J. BURNS.

MACHINE FOR ADDING NUMBERS.

No. 21,243. Patented Aug. 24, 1858.

Fig. 1.

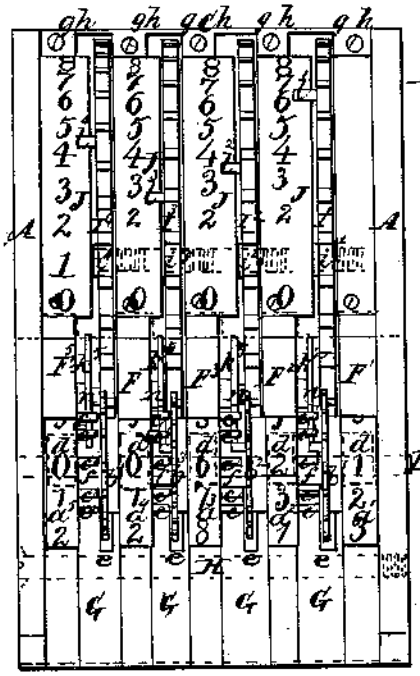


Fig. 3.

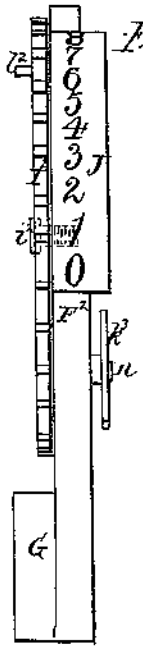
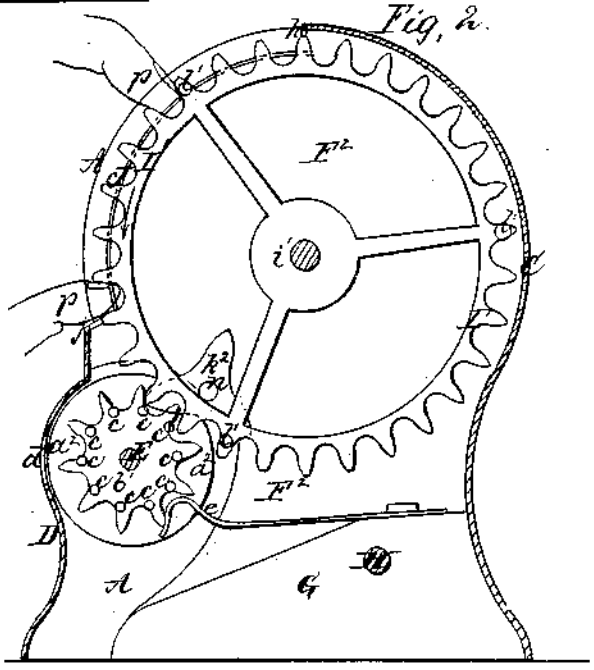


Fig. 2.



# UNITED STATES PATENT OFFICE.

J. BURNS, OF NEW YORK, N. Y.

## ADDOMETER.

Specification of Letters Patent No. 21,243, dated August 24, 1858.

*To all whom it may concern:*

Be it known that I, JABEZ BURNS, of the city, county, and State of New York, have invented an Improved Machine for Adding Numbers; and I do hereby declare the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a front view with the front plate removed to show the gearing which it covers. Fig. 2, is a transverse vertical sectional view of the same. Fig. 3, is a front view of one of the sections of the machine with its attached gearing.

Similar letters of reference indicate corresponding parts in the several figures.

The nature of my invention consists in the toothed wheels $I^1$, $I^2$, $I^3$, $I^4$, when arranged in the particular manner described relatively to the arc index plates, in combination with the toothed wheels of the registering index cylinders, and with the stop, whereby the same teeth which actuate the wheels of the registering cylinder can be used as a means whereby to always turn the wheels the proper distance to accomplish any required movement of the registering cylinders. This arrangement renders the machine very simple and compact, as keys, levers and other devices for actuating the mechanism are dispensed with.

My invention consists, 2nd, in the particular arrangement, in combination with the above, of pins on the sides of the finger wheels, intermediate toothed segments, and pins on the sides of the registering cylinders for the purpose of giving a tenth part of a revolution to a registering cylinder of a higher denomination, when one registering cylinder completes is revolution as set forth.

A, B, C, D, is a box consisting of two end pieces A and B, of wood or metal and a back plate C, and front plate D, of metal. The shape of the end pieces A and B of this box is represented by the external profile of Fig. 2, which figure also represents the transverse form of the front and back plates. The front and back plates C, and D, are straight and parallel longitudinally.

E, is a fixed spindle extending from end to end of the box and carrying the register wheels $a^1$, $a^2$, $a^3$, $a^4$, $a^5$ which are fitted to turn freely on the said spindle. The peripheries of these register wheels are severally divided into ten equal parts numbered 0, 1, 2, &c., to 9. Every one of the said register wheels except the last one $a^5$, at the left hand end of the machine has secured to it one of a series of spur wheels $b^1$, $b^2$, $b^3$, $b^4$, each of which has ten teeth, and every one of the said registering wheels except the first one $a^1$, has on its right hand side ten pins $c$, $c$, arranged at equal distances apart in a circle concentric to the axis. Opposite to each register wheel there is a hole $d$, in the front plate D, large enough to expose to view one of the numerals on the periphery of the register wheel, the said holes $d$, $d$ being all in the same horizontal line as is illustrated in Fig. 1, by the representation of the said holes in red outline, the plate D being omitted in that figure to expose the register wheels and gearing. In order to prevent the stoppage of the register wheels in any position except with one of their numerals opposite the respective opening $d$, a stop spring, $e$, is applied in the manner represented in Fig. 2, to each of the spur wheels $b^1$, $b^2$, $b^3$, $b^4$ and to the series of pins, $c$, $c$, of the last index wheel $a^5$, which has no spur wheel attached. The register wheels are kept at equal and proper distances apart by loose collars $f$, $f$, on the spindle or by being furnished with hubs.

$F^1$, $F^2$, $F^3$, $F^4$, $F^5$, are a series of slabs of wood or plates of metal corresponding nearly in form with the ends A and B of the box, except that they are cut away in front to make room for the register wheels, and corresponding in number with the said wheels, the two endmost of the said slabs or plates being bolted or otherwise attached to the ends A and B of the box and the others being kept at proper distances apart by blocks G, G, G, G, placed between their lower parts. To these blocks the springs $e$, $e$, are secured.

H is a screw bolt passing longitudinally through the box and through the slabs or plates $F^1$, &c., and through the blocks G, and holding the said slabs or plates and blocks and the ends of the box in place and $g$, $g$, are screws passing through overhanging lips $h$, $h$, at the top of the back plate C and screwing into the plates or slabs $F^1$, &c., to hold the upper parts of the said slabs or plates at proper distances apart.

$I^1$, $I^2$, $I^3$, $I^4$, are spur toothed wheels which I will call finger wheels of a pitch corresponding with and gearing with the spur wheels $b^1$, $b^2$, $b^3$, $b^4$ having thirty teeth the

spaces between which are wide enough and deep enough to admit the point of a person's finger as shown at $p$, $p$, in Fig. 2, the said wheels being fitted to rotate on screws $i^1$, $i^2$, $i^3$, $i^4$ which attach them respectively to the left hand sides of the slabs or plates $F^2$, $F^3$, $F^4$, $F^5$. The arc formed front portions of the said slabs or plates constituting third parts of circles are faced with index plates J, J, J, J, divided into ten equal parts numgered 0, 1, 2, &c., to 9. Commencing at the bottom, the said numbers being opposite the spaces between the teeth of the large spur wheels $I^1$, $I^2$, $I^3$, $I^4$. At the bottom of the index plates there is a ledge $j$, extending all across the front of the machine to serve as a stop to the operator's finger in operating the machine.

$k^2$, $k^3$, $k^4$, $k^5$ are wheels having each three teeth fitted to rotate on screws $n$, $n$, by which they are attached to the right hand sides of the slabs or plates $F^2$, $F^3$, $F^4$, $F^5$ in a position to gear with the pins $c$, $c$, of the register wheels $a^2$, $a^3$, $a^4$, $a^5$, and $l^1$, $l^2$, $l^3$, $l^4$ are pins attached to the left hand sides of the large spur wheels, three to each wheel at equal distances apart in the same circle concentric to the axis of the wheel, the said teeth being arranged to act upon the teeth of the wheels $k^2$, $k^3$, $k^4$, $k^5$ and the latter wheels being arranged so that when one of their teeth is moved by one of the said pins it shall act upon one of the pins $c$, $c$, to give the corresponding register wheel one tenth of a revolution. The arrangement of the gearing is such that when either of the register wheels has its 0 opposite to its respective hole, $d$, in the front plate D, one of the pins $l^1$, $l^2$, $l^3$ or $l^4$ on the finger wheel, gearing with it, will be just below its respective wheel $k^2$, $k^3$, $k^4$, $k^5$ and will not come into operation on the latter till the finger wheel turning in the direction of the arrows shown on $I^1$, in Fig. 1, moves a distance equal to ten of its teeth.

The operation of adding numbers by the machine is as follows: In simple addition of whole numbers the wheels $I^1$ and $a^1$ constitute unit wheels, those $I^2$, $a^2$, tens wheels those $I^3$, $a^3$, hundreds wheels and so on; but in the addition of amounts in centesimal or dollar and cent currency the wheels $I^1$, $a^1$, represent cents, $I^2$ $a^2$ tens of cents, $I^3$ $a^3$ units of dollars, $I^4$ $a^4$ tens of dollars and so on. The addition may be performed by first adding all the numbers in the first column to the right hand and then adding all the numbers in the ohter columns in the same manner one after the other, or the amounts may be added one after another, commencing with the first figure and then proceeding with the second, afterward with the third and so on, when the amount is represented by more than one figure. I will first describe the first mentioned method of operation. First set all the register wheels with their 0's, opposite the openings $d$, $d$, in the front plate D, which should be done by turning the finger wheels, commencing at the left hand, but it will be more convenient to turn them backward or in the opposite direction to the arrows shown in Fig. 2. Then place the finger in the space or notch in the wheel $I^1$ opposite the number on the contiguous index plate J, which corresponds with the first number in the column to be added and draw down the wheel till the finger comes to the stop $j$, as shown in red color in Fig. 2, where it is arrested and becomes itself a stop to the tooth above it and prevents the further movement of the wheel. The finger wheel $I^1$, gives motion to the spur wheel $b^1$, attached to the register wheel $a^1$, and which represents the number to be registered opposite to its respective opening $d$. The finger is next placed in the same manner in the space or notch of the wheel $I^1$ opposite to the number on the index J, corresponding with the next number in the column, and drawn down to the rest $j$, and the register wheel is thereby again moved a corresponding distance. If the sum of the two numbers then added be equal to or more than ten and consequently cause the revolution of the register wheel $a^1$ to be completed one of the pins $l^1$, comes into operation on a tooth of the wheel $k^2$, and causes the said tooth to act upon one of the pins $c$, $c$, of the register wheel $a^2$, and thereby imparts to the said index wheel one tenth part of a revolution, which brings the numeral of that index wheel in sight. A similar movement of the wheel $a^2$ is produced in the same manner every time the revolution of $a^1$, is completed. All the numbers in the first columns are proceeded with in the same manner on the wheel $I^1$, and then those in the next column are added by operating in a similar manner on the finger wheel $I^2$, which gears with and moves the index wheel $a^2$. Every time the latter register wheel completes a revolution one of the pins $l^2$, on the wheel I, acts upon a tooth of the wheel $k^3$, which is thus caused to act on one of the pins $c$ of the register wheel $a^3$, and causes it to make a tenth of a revolution. In the same manner the several columns are added in succession, always changing from one finger wheel to the next at the left hand for a new column, and throughout the whole operation whenever a register wheel completes a revolution a pin $l^1$, $l^2$, $l^3$ or $l^4$, on the corresponding finger wheel comes into operation on one of the wheels $k^2$, $k^3$, $k^4$, $k^5$, and thus gives to the next register wheel one tenth of a revolution. It should be observed that the action of the pins $l^1$, $l^2$, $l^3$, $l^4$, and wheels $k^2$, $k^3$, $k^4$, $k^5$, always takes place while the numeral 9 on the register wheel corresponding with the finger wheel carrying the operating pin is moving away from and the 0 moving toward its opening $d$. The sum of the amount

or quantities added is seen through the openings $d$, $d$, as illustrated in Fig. 1, where the number added is 621 or 6, 21. The other method of operation only differs inasmuch as all the figures in one line are registered or added before commencing on the next line, the operator proceeding from the units or smallest denominations to the highest ones, commencing on the first wheel $I^1$, and proceeding from one wheel to another from right to left.

Either of the above methods of operation may be commenced at the left hand with the numbers of the highest denomination and this latter will in some cases, for instance in the addition of numbers not written down, be the most convenient.

This machine possesses advantages over others for the same purpose in being more simple in its construction, in permitting the operation to be changed from one wheel to another without shifting or adjustment of any of the parts, and in the facility for taking it apart to repair if necessary and putting it together again. The facility for taking apart and putting together is owing to the attachment of the finger wheels and wheels $k^2$, $k^3$, $k^4$, $k^5$ to separate slabs or plates applied as described, which provides the whole machine to be taken to pieces by removing the bolt H, and screws $g$, and taking out the screws which screw the front and back plates to the left hand end piece A, when all the shafts or plates except $F^5$, which does not require to be removed, can be taken out and register wheel spindle and all the register wheels can be taken off. This description of the method of taking the machine apart explains the method of putting it together.

It is obvious that in these machines the system of register wheels and gearing may be continued indefinitely.

What I claim as my invention and desire to secure by Letters Patent, is—

1. The toothed wheels $I^1$, $I^2$, $I^3$, $I^4$, when arranged in the particular manner described relatively to the arc index plates J, in combination with the toothed wheels $b^1$, $b^2$, $b^3$, $b^4$, $b^5$, of the registering cylinders, $a^1$, $a^2$, $a^3$, $a^4$, $a^5$, and stop $j$, substantially as and for the purposes set forth.

2. The particular arrangement, in combination with the above of pins $l'$, $l'$, $l'$, $l'$, on the sides of the finger wheels $I^1$, $I^2$, $I^3$, $I^4$, toothed segments $k^1$, $k^2$, $k^3$, $k^4$, $k^5$, and pins $c$, on the sides of the registering cylinders $a^1$, $a^2$, $a^3$, $a^4$, $a^5$, for the purpose set forth.

JABEZ BURNS.

Witnesses:
WM. TUSCH,
W. HAUFF.