2 Sheets--Sheet 1.

W. ROBJOHN.

Improvement in Calculating Machines.

No. 130,244. Patented Aug. 6, 1872.

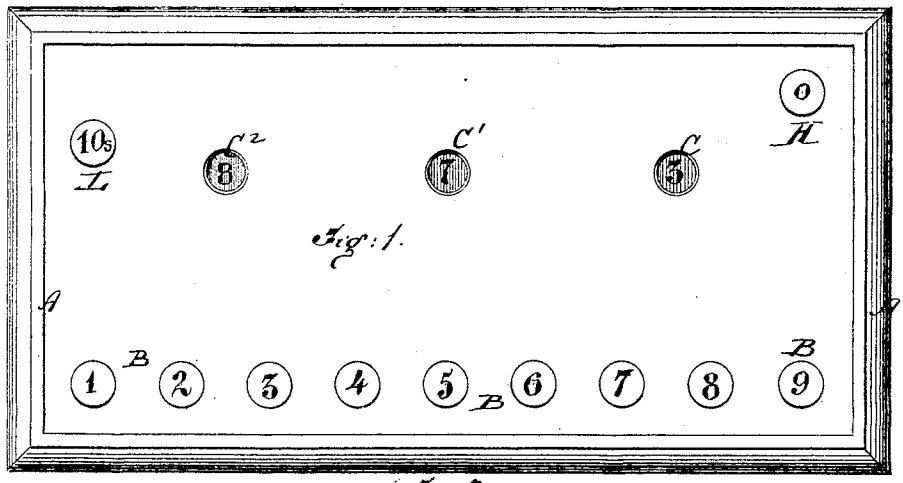


Fig: 1.

Fig: 2

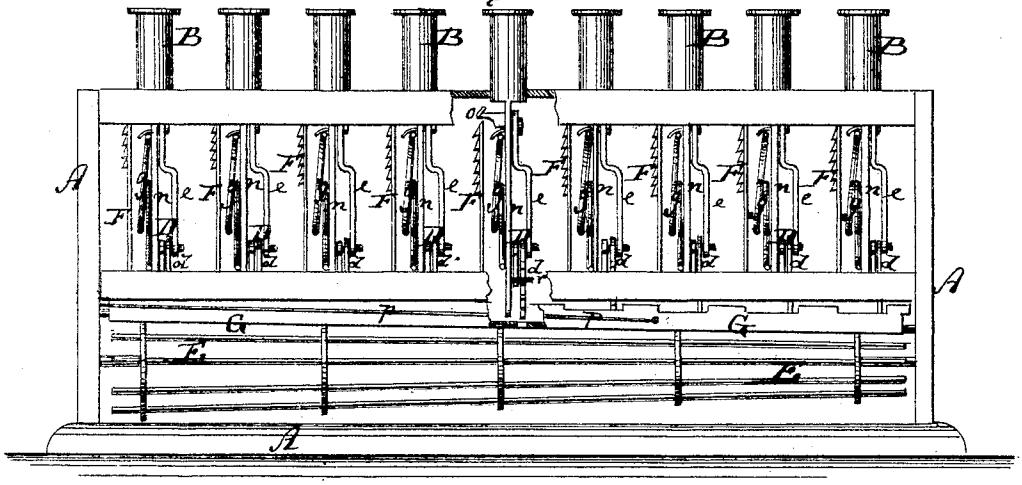


Fig: 4.

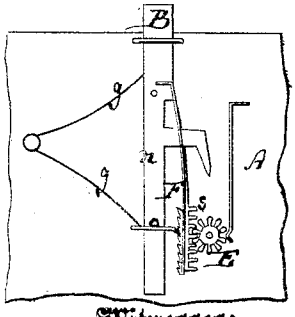


Fig: 3

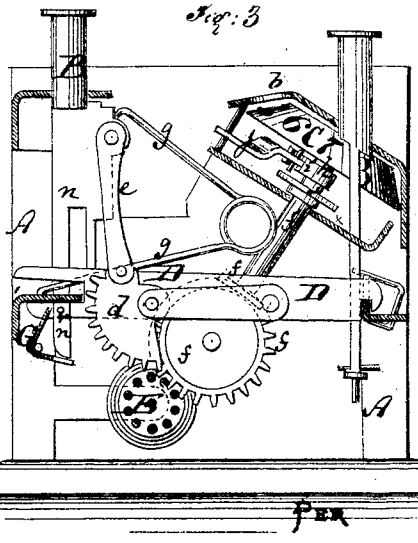
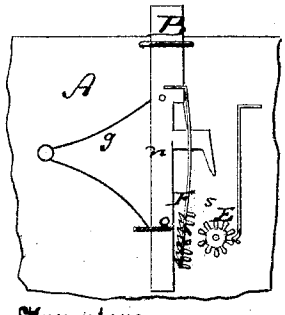


Fig: 5



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2 Sheets--Sheet 2.

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Improvement in Calculating Machines.

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Fig: 6

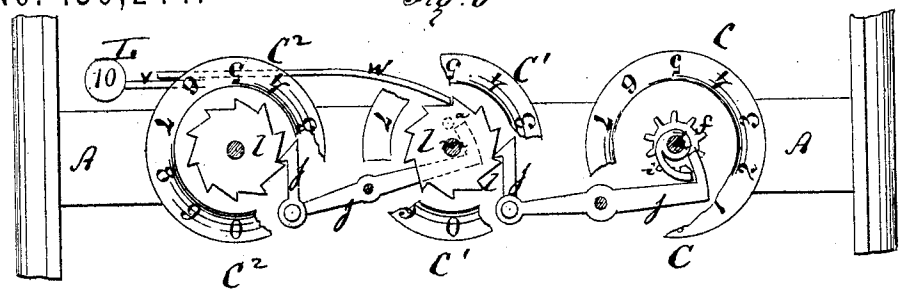


Fig: 7.

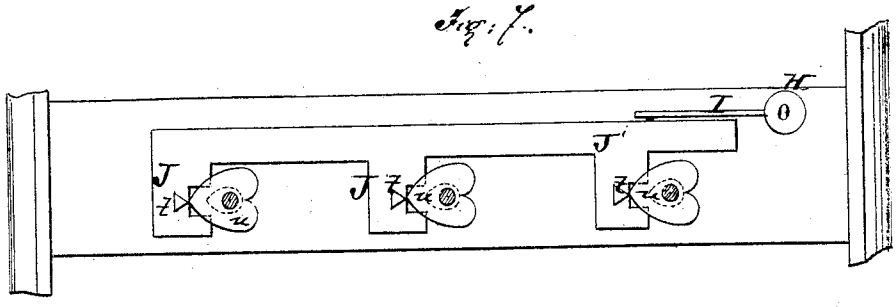
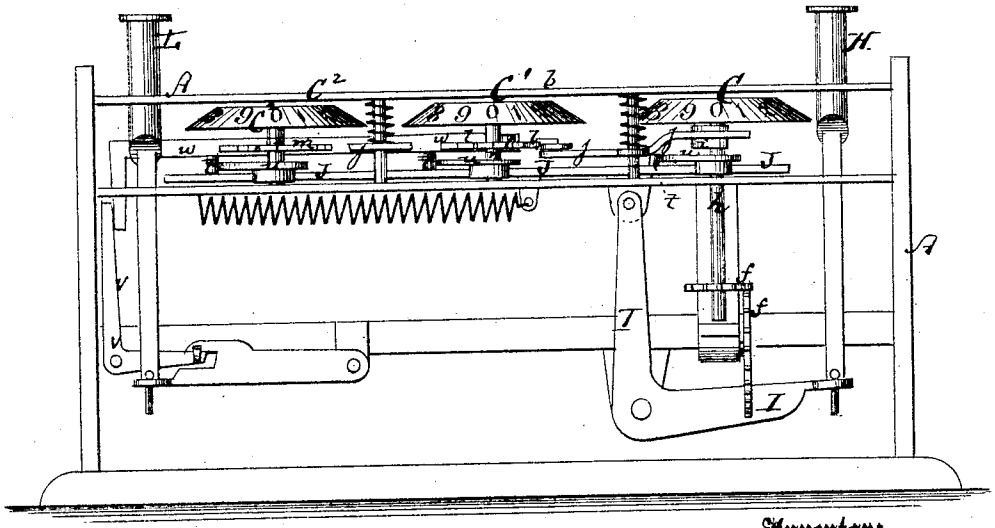


Fig: 8.



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UNITED STATES PATENT OFFICE.

WILLIAM ROBJOHN, OF NEW YORK, N. Y.

IMPROVEMENT IN CALCULATING-MACHINES.

Specification forming part of Letters Patent No. **130,244**, dated August 6, 1872.

Specification describing a new and Improved Arithmometer, invented by WILLIAM ROBJOHN, of New York city, in the county and State of New York.

In the accompanying drawing, Figure 1 is a plan or top view of my improved arithmometer. Fig. 2 is a side elevation, partly in section, of the same. Fig. 3 is a vertical transverse section of the same. Figs. 4 and 5 are transverse sections, showing modifications of the key-locking mechanism. Fig. 6 is a face view of the index-disks. Fig. 7 is a top view of the cam arrangement on the axes of the index-disks. Fig. 8 is a back view of the machine.

Similar letters of reference indicate corresponding parts.

This invention relates to a new adding-machine, which is operated by means of numbered keys, and so arranged that mistakes cannot occur as long as the mechanism is in working order, as all keys are locked as long as any one is more or less depressed, and as the key depressed cannot be restored to its elevated position unless it has first been entirely pushed down. Errors that might arise from depressing some of the keys partly, and thus adding only fractions of the numbers which such keys represent, are thus entirely obviated, and rapid action, insuring absolute accuracy, can be performed. The invention consists, first, in combining with the shank of each key a toothed portion, into which locks a catch during the descent of the key, and holds the key as long as it is only partly lowered. The invention also consists in the use, in connection with the above, of a cam, which serves to throw the toothed portion of the shank of the key out of contact with the catch as soon as the key has been entirely depressed, and thereby enables the key to ascend after having completed its stroke, though not before. The invention also consists in the arrangement, under the several keys, of a pivoted L-shaped plate, which is turned under the non-depressed keys by the one descending, and prevents such other keys from being depressed until the descending key has again been fully elevated to its neutral position, when the L-plate is swung out of the way of the other keys. Action on any key is thus automatically prevented until all keys are raised, while, as before stated, none can be raised until its downward stroke has first been completed.

In the accompanying drawing, A represents the frame of my improved adding-machine or arithmometer. B B, &c., are the nine keys, placed in a row, and marked on top with the figures 1 to 9, respectively. These keys are intended to turn disks or drums C, C^1, and C^2, &c., which, at their edges or faces, are each marked with the figures 1 to 9 and 0, at equal distances apart, and placed under a perforated plate, *b*, so that only one figure of each disk or drum is visible through the plate *b*. Now, the object of the machine is to add by turning the disks or drums, by means of the keys B, so that the number seen through the holes of the plate *b* will be augmented by seven when the key marked 7 is depressed, and by three when the key marked 3 is depressed, &c. This action on the drums is effected by means of toothed segments *d d*, &c., which are hung in levers D D, &c., that are pivoted in the frame A, the segments being connected by rods *e e*, &c., with the several keys B B. These segments, when turned by depressing the keys, gear into a long-toothed wheel E and turn it, the wheel being, by gearing *f f*, connected with the unit-disk C. The segment connected with the key marked 1 has but two teeth, the next, three, &c., the last, connected with the key 9, having ten teeth. Thus the difference of effect is insured, for when the key 1 is depressed the disk C makes but one-tenth of a revolution, showing the following figure through the plate *b*, while, when the key 9 is depressed, the disk C will be turned nine-tenths, and in the same proportion by the other keys. The keys, when depressed, crowd the segments down in contact with the wheel E; but when they are raised by springs *g* they draw the segments off the wheel E, which is permitted by the pivoted levers D, which carry the segment. The upstroke of each key has, therefore, no effect upon the disk C or wheel E. The arbor *h* of the disk C carries a cam, *i*, or a pin, *a*, (see Fig. 6,) which, on the completion of each revolution, acts on a spring-pawl, *j*, and causes it to engage into a ratchet-wheel, *l*, that is mounted upon the arbor *m* of the second disk C^1, and to turn the latter one tooth in its revolution. The arbor of the disk C^1 is, by a similar mechanism, connected with

that of the disk C^2, as is clearly shown in Fig. 6. Thus, when any one disk has passed ten. teeth it is registered by the next disk by adding one to the number displayed through the plate *b*. Parallel with and near to the shank or stem *n* of each key B, is fastened to the frame A a spring-plate, F, which has a series of ratchet-teeth formed at its upper part, as is clearly shown in Fig. 2. From the stem *n* projects a catch, *o*, which, when the key is depressed, moves down along the ratchet-teeth of the spring-plate F and slips over the teeth, one after the other, until the descent of the key is quite completed. The catch then, in coming under the inclined lower edge of the lower ratchet-tooth, crowds the spring-plate F aside, and allows the key to ascend by the power of the spring *g*. The lower tooth of each ratchet constitutes thus a cam for releasing the key from the teeth of the plate F. If a key is not depressed to the entire extent of its stroke it will be arrested by the ratchet-teeth on F and held, and not allowed to reascend until it has first been lowered entirely clear of the teeth on F. Under the shanks *n* of the keys is pivoted, in the frame A, a plate, G, which is L-shaped in cross-section. A spring, *p*, holds this plate so that its upper half is in a vertical position and its lower half in a horizontal position, substantially as in Fig. 3. The lower half will be just under the ends of the several shanks *n*. Whenever a key is depressed, its shank bearing on the horizontal part of the plate G vibrates the same and swings the vertical part of the frame inward under pins *r*, projecting from the several shanks *n*. As long as the plate G is so swung by the descending key, all the other keys will be locked by the plate G and pins *r*, and cannot be lowered. When, therefore, a key is but partly depressed, and locked by the teeth of the spring-plate F, in the manner above stated, all the other keys will be locked, and cannot be worked until the one has been quite depressed and re-elevated.

In Figs. 4 and 5 is shown a modification of the construction, as far as it refers to the mechanism for locking the keys before they are entirely lowered. In these the spring-plate F is shown to be attached to the key-shank *n*, and in gear with a stationary catch, *o*, as in Fig. 5. When the key is quite depressed, the inclined upper edge of the upper tooth on F passes under the catch *o* and causes the smooth side of F to be in contact with the catch, so that the key may readily ascend. In the same figures, 4 and 5, are shown straight racks *s*, in connection with the stems *n*, gearing directly into the wheel E, and thereby dispensing with the segments *d*.

H is a key working through the plate *b*, and connected, by an elbow-lever, I, with a sliding frame, J, under *b*. This frame J has pins or stops *t t*, which, when the key H is depressed and the frame J moved lengthwise, bear against cams *u u* on the arbors of the disks C C^1 C^2, &c., and turn, thereby, all these arbors and disks to restore the latter to the position of zero—*i. e.*, bringing the figures 0 of them under the apertures of the plate *b*. L is another key, connecting, by an elbow-lever, *v*, and pawl *w*, with the ratchet-wheel *l* of the disk C^1. It serves, when depressed, to turn the disk C^1 one tooth without reference to the disk C.

In using the instrument, the keys B B are used to add the figures of one column in a row of figures. Supposing the result to be 168, the 8 is noted down and 16 must be carried, to be added to the next column. To effect this, the key H is first pressed to bring all the disks to zero, and then the key B marked 6 is touched, and also the key L, thus letting 16 appear to view. The addition of the second column is then proceeded with. If two or more tens are to be added to the sum carried, the key L is touched twice or more.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The toothed spring-plate F and catch *o*, combined with the shank of each key B to arrest the same, unless quite lowered, as set forth.

2. The toothed portion of the spring-plate F, when having its lower (or upper) tooth inclined, to constitute a cam, for automatically releasing the catch *o* from the toothed portion of F during the ascent of the key, as set forth.

3. The L-shaped plate G, applied in combination with the shanks *n* of the keys B, and with the pin *r* thereon, as set forth.

4. The combination of the key H, elbow-lever I, sliding frame J, stops *t t*, cams *u u*, and disks C C^1 C^2, &c., as specified, for the purpose of restoring said disks to zero.

5. The combination of the key L, elbow-lever *v*, pawl *w*, ratchet-wheel *e*, and disk C^1, as and for the purpose specified.

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