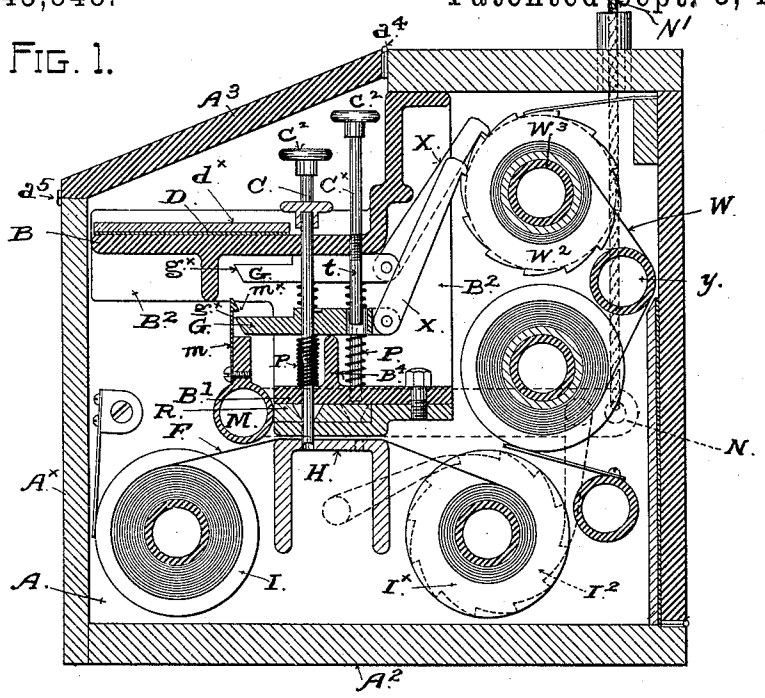
(No Model.) 2 Sheets—Sheet 1.

H. A. CLIFFORD.

VOTING MACHINE.

No. 545,848. Patented Sept. 3, 1895.

FIG. 1.



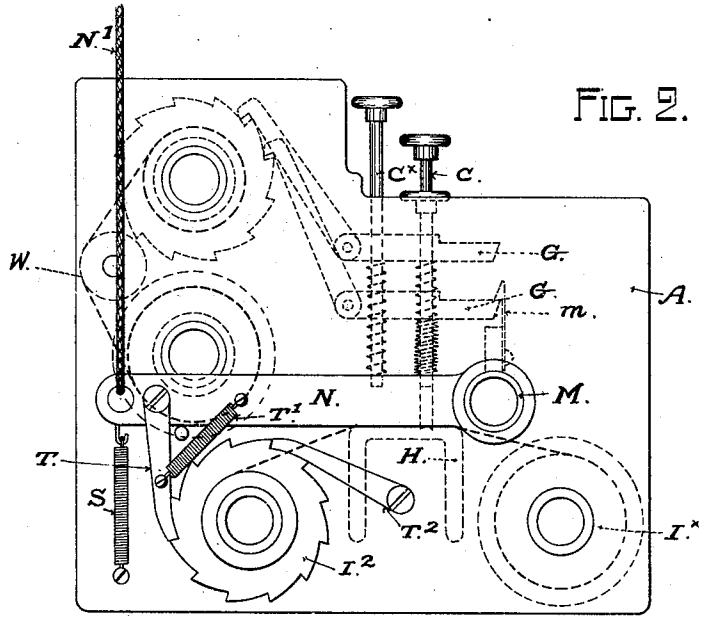


FIG. 2.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

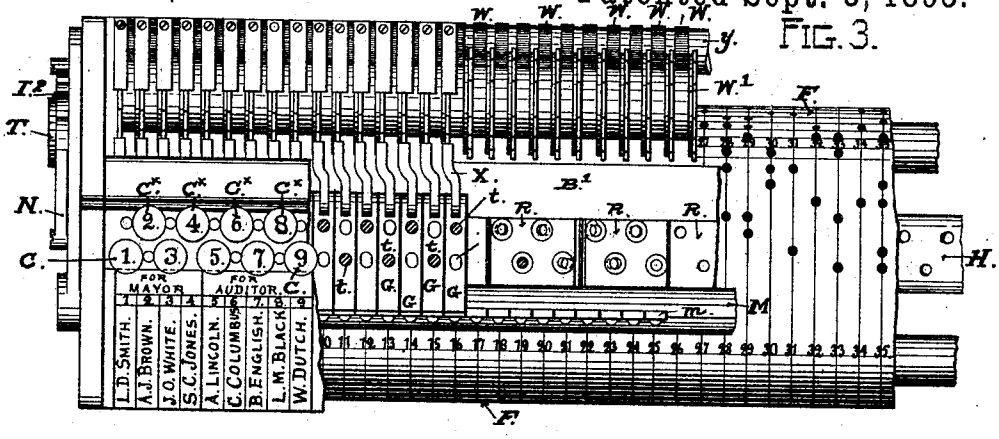


FIG. 4.

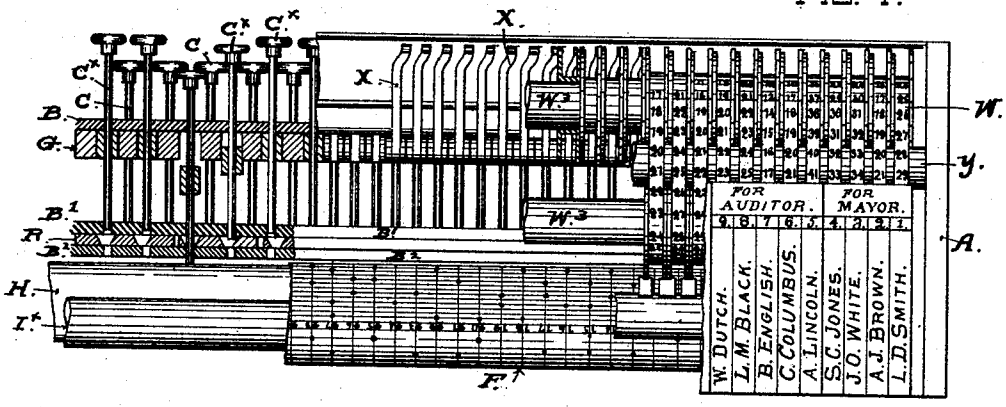


FIG. 5.

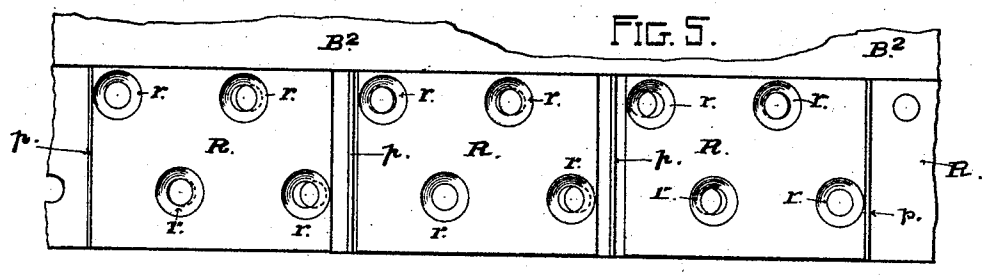
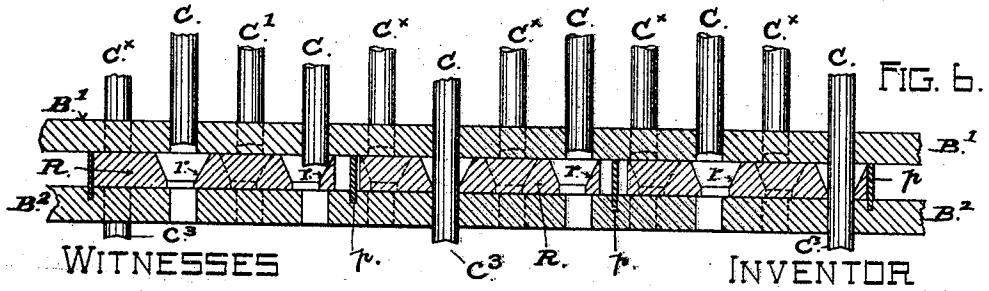


FIG. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

HERSEY A. CLIFFORD, OF SAN FRANCISCO, CALIFORNIA.

VOTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 545,848, dated September 3, 1895.

Application filed May 28, 1894. Serial No. 512,697. (No model.)

To all whom it may concern:

Be it known that I, HERSEY A. CLIFFORD, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Voting-Machines, of which the following is a specification.

This invention relates to improvements made in machines or apparatus for registering votes such as are generally known as "voting-machines;" and the said improvements consist in certain novel constructions and combinations of parts and mechanism, as hereinafter particularly described, and pointed out in the claims.

The principal parts or features of these improvements comprise push pins or keys of novel construction and arrangement, in combination with individual register-tapes and a counter-register sheet common to all the keys, and means whereby the tapes and the sheet are moved and spaced step by step; also in combination with the push-pins or key mechanism of novel construction controlling the keys and so governing their movements that not more than one key in each set or number or series can be operated by a voter.

The nature of these improvements and the manner in which I proceed to construct and produce a machine for registering the votes of a number of candidates for different offices at a municipal election are fully explained in the following description, in which reference is made to the accompanying drawings, forming a part of this specification.

Figure 1 represents a vertical transverse section of a machine constructed according to my present invention. Fig. 2 is an end elevation, taken from the left-hand end of the machine. Fig. 3 is a plan or top view of the parts of the mechanism with the inclosing box or case removed and with the keyboard and parts of the mechanism under it broken away to uncover mechanism beneath. Fig. 4 is a view in elevation, taken from the back of the machine, with portions broken away to expose parts of the mechanism that otherwise would be covered. Figs. 5 and 6 are views in detail, on an enlarged scale, of parts relating to the key-controlling mechanism, Fig. 5 being a plan of the plates through which the keys work, and Fig. 6 a longitudinal section through the same parts at about the line x y, Fig. 5, with the keys added to it.

A $A^{\times}$ A^{2} indicate the sides, ends, and bottom of a box or case covering and inclosing all the mechanism.

B is a flat keyboard formed of a metal plate, in which are two rows of holes for the keys C C′. Over this keyboard is a hinged lid or cover A^{3}, attached to the case at A^{4} and provided with a lock a^{5} at the opposite side to fasten it down over the keys. In front of the first row of keys along the keyboard is placed a tablet or strip D, on which are printed or marked in clear characters the names of the different candidates in regular order, the strip being divided, as indicated in Fig. 3, into sections corresponding to the offices or positions for which the candidates are standing, and each section separated or subdivided by parallel lines into as many columns as there are names of candidates. The keys are arranged in two rows, with those in the one row opposite the space between those in the other row, and the divisions on the tablet at the front are in line with the keys, so that at the back of each division is the key of the candidate whose name is read on the tablet. Over the tablet D is a glass plate $d^{\times}$, through which the names can be read. This manner of arranging the keys in double row brings the keys and the mechanism operated by them into compact form and at the same time allows the keys to be placed sufficiently apart to prevent mistakes in striking one key for another on the part of the voter.

Below and parallel with the plate B, hereinbefore termed the "keyboard," is a stationary bed-plate B′, either cast in one piece with that part or fixed between the perpendicular end pieces B^{2} across the space under the keyboard.

The before-mentioned plate is perforated with holes corresponding both in number and in position with the holes in the keyboard above, and in these holes the rods C that form the keys are fitted to work up and down without binding.

Each key has two offices or functions in the machine, of which the first is to operate at every stroke of the key a pawl-and-ratchet mechanism and move a register-tape the distance of one number, and the second is to

punch in or mark upon a register-sheet every stroke or movement of the key, so that in addition to the registration of the vote the mechanism produces on a single sheet of paper a permanent record of the individual votes cast or registered for each candidate. To such end the top of each rod terminates above the keyboard in a knob or head c^2 and the end below the keyboard in a punch or cutter c^3, the rod C being of such length that when it is pressed down the punch on the lower end will penetrate or mark a sheet of paper F, supported beneath the bed-plate B′. This sheet, before mentioned, is supported by a stationary bed or die plate H, fixed in position beneath the plate B′ and perforated with holes h h for the punches, suitable space between the surface of the piece H and the under side of the bed-plate being provided for the register-sheet to pass through without binding. A single piece of paper stretched over two rollers I $I^{\times}$ is used for the whole set of keys in the machine, the sheet being drawn off one roller and taken up on the other roller by a pawl and a ratchet-wheel actuated from the outside of the machine.

When a key is pressed down, its lower end penetrating this sheet records the movement of the key, and similarly the movements of every key in the machine produced by the voter are permanently recorded on the register-sheet. To prevent repetition of the stroke of a key by the same voter, however, every key is locked after it is depressed, and it cannot return to position until specially released, which operation is to be effected by the official in charge of the machine after the voter has finished. The locking mechanism consists of a cross-bar G on the rod of every key attached to and moving up and down with the rod, and a spring-catch $g^{\times}$, having a notch or shoulder $m^{\times}$ set in the path of the point or front end $g^{\times}$ of the cross-bar in such position that in the downward movement of the cross-bar its end $g^{\times}$ slips under the shoulder before mentioned and holds down the key. A coil-spring P, placed around the rod between the cross-bar G and the fixed bed-plate B′ beneath it, bears against the cross-bar and is compressed by the downward movement of the key. The reaction of this spring throws up the key when the spring m is drawn away. There is a separate cross-bar for each rod or key and a separate spring-catch for the same, and the whole set or number of spring-catches are fixed on a single rock-shaft M, by the movement of which all the depressed and locked keys are released, and the machine is reset after every voter has operated it and before the next voter is allowed to move the keys.

The spring m is secured to the rock-shaft by a screw n, with the catches $m^{\times}$ standing upright and in line along the row of cross-bars G. The ends of the rock-shaft M are journaled in the sides of the case, and one end extends through the case to the outside to take an arm or lever N. The arm N extends horizontally backward closely against the side of the case, and to its free end is attached a cord N′, that is carried from that end upward to any convenient point more or less distant from the machine, to be operated by the officer in charge. When the cord is pulled, the upward movement of the arm N turns the rock-shaft, and the whole number of keys held down by the cross-bars and the spring-catches are released simultaneously. The arm N is thus moved in one direction by the cord and is drawn back to position again by a spiral spring S when the cord is released. In addition to this work the arm N actuates a pawl T, that engages a ratchet-wheel I^2 on the outer end of the axle of one of the register-sheet rollers, whereby the sheet is moved along a given distance under the punches after the keys are released and restored to position. As already described, the arm N by its upward movement, releases the keys from the holding-down catches, and so afterward the downward movement of the arm turns the ratchet-wheel I^2 by working the pawl T. A spring T′, attached to the pawl and the arm of the rock-shaft, holds the end of the pawl in working contact with the teeth of the wheel, and the parts are so arranged that the roller is turned to draw off the sheet from the other roller the proper distance for spacing the register-marks between one depression or operation of the keys and the next operation of the keys. A guard-pawl T^2 is placed on the side of the keys in working position, as shown in Fig. 2, to prevent backward movement of the roller. Tubular rods are used for all the shafts and axles in the machine to reduce the weight of the parts and also to secure strength and stiffness.

As already described, the keyboard of the machine contains an individual key for every candidate, and all those for the same office or position are grouped or arranged together in one division, provision being made for as many names and keys in each division as there are candidates for the office. As, for example, in the first division of the keyboard, in Figs. 3 and 4, contains the names of four candidates for the office of mayor, and in the keyboard there are four keys numbered to correspond with the numbers in the column or spaces composing the division, and each one in line with the name, while the next division is composed of five different names of candidates for the office of auditor, with five keys similarly numbered to agree with the numbers on the name-bearing spaces. In this way the keys are arranged and associated with the names of the candidates, so that each one can be selected and operated by the voter without difficulty, either by taking the key which is directly in line with the name of the candidate he desires to vote for in each division of the keyboard or else selecting the key by its number. Not more than one key in each division of the keyboard can be op-

erated by the same voter, however, for the reason that when the first key is depressed it is held down and cannot be restored to position until the voter has left the machine, and in its movement this first depressed key cuts out all the other keys in the same division of the keyboard, so that none of them can be moved. The means by which this is effected is both simple in character and certain in its operation. It consists of a plate R, set closely against and movable freely beneath the under side of the fixed plate and having holes in it corresponding in number with the holes for the keys C in the fixed plate. These holes *r* in the plate R are counter sunk or made with beveled top edges in the upper face of the plate, and the cylindrical portion of the hole has the same diameter as the holes in the fixed plate; but while the distances between the holes in the plate last mentioned, measuring from center to center of the holes, are uniform the corresponding distances between the countersunk holes in the movable plate R vary both with the holes in the same plate and the holes in the fixed plate, and the same are so arranged with reference to the spaces or distances between the holes in the fixed plate that the movable plate cannot be set in position against the fixed plate to bring more than one of its holes in line with the corresponding hole in the fixed plate. The position and operation of this movable plate in each division will be understood from Figs. 5 and 6 of the drawings.

In the construction and arrangement herein shown the sliding plate for each set of keys is confined between the under face of the fixed plate B′ and a bar or plate B^2 of corresponding length and width bolted to the fixed plate, as shown in Fig. 1. This plate B^2 is formed with an offset about equal to the thickness of the movable plate R, so that while confined between the two fixed plates the movable plate can slide both laterally or from side to side and longitudinally or forward and backward.

The sliding plate for the keys of each division of the keyboard is separated from the corresponding plate in the next division and is limited in its lateral movements by a dividing-strip *p* set between the two fixed plates B′ B^2, so that the movement of one plate can not affect the adjacent plate on either side. The sectional view, Fig. 6, illustrates the sliding plates and the positions which they assume in several divisions of the keyboard when different keys are depressed, and from that figure and the top view of the sliding plate, Fig. 5, the operation of the sliding plates will be readily understood. In its elevated position of a key its lower end rests in the hole of the fixed plate and clear of the sliding plate beneath; but the corresponding hole in the sliding plate is either directly in line with the end of the key or it is more or less out of line, according to the position of the sliding plate with respect to the ends of the keys that rest in the fixed plate above. This position is such that the extreme edge or margin of the countersunk portion in each hole of the sliding plate is just outside the circumference of the hole in the fixed plate above, and consequently when a key is depressed its lower end must strike against the inclined face of the hole beneath and bring the sliding plate into position, so that the end of the key will pass through the sliding plate and into the fixed plate below. It will be seen, however, that such movement of the sliding plate can take place only when there is no key in it, and as long as a depressed key is held down by the locking mechanism no other key in the same set or division of the keyboard can be pressed down, because all the remaining holes in the sliding plate will stand out of line with the corresponding holes in the fixed plate, and if any one of the keys should be depressed it cannot pass through the plate.

Each key of the keyboard, in addition to its function as a punch or marker in registering the vote on the sheet F, operates by its downward movement a ratchet-wheel W^2 on one of a pair of spools or rollers W′ carrying a register-tape W, and the whole set of these tapes are mounted on horizental shafts or axles W^3 at the back of the case in close order, the tapes being brought into line with a sight-opening at the back of the case by a roller *y*, placed between the two sets of spools, as shown in Figs. 1 and 4. The tape W is drawn from the lower spool and wound on the upper spool at every depression of the key a distance corresponding to the space between one number and the next on the tape, and the total number of movements of each separate key is thus read from its tape at the back of the machine. The ratchet W^2 on the upper spool is turned by a pawl *x*, that is pivoted at one end to the cross-bar G on the key C, and at the opposite end is hooked to engage the ratchet-teeth of the wheel W^2, so that, as the cross-bar is moved by the key to which it is attached, the pawl is operated at the same time. This operation takes place on the downward movement of the key, at which time the cross-bar is carried down, while in the contrary movement when the key is released the pawl is set up for the next movement.

The cross-bars are kept in line by guide-pins *t*, fixed in and extending downward from the top plate of the keyboard through a hole in the cross-bar and in line with the key C. The position of these pins is also shown in Fig. 3 at that part where several of the cross-bars are exposed to view. The pins are represented in section, but the keys are omitted, showing only the holes in each cross-bar through which the keys work. Each cross-bar thus sets on a key, with which it moves up and down, and on a perpendicular guide-pin *t*, which is either in front, or behind the key, according to the position of the key on the keyboard, whether in the front row or in the rear row. The extent of the cross-bar's

movement downward is limited by a standing rib B^4 across the top of the fixed plate and extending from one side piece to the other between the two rows of keys, as above in Fig. 1, and in the opposite direction the cross-bar strikes against the top plate of the keyboard as the key is raised to position by the reaction of its spring.

The rod that forms the key is of such length that when the cross-bar strikes and is arrested by the fixed rib or projection B^4 the punch on the lower end of the rod has passed through the fixed guide-plate B^1 and has penetrated the register-sheet beneath it. Immediately under this portion of the sheet so fixed the die-plate H receives the cutting ends of the punches. This part is fixed in place between the two rollers to carry the register-sheet.

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

1. The combination, with the key-board consisting of push-rods provided with punches or marking devices on their lower ends, and stationary guide-plates through which the said rods are fitted to move, of the rollers, the register-sheet carried thereby, the cross-bars connected with and actuated by the push-rods, the rock-shaft and the spring-catches thereon adapted to hold down the push-rods by engaging the catches, the pawl and the arm on the rock-shaft, the ratchet-wheel on one of the register-sheet rollers and a pawl on the said arm engaging the ratchet-wheel, for operation as set forth.

2. The combination, with the key-board consisting of the push-rods and the stationary guide-plates through which the said rods move; of the cross-bars connected to the push-rods, the pivoted pawls on said cross-bars, an individual register-tape and carrying spools to every push-rod, a ratchet-wheel on one of said spools with which the pawl of the cross-bar engages, a locking means to hold down the push-rod when it is depressed, a means to release it, and a spring to throw up the push-rod at such release, for operation as set forth.

3. The combination, with a key-board composed of push-rods arranged in two or more rows, and carrying punches or marking devices on their lower ends; of the stationary guide-plate B′ having holes in which the lower ends of the push-rods are held, the stationary plate B^2 beneath said guide-plate having holes through which the ends of the push-rods pass when said rods are depressed, the stationary die-plate H, the guide-strips *p*, and the set of separately movable slide-plates R having counter-sunk holes in rows corresponding with the rows of push-rods in the key-board, said holes in each slide-plate being so spaced that when one hole is set in line with the hole in the stationary guide-plate B′ to allow the push-rod to pass through all the remaining holes in said slide-plate are out of line with the holes in the stationary plate, for operation as set forth.

In testimony that claim the foregoing I have hereunto set my hand and seal,

HERSEY A. CLIFFORD. [L. S.]

Witnesses:
EDWARD E. OSBORN,
C. W. M. SMITH.