

(No Model.)

3 Sheets—Sheet 1.

J. H. SCHNARRENBERGER.
ADDING MACHINE.

No. 391,430.

Patented Oct. 23, 1888.

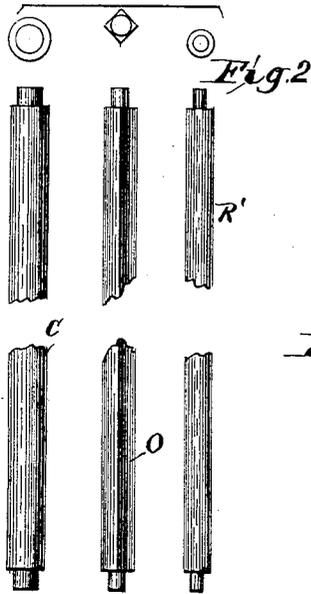


Fig. 1

A

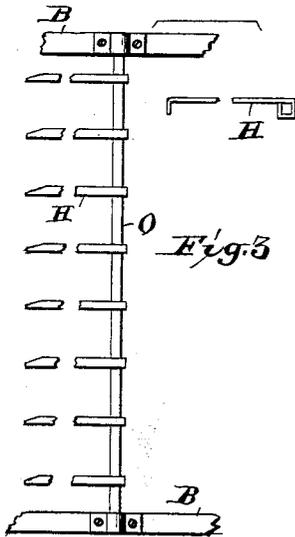
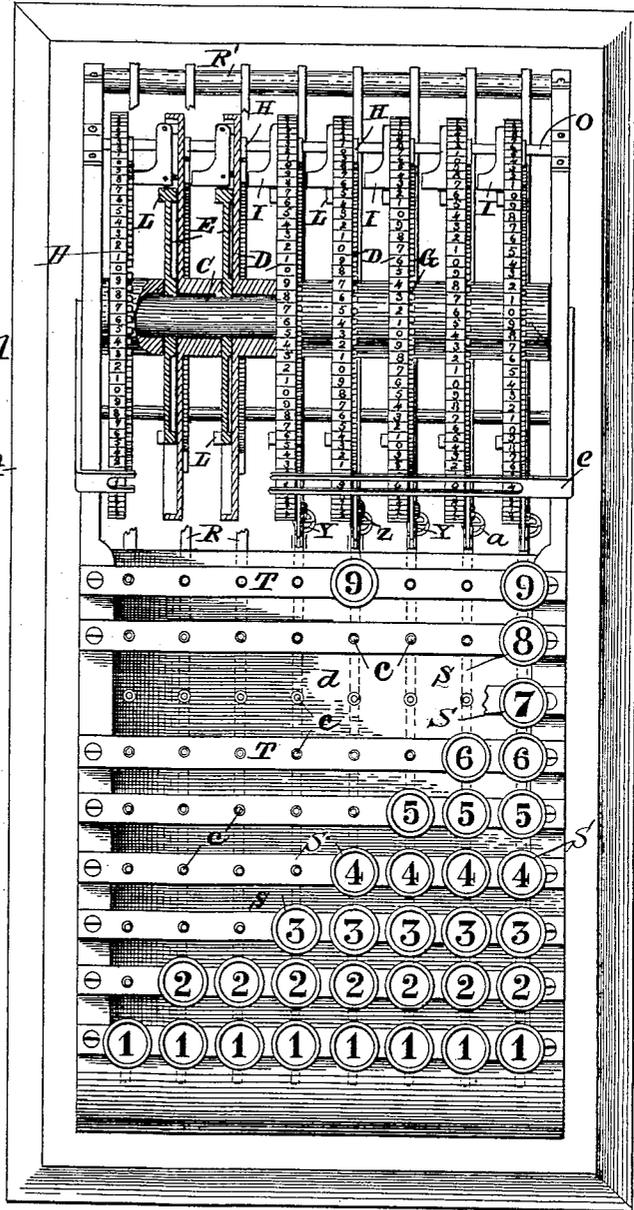


Fig. 5

WITNESSES,
G. M. Gridley,
Jas. A. Mahan.

INVENTOR,
J. H. Schnarrenberger,
By H. A. Paulin,
his Attorney.

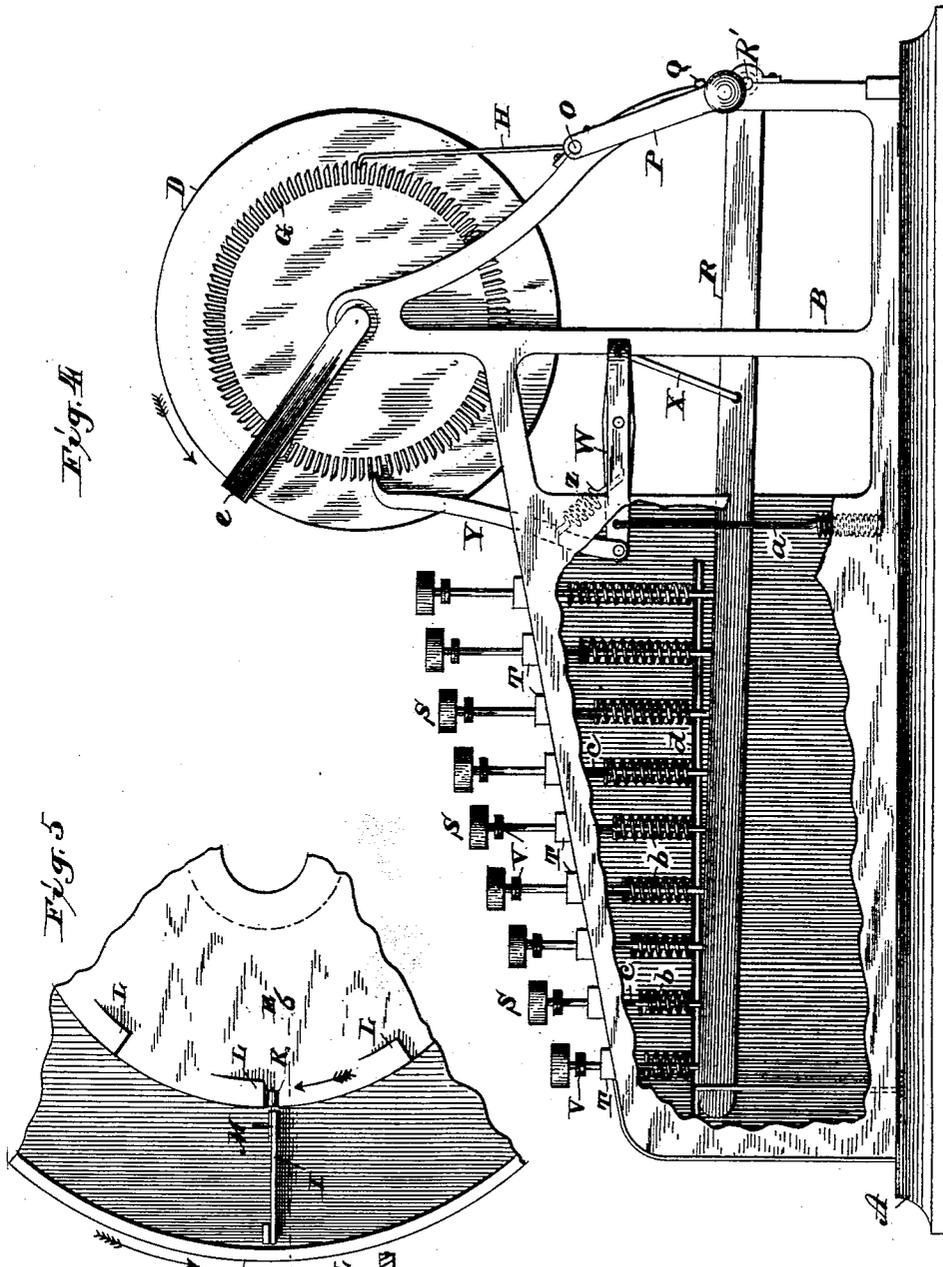
(No Model.)

3 Sheets—Sheet 2.

J. H. SCHNARRENBERGER.
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Patented Oct. 23, 1888.



WITNESSES.
G. M. Girdley.
Jas. H. Mahan.

Fig. 6

INVENTOR.
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(No Model.)

3 Sheets—Sheet 3.

J. H. SCHNARRENBERGER.
ADDING MACHINE.

No. 391,430.

Patented Oct. 23, 1888.

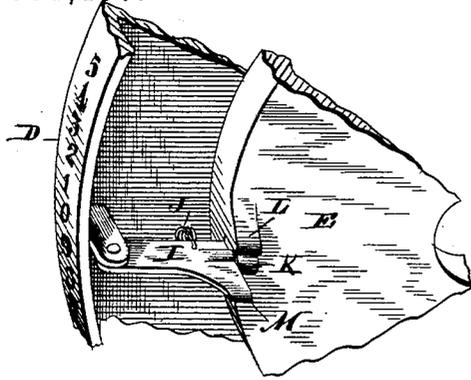


Fig. 7

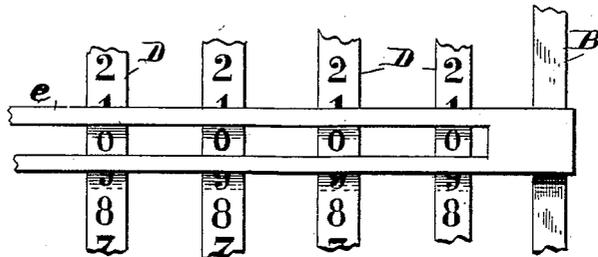


Fig. 10

Fig. 8
 95
 101.04
 196.04

Fig. 9
 4
 3
 2
 1
 10

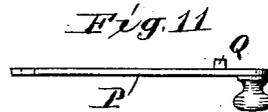


Fig. 11

WITNESSES,
 G. M. Gridley,
 Jas. Mahan

INVENTOR,
 J. H. Schnarrenberger,
 Roy A. Stevens
 his Attorney.

UNITED STATES PATENT OFFICE.

JACOB H. SCHNARRENBERGER, OF SPRINGFIELD, OHIO, ASSIGNOR OF ONE-HALF TO THOMAS REYNOLDS, OF SAME PLACE.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 391,430, dated October 23, 1888.

Application filed March 21, 1888. Serial No. 268,009. (No model.)

To all whom it may concern:

Be it known that I, JACOB H. SCHNARRENBERGER, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in adding-machines.

The object of the invention is to mechanically add together figures, whether the figures be arranged in single column or in numerous columns, in which latter instance all of the columns are added at the same time, so that the result will show the footing of all the columns just as if they had been added up one column at a time, as is usually done.

20 Another object of my invention is to arrange a key-board so that the figures to be added can be read off or dictated, and the operator manipulate the machine by actuating the key-board and add the figures together after the manner of printing words on the well-known type-writing machines.

In the accompanying drawings, forming a part of this specification, and on which like reference-letters indicate corresponding parts, 30 Figure 1 represents a plan view of my improved adding-machine with many of the keys omitted; Fig. 2, plans and elevations of several of the shafts employed in constructing the machine; Fig. 3, a plan view of a rock-shaft and a series of locking-pawls, with one pawl in detail elevation; Fig. 4, a side elevation of my improved machine; Fig. 5, a side elevation of a portion of one of the adding-disks and a stationary cam-plate, showing also one of the engaging-pawls; Fig. 6, a detail sectional view on the line 6 6 of Fig. 5, looking in the direction of the arrow; Fig. 7, a detail perspective view of parts shown in Fig. 5; Fig. 8, a diagram of an example containing five orders of 40 figures; Fig. 9, a diagram of an example containing one order of figures; Fig. 10, an enlarged detail view of portions of several of the adding-disks, showing them adjusted at zero, and of the sight-plate; and Fig. 11, a detail 50 view of the locking-arm.

A designates a platform or base, and B the main frame of the machine, constructed, preferably, of cast-iron and secured to said base. In this frame is mounted an arbor, C, upon which are independently mounted a series of 55 adding-disks, D, and also a like series of fixed cam-disks, E. The disks D are arranged to rotate on the arbor and the disks E to be held against rotation by the arbor, which itself is non-rotating. The disks D, as already intimated, I term the "adding-disks," and upon 60 their periphery are placed the numerals 0 to 9, running through the series of 0 1 2 3 4 5 6 7 8 9 and terminating with 0. These figures I term "groups," of which groups there are 65 ten upon the periphery of each disk. One side of each adding-disk is provided with one hundred ratchet or escapement teeth, G, by which the disks are rotated in the manner presently to be described, and by which they 70 are held against accidental rotation by the series of the spring locking-pawls H. (Seen in Figs. 3 and 4.) Each adding-disk is also provided with a pivoted engaging-dog, I, normally drawn at its free end toward the disk 75 by a spiral or otherspring, J. (See Fig. 6.) The dog is provided with an anti-friction roller, K, which runs upon the surface of the cam-disk E nearest to the adding-disk which supports the dog I. When this roller reaches 80 one of the cam-surfaces L of the cam-disk, of which surfaces there are ten to each disk, it rotates out upon the same and projects the engaging-dog laterally until its end M engages the teeth G of the adding-disk ad- 85 jacent to such end. The result of this is to interlock or positively engage one adding-disk with the other—that is to say, to engage the adding-disk first to the left with the adding-disk which carries the dog, which is thus pro- 90 jected. The purpose of this engagement will presently appear. It should be observed at this point that, there being but ten of the cam-surfaces L upon each cam-disk E, and there being as much space between the vertical ter- 95 minations of any two of said cam-surfaces as there is distance between ten of the teeth G on the adding-disks, an engaging-dog, I, will be projected but once at every ten movements of this adding-disk; or, in other words, will be 100

projected only when 0 of its disk reaches the point where the figures are read in adding, and therefore that one adding-disk will only project its dog into engagement with the next adding-disk and move the latter when the former is passing from the numeral 9 to 0 at the sight-slot of the plate *e*.

O designates a shaft mounted in the main frame B, to which shaft the spring-pawls H are secured. This shaft is held so that the pawls are held to engagement with the teeth G by an arm, P, having a stud, Q, which engages the frame, as seen in Fig. 4. When the pawls H are to be thrown out of the said teeth, the arm P is manipulated. The function of the pawls H, as already intimated, is that of holding the adding-disks against accidental rotation and against rotating by the frictional contact of the actuating-pawl, presently to be described, with the teeth G. The object in disengaging the pawls H is to admit of resetting all the adding-disks to 0 after using the device.

R designates a series of key-levers pivoted to the rear portion of the machine on a shaft, R', and each surmounted by nine keys, S, which are mounted in the guides T and provided with shoulders V. The position of the latter with respect to the guides is such that a depression of a key will move a lever, R, a sufficient distance downward to rotate an adding-disk a distance equal to as many teeth G as the key designates. Thus the distance between the shoulder V and the guide T of the key numbered 1 is much shorter than the distance between the guide T and the shoulder V of key numbered 9, and when the latter is depressed the disk is moved the distance of nine of such teeth.

W designates pivoted levers, one end of one of which is connected by a link, X, with one of the levers R, and the other end of which carries an actuating-pawl, Y, held in engagement with the teeth G of a disk, D, by a suitable spring, Z, connected to it and to said lever W. This lever is also connected to the frame by a spring connecting-link, *a*, by the contraction of which the lever R is returned to normal position. The keys are held in and returned to normal position by the coil-spring *b*, fitted round the keys and engaging pins *c* and resting upon a sheet, *d*, secured to the frame of the machine in any convenient way.

It will be understood that there are as many of the devices W, X, Y, Z, *a*, and R as there are sets of keys running from 1 to 9, as seen in Fig. 1.

e designates a slotted strip of metal extending across the peripheries or faces of the disks D and constituting a sight-plate.

Before computing a given example the locking-detents H are thrown out of engagement with the teeth G and all of the adding-disks set by hand to present 0 in the slot of the side plate.

I will now give an example of the operation of my improved instrument, referring to dia-

gram, Fig. 8, in the drawings, in which \$101.04 are to be added to \$95.00. The operator would strike key marked 4 at the extreme right hand, which would present 4 in the slot of the sight-plate by moving the disk from 0 through four of the teeth G. 0 being the next figure, and there being no key designated or marked 0, he would not disturb the second disk to the left. In the third or hundreds order he would strike key marked 1, which would move the disk one space and present 1 instead of 0 in the slot. The next figure being an 0, he would not disturb the fourth or thousands disk, for the above reason. The next figure being 1, he would strike key marked 1 in the fifth order and move that disk one space and present 1 in the slot. The figures would then read \$101.04. Going on up the column in the example, he would observe 5. The operator would then depress key marked 5 in the third order, which would move the third disk five spaces, which, added to the one space already moved from 0, would present 6 in the slot. The next key to be depressed would be that marked 9 in the fourth order. This the operator would depress and move the fourth disk from 0 to 9. Thus \$196.04, the sum of \$101.04 and \$95.00, is shown in the slot.

Another example is as follows, being that shown in diagram 9: Key marked 1 is depressed, which will move the units-adding disk one notch. Key marked 2 is then depressed, which will move said disk two notches farther, making three notches in all. The units-key marked 3 is then depressed, which will move the disk three notches farther, making six in all, and, finally, the units-key marked 4 is depressed, which will move the disk four notches farther, making ten in all, which will bring 0 to view through said slot. As 9 passes from the slot and 0 appears therein, the engaging-dog I is projected outward by means of the cam L on the disk E into the teeth G of the next disk to the left, and said disk is moved one notch, which will bring the numeral 1 in said slot. Thus 1 and 0 appear, designating 10, the sum or result of the said example.

It will be observed that the number of adding-disks illustrated will permit the adding of figures the sum of which will amount to \$999,999.99. This, however, is not the limit, as additional disks may be added.

I do not wish to be understood as confining myself to the precise arrangement shown and described, nor to the detail illustrated and set forth, inasmuch as various changes in these respects will readily suggest themselves to the mechanic or builder of this machine.

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

In an adding-machine, the combination, with an arbor, a series of independent rotatable disks mounted thereon and respectively bearing groups of figures from 0 to 9, inclusive, on their peripheries, and provided each with

an annular row of teeth on one side, save the
last disk to the left, with a dog pivoted to the
side opposite the teeth, and a fixed cam-disk
between each two of the rotatable disks, and
5 mounted on said arbor, the cam-surfaces of
said disks being opposite the numerals 0 and
9 to throw the dog of one disk into engage-
ment with the teeth of the next disk to move
it from 0 to 1 as the first-named disk passes
10 from 9 to 0, of a pivoted key-lever for each
disk, a pivoted actuating-lever connected to
it, and an actuating-pawl carried by the actu-
ating-lever to rotate the disk by engaging the

teeth thereof, a spring to return the key and
actuating-lever to the normal position, and
keys for each key-lever agreeing with the 15
groups of figures on the respective disks, and
locking-pawls engaging the teeth of the disks,
and adapted to allow the disks to rotate in one
direction but not in the other. 20

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

JACOB H. SCHNARRENBERGER.

Witnesses:

J. W. ALLEN,

JAS. H. MAHAN.