(No Model.) 3 Sheets—Sheet 1.

B. ADAMS.

ADDING MACHINE.

No. 301,784. Patented July 8, 1884.

Fig. 1.

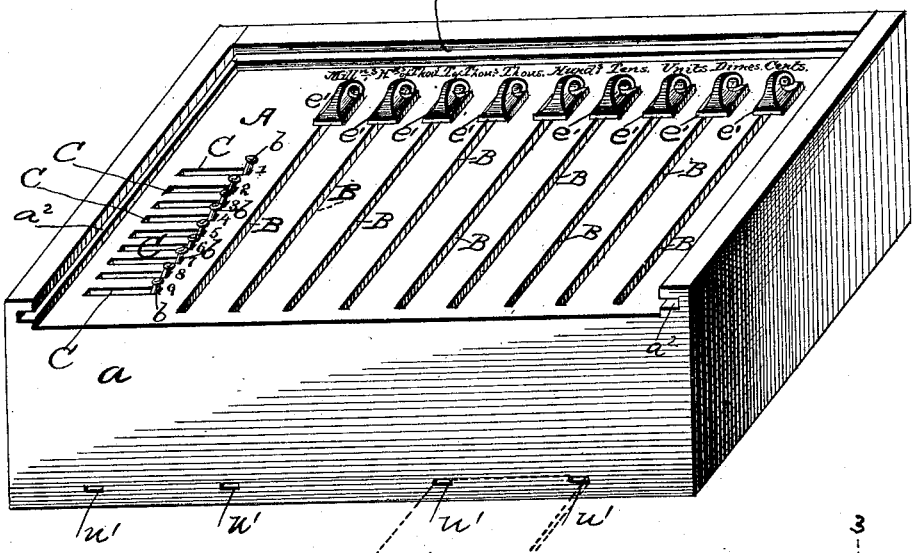


Fig. 2.

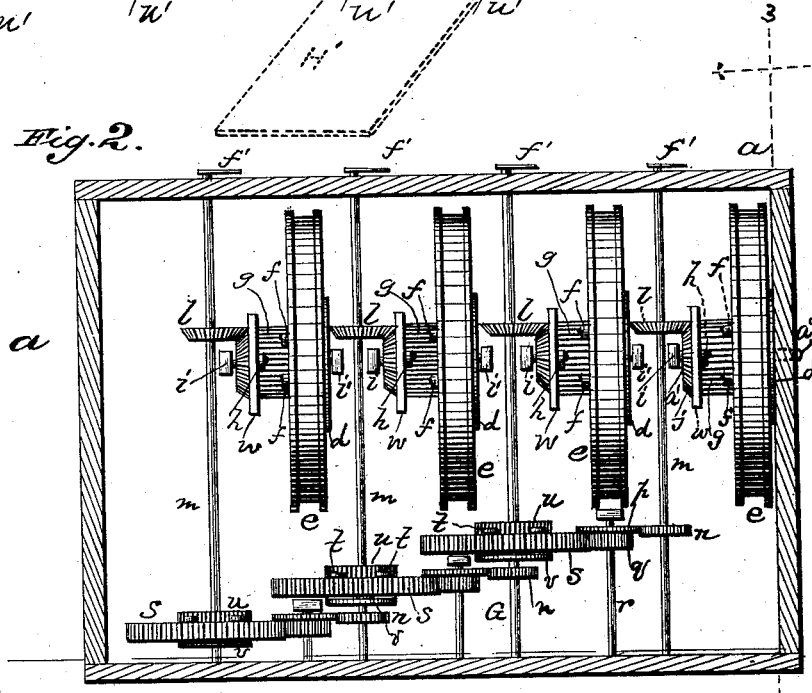


Fig. 15.

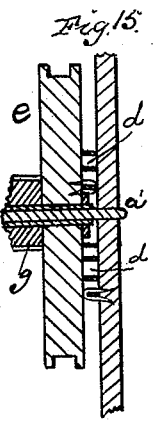
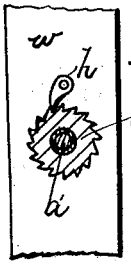


Fig. 14



WITNESSES

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Villette Anderson.

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(No Model.) 3 Sheets—Sheet 2.

B. ADAMS.

ADDING MACHINE.

No. 301,784. Patented July 8, 1884.

Fig. 3.

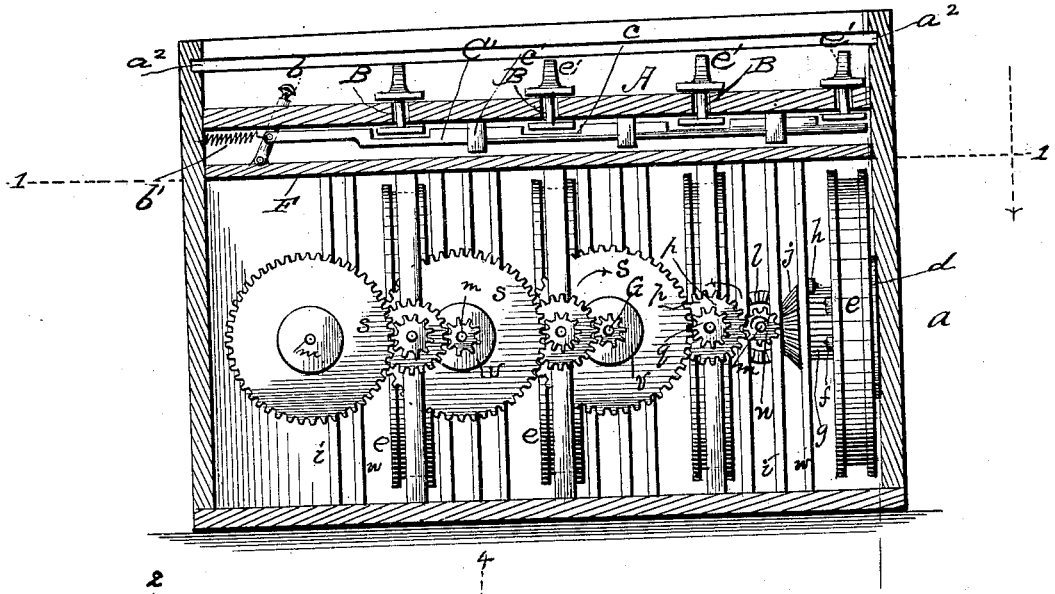


Fig. 6.

Fig. 4.

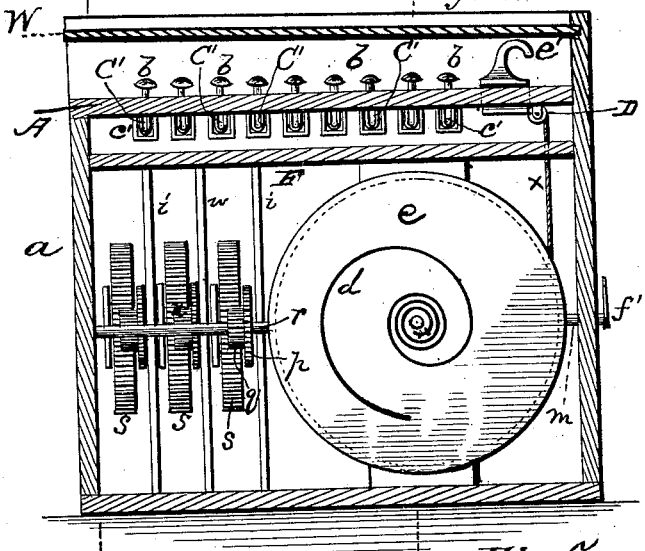


Fig. 7.

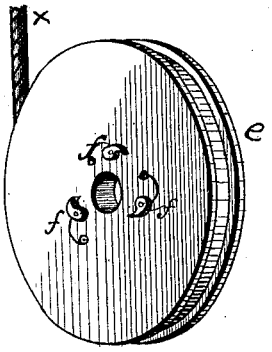
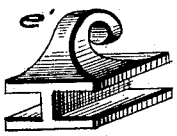


Fig. 5.



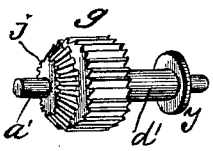


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Fig. 8.

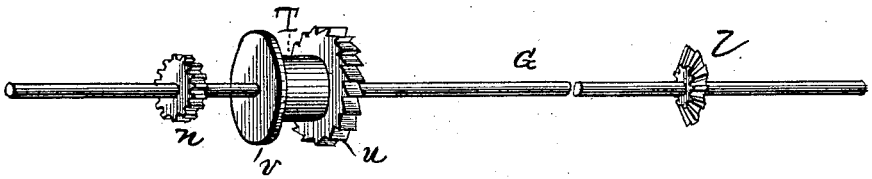


Fig. 9.

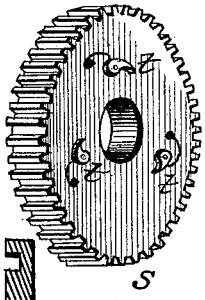


Fig. 11.

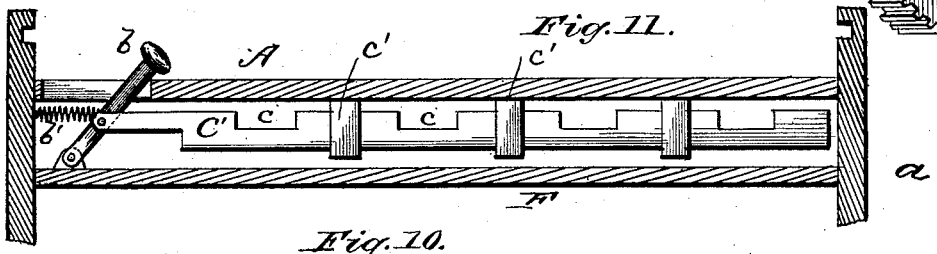
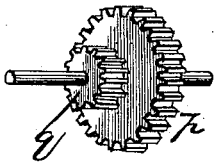


Fig. 10.

Fig. 13.



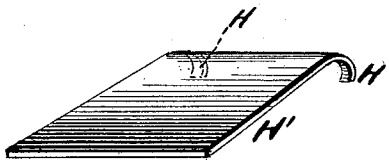
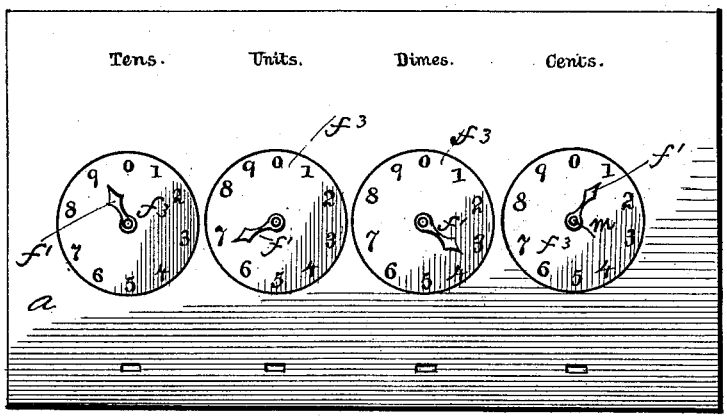


Fig. 12.



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UNITED STATES PATENT OFFICE.

BENJAMIN ADAMS, OF NORFOLK, VIRGINIA.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 301,784, dated July 8, 1884.

Application filed January 18, 1884. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN ADAMS, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented certain new and useful Improvements in Adding-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a perspective view, the cover being removed. Fig. 2 is a horizontal sectional view taken on lines 1 1 of Fig. 3. Fig. 3 is a vertical longitudinal sectional view taken on lines 2 2 of Fig. 4. Fig. 4 is a vertical cross-sectional view taken on lines 3 3 of Fig. 2. Fig. 5 is a perspective view of one of the slides *e'*. Fig. 6 is a perspective view of one of the wheels *e*, showing the tape and spring-pawls. Fig. 7 is a perspective view of the shaft *a'* with a pinion, bevel-gear, collar, and sleeve attached. Fig. 8 is a perspective view of the shaft G, showing the sleeve T to receive one of the wheels S and a ratchet and pinions. Fig. 9 is a perspective view of one of the wheels S. Fig. 10 is a similar view of the wheels *p* and *q*, showing the same on their shaft. Fig. 11 is a longitudinal vertical sectional view of the upper portion of the frame, showing a stop-strip and operating-lever attached. Fig. 12 is a rear view of the frame, showing the registering-dials; and Fig. 13 is a perspective view of the apron. Fig. 14 is a detail view of one of the bearing-posts *w*, showing the ratchet *g* and shaft *a'* in section; and Fig. 15 is a sectional detail view taken on the lines 4 4 in the lower portion of Fig. 4.

This invention has relation to adding-machines; and it consists in the construction and novel arrangement of devices, as will be hereinafter fully described, and particularly pointed out in the claims appended.

The object of the invention is to provide a practical and reliable machine for adding long columns of figures as quickly, or perhaps, after a little practice, more quickly, than can be done by the average book-keeper, and which shall enable a person with little or no practice in addition to foot the columns of a ledger as easily and accurately as the most experienced mathematician could attain the result.

Referring by letter to the accompanying drawings, *a* designates the incasement of the machine, which is provided with a removable cover sliding in grooves a^2 in the ends and one side, which is to be kept in place when the machine is not in use to exclude dust from the operating mechanism, and removed when the machine is to be used. The bottom should be covered with cloth, to prevent it from scratching the book on which it is placed when in use.

The dimensions of a machine capable of adding up to ten millions should be about five and a half inches long, three and one-half inches wide, and one and one-half inch high. A machine for adding a greater or lesser sum should vary correspondingly in length, and should be about the same in height and width.

F designates a horizontal partition near the slotted top A of the incasement, and this partition is connected with the bottom of the incasement by posts or uprights *i* and *w*, which form bearings for the gearing, hereinafter explained. The top A is provided with nine transverse slots B, extending nearly across its width, as shown, and to the left of these slots B is a series of slots, C—nine in number—at right angles to the slots B. The nine slots B, commencing at the right hand and reading to the left, are marked "cents," "dimes," "units," "tens," "hundreds," "thousands," "tens of thousands," "hundreds of thousands," and "millions" in a machine that is adapted to add to ten millions.

In order to illustrate the working of the machine I have shown but four sets of gearing. I will now proceed to describe the first four sets of gearing and their attendant mechanism, commencing with what I denominate the "cents" column.

A short shaft, *a'*, has its right hand bearing in the right-hand end of the box *a*, its left hand bearing being in the upright or post *i*, below the partition F. This shaft *a'* is provided, near its left-hand end, with a miter-gear, *j*, having ten teeth, next to which and on the same shaft is a ratchet-pinion, *g*.

d' indicates a sleeve, which is placed upon

the shaft a', and is provided at one end with a pinion, g, its opposite end engaging a collar, y, which is also placed upon the said shaft a'. Upon this sleeve d', between the pinion and collar, is loosely mounted a wheel, e, which is grooved in its periphery to receive a tape, x, which is connected at one end to the wheel e, and at the other end to the cents-slide e'. This wheel e is provided with spring-pawls f, which engage the pinion g and cause the shaft a' and miter-gear j to revolve with the said wheel e, when a slide, e', which is arranged in one of the slots B, is moved toward the operator, who stands at the front of the machine. The miter-gear j engages a miter-gear, l, having also ten teeth, the gear being secured to a shaft, m. The miter-gears j and l are at right angles to each other, and move only in one direction. A pawl, h, engages the pinion g and prevents the shaft a', pinion g, and gear j from turning backward with the wheel e when the said wheel is drawn back to its normal position by the spring d, one end of which is secured to the face of the wheel and the other end to the side wall of the box a, and the outer ends of the springs of the other wheels to the adjacent posts i'. It should be observed that the bearing-post w is between the ratchet-pinion g and the miter-gear j, so that the pawl h can be pivoted thereto and engage the pinion g. Each set of gearing for the several columns is provided with a loose wheel, e; but in all others, except the "cents" column, the spring d is connected to an upright or bearing post, i. When one of the slides e' has been moved in its slot B, the gearing will have been moved forward, and an indicator-finger, f', on the end of its shaft m will have been moved forward to the required point on its dial f^3 at the end of the box a farthest from the operator. When the operator releases the slide e', the spring d upon the wheel e will wind the tape x upon the wheel e and carry the slide e' back to its normal position without revolving the gearing backward. The shaft m is provided at a point that will not interfere with the wheel e of the "dimes" column with a spur-gear, n, having ten teeth, which engage the teeth of the gear-wheel p, having twenty teeth, and the said gear n will cause the wheel p to make one revolution to the left, while the gear-wheel n makes two revolutions to the right. On the same axle r with the wheel p another wheel, q, with ten teeth, is provided, and the teeth of this wheel q engage the teeth of a wheel, s, having fifty teeth, so that ten revolutions of the wheel n to the right will cause one revolution of the wheel s also to the right. This set of gearing must work only in one direction—that is, when the "cents" slide is pulled in its slot, its indicator f' should be moved forward around its dial; but it should not move backward when the "dimes" slide is pulled. There should be an indicator for each slide. This result is effected as follows: The shaft m of the first or "cents" column is quite simple, having only the two wheels l and n. The shafts of the other columns are more complicated. On these shafts l designates the gear-wheels, through which the power is received from the slides, and n is the gear-wheel that imparts motion to the gear-wheels p q of the next column, and so on throughout the train of gearing.

G designates the shaft, on which is arranged the sleeve T, having collar v, and upon this sleeve is loosely mounted the wheel s and gear u. The wheel s is provided with spring-pawls t, similar to those on the wheel e, and engaging the teeth of the wheel u. The wheel s, without being loose enough to get out of gear, should revolve very easily on its shaft, so that when the pressure comes through the wheel s the whole shaft shall be made to revolve by means of the pawls t; but when the pressure comes from the shaft the wheel s shall not revolve. If made to work easily on its shaft, there will be no danger of it revolving with the shaft, as to do so it would have to work all the preceding columns, and this pressure will keep it in position until the power comes through the wheels n, p, and q.

Between the partition F and the slotted top of the box a are arranged nine notched slides, C', each of which is pivoted to a pivoted lever, b, which, in its normal position, inclines to the right, as shown, and presents the notches c of the slide in line with the slots B, so that the slides e' may be pulled down the slots B without meeting an obstruction. Each slot C is occupied by one of the pivoted levers b, and these slots C are numbered from 1 to 9 in series. Each lever b is provided with a spring, b', at its left-hand side, between the lever and the end of the box a, which serves to return and hold the lever in the inclined normal position when it has been removed therefrom and released. When either of these levers b, from 1 to 9, is moved to the left by the left hand of the operator, and either one of the slides e' is pulled down its slot B, the slide e' will be stopped by the slide C', that has been moved to obstruct the slots B. The end of each shaft m is provided with a dial-finger, f', and a dial, f^3, is fixed in the side of the box farthest from the operator, and is numbered from 0 to 9, as shown. The dials f^3 may either be closed by watch-crystals, or by a single pane of glass framed into the side of the box over them. The dials are designed to indicate the total of the amounts added. The slides C' work in guides c' loosely, and when the levers b and slides c' are in their normal positions any one of the slides e' may be moved the entire length of its slot B. The diameter of the wheels e is such that one revolution of the said wheels e will unwind the tapes x a distance equal to the length of the slot B. The tapes x run over pulleys D on the under side of the slotted top A, and above the partition F. After the gearing for the "dimes" column, the gearing for the other columns

to the left is precisely similar, and may extend to any desired number of sets without departing from the character of the invention.

In order to prevent the operator from skipping lines of figures in operating the machine, I have provided a small metallic apron about two inches long, one inch wide, and one-sixteenth of an inch thick, which I provide with hooks H, to engage the slots a' in the front of the case a, next to the operator, so that the apron H′ may be brought on the column of figures to be added, and changed from end to end of the frame as the calculation is proceeded with. The machine being thus placed before the operator, the fingers of the left hand naturally control the levers b to stop the slides C′, while the fingers of the right hand can be used to work the slides e'. Thus it will be seen that the sole object of the levers b is to stop the slides e', and when it is desired to add any figures the desired lever in the slots C should be first moved to the left, and there held until the desired slide e' has been moved to engage the slide-bar of the lever b previously, when the said lever b may be released and allowed to return with its connecting stop-slide to its normal position, the dials simultaneously indicating the result added.

From the foregoing explanation it will be seen that if any one of the slides e' is pulled down, its slot to, say, No. 3 of the lever-slots, the corresponding indicator will be advanced three points, the next indicator to the left three-tenths of a point, the next three-hundredths, and thus on throughout, so that the tens may be carried while commencing the addition to the left of the line. All the indicators to the right of the one operated will remain unmoved; but those to the left will be operated, as above described. The spring-pawls should be controlled by light springs, so that they shall be held lightly in place upon the teeth of the pinions, and not strong enough to exert any pressure. The teeth of the gear-wheels should be quite fine, so that the pawls will work at once and not lose any part of a revolution.

To set the machine the "cents" slide must be worked until the finger points to "0" on its dial, and so in all the others.

From the foregoing description, taken in connection with the drawings, it is believed that the construction and operation of the machine will be readily understood by those skilled in the art to which it pertains, and that with a little practice any person having an ordinary knowledge of arithmetic will be enabled to operate the machine rapidly.

The slides e' have convenient finger-pieces, and the levers b have knobs by which to grasp them, so that the machine may be worked as rapidly as the operator can accurately read the lines of figures or the numbers to be added.

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

1. In an adding-machine, the combination, with the incasement having the top slots, B and C, the bearing-posts and partition F, of the short shaft a', provided with pinion g, miter-gear j, and the loose wheel e, provided with the spring-pawls f, spring d, and tape x, connected to the slide e', the post i, and pawl h, and the shaft m, provided with the miter-gear l, and the spur-gear n, the shaft r, having wheels p and q, engaging a second shaft provided with wheels l and n, shaft G, wheel u, and a loose gear-wheel, s, having a spring-pawl, t, substantially as specified.

2. In an adding-machine, the combination, with the incasement having a slotted top for the slides and stop-levers, and a horizontal portion, F, above the gearing, for operating the indicator-fingers, of the slides e', the tape-wheels e, the tapes x, and the levers b, connected to the notched stop-slides, the returning springs for said levers b, and gearing connected to operate decimally to carry the tens to the left when the slides are operated from left to right to move the indicator-fingers on the dials, substantially as specified.

3. In an adding-machine, the combination, with an incasement having a slotted top provided with "cents," "dimes," "units," "tens," "hundreds," "tens of hundreds," &c., columns having slides e', and stop-levers and notched slides intersecting the column-slots, and a series of shafts provided with indicator-fingers, and gearing arranged to operate the shafts and indicator-fingers forward to the left on the dials, to indicate the total of two or more lines of figures, by operating the slides e' in their slots B from left to right against the stop-slides operated from right to left by the levers b, substantially as specified.

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

BENJAMIN ADAMS.

Witnesses:
ANTONIO GASTAVER,
ARTHUR C. HUMPHREYS.