P. E. SAEHRENDT.

POCKET ADDING MACHINE.

APPLICATION FILED OCT. 11, 1911.

1,035,475.

Patented Aug. 13, 1912.

3 SHEETS—SHEET 1.

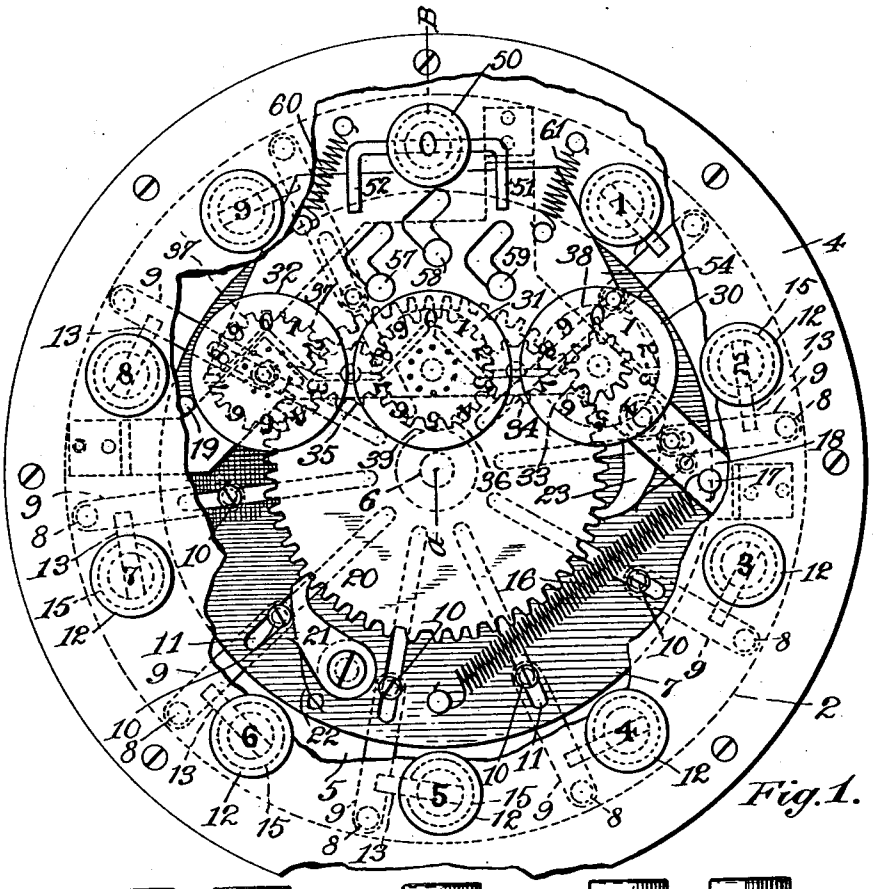

Fig. 1.

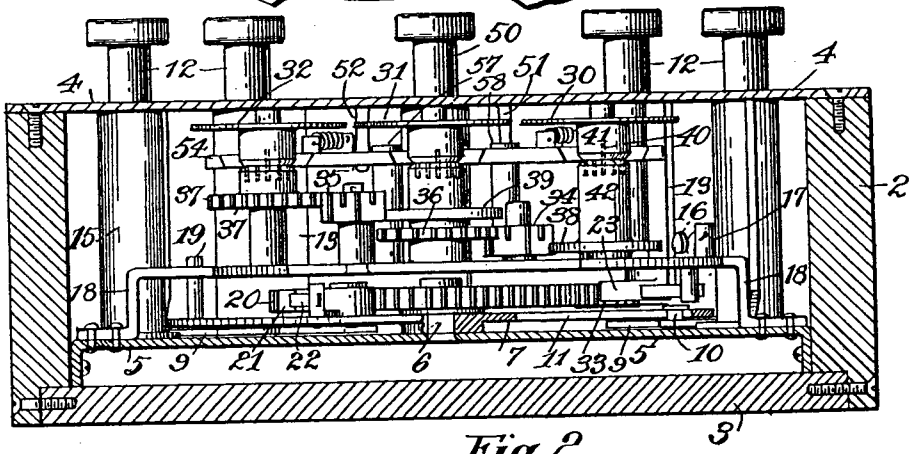

Fig. 2.

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3 SHEETS—SHEET 2.

Fig. 3.

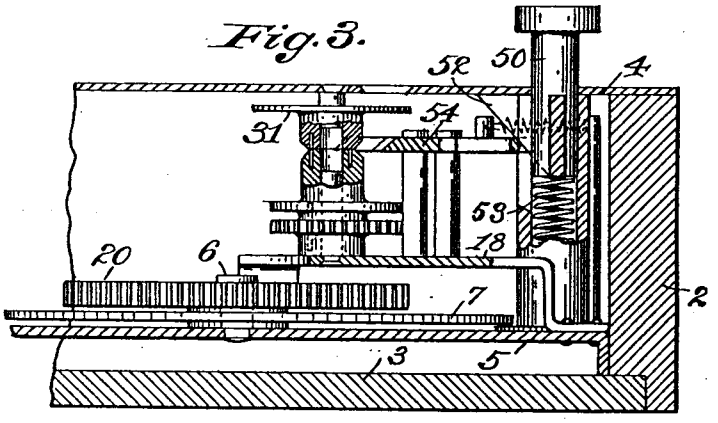


Fig. 4.

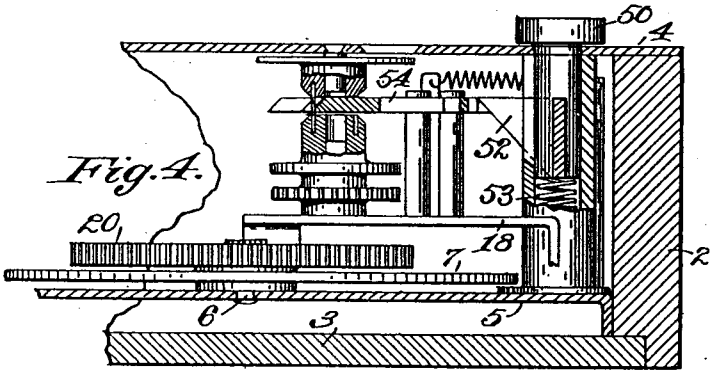
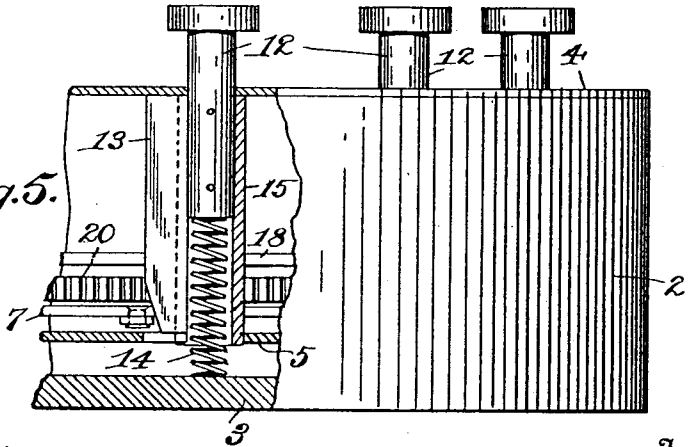


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

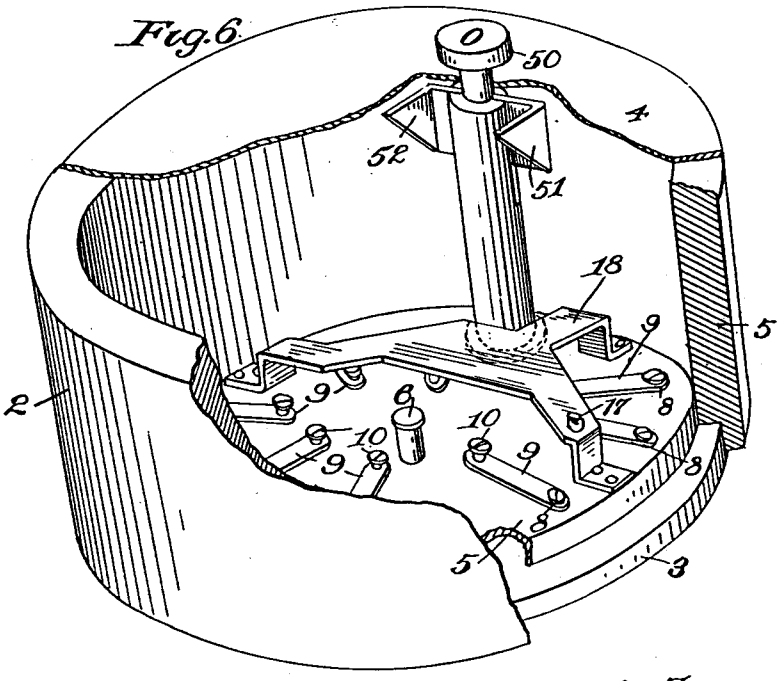


Fig. 7.

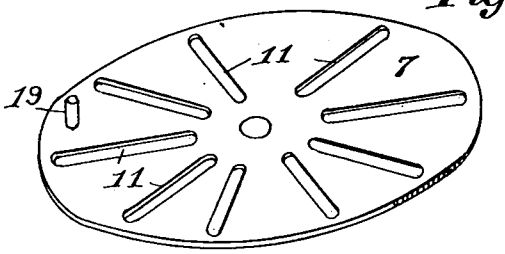


Fig. 9.

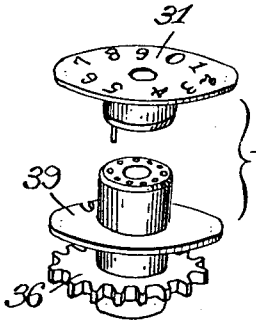
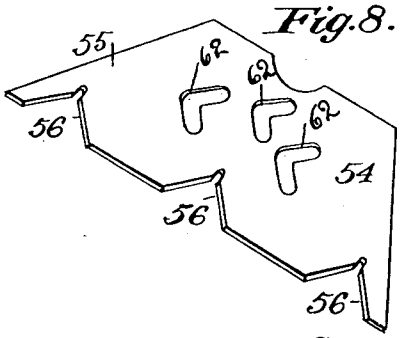


Fig. 8.



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UNITED STATES PATENT OFFICE.

PAUL E. SAEHRENDT, OF BROOKLYN, NEW YORK.

POCKET ADDING-MACHINE.

1,035,475. Specification of Letters Patent. Patented Aug. 13, 1912.

Application filed October 11, 1911. Serial No. 654,031.

To all whom it may concern:

Be it known that I, PAUL E. SAEHRENDT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Pocket Adding-Machines, of which the following is a specification.

This invention relates to adding machines, and more particularly to pocket adding machines, the object of the invention being to provide a simple, compact and comparatively inexpensive mechanism of this character, easily operated and accurate in its calculations, and in which the operating mechanism is controlled by keys which actuate such operating mechanism in a positive manner.

In the drawings accompanying and forming part of this specification, Figure 1 is a top view of this improved pocket adding machine, with a part of the top of the casing broken away; Fig. 2 is a cross-sectional view of the mechanism shown in Fig. 1; Fig. 3 is a cross-sectional view of a part of the operating mechanism; Fig. 4 is a similar cross-sectional view illustrating one of the keys depressed; Fig. 5 is a partly sectional view illustrating in detail a part of this improved mechanism; Fig. 6 is a perspective view of the interior of the casing with parts of the operating mechanism removed; Fig. 7 is a perspective view of the rotary gear operating disk or plate; Fig. 8 is a detail view of a part of the mechanism; and Fig. 9 illustrates one of the dials and the means for rotating it.

Similar characters of reference indicate corresponding parts throughout the figures of the drawings.

The operating mechanisms are carried by a suitable casing, shown herein as a circular body 2 having a bottom plate 3 and a top plate 4, within which casing all of the operating mechanisms are located, the keys only projecting from the top of the casing.

Supported on the bottom 3 is a supplemental bottom 5, on which is pivotally supported on a centrally located pin 6 a rotary disk 7. Pivotally secured to the supplemental bottom 5, as at 8, is a series of levers 9, nine in number. Each of these levers carries at its inner end a headed pin 10, which pins project into slots 11 of the rotary disk 7. The headed pins 10 are located at various distances from the pivotal points 8 of the levers so as to vary the leverage of the levers 9. The headed pins or studs 10 revolve the disk 7 on the shifting of the levers 9, while the pins slide in the slots of such disk. For shifting the levers suitable keys 12 are provided, one for each lever, and as there are nine levers nine keys are provided and marked on the heads thereof with the characters 1 to 9. To the key rod of each of these keys is secured an inclined cam 13, so that as each key is struck its cam moves downward, and thus shifts the lever which is in engagement with the particular cam, and as such lever is shifted laterally it shifts the rotary disk 7 the desired distance, according to the leverage of the lever which is operated. The greater the distance between the pins 10 and the pivotal points 8 of the levers 9 the greater will be the movement or rotation of the rotary disk 7. For returning the key, when released, to its normal position a spring 14 is provided, the spring and the key rod of each key being suitably carried in a tubular casing or bushing 15, which is slotted or split to provide for the movement of the cam and which thus acts to properly guide the key rod and its cam. When the key is released and returned by its spring to its normal position the rotary disk and the levers 9 will be swung back into their original position by means of a spring 16, one end of which is secured to the disk while the other end is secured to a pin 17 carried by a support 18.

For limiting the swinging movement of the rotary disk 7 when operated by the keys, a suitable stop in the form of a pin 19 is provided, this pin being carried by the disk in position to engage the support 18, thus preventing the rotary disk from being swung back beyond its normal position by the spring 16.

On top of the rotary disk 7 is a master gear 20 mounted loosely on the pin 6. Secured to the rotary disk 7 is a spring pressed pawl 21, which is forced into the teeth of this gear 20 by means of a spring 22, so that when the disk 7 is rotated forward in the manner hereinbefore indicated the gear 20

is also rotated with it by means of the pawl 21 just referred to. Another spring pressed pawl 23 is also provided pivotally secured to the support 18 and pressed into engagement with the teeth of the gear 20 by means of a spring 24. This pawl merely rides over the teeth of the gear 20 when the same is turned by the pawl 21 until the gear comes to a stop, at which time the pawl 23 prevents the return movement of the gear 20 with the rotary disk when the same is shifted backward by means of the spring 16, thus holding the gear 20 in its advanced position, the pawl 21, on the pulling backward of the rotary disk 7 by its spring 16, at this time riding over the teeth of the gear 20 in a manner which will be readily understood. Thus it will be observed that by means of these two pawls the gear 20 may be advanced with the rotary disk 7, but its advanced position not affected by the return or backward movement of the rotary disk 7 through the medium of the spring 16.

The adding mechanism comprises three dials 30, 31 and 32, three pinions 33, 34 and 35, a pair of gears 36 and 37, and a pair of Geneva devices 38 and 39, operating substantially as follows: The pinion 33 meshes with gear 20, while its Geneva device 38 is connected with such pinion 33 and revolves with it. Dial 30 is connected with the Geneva device by means of a pin 40 carried by the dial hub 41, and which pin fits loosely in the hub 42 of the Geneva device 38, which has ten holes provided for such pin. Thus the pinion 33, Geneva device 38 and dial 30 turn as one unit together. The Geneva device 38, like the Geneva device 39, is a disk with but one tooth cut in it, so that in one complete turn this Geneva device 38 engages only once with pinion 34. This pinion 34, like the pinion 35, has the lower half of every other tooth cut away, so that when the Geneva device engages it it turns the pinion 34 two teeth. As pinion 33 has ten teeth and its Geneva device 38 one tooth, and pinion 34 has ten teeth on its upper half and is turned two teeth on each complete revolution of pinion 33, and as pinion 34 meshes with gear 36, which has twenty teeth and is firmly connected with Geneva device 39 and dial 31, it follows that the ratio between the revolutions of dials 30 and 31 is one to ten. The same is true also of dials 31 and 32, the ratio being exactly the same and therefore need not be further described. The ratio between the first and third dials 30 and 32 is therefore one to one hundred. Thus it will be observed that on the shifting forward of the rotary disk by the levers through the medium of the keys in the manner hereinbefore described the several dials are operated in the manner herein set forth. For returning the dials to their zero positions, suitable mechanism is provided, comprising a key 50, marked 0, the key rod of which is suitably supported in a tubular slotted bushing and carries a pair of inclined cams 51 and 52, see Fig. 6, so that when the key is pushed downward against its spring 53 it engages a horizontally located cam plate 54 provided with inclined or wedge-shaped edges 55 having therein three V-shaped notches 56, each of which notches is directly opposite and corresponds to one of the dials 30, 31 and 32. This horizontally located cam plate is guided first forward to the left and then forward to the right by three pins 57, 58 and 59 projecting into V-shaped slots 62, on which pins the cam plate slides when the key cam is pushed downward. The V-shaped notches in the front of the cam plate 54 thus raise the dial and its hub, disconnecting it from the hubs of the Geneva devices owing to the beveled form of the dial hub, and then, by the movement hereinbefore described of this cam plate, it brings the pins of the dial hubs to the bottom of the V-shaped notches, so that all of the dials will then register at 0. The key is then released, being returned to its normal position by its spring, while the cam plate is pulled back by its springs 60 and 61, whereupon the pins of the dials drop back into one of the holes of the Geneva device directly beneath them. The dials and their hubs, it is understood, rotate and raise and lower loosely on three pins, which are riveted into the top or cover 4.

The present organization provides a mechanism in which the advantages hereinbefore set forth not only are obtained, but the additional advantage of having the keys very steady in their operation, since there is no lateral movement of the keys or of the cams carried thereby.

It will of course be understood that in some forms of the improvement, instead of providing levers having the pins 10 located at different distances from the pivotal points 8 of such levers, the levers may be operated by the key cams, which may be differently formed, as by having different inclinations, so that one lever would be shifted to a greater extent than another. It will also be understood that each dial is shifted according to the distance traveled by the lever. In other words, one key will shift its lever a short distance, while another key will shift its lever a comparatively great distance, and consequently the dials will be rotated according to the distance of travel of the levers.

I claim as my invention:

1. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a

series of keys corresponding in number with the number of levers, and operated by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a distance different from all of its companion levers.

2. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of push keys corresponding in number with the number of levers, and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from its companion keys.

3. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for controlling the rotation of said gear and comprising a rotary disk, a pair of spring-pressed pawls, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers, and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from all of its companion keys.

4. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers, cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a distance different from all of its companion levers, and means for returning said dials to their zero positions.

5. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers and cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a distance different from all of its companion levers, and means for returning said dials to their zero positions and comprising a key and a horizontally actuated cam plate.

6. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of push keys corresponding in number with the number of levers and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from its companion keys, and means for returning said dials to their zero positions and comprising a key and a horizontally actuated cam plate.

7. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers and cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a distance different from all of its companion levers, and means for returning said dials to their zero positions and comprising a horizontally actuated cam plate having a series of V-shaped notches therein, one for each dial, and a plurality of V-shaped slots therein for controlling the movements of said plate.

8. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of push keys corresponding in number with the number of levers and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from its companion keys, and means for returning said dials to their zero positions and comprising a horizontally actuated cam plate having a series of V-shaped notches therein, one for each dial, and a plurality of V-shaped slots therein for controlling the movements of said plate.

9. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for controlling the rotation of said gear and comprising a rotary disk, a pair of spring-pressed pawls, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from all of its companion keys, and means for returning said dials to their zero positions and comprising a horizontally actuated cam plate having a series of V-shaped notches

therein, one for each dial, and a plurality of V-shaped slots therein for controlling the movements of said plate.

10. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a rotary disk carrying a pawl and a series of pivotally connected levers, said disk and levers having slots and pins, each pin projecting into a slot, a series of keys corresponding in number with the number of levers and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from that of every other key.

11. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for rotating said gear and comprising a rotary disk carrying a pawl and a series of pivotally connected levers, said disk and levers having slots and pins, each pin projecting into a slot, a series of keys corresponding in number with the number of levers and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from that of every other key, and means for returning said dials to their zero positions and comprising a key and a horizontally located cam plate having notches, one for each dial.

12. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, said disk and levers having slots and pins, each pin projecting into a slot, the pin and pivotal connection of each lever being differently located from the pins and pivotal connections of its companion levers, a series of keys corresponding in number with the number of levers and cams carried by said keys for shifting said levers thereby to rotate the disk.

13. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, said disk and levers having slots and pins, each pin projecting into a slot, the pin and pivotal connection of each lever being differently located from the pins and pivotal connections of its companion levers, a series of keys corresponding in number with the number of levers and cams carried by said keys for shifting said levers thereby to rotate the disk, and means for returning said dials to their zero positions and comprising a key and a horizontally shiftable cam plate having notches, one for each dial.

14. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a rotary disk having a pawl and a series of pivotally connected levers, said disk having slots and said levers having pins projecting thereinto, the pin and pivotal connection of each lever being located differently from that of its companion levers, a series of keys corresponding in number with the number of levers and inclined cams carried by the keys for shifting said levers thereby to rotate the disk.

15. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for rotating said gear and comprising a rotary disk having a pawl and a series of pivotally connected levers, said disk having slots and said levers having pins projecting thereinto, the pin and pivotal connection of each lever being located differently from those of its companion levers, a series of keys corresponding in number with the number of levers and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, and means for returning said dials to their zero positions and comprising a key having inclined cams and a horizontally shiftable cam plate having notches, one for each dial.

16. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, means for rotating said gear and comprising a rotary disk having a pawl and a series of pivotally connected levers, said disk having slots and said levers having pins projecting thereinto, the pin and pivotal connection of each lever being located differently from those of its companion levers, a series of keys corresponding in number with the number of levers and inclined cams carried by the keys for shifting said levers thereby to rotate the disk, and means for returning said dials to their zero positions and comprising a key having inclined cams and a horizontally shiftable cam plate having notches, one for each dial, and also having V-shaped slots and pins projecting into said slots for guiding said plate.

17. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a

rotary disk, a series of pivotally connected levers, said disk and levers having slots and pins, a series of keys corresponding in number with the number of levers, cams operated by the keys for shifting said levers thereby to rotate the disk and slotted bushings for guiding said keys and cams.

18. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers, cams carried by the keys for shifting said levers thereby to rotate the disk and slotted bushings for guiding said keys and cams, the organization being such that each lever will be shifted a distance different from all of its companion levers.

19. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof, and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of push keys corresponding in number with the number of levers, inclined cams carried by the keys for shifting said levers thereby to rotate the disk and slotted bushings for guiding said keys and cams, the organization being such that each key will shift its lever a distance different from its companion keys.

20. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, and means for controlling the movements thereof and including a rotary disk, a series of pivotally connected levers connected with said disk, a series of keys corresponding in number with the number of levers and means operated by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from that of its companion keys.

21. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, means for controlling the movements thereof and including a rotary disk, a series of pivotally connected levers connected with said disk, a series of keys corresponding in number with the number of levers and cams carried by the keys for shifting said levers thereby to rotate the disk, the organization being such that each key will shift its lever a distance different from that of its companion keys, and means for returning said dials to their zero positions and comprising a key having a cam and a horizontally shiftable cam plate controlled by said cam and having a V-shaped slot and V-shaped notches, one for each dial.

22. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers, means operated by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a distance different from all its companion levers, and means for returning said dials to their zero positions and comprising a key having a cam and a horizontally shiftable cam plate having V-shaped notches, one for each dial.

23. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers, means operated by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a distance different from all its companion levers, and means for returning said dials to their zero positions and comprising a key having a cam, a horizontally shiftable cam plate having V-shaped notches, one for each dial, and V-shaped slots and pins projecting into said slots for guiding said plate.

24. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers, means operated by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a distance different from all its companion levers, and means for returning said dials to their zero positions and comprising a key having a cam, a horizontally shiftable cam plate having V-shaped notches, one for each dial, and V-shaped slots, pins projecting into said slots for guiding said plate and a slotted bushing for guiding said key and its cam.

25. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers, means operated by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a

distance different from all its companion levers, and means for returning said dials to their zero positions and comprising a key having a cam, a horizontally shiftable cam plate having V-shaped notches, one for each dial, and V-shaped slots and pins projecting into said slots for guiding said plate, said V-shaped slots being located one out of alinement with its companion slots.

26. In a pocket adding machine, the combination of adding mechanism including a plurality of dials, a master gear for controlling the movements thereof and means for rotating said gear and comprising a rotary disk, a series of pivotally connected levers, a series of keys corresponding in number with the number of levers, means operated by the keys for shifting said levers thereby to rotate the disk, the organization being such that each lever will be shifted a distance different from all its companion levers, and means for returning said dials to their zero positions and comprising a key having a cam, a horizontally shiftable cam plate having V-shaped notches, one for each dial, and V-shaped slots and pins projecting into said slots for guiding said plate, each of said notches merging into a pin receiving opening.

Signed at 1821 Park Row Building, New York, N. Y., this 4th day of October, 1911.

PAUL E. SAEHRENDT.

Witnesses:
F. E. BOYCE,
C. D. WATSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

BEST AVAILABLE COPY

It is hereby certified that in Letters Patent No. 1,035,475, granted August 13, 1912, upon the application of Paul E. Saehrendt, of Brooklyn, New York, for an improvement in "Pocket Adding-Machines," errors appear in the printed specification requiring correction as follows: Page 3, line 2, before the word "operated" insert the word *means;* page 5, lines 76, 93, 111, and page 6, line 1, after the word "all" insert the word *of;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of September, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.