(No Model.) 2 Sheets—Sheet 1.

W. W. ALEXANDER.

INDIVIDUAL CALLING APPARATUS.

No. 563,352. Patented July 7, 1896.

Fig. 1.

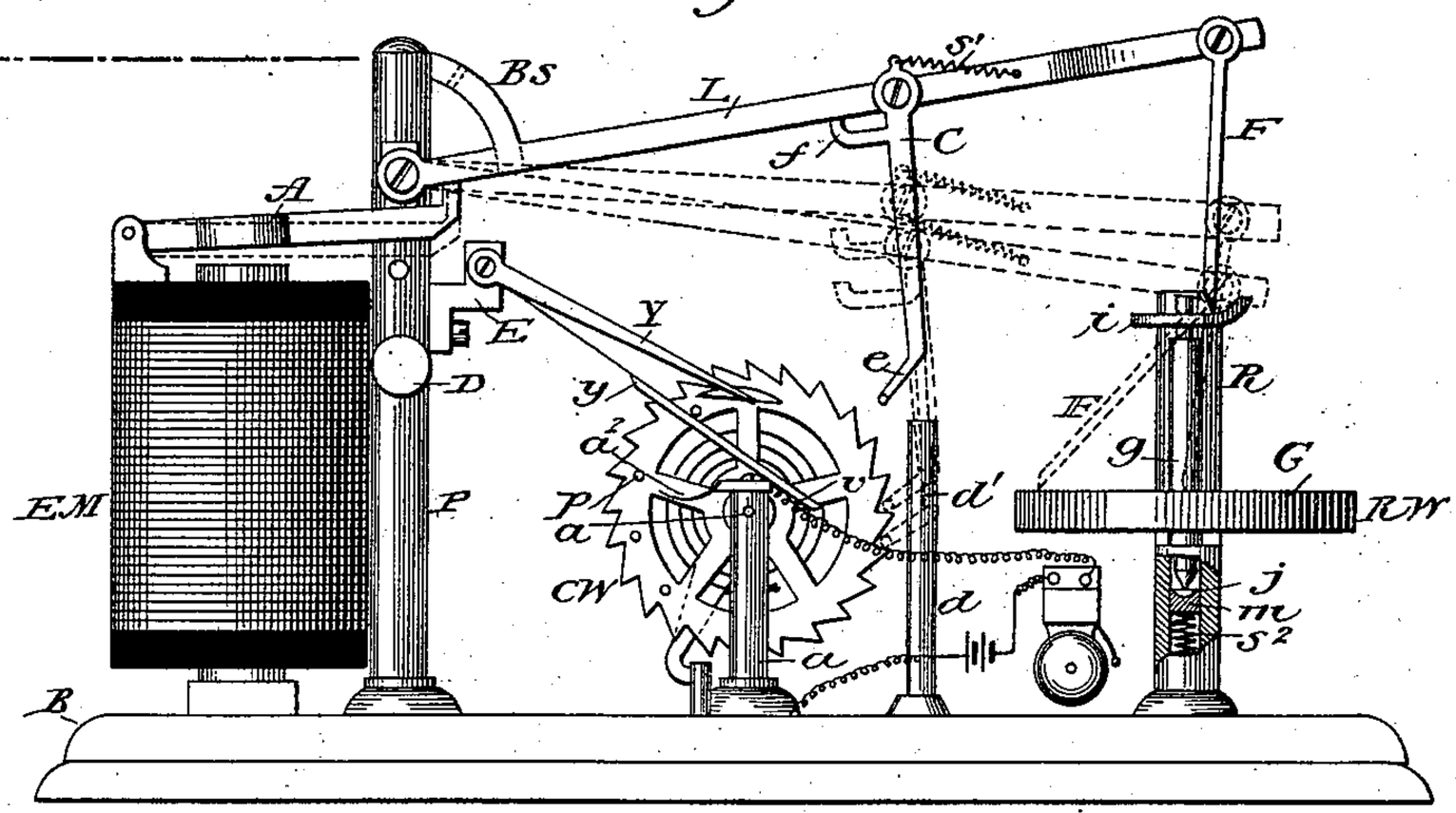
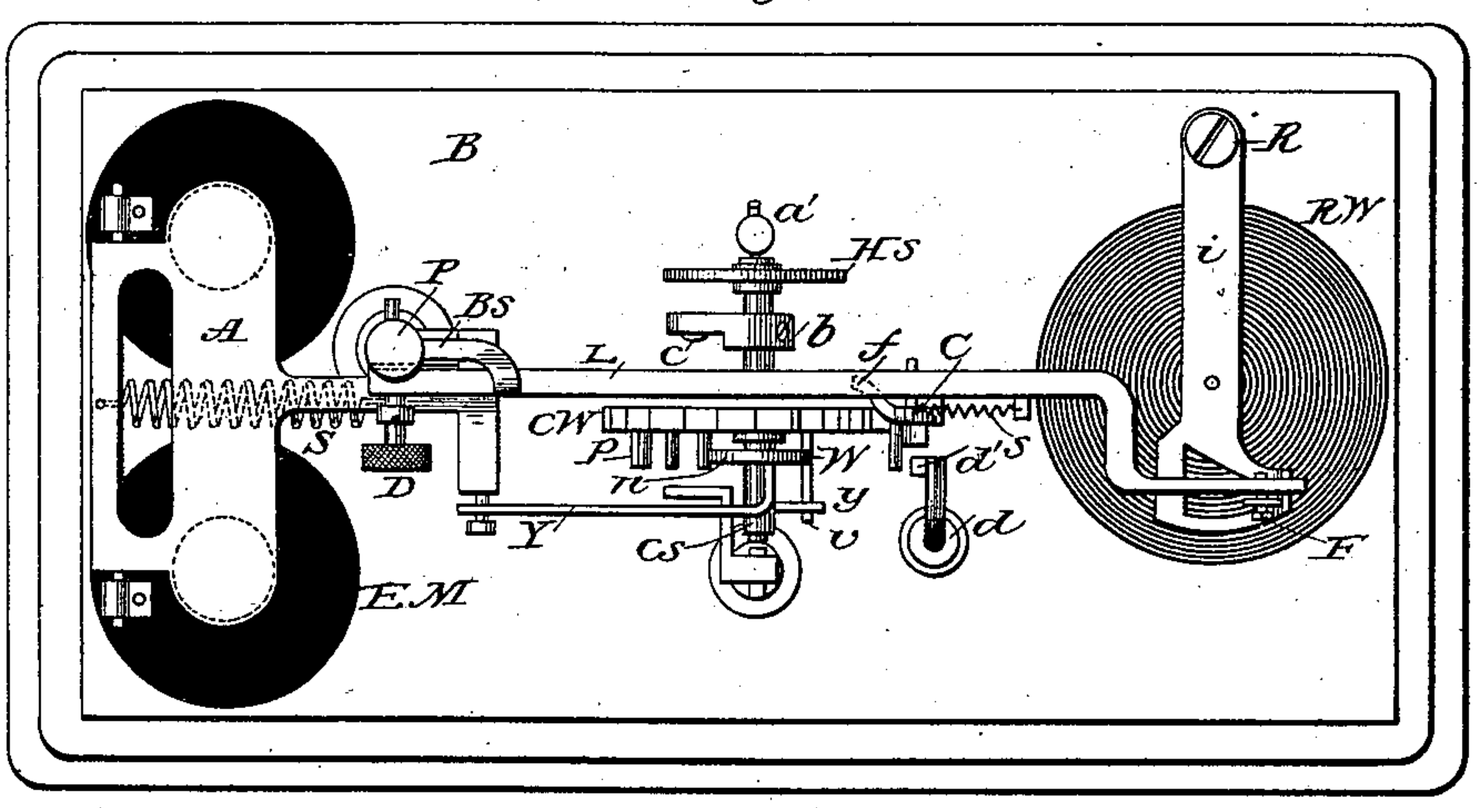


Fig. 2.



Witnesses:

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L. L. Heinrichs

Inventor:

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by E. E. Masson, Atty

(No Model.) 2 Sheets—Sheet 2.

W. W. ALEXANDER.

INDIVIDUAL CALLING APPARATUS.

No. 563,352. Patented July 7, 1896.

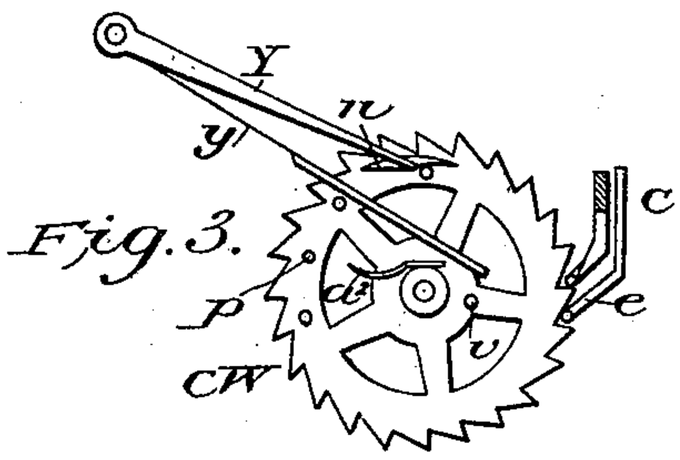

Fig. 3.

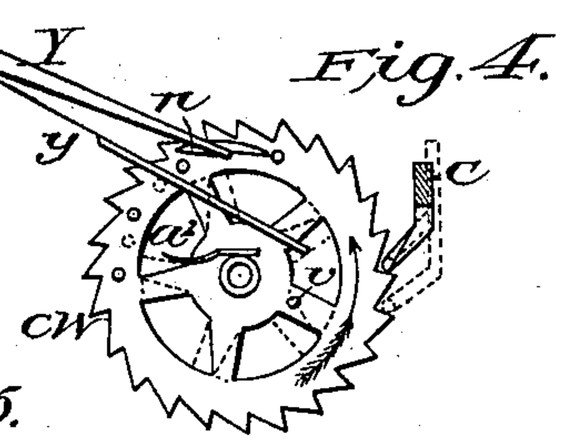

Fig. 4.

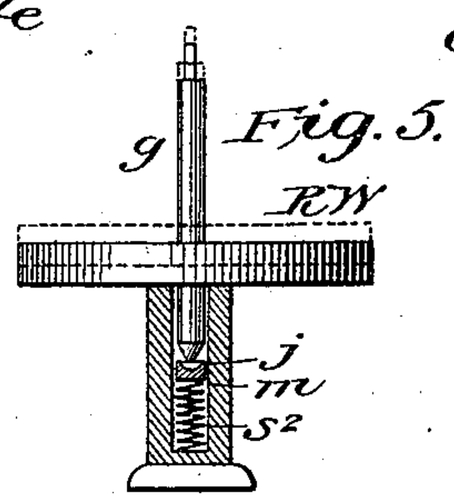

Fig. 5.

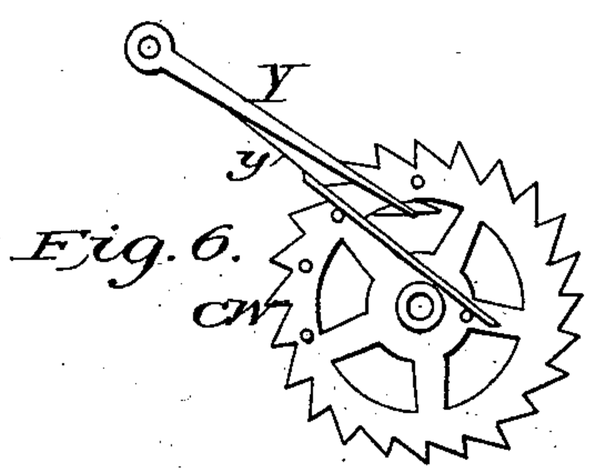

Fig. 6.

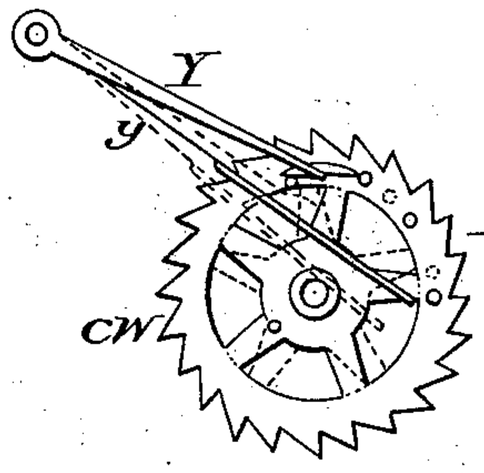

Fig. 7.

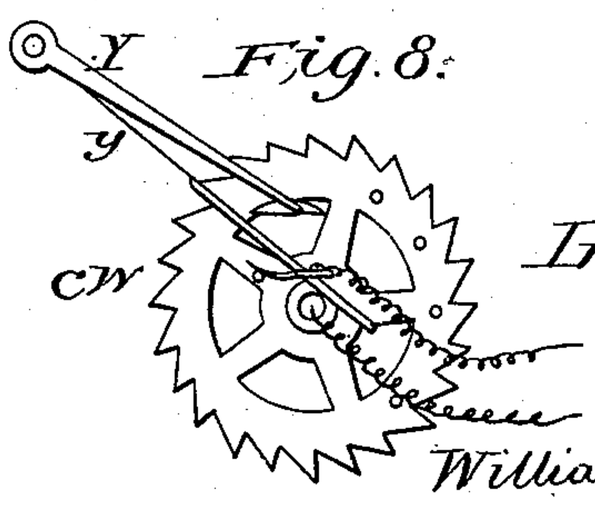

Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM W. ALEXANDER, OF KANSAS CITY, MISSOURI.

INDIVIDUAL CALLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 563,352, dated July 7, 1896.

Application filed April 8, 1893. Serial No. 469,581. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. ALEXANDER, a citizen of the United States, residing at Kansas City, in the county of Jackson, State of Missouri, have invented certain new and useful Improvements in Electromechanical Combination-Locks, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to devices known as "individual" calling apparatus, and the objects of the improvement are to simplify and reduce the cost of construction; second, to increase the certainty of operation of the device at all times and render it substantially free from injury while under transportation. I attain these objects by the construction hereinafter described, and shown in the drawings, in which—

Figure 1 is a side view of an apparatus constructed in accordance with my invention. Fig. 2 is a plan view of the same. Figs. 3, 4, 6, 7, and 8 are side views of the combination carriage or wheel, its detent or retaining pawl, pushing-pawl, butting-stop, combination-pins, and lifting-pin. Fig. 5 is a side view of the retarding device.

In said drawings, B represents the base upon which is mounted an electromagnet EM, the armature A of which is mounted upon the heads of said electromagnet and adapted to operate the lever L, that is pivoted to a post P. Said lever has pivoted thereto at its outer end a retarding-pawl F, and also has nearer its center a pushing-pawl C, provided with a tension-spring s'. Said lever also has an upward projection or back-stop BS, adapted to abut against the post P. A retractile spring S has one end attached to an adjusting-screw D and its opposite end to an extension-leg projecting down from the armature between the spools of the electromagnet, to retract and thereby raise the armature after the depressing action of the electromagnet has ceased, and to also raise the lever L and its parts to normal position.

Mounted upon the post P is a bracket E, upon which is pivoted a detent Y, having thereunder an arm y. The free end of the detent engages upon the pins p, projecting from the front side of the combination-carriage, and the free end of the arm y engages with the pin v, also projecting from the front side of the carriage CW.

The carriage CW is propelled or pushed against the tension of a light spiral spring HS, that is mounted upon and has one end secured to the shaft CS. The other end of the spring HS is attached to a post a' alongside of said spring. The carriage CW is also secured upon the shaft CS. The shaft CS is received in bearings in the posts a a' and is provided with an adjustable back-stop b, which is adapted to strike against a post c, projecting upward from the base. Mounted upon the base B, a little to the right of the post a, there is another post d, which has its upper end bent to form a limiting or butting stop for a projection e, extending laterally from the lower end of the pawl C.

Near the pivot or upper end of the pawl C there is a bent projection f, which is adapted to engage with the bottom of the lever L (by virtue of the spring s') when said lever is raised toward normal position, and (by virtue of the difference in the location of the bearings of the lever L and of the carriage CW) causes the lower end of the pawl C to become disengaged from the carriage CW. Said arm f is also a limiting-stop to the backward motion of said pawl. Standing upon the base adjacent to one end thereof there is a hollow post G, within which a jewel j is mounted in a bearing-cup m, supported upon a spring s^2.

Bearing upon the jewel j rests the pivot of a shaft g, upon which is mounted a retarding-wheel RW. Standing upon the base beyond the periphery of said wheel there is another post R, which carries upon its upper end a substantially horizontal arm i, the free end of which has a slot to receive and guide the pawl F, while the latter is near the center of its downward course. Within the arm i a bearing is formed for the upper pivot of the shaft g.

In operating the apparatus, if a sufficient current of electricity is sent through the electromagnet EM, the armature A will be drawn downward against the tension of its spring S, thereby allowing the lever L to fall by gravity to the position shown in dotted lines in Fig. 1. If the current is continued for a short time only, the lever L will only fall to the upper position shown in dotted lines, because the

said lever L carries the pawl F, which by that time will have struck upon the wheel RW and the inertia of said wheel prevents the lever L from immediately falling farther; and, as will be seen by the drawings in Fig. 1, the said wheel RW must be revolved some distance before the lever L can make or complete its full downward motion. If the current is continued for a longer time, the lever L will thereby fall to the lower position shown in dotted line in Fig. 1. Therefore if a series of impulses are closed through EM, a corresponding series of motions are transmitted to the lever L, and by it to the combination wheel or carriage CW. If the lever L falls to the upper position shown in dotted lines in Fig. 1, I will call it a "short" impulse, and the one that allows it to fall to the lower position in dotted lines a "long" impulse.

When a short impulse is made, the combination-carriage CW, being acted upon by the pawl C, will be propelled two teeth, as will be seen in dotted lines in Fig. 1, and when a long impulse is made the said carriage will be propelled three teeth. This difference in the distance that the combination-carriage CW is propelled by a short or by a long impulse forms the basis of the permutation for the combination. The combination to which this device is set in the present case is two long, followed by three short impulses and one long one, as is indicated above Fig. 1, and represented by long and short lines with spaces between them; and if the carriage CW is at zero or normal position, as in Fig. 1, and a short impulse is made, the carriage being only propelled two teeth will not be quite far enough advanced for the notch in the detent Y to engage with the first pin or projection in the combination, and consequently when the lever L returns to the top of its course the carriage CW will return to normal position by virtue of the spring HS; but if a long impulse is made the carriage CW will be propelled far enough to allow the notch in the detent Y to engage with the first pin in the combination. Fig. 3 represents the carriage CW and detent Y in said position, which is the first long impulse in the combination made correctly; and now, as before, if a short impulse is made the carriage CW will not be propelled three teeth or far enough for the detent to engage with the second pin in the combination; and when the carriage CW starts to return to normal position the detent Y, acted upon by gravity, will fall below the path of the combination-pins, as shown in Figs. 6 and 8, and will not therefore offer any obstruction or resistance to its backward motion. As shown in Figs. 4 and 6, the direction of motion is indicated by the arrow, and the dotted lines in Fig. 4 show the position before it commenced to return to normal position. When the carriage CW has nearly reached normal position, the first pin v becomes engaged with the lower spring-arm y of the detent Y and partially elevates it just before the first combination-pin passes its hooked point or end n, thereby causing the spring portion of the arm y to be slightly pressed upon as the said pin passes the end n, which immediately springs up after the pin has passed, as illustrated in Fig. 1, so that it will ride over the pins as the carriage CW is rotated, and be thereby enabled to retain said carriage after each correct impulse, or not, as the case may be; but if it is supposed that instead of the last short impulse a long one was made, the carriage CW in that case would be propelled far enough to allow the notch on the under side of the detent Y to engage with the second pin in the combination and retain said carriage CW, as before described. Starting from the last-described position, the next impulse in the combination is a short one, and if a long one is made instead, as shown in Fig. 7, the carriage CW would be propelled too far for the third pin in the combination to engage with the notch of the detent Y, and consequently the carriage CW would return to zero or normal position, as before described; but instead of a long impulse, if a short one is made, the carriage in that case would be propelled two teeth, or the proper distance for the third pin to engage with the notch of the detent Y, as before described.

The same actions will occur throughout the entire combination of short and long impulses; that is, reversing or returning to zero, or being retained after each impulse, as the case may be, until the entire combination of impulses are correctly made in their order from the start. Then a contact-spring a^2, mounted with insulation upon the post a and lying in the path of the pin v (and forming the terminals of an electric circuit) touches said pin v, as shown in Fig. 8, and thereby completing said circuit, which may be used for signaling a telegraph-operator or for many other purposes of a like nature.

The apparatus may be arranged to have the pin v to mechanically or directly operate mechanism by its motion when it has reached a certain point, also the combination-carriage may be a wheel, segment, or bar, and it may be provided with different number of teeth, the only essential feature being that the carriage CW be propelled a number of teeth for a short impulse, said number being an uneven or unequal multiple of the number of teeth propelled for a long impulse, and vice versa. The arc or distance of motion imparted to the carriage CW by one or two short impulses must differ from the motion imparted by one long impulse.

Having now described my invention, what I claim is—

1. An electromechanical combination-lock, provided with a combination-carriage CW having pins or projections p and a longer restoring-pin v, a detent Y acting upon said pins p, the longer restoring-pin acting on the lower arm y of said detent, a pivoted lever L hav-

ing a pawl C pivoted thereto and provided with a limiting-stop *f* adjacent to its upper end and a lateral extension or pin *e* on its lower end, said pin *e* being to engage with a stationary butting-stop *d'* and thereby check the inertia of the carriage CW, a detaining-pawl F and retardation device RW mounted on shaft *g* resting on a spring-support *m* substantially as described.

2. The combination of the pivoted lever L, the retarding-pawl F and wheel RW, with a shaft *g* bearing upon a jewel *j* resiliently mounted upon a spring substantially as described.

3. The combination of the wheel RW, its shaft *g* supported upon a resiliently-mounted jewel *j*, with a retarding-pawl F having a movable pivot-support substantially as described.

4. The combination of the wheel RW, the retarding-pawl F, and its stationary guide *i*, the shaft *g* for said wheel, the jewel *j* for said shaft, its bearing and the spring *s* for said bearing substantially as described.

5. The combination of a carriage CW, having ratchet-teeth, a propelling-lever L, and a retarding device RW, having its shaft resting upon a yielding support and so constructed and arranged that the combination-carriage will be propelled by a short impulse a distance not an equal multiple of the distance propelled by a long impulse.

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

WILLIAM W. ALEXANDER.

Witnesses:
AUGUST JOHNSON,
GARRETT ELLISON.