

(No Model.)

2. Sheets—Sheet 1.

E. W. TAYLOR.
ADDING MACHINE.

No. 417,954.

Patented Dec. 24, 1889.

Fig 1.

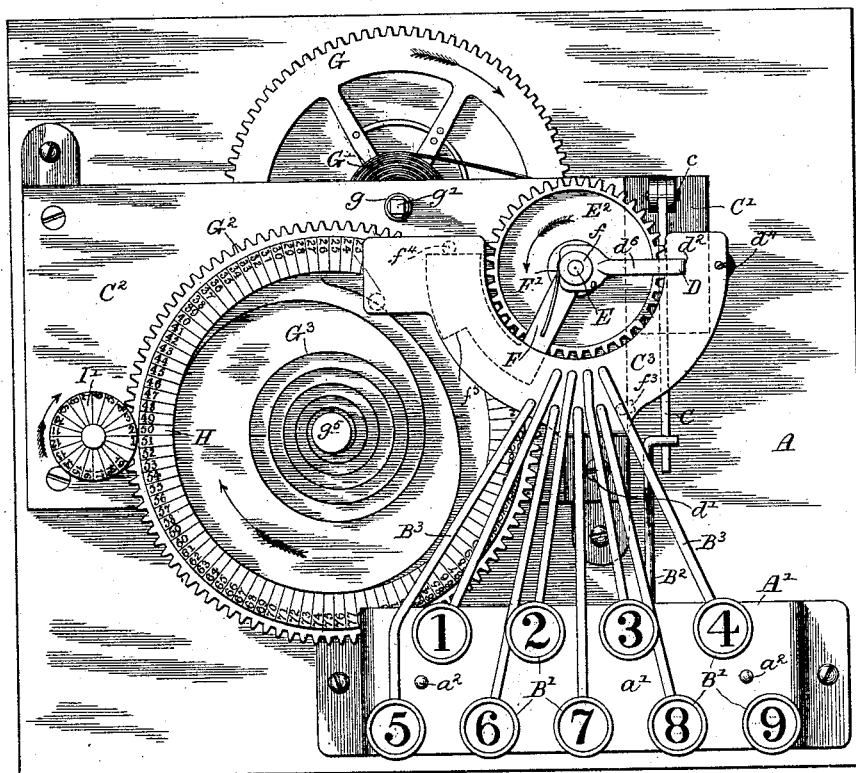
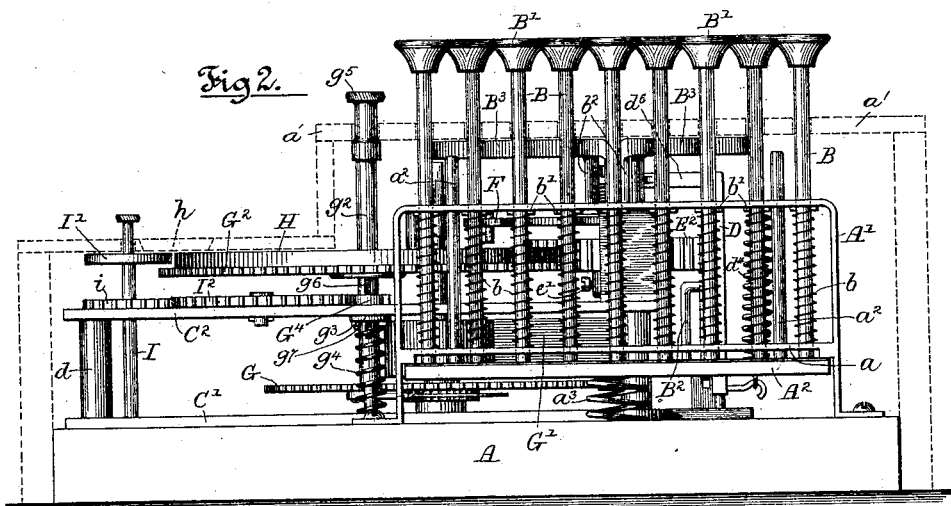


Fig 2.



Witnesses

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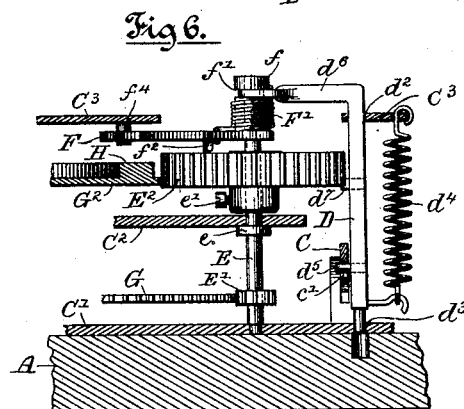
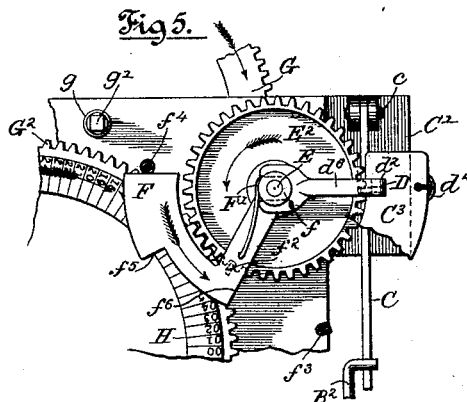
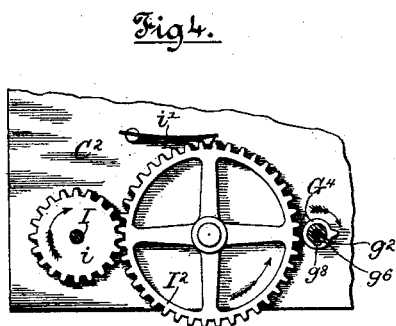
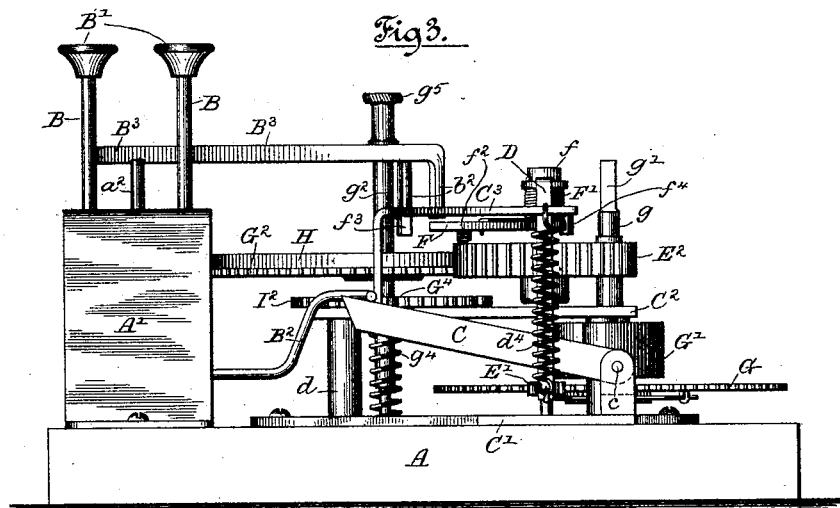
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

EDWARD W. TAYLOR, OF McPHERSON, KANSAS.

ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 417,954, dated December 24, 1889.

Application filed February 8, 1889. Serial No. 299,118. (No model.)

To all whom it may concern:

Be it known that I, EDWARD W. TAYLOR, of McPherson, in the county of McPherson and State of Kansas, have invented certain new and useful Improvements in Adding-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in that class of devices known as "adding-machines," wherein the result of the addition of two or more numbers is indicated upon a dial.

The particular improvement consists in the novel features of mechanism herein illustrated, described, and more particularly pointed out in the appended claims, whereby by depressing a key upon the face of which is illustrated the number to be added the dial is revolved a sufficient distance to reveal a second number, which indicates the result of the addition of the previously-indicated number and of the number indicated upon the face of the key.

In the drawings, Figure 1 is a full-sized plan view of my improved adding-machine with the case or cover removed. Fig. 2 is an end elevation of the same, showing the position of the case or cover in dotted lines. Fig. 3 is a side elevation of the same. Fig. 4 is a plan view of a portion of the device, showing the mechanism for operating the hundreds-wheel. Fig. 5 is a plan view of a portion of the device, showing more clearly the adjusting-arm and operating parts. Fig. 6 is a partial vertical sectional view of the parts represented in Fig. 5.

In the drawings, A is the base of the machine, to which is secured a bent plate or key-supporting frame A', having a cross-plate a between its vertical portions at some distance below the upper horizontal portion or table a'.

B are the keys, which are secured in bearings in the table a' of said frame A' and in the under plate a. These keys B are vertically movable in their bearings, and are held in their uppermost position by means of the

springs b, which surround the keys. These springs rest at their lower ends upon the plate a, and bear at their upper ends against a suitable collar or pin b' upon the several keys. The upward movement of the several keys is limited by said collar or pin b' bearing against the under side of the table a', as clearly shown in Fig. 2. Each of the keys B is provided at its top with an enlarged end or button B', upon which is stamped, painted, or otherwise placed one of the nine initial numerals.

A² is a plate or bar placed between the vertical portions of the frame A', near each end of which plate is secured an upwardly-extending guide-rod a². These guide-rods a² pass upwardly through the plate a and through the table a'. A spring a³ keeps the plate A² in its uppermost position against the lower end of the keys B, which latter rest on said plate. Secured to the plate A² is an arm B², one end of which arm rests upon the moving end of a lever C.

The lever C is pivoted at c to a slotted post, which rises from the base-plate C'.

C² is a plate or table supported upon posts d, rising from the base-plate C'. Rising from said plate C², and secured thereto at d', is a second plate or table C³, which latter is U-shaped in plan view, as clearly shown in Fig. 1.

D is a vertically-movable bar, which passes through the opening d² in one arm of the plate C³, and is secured at its lower end in a suitable opening d³ in the base-plate C'.

d⁴ is a spring, secured at its upper end to the plate C³ and at its lower end to a hook or projection upon the lower end of the vertically-moving bar D. This spring tends to keep the bar D in its uppermost position. The lever C is movably secured to said bar D by means of a pin d⁵ on the bar D, which engages a slot c' in the lever C.

E is a vertical shaft, journaled near its upper end in the plate C² and at its lower end in the base-plate C'. Below the plate C² said shaft E is provided with a suitable collar e, which prevents any upward movement of said shaft E in its bearings. Secured to said shaft E, near its lower end, is a pinion E', hereinafter mentioned.

E² is a spur-gear, secured to the shaft E by the set-screw e', immediately above the plate C².

F is an adjusting-arm, having a suitable hub or sleeve f, by which said arm F is movably secured upon the upper end of the shaft E. The sleeve f is provided on its periphery with an annular slot or groove f'.

The upper end of the bar D is provided with an arm d⁶, the forked ends of which engage the slot f' of the sleeve f, whereby by the vertical movement of the bar D the sleeve f and the adjusting-arm F are moved vertically upon the shaft E. A lug or pin d⁷, secured to the bar D, engages the spur-wheel E² when said bar D is in its uppermost position, as shown in Fig. 6. A similar pin or lug f² depends from the adjusting-arm F, and is adapted to engage said spur-gear E² when the bar D is moved vertically downward, so that the pin d⁷ is disengaged from said spur-gear E². A spring F' is coiled about the spool or sleeve f, with one of its ends secured to the adjusting-arm F and the other end secured to the arm d⁶ of the bar D. A pin or stop f³ limits the movement of the adjusting-arm F in one direction, as shown in Fig. 5, while a similar pin or stop f⁴ limits the movement of said adjusting-arm in the other direction. The spring F' holds the adjusting-arm against the stop or pin f⁴.

Secured to and projecting from each of the keys B, except that having the numeral 9, is an arm B³, the end b² of which is bent downwardly and projects through one of a plurality of suitable holes or openings in the table C³, which holes or openings are arranged in two concentric lines with the shaft E as a center. When the keys are depressed, the ends b² are forced downwardly and project beneath the lower edge of the table C³ a distance sufficient to engage or arrest the adjusting-arm F when said arm is swung around upon the shaft E in the direction of the pin or stop f³. The adjusting-arm F is notched, or, more properly speaking, is provided with a shoulder f⁵. The edge f⁶ of the swinging arm F strikes against the end b² of one of the arms B³, attached to one of the inner row or set of keys B, when one of said keys is depressed, while the shoulder f⁵ strikes against the end b² of the rod B³, attached to one of the outer set of keys, when one of said keys is depressed. This shoulder f⁵ also strikes against the pin f³ when the swinging arm F is rotated and when that key of the outer row numbered 9 is depressed. The location of the ends b² of the arms B³ with reference to the edge f⁶ and the shoulder f⁵ of the arm F is such as to arrest the arm F after it has swung a distance equal to the pitch of one, two, or more teeth on the wheel E² corresponding with the numeral on the button of the key B which has been depressed.

G is a spur-wheel mounted upon the shaft g, which latter is suitably journaled in the

table C² and in the base-plate C'. The gear G meshes with the pinion E' upon the lower end of the shaft E.

G' is the mainspring, which is so attached by any suitable pawl-and-ratchet mechanism (not shown in the drawings) to said gear G as to exert its power to rotate said gear in the direction indicated by the arrow in Fig. 1. The upper end of the shaft g is squared, as shown at g', to engage any suitable key, (not shown,) whereby said shaft may be properly rotated to wind or tighten up the spring G' and thus increase its tension.

G² is a spur-gear suitably mounted upon the rotating and vertically-movable shaft g², which latter is journaled in the base-plate C' and in the table C². The gear G² meshes with and is rotated by the gear E². A spring G³ is attached at one end to said shaft g² and at its other end to a pin on the under side of the table C³, whereby the gear G² when disengaged from the gear E² may be given a rotation in a direction opposite to that received from said gear E².

g³ is a collar or pin upon the shaft g², and g⁴ is a spiral spring encircling the shaft between said collar g³ and the base-plate C'. The spring g⁴ causes the shaft g² to remain in its uppermost position—to wit, with the gear G² in engagement with the gear E², the upward movement of the shaft g² being limited by contact of the collar g³ with the table C² of the frame.

g⁵ is a thumb-piece or push-button loosely secured to the shaft g², by which the shaft may be vertically depressed against the action of the spring g⁴, thus throwing the gear G² out of engagement with the gear E².

H is a dial comprising a series of numerals beginning with two ciphers (0 0) and ending with 99, which dial may be made by stamping the numerals upon the face of the gear G² by printing or otherwise placing the same directly thereon, or upon suitable paper or other material to be attached to the face of said gear G².

h is a slot in the cover or case of the machine through which the operator may look at the dials H and I'. Only one set of numerals on each dial will be visible through this slot h at a time.

I is a rotatable shaft journaled in the base-plate C' and in the table C² in such manner as to be vertically movable in its bearings. Secured to this shaft I is a pinion i, and above said pinion and also secured to said shaft I is a circular disk or dial I', upon which is registered a series of numerals to designate hundreds, or thousands if necessary.

The shaft g² is slotted longitudinally, as shown at g⁶, for a portion of its length. The shaft g² is provided with a single-tooth pinion G⁴, having a hub that projects downward through the plate C², and is secured in a collar g⁷ immediately below said plate, thus preventing any vertical movement of the pinion. The shaft g² and the pinion G⁴ are locked

together by a pin or lug g^8 , which projects inwardly from said pinion G^4 and engages the slot g^8 in the shaft g^2 , and thus the pinion and the shaft are rotated simultaneously. The pinion G^4 will not partake of the vertical movement of said shaft when the latter is depressed by pressure upon the thumb-piece g^5 or raised by the action of the spring g^4 , as will be readily understood.

I^2 is a spur-gear journaled to and above the table C^2 in such position as to mesh at all times with the teeth of the pinion i . i' is a spring-detent pivoted to the table C^3 to engage one of the teeth of the gear I^2 to hold the latter by frictional contact from rotation in either direction except when the gear I^2 is rotated by the action of the pinion G^4 or by hand.

The operation of my invention is as follows:

The dial H being adjusted so that no numeral appears beneath the slot h , and the dial I' being similarly adjusted, the machine is ready for work. To illustrate the operation, I will suppose that a column of figures comprising the numerals 1, 5, and 7 is to be added. The operator will depress the key upon which the numeral 1 is placed. In depressing the key the plate A^2 is depressed and also the arms B^3 and B^2 . The arm B^2 depresses the lever C, which latter through the bar D moves the adjusting-arm F down on the shaft E, so that the pin f^2 of said arm F will engage between two of the teeth of the gear E^2 . At the same time the end b^2 of the bar B^3 is depressed a distance sufficiently below the table C^3 to engage and arrest the arm F when it has swung its proper distance upon the shaft E. At the same time the pin d^7 on the bar D disengages itself from the gear E^2 . Thereupon the mainspring G' exerts its power upon the gear G and rotates said gear in the direction indicated by the arrows, thereby communicating motion to the gear E^2 through the medium of the pinion E' in the shaft E. The gear E^2 moves in obedience to this motion, carrying with it the adjusting-arm F until the edge f^6 of said arm strikes against the depending arm b^2 of the key and is arrested thereby. As before explained, the location of this depending arm is such that the rotary movement of this gear E^2 is only equal to one pitch. In moving this distance the gear E^2 communicates power to the gear G^2 and moves said gear G^2 the distance of one pitch, which movement brings that portion of the dial H upon which the figure 1 is printed beneath the slot h of the case. The pressure upon the key numbered 1 is now released, and said key, under the influence of the spring b , resumes its uppermost position. Thereupon the lever C is released and the spring d^4 raises the bar D until the pin d^7 again engages the spur-gear E^2 and the pin f^2 is disengaged from said gear. The spring F' communicates power to the adjusting-arm F and swings said arm back to its original position or until said arm engages the stop f^4 .

The operator then depresses the key numbered 5, whereupon the operation of the parts is precisely the same as that just described, with this exception: the adjusting-arm F swings until its shoulder f^5 is arrested by the depending arm b^2 , attached to said key, thereby swinging a distance equal to the pitch of five teeth of the gear E^2 , instead of the pitch of one tooth, as in the case just described. The gear E^2 thus communicates motion to the gear G^2 and turns it a distance equal to five spaces and brings to view beneath the slot h , that portion of the dial H bearing the numeral 6. The operator after releasing the key 5 depresses the key provided with the numeral 7. The parts operate the same as before, except that the gear E^2 moves seven spaces instead of five, and thus brings that portion of the dial H numbered 13 beneath the slot h . It will thus be observed that by depressing the key bearing the numeral desired to be added the operation of the parts is such as to cause the dial H to indicate through the slot h the result of the addition of said numeral to the numeral previously indicated on said dial. When the gear G^2 has made one complete rotation, the single tooth of the pinion G^4 will engage the gear I^2 and rotate said gear one space. The gear I^2 in turn will rotate the gear i a space and thus move the dial I' one space, so as to bring the numeral indicating 100 to view beneath the slot h . When the gear G^2 has made its second rotation, these parts operate precisely the same, the result being that the dial I exposes to view the numeral indicating 200. It will thus be seen that the result of adding any combination of numbers is automatically presented to view and that the only mental calculation which the operator performs is that of depressing such key or keys as alone or together form the number which he desires to add to the number indicated on the dial. The dial H may be reversed or brought back to the starting-point by simply pressing upon the thumb-piece g^5 . The shaft g^2 is thereby depressed, carrying the gear G^2 downward and out of engagement with the gear E^2 . When so disengaged, the gear G^2 may be rotated by hand or by the unwinding of the spring G^3 . The dial I' is automatically returned to its starting-point by the reverse motion of the gear G^2 . The dial I' may be rotated by hand whenever the single tooth of the pinion G^4 is not engaged in the gear I^2 . It will also be understood that an ordinary flat spring may be placed beneath the lever C to raise the latter, and in such case I dispense with the spring d^4 . I may also dispense with the spring beneath the movable plate A^2 , and in lieu thereof place a spring around each of the guide-rods a^2 , securing the upper ends of said springs to the upper ends of said guide-rods, as will be readily understood.

Instead of placing the numeral of the dial H directly upon the face of the gear G^2 , I sometimes provide a disk of much greater

diameter than said gear and secure said disk to the shaft g^2 . In this manner I am enabled to make the numerals of the dial quite large for convenience in reading them.

5 What I claim is—

1. In an adding-machine, a rotating dial provided with a series of teeth, a gear-wheel meshing with the said dial-teeth, a spring for actuating said gear-wheel, a movable detent adapted for engagement with and disengagement from said gear-wheel, a plurality of keys, each adapted by its vertical movement to withdraw said detent from said gear-wheel, a pivoted arm F, connected to said detent and adapted to engage and rotate with said gear when said detent is disengaged therefrom, and a plurality of stops adapted to arrest the rotation of said pivoted arm at desired intervals.
2. In an adding-machine, a rotating dial, a spring-actuated spur driving-wheel, an intermediate shaft provided with two gear-wheels severally engaging the dial and the driving-wheel, a movable detent engaging one of the intermediate gear-wheels, an arm pivoted on the axis of the intermediate gear-wheels, and provided with a spring for throwing it in a direction opposite to that in which the intermediate gear-wheels move under the action of the driving-wheels, and provided with a projection for engaging one of the said intermediate gear-wheels, said arm being movable with the movable detent, a stop for the arrest of the arm in that movement thereof produced by its spring, a series of movable keys severally adapted to release the detent from the intermediate gear-wheel and arranged to arrest the spring-arm in different positions as

carried by the intermediate gear-wheel when engaged therewith, and a spring for engaging the detent with the gear-wheel when the latter is relieved from the pressure of the keys.

3. In a machine essentially as shown and described, the combination, with the double rows of keys provided with stop-arms terminating alternately in the arcs of different circles and with a movable detent and swinging pawl-arm, of a segment attached to said arm and provided with two shoulders in different circles corresponding with those in which the stop-arms terminate for engagement with said stop-arms.

4. In combination with a driving spur-wheel and a dial, of a gear-wheel E^2 , intermediate to the said driving spur-wheel and the said dial, of the sliding bar D, carrying the detent d^7 , and with a plurality of keys B, one to nine inclusive, of a lever C, and a vertically-movable plate A^2 , actuated by each of the keys and engaged with the lever C.

5. The combination, with the driving-spur and the intermediate gear-wheel normally engaged with a dial, of the dial having a movement in the direction of its axis, whereby it may be moved out of engagement with the intermediate gear-wheel to permit its return to zero, and a spring arranged to retain the dial normally in engagement with the intermediate gear-wheel.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

EDWARD W. TAYLOR.

Witnesses:

TAYLOR E. BROWN,
M. E. DAYTON.