

R. BAUMANN.
ELECTRICALLY OPERATED ADDING MACHINE.

No. 522,097.

Patented June 26, 1894.

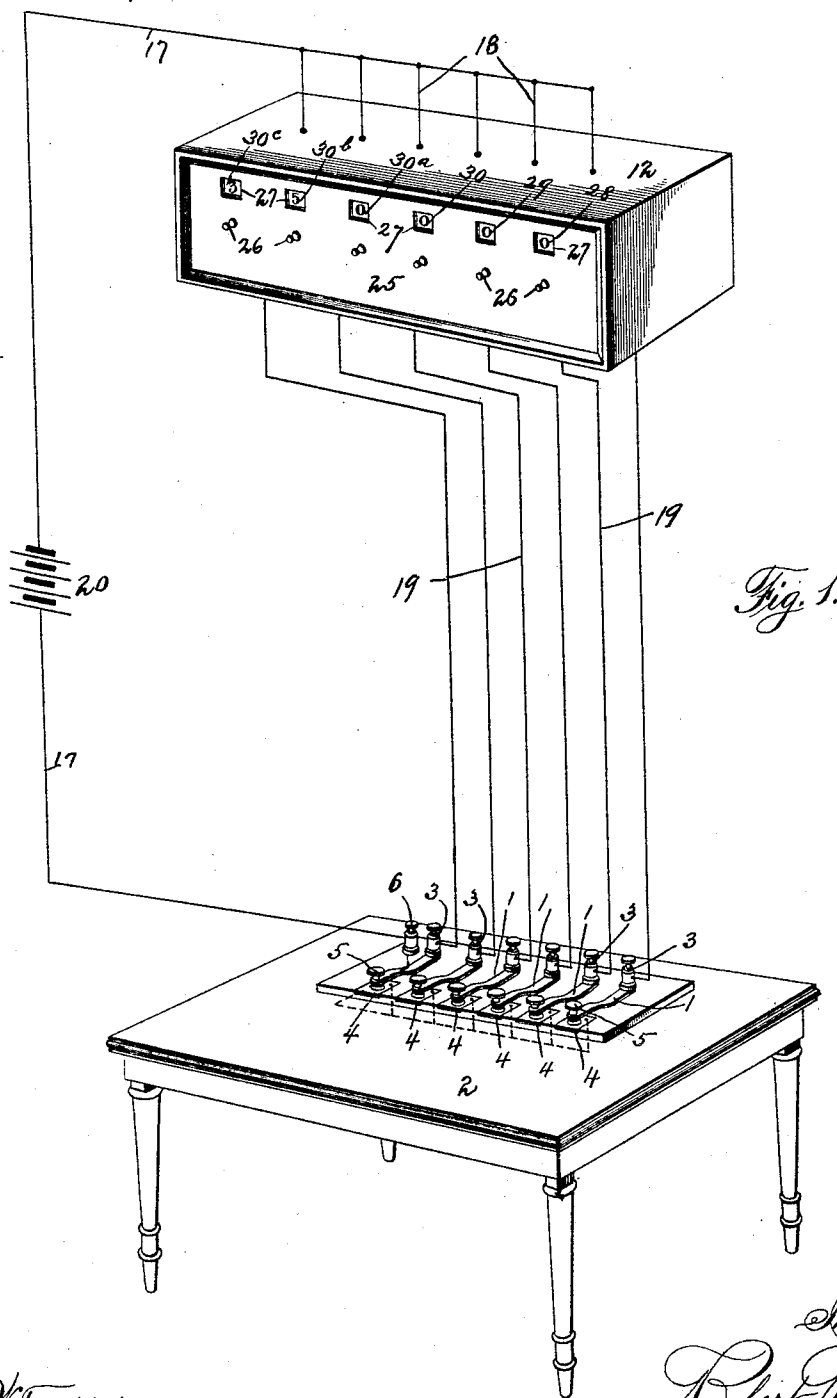


Fig. 1.

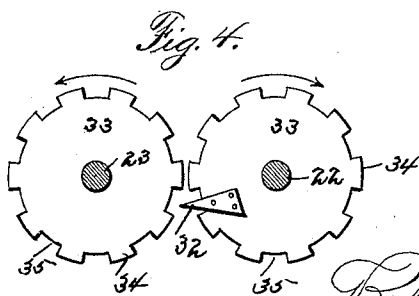
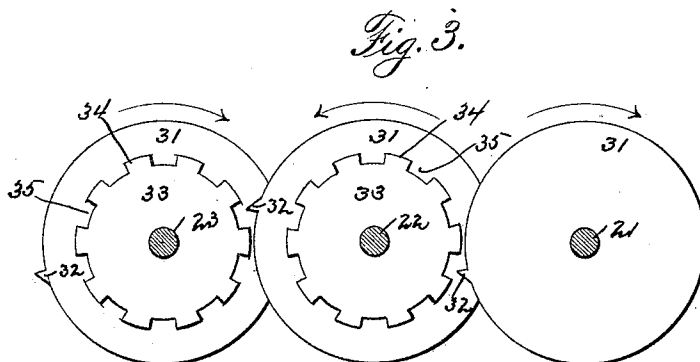
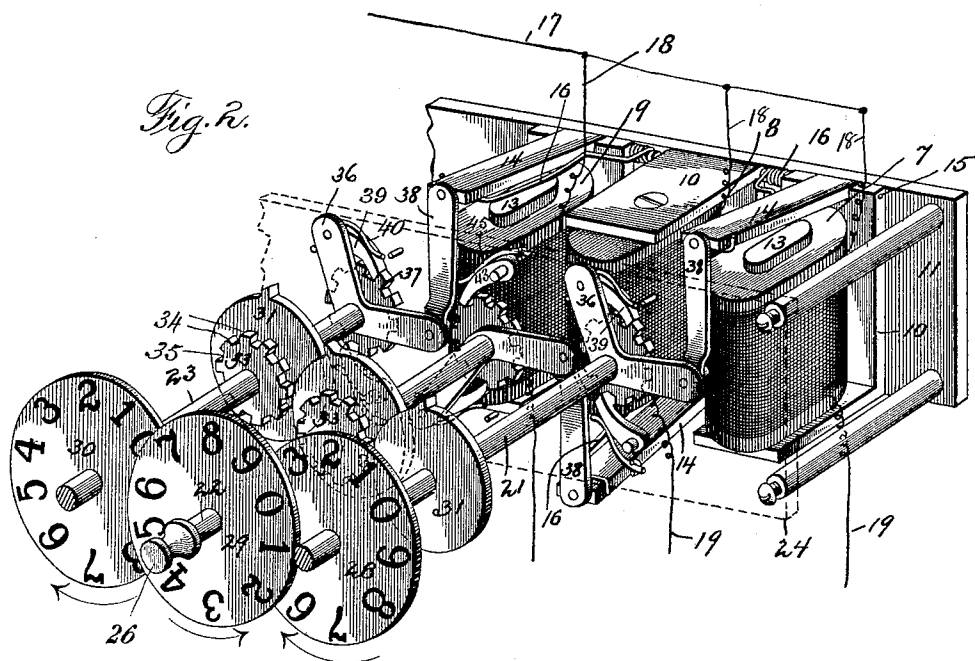
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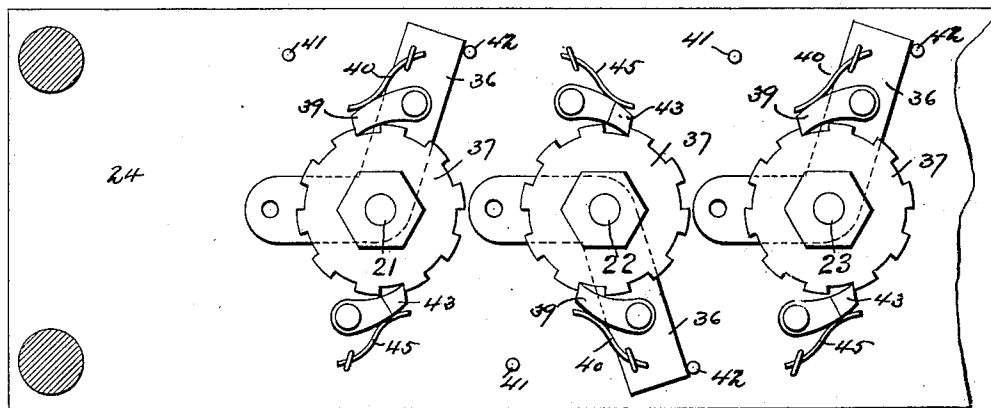
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Fig. 5.



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UNITED STATES PATENT OFFICE.

ROBERT BAUMANN, OF ST. LOUIS, MISSOURI.

ELECTRICALLY-OPERATED ADDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 522,097, dated June 26, 1894.

Application filed September 4, 1893. Serial No. 484,745. (No model.)

To all whom it may concern:

Be it known that I, ROBERT BAUMANN, of the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Electrically-Operated Adding-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

10 My invention relates to an improved electrically operated adding machine, and consists in the novel construction, combination and arrangement of parts hereinafter specified and designated in the claims.

15 In the drawings, Figure 1 is a perspective view, illustrating my improved electric actuated adding machine connected for operation. Fig. 2 is a detailed view in perspective, showing a series of adding disks mounted upon 20 their respective spindles and connected to the actuating magnets with parts broken away. Fig. 3 is a detailed sectional elevation of a series of adjacent spindles and actuating wheels made use of in carrying out my invention. Fig. 4 is a detailed sectional elevation, showing a pair of two actuating wheels 25 mounted on separate spindles, and provided with a modified form of connecting the mechanism. Fig. 5 is a rear elevation of a central 30 frame plate detached, and having operative mechanism applied thereto.

The finger keys for controlling the magnets of my improved machine may be of any common form.

35 In Fig. 1 I have shown a series of common make and break keys 1, arranged upon an ordinary table 2 so as to extend parallel, with their adjacent ends fixed to some portion of said table, and each provided with a binding 40 post, or screw 3, so that their opposite ends are free and project normally a distance above contact plates 4 also fixed upon said table. The ends of said keys are provided with finger knobs or buttons 5, by means of which 45 they may be manipulated.

6 indicates a binding post fixed upon the table separate from either key of the series.

7, 8, 9, indicate a series of electro magnets which are mounted upon the brackets 10, projecting horizontally from the vertical rear 50 plate 11 of the casing 12, in which the said magnets and the adding mechanism are lo-

cated. There are three or more brackets and magnets not illustrated. There may be any desired number of these magnets, as will be 55 explained farther on. Although these magnets may be of the ordinary cylindrical spool form, yet I prefer to make them of the shape herein shown so as to economize in the space occupied by them. I prefer to arrange these 60 magnets with their pole pieces 13 projecting vertically in alternate directions as shown in Fig. 2; that is, the pole piece 13 of the magnet 7 projects at the upper end of said magnet, while the pole piece of the next adjacent 65 magnet projects downward in an opposite direction to that in which the first mentioned pole piece projects and so on. Each magnet is provided with a vibrating armature 14, which is pivotally connected at 15 at its rear 70 end to the adjacent bracket 10, or some other portion of the casing so as to be vibrated or moved directly in front of the pole piece of its magnet with its forward end free. Each armature is provided with a suitable spring, 75 or spring arm 16, which has its rear end fixed to the adjacent bracket 10, or some fixed part of the casing, so that its forward end projects a distance forward, and is bent at an angle and engages beneath its armature, there being 80 a separate spring for each armature. These springs normally retain the armatures of the magnets a distance separated from their respective pole pieces.

The spools or coils of all the magnets are 85 connected by a conductor 17 and wires 18 and 19 in multiple, or parallel with a suitable battery, or other source of electricity 20, and with the binding post 6 and contact plates 4, binding posts 3 and keys 1, so that by depressing 90 any one or more of said keys into contact with their contact plates 4, the corresponding one or more of the magnets 7, 8, 9, will be energized, and the corresponding armatures will be attracted and drawn toward said magnets. 95

The electrical connections above described are so clearly shown in Figs. 1 and 2 that they will be readily understood by persons skilled in the art without further elucidation, they being the common multiple or parallel 100 connections well known to electricians.

The parts of the magnets 7, 8, 9, are preferably oval or elongated in cross section, as shown in Fig. 1, whereby each magnet is pro-

vided with flat opposite vertical sides, which may be placed very closely adjacent, and thereby permit of the magnets occupying a comparatively less space than they would if made in the usual cylindrical form, as space in a machine of this character is an important consideration.

The finger buttons, or knobs 5 of the keys 1 are to be numbered consecutively in a manner common in analogous machines, beginning with the key shown in the right hand of said figure, or they are otherwise provided with indicating characters, indicating units, tens, hundreds, &c., in any common manner. An important portion of my invention is that the numbered finger buttons and their keys may be located in one room, while the registering mechanism and its magnets may be located in a separate room or apartment many feet, or even one mile distant from said finger buttons, and be connected by suitable electric conductors as herein shown, and the operation will be substantially the same as if both the finger buttons and keys and registering mechanism were located in the same apartment, and closely adjacent within a single casing.

The location of the registering mechanism in one apartment and the finger buttons in another apartment is an arrangement that has proven very desirable in practice, for the reason that the operator manipulating the finger buttons will then have a check placed upon him, promoting accuracy and carefulness in such manipulation, for the reason that he cannot see the movement of the adding disks of the adding machine, and must exercise proper care in striking the finger buttons in the correct manner, which he otherwise might not do if the adding disks were in his presence and accessible to him.

We will now proceed to describe the adding or registering mechanism.

21, 22, 23, indicate a series of separate parallel spindles located each in a horizontal plane to rotate in bearings formed in the central frame plate 24 of the casing, and in the front plate 25 thereof. There are three or more parallel spindles not illustrated in the drawings. Each spindle carries a separate knob 26 upon its forward end, which projects in front of said front plate 25, and is accessible to the operator for a purpose hereinafter mentioned. Each of these spindles has fixed upon it, adjacent its forward end and in rear of the front plate 25 of the casing, an adding disk having indicating characters upon its front face. The characters upon each disk are preferably arranged radially, and are preferably in the form of numerals from naught to nine consecutively, and certain ones of the characters upon these several adding disks are arranged to be brought into horizontal alignment in the rear of the series of sight openings 27 formed in said front plate, or it may be a single longer slot, or sight opening formed in said plate, so that a hori-

zontal line of numerals will be exposed through said opening or openings during operation of the machine. The adding disks I will designate by the numerals 28, 29, 30, 30^a, 30^b, 30^c. The rear ends of these spindles are located each one in front of the magnet, and closely adjacent to same.

The spindles 21, 22, 23, are provided with transmitting devices for moving forward the next adjacent adding disk of next higher denomination, one step for each revolution of the next lower adding disk of the series. I have here shown these transmitting devices in the form of toothed-wheels or disks and spring-pressed pawls or dogs.

The spindle 21, which I will denominate the units spindle, has fixed upon it in rear of its adding disk 28, a disk 31 having a single peripheral tooth or projection 32, and each one of the remaining spindles of the series is provided with a similar disk 31 having the single peripheral projection 32, and also each additional spindle of the series is provided with a separate toothed-wheel 33, having ten peripheral teeth or projections 34 and ten peripheral spaces or depressions 35. These toothed-wheels 33 and the disks 31 are fixed upon their respective spindles so as to rotate therewith, and so that when the first or units spindle 21 is moved one rotation forward the peripheral projection 32 of the disk 31 will engage the teeth 34 and depressions 35 of the toothed-wheel 33 carried by the next adjacent spindle and moves said spindle and its toothed-wheel and disk 31 and its adding disk one step forward, and so on throughout the series of spindles and disks, in a manner similar to that in which the total adding mechanism and the common cash register operates.

It will be noted that the spindle 21 and its disk 31 is to be rotated in a certain direction, which is indicated by the arrow in Fig. 3. It will also be noted that the next adjacent spindle and disk are to be rotated in a reverse direction, and so on throughout the series. It will be further noted that the relative position and construction of the peripheral projection 32 of the disks 31 and the teeth 34 and the depressions 35 of the toothed-wheels 33, are such that the spindle and the adding disk of any one of the series above the units spindle and disk may be rotated separately and independently in a forward direction without disturbing the position of and without affecting the spindles and adding disks of lesser denomination below, which is a very desirable point of advantage in a mechanism of this class. This is accomplished by reason of the fact that the peripheral projection 32 of the disks 31 rests out of the path of the teeth of the next adjacent toothed-wheel 33 of lower order, so that said projection engages only the teeth and depressions of the adjacent toothed-wheel of the next higher denomination. (See Figs. 3 and 4.)

In Fig. 4 I have illustrated the modified construction in which I do away with the solid

disks 31, and locate the projections 32 one upon each of the toothed-wheels 33 and secure them in position by means of screws or rivets, so that they will project a distance beyond the teeth of said wheels and engage the teeth and depressions of the next adjacent toothed-wheel of the next higher denomination, in a manner similar to that which has just been described to move said wheels and their spindles.

Loosely mounted to rock upon the rear projecting-portions of the spindles 21, 22, 23 are bell-crank-levers 36, one upon each spindle in rear of the central frame-plate 24 and next adjacent the same. Fixed upon the projecting rear end of each spindle is a toothed-wheel, which I may term a ratchet-wheel 37. The ratchet-wheels 37 rotate with said spindles, but the bell-crank-levers do not. One arm of each bell-crank lever 36 projects to a position substantially in vertical alignment with the free end of the adjacent armature and is connected thereto by means of a connecting rod or bar 38, so that when said armatures are vibrated, said bell-crank-levers will be correspondingly rocked upon their spindles. Pivotally mounted upon the inner arms of the bell-crank-levers are pawls or dogs 39, the free ends of which engage the teeth of said ratchet-wheels 37 and are normally held in such engagement by means of suitable springs 40 having one of their ends fixed to said arms and their opposite ends free and engaging said pawls or dogs adjacent the free ends thereof, as shown in Figs. 2 and 5.

The bell-crank-levers 36 are connected to move their respective-ratchet-wheels 37 forward one step each time they are rocked, and each time their respective armatures 14 are vibrated. The rocking movement of said bell-crank-levers is limited in one direction by means of a pin or stop 41 which projects from the rear side of the central frame-plate 24 in the path of said bell-crank-levers, while movement of said bell-crank-levers in the opposite direction is limited by means of additional stops or pins 42 also projecting from the rear of said plate in the path of said bell-crank-levers.

It will be observed from the above described construction that the spindles and the parts carried thereby are mounted to rotate each in only one direction. A reverse rotation of said spindles and the parts carried thereby is prevented by means of pawls or dogs 43 upon the rear side of said central frame-plate 24 so as to engage the teeth of said ratchet-wheels. Common springs 45 have one of their ends fixed to said frame-plates 24 and their opposite ends free so as to engage said pawls 43 and normally urge them into contact with said ratchet-wheels, for said purpose.

The operation is as follows: If the operator desires to set all, or any one of the adding disks to zero, he may do so by grasping the projecting knobs 26, and rotating the same in the appropriate direction. By depressing the

units key into contact with its contact plate 4, an electric circuit will be established through said contact plate, the conductor 17, the battery 20 and one of the wires 18, the winding of the magnet 7, one of the wires 19, the binding post 3 and said units key, and the said magnet 7 will be thereby energized, and will attract its armature 14, drawing said armature downward to its pole piece in opposition to the power of its spring 16, and thereby moving the bell-crank-lever 36 upon the units spindle 21, and the pawl or dog 39 is thereupon made to engage one of the teeth of the ratchet wheel 37 on said units spindle, and said ratchet wheel and the parts carried by said spindle will thereupon be moved one step forward in the direction indicated by the arrow in Fig. 3. If the units adding disk had been set at zero prior to the above described operation, it would require ten separate steps of the kind above described to move the next adjacent spindle and adding dial of the next higher denomination one step forward, and so on throughout the series. The same operation takes place if any one or more of the keys of higher denomination be depressed into contact with their contact plates 4; that is, the adding disks of any order may be independently rotated without affecting those of lower denomination, but a complete rotation of any one disk imparts to the next disk of higher order a movement of one-tenth of a rotation. The reverse movement of the several spindles, and the parts carried thereby, is prevented by the spring pressed pawls 43.

The result of the adding operation may be readily ascertained by a glance at the sight opening or openings in the front plate 25.

What I claim is—

1. The combination of a series of keys provided with finger-buttons, a series of electromagnets, an armature for each magnet pivotally connected at one of its ends to the fixed portion of the frame of the machine, a spring for normally holding each armature a distance from the pole-piece of its magnet, electrical connections between said magnets and said keys whereby but one armature will be moved upon movement of one of said keys, a series of separate parallel spindles located each in a horizontal plane to rotate in bearings, a knob formed upon the forward end of each spindle, adding disks fixed one upon each of said spindles, one end of each spindle located adjacent a magnet, toothed-wheels fixed one upon each of said spindles adjacent said magnets, bell-crank-levers mounted loosely to rock one upon each of said spindles adjacent said toothed-wheels, pawls located one on each of said bell-crank-levers to move said toothed-wheels one step forward each time said bell-crank-levers are rocked, means for limiting the movement of said bell-crank-levers in each direction, pawls pivotally mounted adjacent said toothed-wheels to engage the teeth thereof and prevent movement of said spindles in a reverse direction, trans-

mitting devices for moving forward each spindle of the series by revolution of the first spindle, and connections between said armatures and said bell-crank-levers, substantially
5 as herein specified.

2. An adding machine having grouped within its casing or frame a series of electro-magnets in a horizontal line, with their pole-pieces projecting in alternate directions
10 throughout such line, armatures for said magnets, located one above each pole-piece which projects in one direction and below each pole-piece which projects in the opposite direction, a series of adding-disks mounted one
15 closely adjacent each of said magnets, mechanical connections between said armatures and said disks for rotating the latter, and electrical-connections for actuating said armatures.

3. An adding machine having grouped within its casing or frame in a horizontal line a series of electro-magnets each elongated in cross-section and constructed with flat opposite sides closely adjacent, a series of adding-disk spindles with ends adjacent said magnets and in the same plane that said magnets are in, and mechanical-connections for rotating said spindles when said magnets are energized, said last-named connections being
25 also in the same horizontal plane that said magnets are located in, substantially as herein specified. 30

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

ROBERT BAUMANN.

Witnesses:

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JNO. C. HIGDON.