

(No Model.)

2 Sheets—Sheet 1.

O. BEHER.  
ADDING MACHINE.

No. 494,618.

Patented Apr. 4, 1893.

Fig. 2

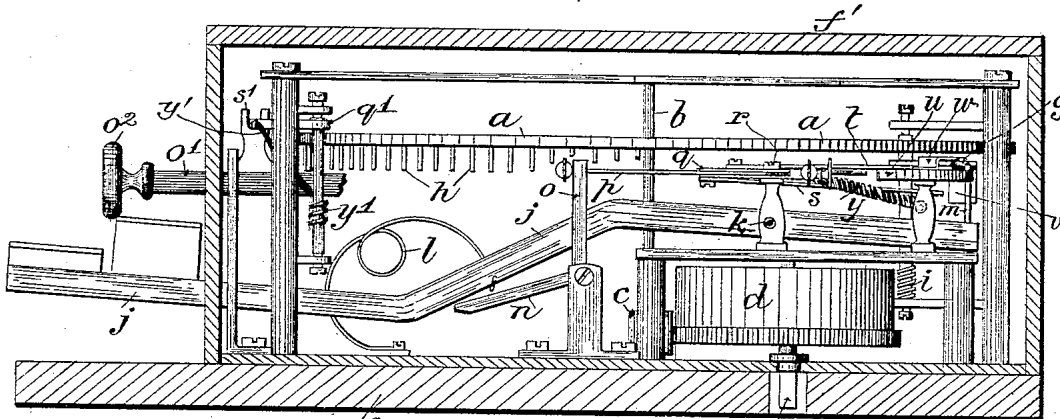
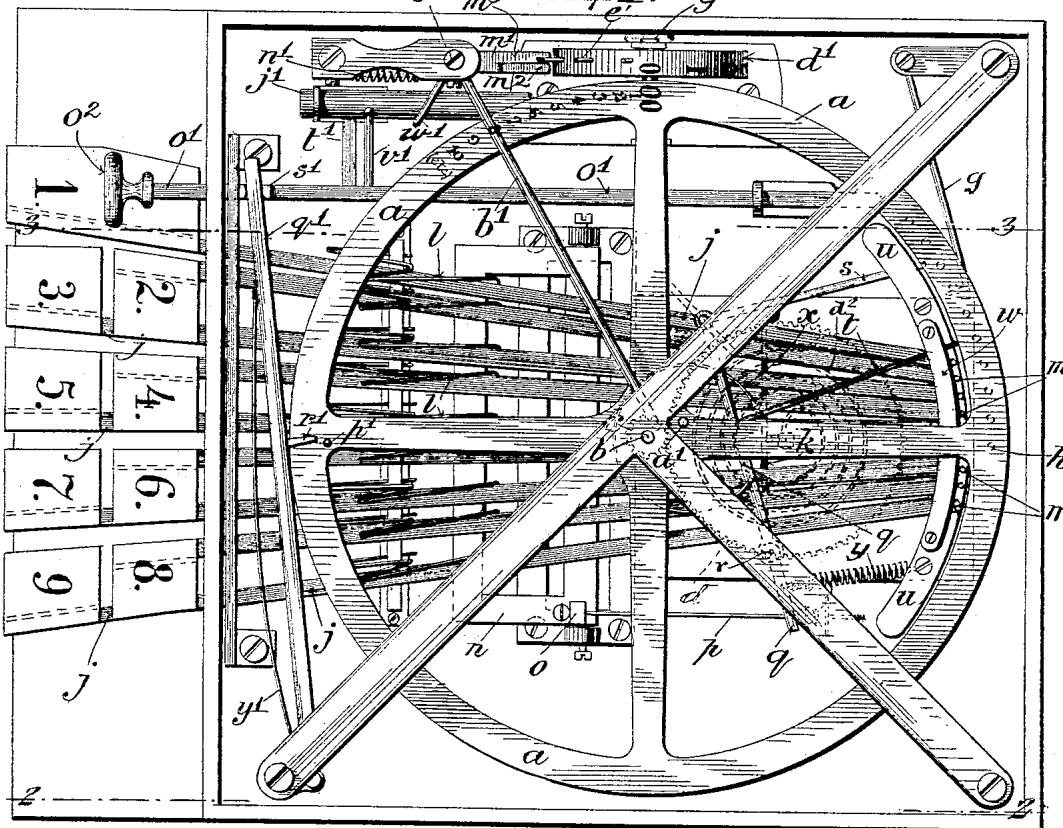


Fig. 1



Witnesses  
*A. J. Melhuish*  
*A. J. Haddan*

Inventor  
*Oswald Beher*  
 by his Attorney, *A. J. Haddan*

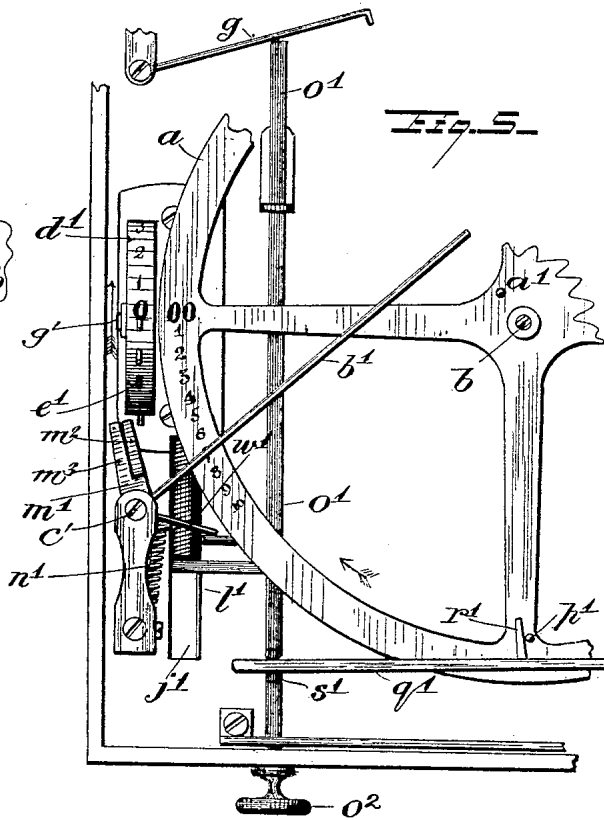
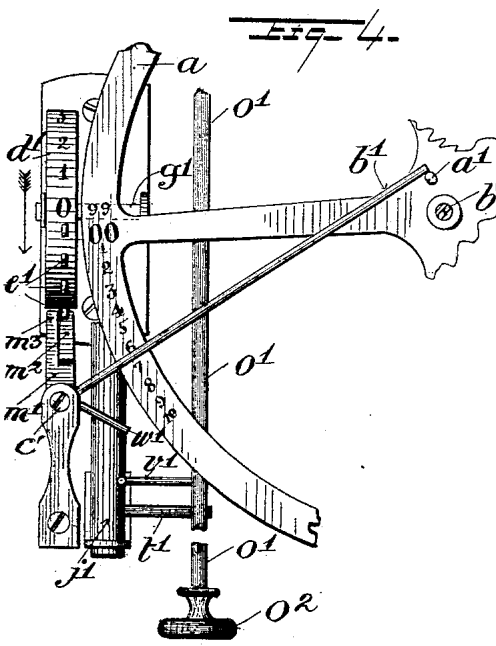
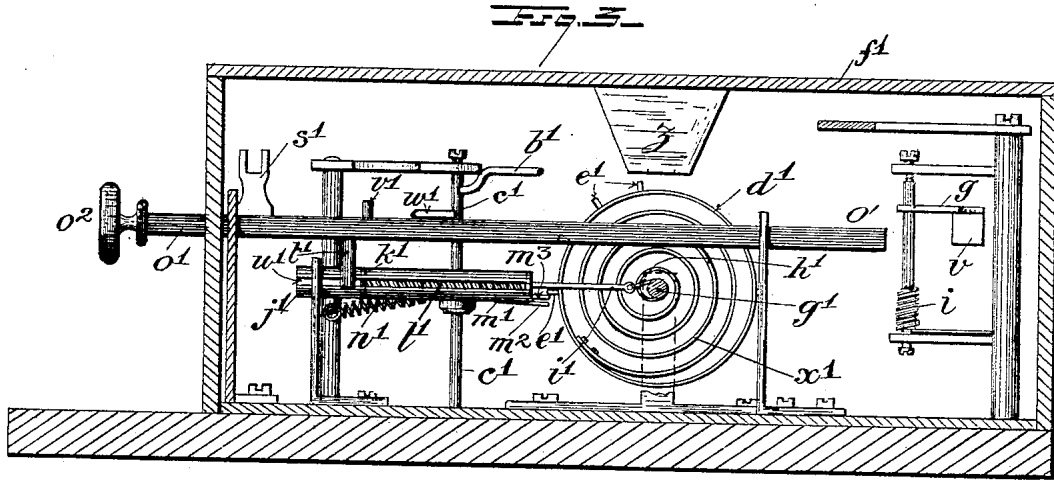
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2 Sheets—Sheet 2.

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ADDING MACHINE.

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Witnesses  
Al Melhus  
A. J. Hadday

Inventor  
 Oswald Beher  
 by his Attorney R. Hadday

# UNITED STATES PATENT OFFICE.

OSWALD BEHER, OF GROSS GUHRAN, GERMANY.

## ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,618, dated April 4, 1893.

Application filed August 5, 1890. Serial No. 361,037. (No model.) Patented in Germany July 7, 1889, No 50,885; in Austria-Hungary May 13, 1890, No. 22,697 and No. 44,377, and in England August 21, 1890, No. 13,538.

To all whom it may concern:

Be it known that I, OSWALD BEHER, a subject of the German Emperor, residing at Gross Guhran, near Graase, Silesia, in the Empire of Germany, have invented a certain new and useful Improvement in Adding-Machines, (for which I have obtained patents in Germany, dated July 7, 1889, No. 50,885; in Austria-Hungary, dated May 13, 1890, No. 22,697 and No. 44,377, and in Great Britain, dated August 21, 1890, No. 13,538,) of which the following is a specification, reference being made to the accompanying drawings, in which—

Figure 1 is a plan view of the improved adding machine the top plate of the cover or case being removed to show the interior. Fig. 2 is a cross section thereof on line 2—2 Fig. 1, certain parts at the rear being however omitted for clearness of illustration. Fig. 3 is a cross section of the machine on line 3—3 Fig. 1, the crown wheel which bears the "units" and "tens" being removed. This figure shows parts omitted in Fig. 2. Figs. 4 and 5 are plan views of parts of the mechanism showing the same in different positions as hereinafter referred to.

In the improved machine a horizontal crown wheel provided on its circumference with a series of numbers from 0 to 99 inclusive is adapted to be revolved by a spring when released by the depression of any one of a series of keys numbered from 1 to 9 inclusive. The depression of any one of these keys causes a finger to be thrust forward to engage with pins, the equivalent of teeth on the crown wheel so that the said finger is carried along with the crown wheel on its revolution and arrests the movement of the latter by arriving against a stop pin moved into its path by the respective key so that the amount of revolution allowed to the crown wheel is equivalent to the value of the key. A "hundred" wheel is also provided and operated as hereinafter explained, and means are provided for setting both wheels simultaneously to zero.

The crown wheel *a* is fixed upon the vertical arbor *b* carrying also the toothed pinion *c* gearing on the teeth on the spring barrel *d* (see Figs. 1 and 2). This spring barrel contains a coiled spring *d*<sup>2</sup> and differs in no respect from the spring barrel of an ordinary

clock. The spring may be wound up by a key applied to the square head *e* reached through a hole in the base plate *f* of the machine. On the upper face, the crown wheel *a* is provided all round its circumference with a series of numbers from 0 to 99 inclusive equally spaced, (only a few of these being shown in the drawings.) On the under side, the wheel *a* is provided with a like number of projecting pins *h* equally spaced and equivalent to teeth. The crown wheel is prevented from revolving under the influence of the spring *d*<sup>2</sup> in the barrel *d*, by the hook *g* which engages between the pins *h*. The spring *i* which encircles the post on which the hook *g* is pivoted and presses with one end on the back of the hook *g* tends to hold the hook *g* in engagement with the pins *h*. The nine key levers *j* are pivoted on a cross bar *k* and are severally lifted at their front ends by springs *l* so that their rear ends are usually depressed. Each lever *j* is provided at its rear end with a vertical pin *m*.

Extending under all the keys to be depressed by any one of them is the pivoted frame *n* carrying the arm *o*. This arm *o* is connected by a rod *p* to one arm of the lever *q*, pivoted at *r*, as shown in dotted lines at that part of the lever *q* which is under the arm of the frame, Fig. 1, and carrying pivoted to it, on its other arm, the rod *s* and the finger *t*. The rod *s* is guided under the bridge *u* below the level of the ends of the pins *h* on the wheel *a*, and is directed against the plate *v* which forms a downward extension of the hook *g* before referred to. The finger *t* passes under the upper bridge *w* and over the bridge *u* being free to move to and fro under said bridge *w* so far as the limits of the latter allow. The spring *x* tends to throw the finger *t* against the left hand end or limit of its movement. The spring *y* tends to return the lever *q* to the position in which it is shown in the drawings after it has been moved as hereinafter described. The action of these parts is as follows: On depression of any one of the keys *j*, the pin *m* on that key is raised into the path of the finger *t*; the frame *n* is at the same time depressed by the respective key *j*, and rocks the lever *q* which throws backward the rod *s* and presses

back the hook  $g$ , at the same time thrusting backward the finger  $t$  so that its end arrives between two adjacent pins  $h$  on the wheel  $a$ . The wheel  $a$  being released by pushing back the hook  $g$  flies round under influence of the spring  $d^3$  in the barrel  $d$  and carries with it the finger  $t$ , until the latter strikes against and is stopped by the uplifted pin  $m$  on the key  $j$  which is depressed. This stops the further revolution of the wheel  $a$  which has therefore moved round through a distance proportional to the distance between the end of the bridge  $w$  and the raised pin  $m$ , which distance is proportional to the number indicated on the key depressed. Thus if key numbered 2 be depressed the distance through which the wheel  $a$  revolves before it (or rather the finger engaged with it) is stopped by the raised pin  $m$  on that key lever, is sufficient to replace the figure occupying the position of "00," in Fig. 1, by the figure greater by 2. This completed, the pressure is taken off the key, which rises allowing the parts to resume their first positions under influence of the springs  $l, i, y$ , as shown in Fig. 1, the hook  $g$  holding the wheel  $a$  in its new position until depression of another key causes the same operations to be repeated. The spring  $y$  holds the lever  $q$  in the position shown and through the rod  $p$  holds up the rocking frame  $n$ . A window or open based funnel shaped depression  $z$  in the cover plate  $f'$  of the case (Fig. 3) will allow only the numbers on the wheel  $a$  and barrel  $d$  occupying the position of 00 in Fig. 1 to be visible through the casing. Thus the machine being set at "000" as hereinafter described the depression of the key marked 2 will cause 02 to appear at the window—if other keys, say those marked 5, 7, 9 be thereafter successively depressed the totals 7, 14, 23 will successively appear at the window.

On the wheel  $a$  at any suitable position on the upper surface of the wheel is the pin  $a'$ . An arm  $b'$  radiating from a vertical arbor  $c'$  extends across the wheel  $a$  in the path of the pin  $a'$ . Alongside the wheel  $a$  is a vertically arranged wheel  $d'$  carrying numbers 0, 1, 2, 3 and more if desired and the same number of projecting pins  $e'$ .

Around the shaft  $g'$  of the wheel  $d'$  is coiled a cord  $h'$  connected to the end of a rod  $i'$  which passes into the end of a cylinder  $j'$  and terminates in a cross head or button  $k'$ . The spring  $l'$  in the cylinder  $j'$  tends to press the cross head of the rod  $i'$  inward and so to revolve the wheel  $d'$  in the direction of the arrow in Fig. 4.

On the arbor  $c'$  is a projecting plate  $m'$  slit longitudinally and having one part  $m^2$  at a lower level than the other part  $m^3$ . The spring  $n'$ , a coiled spring one end of which is fixed in any suitable way to the frame and the other end pressed against the back of any of the arms radiating from the arbor  $c'$  or is fixed to the arbor  $c'$  itself, will tend to hold the arbor  $c'$  so that the arm  $b'$  rests against

some fixed stop for instance conveniently the arbor  $b$  of the main crown wheel  $a$ . In this position the higher part  $m^3$  of the plate  $m'$  lies in the path of the pins  $e'$  and the latter, one of them rests thereon under the pressure of the spring  $l'$  in the cylinder  $j'$ . As the wheel  $a$  revolves the pin  $a'$  will arrive against and move the arm  $b'$  until when the wheel  $a$  marks 99 the parts will be in the position shown in Fig. 4. During this movement the higher part  $m^3$  of the plate  $m'$  will have given place to the lower part  $m^2$  as a support for the pin  $e'$  and the wheel  $d'$  will have rotated slightly. When the pin  $a'$  moves from under the end of the arm  $b'$  the latter resumes the position shown in Fig. 1 and the pin  $e'$  which was resting on the part  $m^2$  will slide off that part under the part  $m^3$  and the wheel  $d'$  will revolve sufficiently to bring the next hundred before the window, the next pin  $e'$  arriving on the higher part  $m^3$  of the plate  $m'$ .

For resetting to "zero" the following mechanism is added,  $o'$  is a thrust rod ending outside the casing in a button  $o^2$  and adapted when pushed in to perform the several disengagements necessary for resetting the apparatus to "zero." On the wheel  $a$  is a pin  $p'$  and on the pivoted bar  $q'$  is a nose  $r'$  adapted to be brought into the path of the pin  $p'$  when the bar  $q'$ , which engages in a notch  $s'$  on the rod  $o'$ , is pushed inward by said rod. The inner end of the rod  $o'$  is adapted to disengage the hook  $g$  (Fig. 5) so that the wheel  $a$  is freed and revolves until the pin  $p'$  is stopped by the nose  $r'$  which will bring the "zero" of wheel  $a$  under the window. The rod  $o'$  carries an arm  $t'$  entering into a slit  $u'$  in the cylinder  $j'$  and also an arm  $v'$  adapted to strike against and deflect the arm  $w'$  on the arbor  $c'$ .

In the wheel  $d'$  is a spring  $x'$  (see Fig. 3) the tension of which is contrary to that of the spring  $l'$  but weaker so that the latter spring when in action overcomes the spring  $x'$ . When the rod  $o'$  is pushed in, the arm  $t'$  compresses the spring  $l'$  and relieves the wheel  $d'$  of the tension of this spring so that the wheel  $d'$  can now be revolved back to its zero position by the spring  $x'$ . At the same time the arm  $v'$  so far moves the arm  $w'$  that the plate  $m'$  is brought entirely out of the paths of the pins  $e'$  and the wheel  $d'$  is so left free to assume the position given to it by the spring  $x'$ . The spring  $y'$  operates the return of the rod  $o'$ .

I do not claim broadly the construction by which the movement of the number wheel is limited at each stroke by a pin the position of which corresponds to the position at which the wheel must be arrested to indicate or add the number corresponding to that indicated on the key depressed with which the respective pin is in connection, but

I claim—

1. In an adding machine—the combination of a rotary crown wheel having pins thereon,

a series of key levers adapted to be vibrated by hand, a loosely vibrating finger adapted to be thrust between the pins of said crown wheel on depression of any key lever, and a pin on each key lever adapted on depression of the respective lever to be moved into the path of said vibrating finger to limit the movement of said finger whereby the rotation of said crown wheel is limited to an amount proportional to the indication on the respective key.

2. The combination of a rotary crown wheel having pins thereon, a series of key levers adapted to be vibrated by hand, a loosely vibrating finger adapted to be thrust between the pins of said crown wheel on depression of any key lever, a pin on each key lever moved on depression of the key lever into the path of said vibrating finger to limit the movement of said finger, a pawl *g* for locking the crown wheel, adapted to be thrown out of engagement therewith on depression of any key lever, and a spring barrel or equivalent motor *d d<sup>2</sup>* for rotating said crown wheel when released.

3. The combination of the crown wheel *a*

having the series of pins *h*, the key levers *j*, pins *m* on said levers, the lever frame *n* with arm *o*, rod *p*, lever *q*, vibrating finger *t*, rod *s*, hook *g* and motor *d d<sup>2</sup>* adapted to co-operate substantially as set forth.

4. The combination of the rotary numbered wheel *a*, the pin *a'* on said wheel, the arbor *c'*, the radial arm *b'* and divided plate *m'* with higher stage *m<sup>3</sup>* and lower stage *m<sup>2</sup>*, the rotary wheel *d'* having pins *e'* and numbers thereon, and a motor for said wheel *d'* substantially as and for the purpose set forth.

5. The combination of the wheel *d'*, having pins *e'* thereon, arbor *g'*, cord *h'* rod *i'* and spring *l'*, of the rod *o'* having the arm *t'* for compression of said spring *l'* and the arm *u'*; the arbor *c'* with arm *w'* and divided plate *m'*, adapted to be rocked by said arm *w'*; and a spring *x'* adapted to reset the wheel *d'* to zero as and for the purpose herein described.

In testimony whereof I have signed this specification in presence of two witnesses.

OSWALD BEHER.

Witnesses:

BRUNO KNACKENBURG,  
H. J. DUNLAP.