

No. 701,314.

Patented June 3, 1902.

F. L. DYER.
ASSEMBLY VOTING MACHINE.

(Application filed Apr. 9, 1901.)

(No Model.)

8 Sheets—Sheet 1.

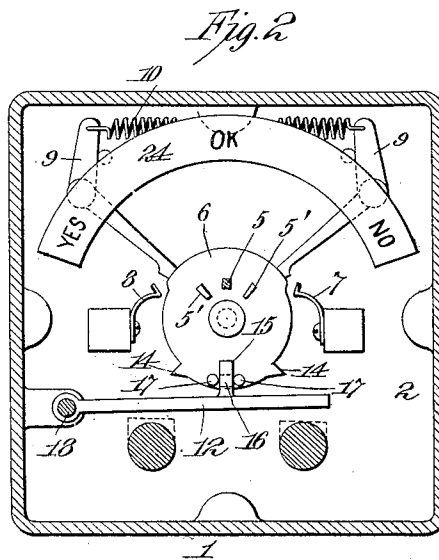
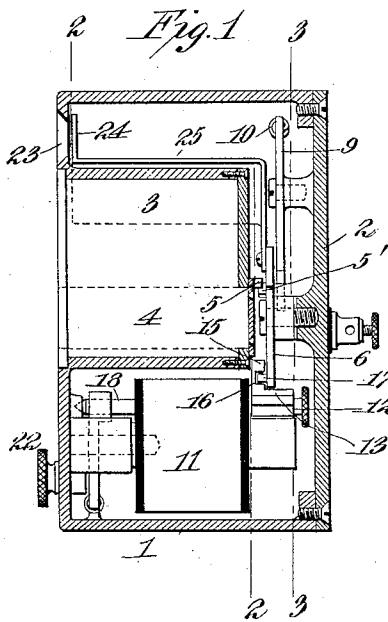


Fig. 3

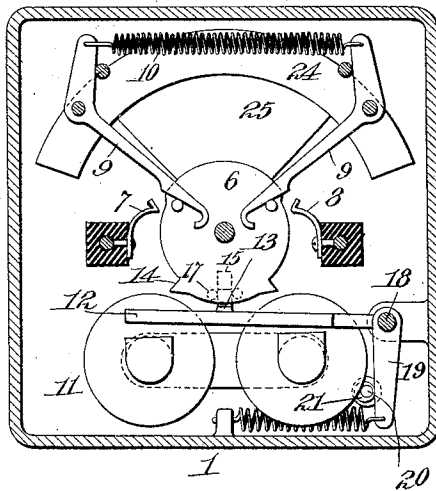
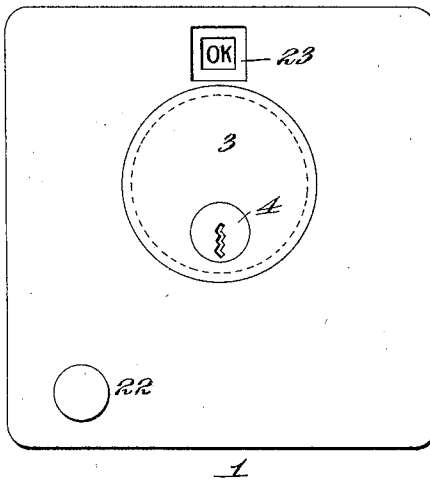


Fig. 4



Witnesses:

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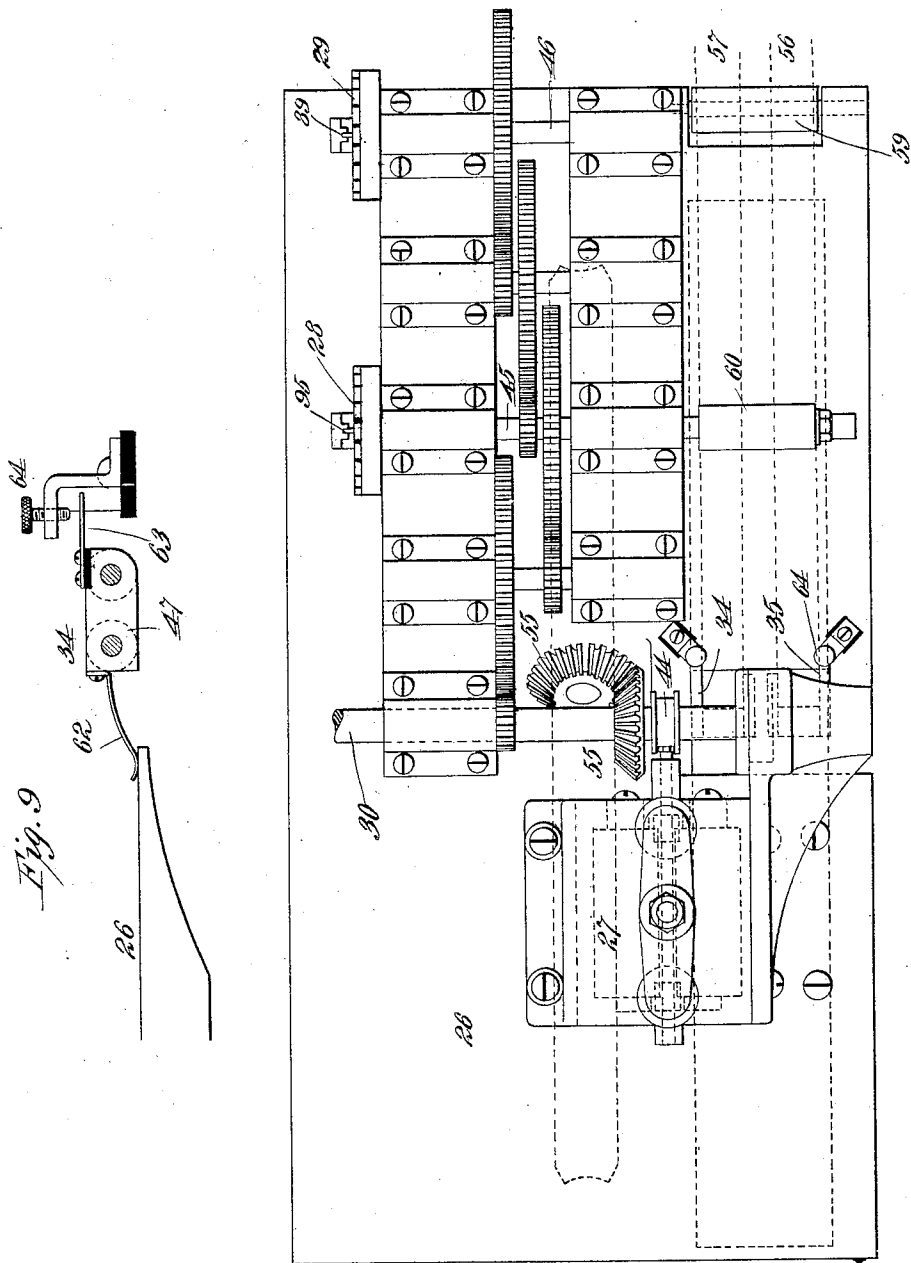
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8 Sheets—Sheet 2.



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Fig. 5

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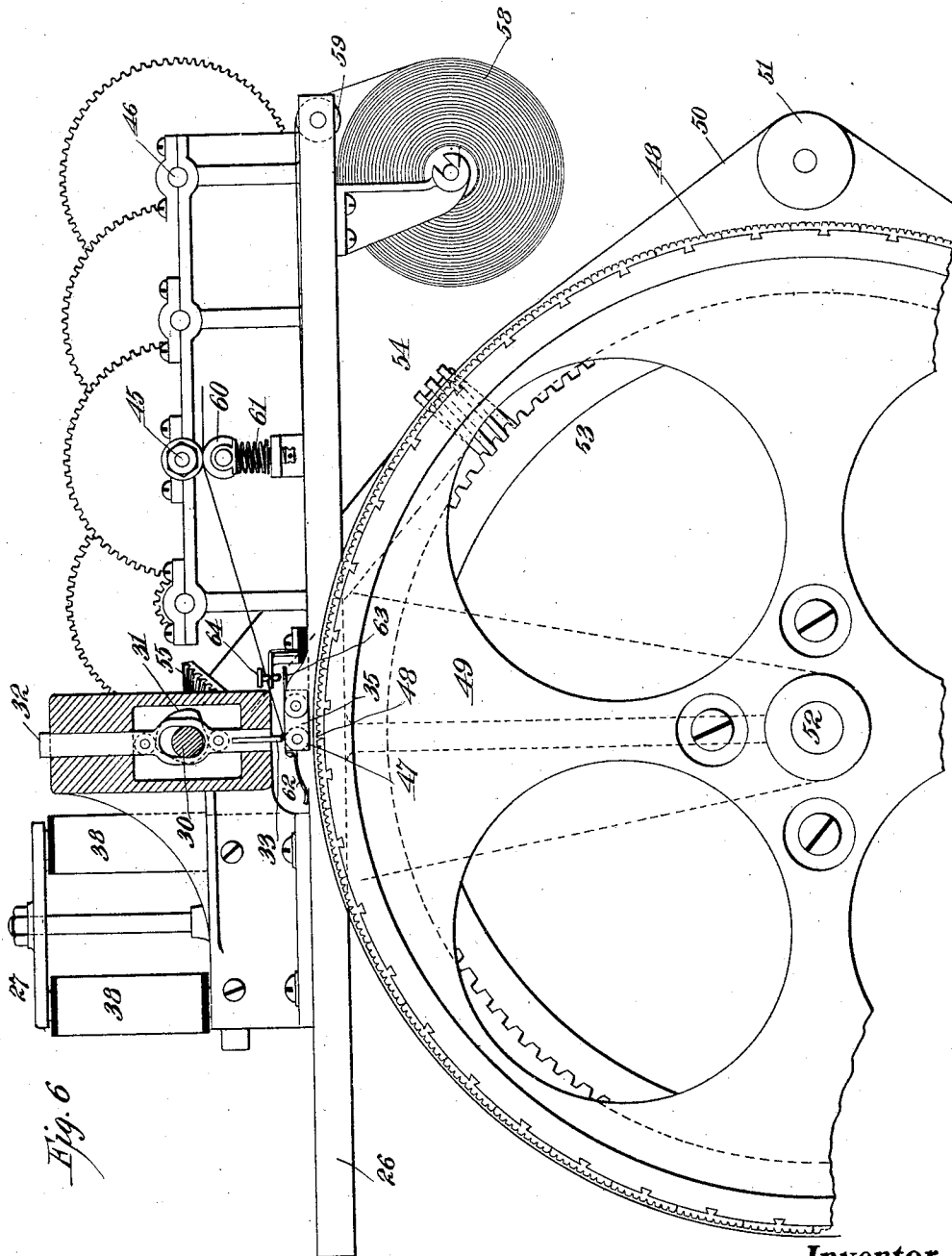


Fig. 6

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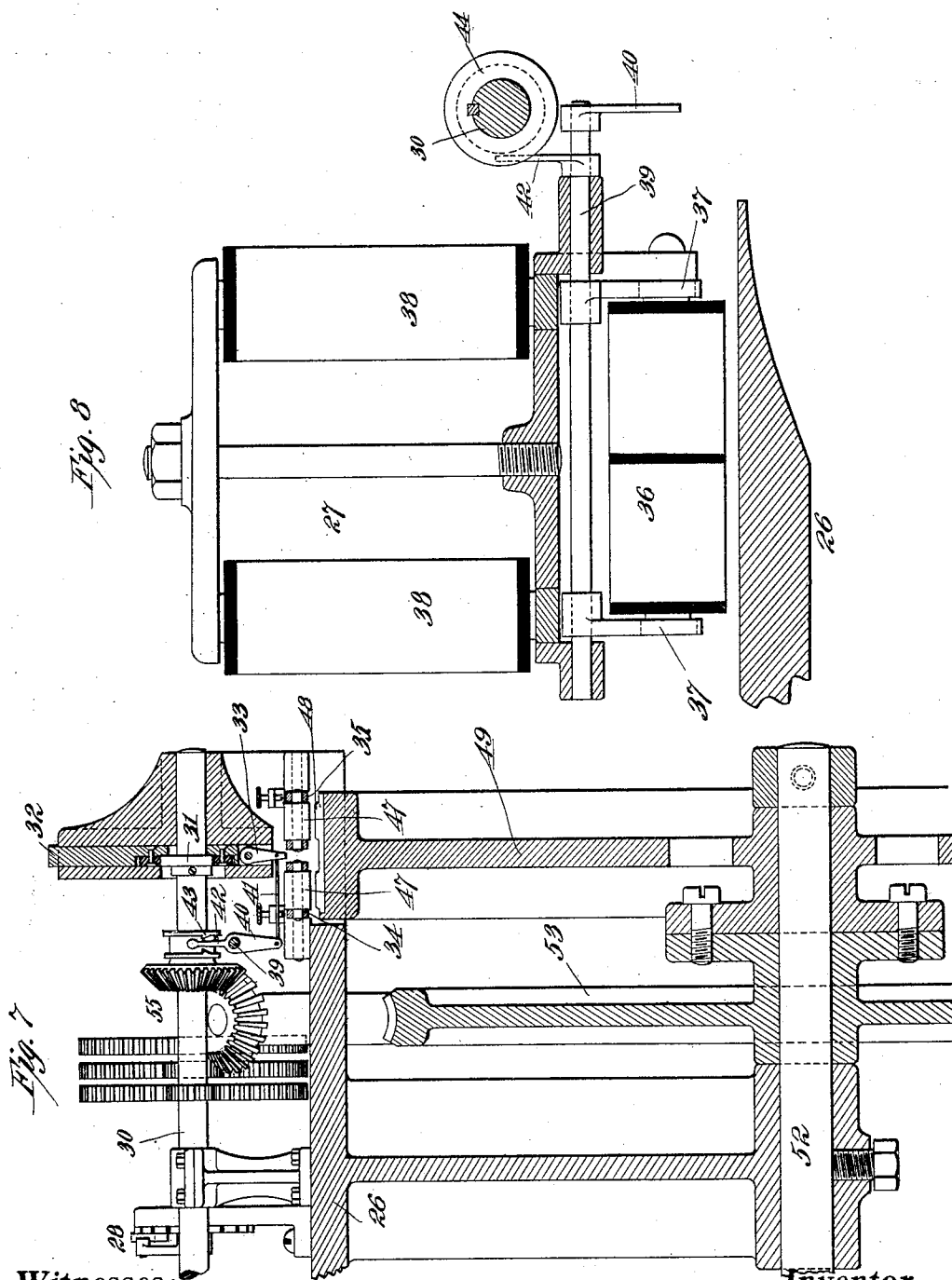
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8 Sheets—Sheet 4.



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Fig. 10

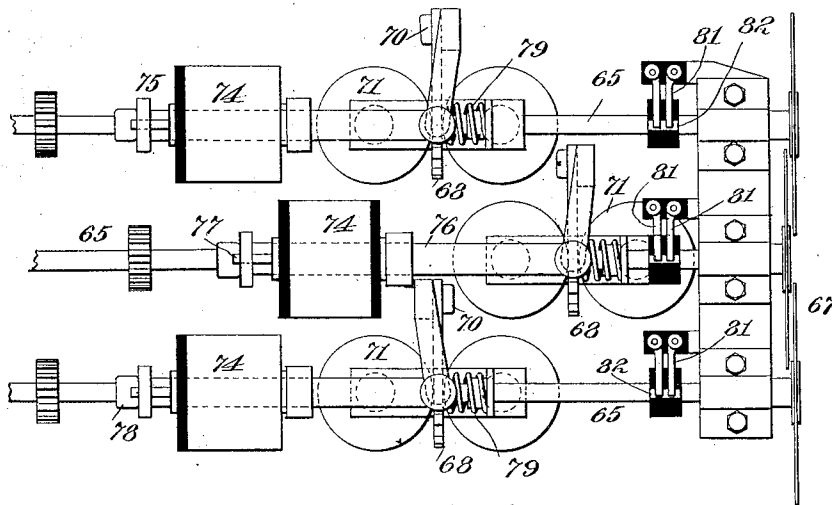
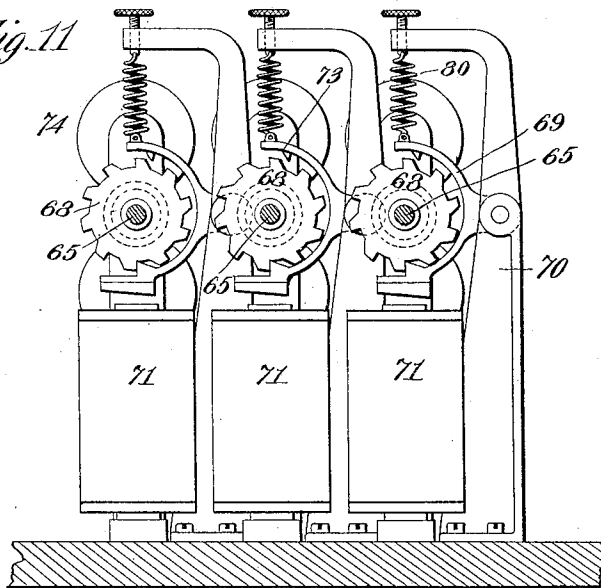


Fig. 11



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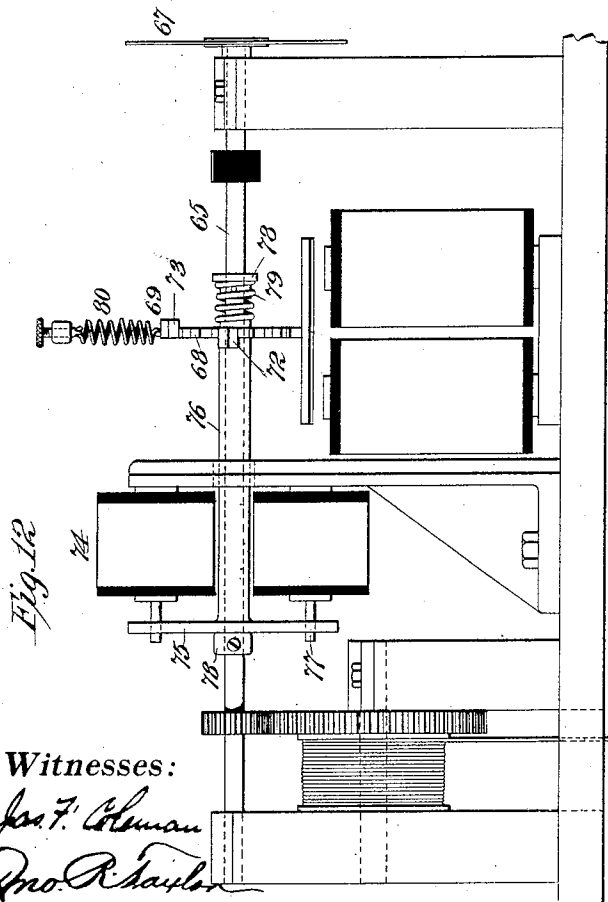
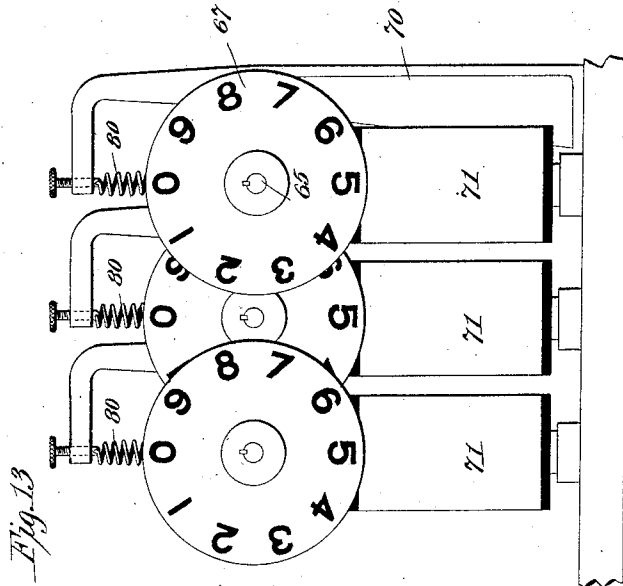
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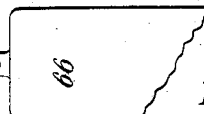
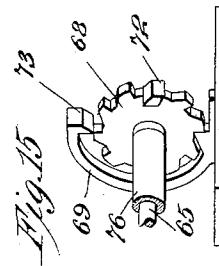
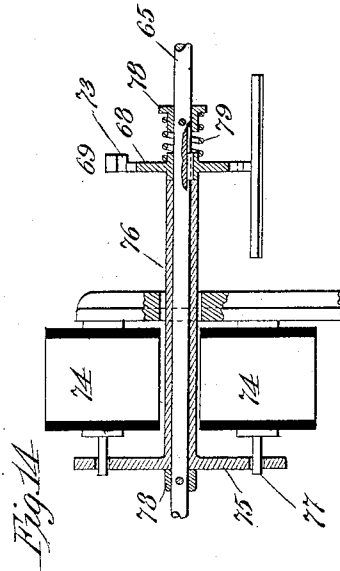
(No Model.)

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(No Model.)

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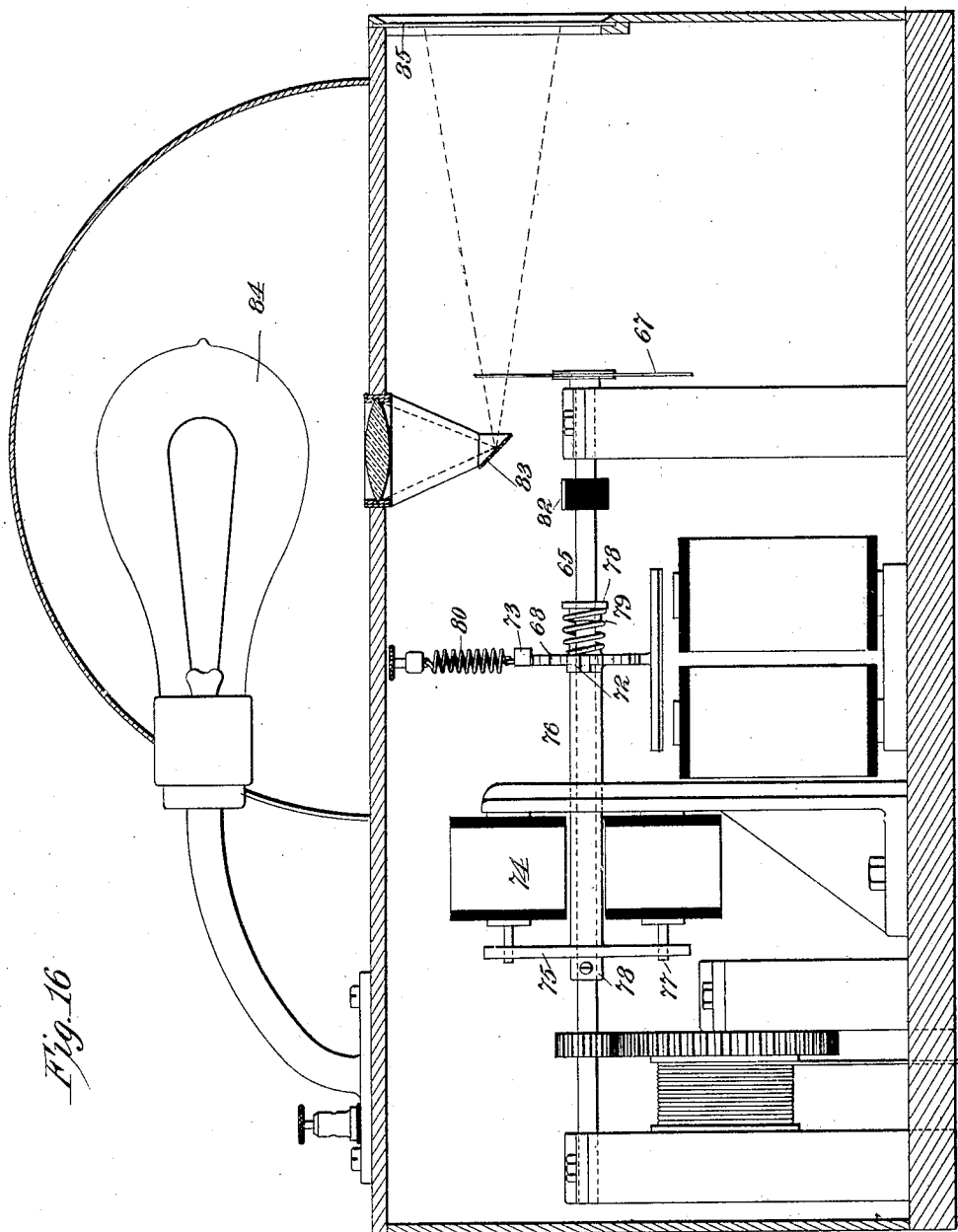


Fig. 16

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8 Sheets—Sheet 8.

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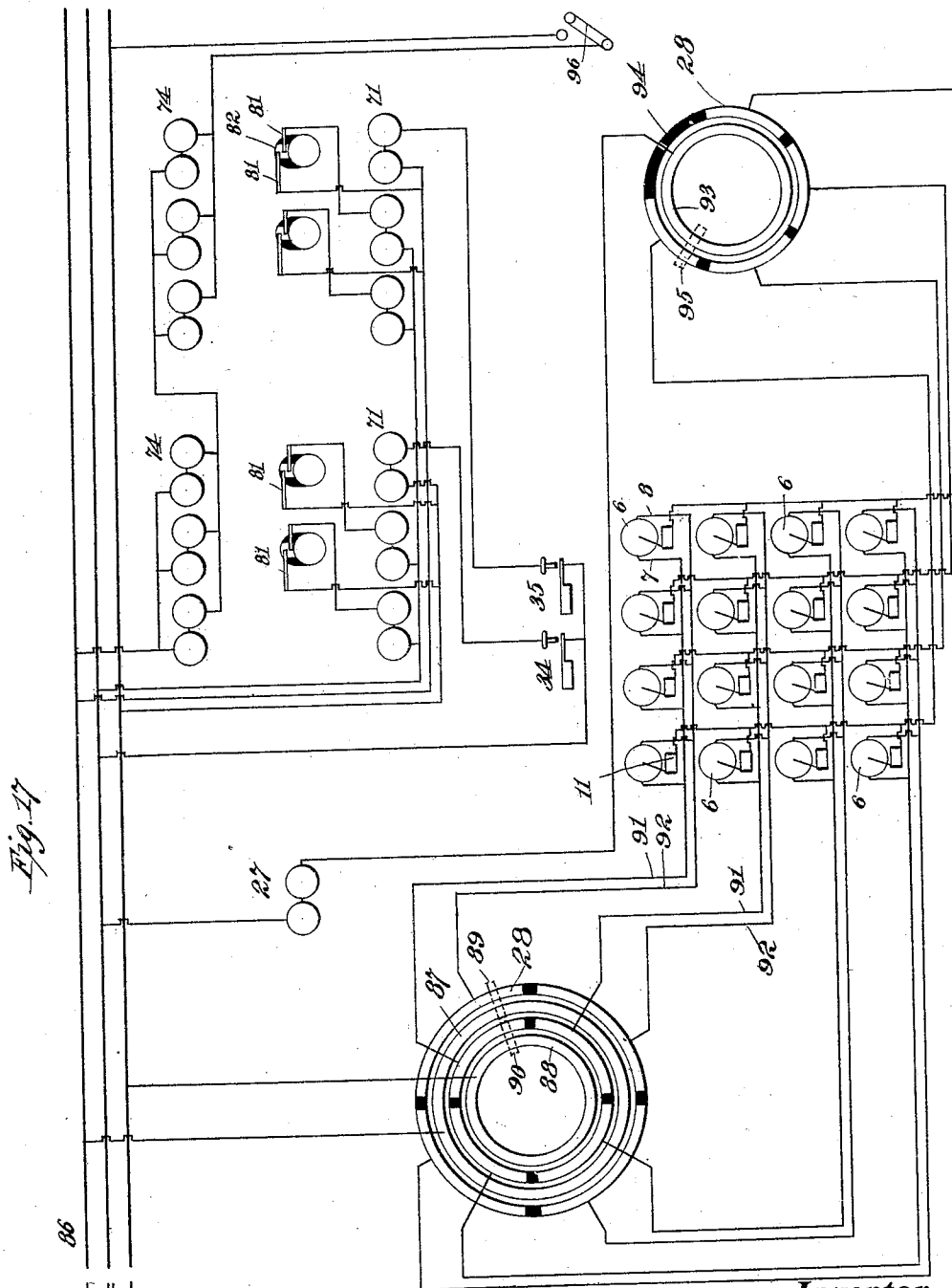


Fig. 17

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UNITED STATES PATENT OFFICE.

FRANK L. DYER, OF MONTCLAIR, NEW JERSEY.

ASSEMBLY VOTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 701,314, dated June 3, 1902.

Application filed April 9, 1901. Serial No. 54,971. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. DYER, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Apparatus for Determining, Registering, and Totalizing the Sense of Legislative Bodies and Conventions, (Case No. 43,) of which the following is a specification.

My invention relates to an apparatus for use in connection with legislative bodies, conventions, and analogous assemblies, by means of which the sense of the members on questions presented for vote may be readily and rapidly determined and preferably, also, both recorded and totalized. In a broad sense, however, the invention relates to apparatus by means of which the sense of such bodies may be determined and a proper indication thereof made either by totalizing devices or by recording devices, or by both. The improved apparatus is also adapted for use in effecting a roll-call, which result can be secured with certainty and expedition.

At the present time it is the custom in ascertaining the sense of an assembly to call the roll on questions presented, the members voting negatively or affirmatively, as the case may be, and the individual votes being recorded and subsequently totalized. Generally after the roll has been once called the names of members not answering thereto are again called and additional votes recorded, and after the second call of the roll it is usually the custom for members who may have been previously absent to demand individual recognition in order that their votes may be noted and recorded. All of this takes much time and labor. I am of course aware that many suggestions have been made for apparatus for doing this work; but such apparatus has not met the practical conditions, and hence, so far as I know, has never been practically used.

The object of my invention is to provide a simple, compact, and relatively cheap apparatus by means of which the votes of members of assemblies of any kind may be indicated either by proper recording mechanism or by totalizing devices, or both, which oper-

ations can be performed with great rapidity and entirely automatically.

My invention therefore comprises, first, a series of stations corresponding to the individual members and from which the desired negative or affirmative vote is transmitted, which stations may be located on the members' desks or at any other convenient points, and, second, suitable apparatus by means of which the votes so transmitted may be properly indicated, which apparatus comprises either (a) a mechanism by means of which a record, permanent or otherwise, of the votes may be secured or (b) devices by means of which all the negative and affirmative votes so transmitted may be separately registered or totalized, or (c) both of such apparatus.

The preferable form of transmitter consists of a circuit-closer by means of which a circuit may be closed at the transmitter, so that when the particular contact-plate or arrangement of contact-plates is reached to correspond to such transmitter a current of one polarity or the other will energize a polarized relay which controls the indication. I prefer to use a polarized circuit in order to reduce the number of wires; but it will be understood from the following description that two separate relays may be employed—one for controlling the registration of affirmative votes and the other of negative votes. In order that individual members may be prevented from voting at the wrong stations, the circuit-closer in each transmitting device is operated by means of a key which is inserted in an ordinary lock and turned to the right or left, according to the vote which is to be transmitted. Preferably each transmitter employs an indicator for indicating the vote to the member voting in order that he may be sure that the proper vote is to be transmitted. After each transmitting device has been thus operated the circuit-closer remains locked in its closed position, ready to transmit to the receiver a current for actuating the relay or relays at the proper time, and after that operation a restoring-magnet in each transmitting device permits the circuit-closer to again open, the parts returning to their normal position. Each transmitting device also preferably makes use of means by which, after

the circuit-closer has been moved to effect the transmission of a vote of one kind, it may be released to return the parts to their normal position, and therefore enable the member to correct any error in voting.

At the receiving apparatus I employ a series of contact-plates which correspond to the several stations. When a single set of receiving contact-plates is used, as would be the case in apparatus for small bodies, the circuit from each transmitter will connect with a particular contact-plate. If a collecting device is now caused to successively engage the several contact-plates, it will be brought into circuit successively with the several stations, and a polarized relay connected to the collecting device will be operated in one sense or the other, according to the polarity of the current transmitted from the stations, or be inoperative in case any of the transmitters have not been operated. The armature of the polarized relay controls the operation of an indicating mechanism by means of which an indication of the votes will be secured. When a permanent record of the votes is desired, the indicating mechanism preferably comprises a moving surface, such as a drum or tape, carrying the names of the individual members, or numbers corresponding thereto, arranged in two separate and distinct series, an impression-roller for forcing a paper strip into engagement with the successive type of either series, and means controlled by the relay for operating said impression-roller. With such an apparatus the movement of the armature of the polarized relay in one direction effects the operation of the impression-roller corresponding to the negative strip, and vice versa, so that a permanent record will be secured of the names of all members voting affirmatively and another distinct record of all members voting negatively. When the indicating mechanism comprises a registering or totalizing device, two circuit-closers will be used, one controlling the operation of a negative totalizer and the other the operation of an affirmative totalizer, which circuit-closers are directly controlled or operated by the relay, so that upon the reception of an affirmative vote the circuit-closer for the affirmative register will be operated, and vice versa. When the receiving apparatus comprises means for permanently recording as well as registering the votes, both of these devices will preferably be used, the circuit-closer for the registers being operated in connection and simultaneously with the movements of the impression-rollers.

In apparatus for use with numerically large assemblies the provision of a set of receiving contact-plates, one corresponding to each member, would be undesirable on account of the bulk and wires necessary. When the apparatus is employed for such purposes, I therefore prefer to make use of two sets of contact-plates, with each of which a collecting device

coöperates. The collecting device of one set of contact-plates moves the distance between two plates during the time that the collecting device of the other set of contact-plates moves the entire circuit of the plates. With this arrangement the several transmitting devices will be arranged in groups, circuits leading from the several contact-plates of one set to the transmitters of corresponding distinct groups and circuits leading from corresponding transmitters of all the groups to the several plates of the other set. The movement of the collecting device of one of the sets from plate to plate selects the transmitters of the respective groups, while the movement of the collecting device of the other set selects successively the transmitters of such groups. By this expedient I materially simplify and cheapen the cost of the apparatus. Thus assuming an assembly of four hundred members and that a single contact-plate for each member is employed, four hundred contact-plates and a corresponding number of circuit-wires will be necessary. By the new arrangement only forty contact-plates and sixty wires require to be employed. This part of the apparatus, comprising a pair of coöperating selecting apparatus for permitting the operation of electrical devices exceeding in number the sum of all the plates, can be utilized in other arts—as, for example, in the art of printing-telegraphy—and I shall therefore claim the same broadly.

My register, when the same is used, presents novel features. Each register comprises a plurality of number-disks, the units-disk being operated by suitable step-by-step mechanism from the receiving-circuit maker and the tens and hundreds disks, when used, being preferably operated from or in connection with the disks of lower order. In order that the voting may proceed with great rapidity, at a rate preferably of many times per second, the number-disks should be made as small and light as possible. When of this character, they obviously could be observed only from short distances. I therefore prefer to use the number-disks like lantern-slides, permitting the numbers to be reflected by a light upon a suitable screen and enlarged to the proper degree.

The features of the apparatus to which I have above generally alluded are those which are broadly characteristic of it. Their details of construction and operation will be more clear from reference to the accompanying drawings, which form a part of this specification, and to which attention is now directed.

In the drawings, Figure 1 is a vertical sectional view through one of the transmitters; Fig. 2, a section on the line 2 2 of Fig. 1; Fig. 3, a section on the line 3 3 of Fig. 1 looking toward the left; Fig. 4, a front view; Fig. 5, a plan of the receiving and registering mechanism, showing the same as having a capacity for four hundred members; Fig. 6, a front

view, partly in section, of the same; Fig. 7, a transverse section of the same through the main operating-shaft; Fig. 8, an enlarged detail of the preferred form of polarized relay and resetting mechanism therefor; Fig. 9, a detail of one of the impression-rollers and registering circuit-closers; Fig. 10, a plan of one of the registers; Fig. 11, a section through the escapement-wheels of the registers; Fig. 12, a side view of the same; Fig. 13, a front view; Fig. 14, a longitudinal section through one of the register-shafts, illustrating particularly the restoring mechanism therefor; Fig. 15, a detail perspective view of one of the escapement-wheels and its cooperating ratchet; Fig. 16, an enlarged side view, partly in section, of one of the registers; and Fig. 17, a diagram of the entire apparatus, showing particularly the circuits and illustrating sixteen transmitting-stations used in connection with two sets of contact-plates of four each.

In all of the above views corresponding parts are represented by the same numerals of reference.

Each transmitter comprises a metal box 1, having a removable back 2.

3 is an ordinary Yale lock, the barrel 4 of which is provided on its back plate with a stud 5, adapted to engage with studs 5' 5' on the circuit-closing disk 6, which is mounted to rotate on the back plate 2 and has a raised portion which coöperates with the contact-piece 7 or 8, according to the position to which the disk may be moved. A pair of levers 9 and a spring 10 tend to turn the disk to a central position when the disk is released, as will be explained. The levers 9 are provided with hooks on their ends, which limit the movement in either direction to which the disk may be turned.

Mounted below the lock 3 are preferably restoring-magnets 11, the armature 12 of which carries a lug 13, adapted to be engaged behind ears 14 14 on the disk. The armature 12 is also provided with an extension 15, having a slot 16 therein, and each disk is provided with two pins 17 17, one of which is adapted to pass through the slot 16 as the disk is moved in one direction or the other. The armature 12 of the restoring-magnet is preferably mounted on a rock-shaft 18, from which a lever 19 extends downward, said lever connecting at its lower end with a spring which normally elevates the armature 12. A release-shaft 20 carries a small eccentric cam 21, (see Fig. 3,) which engages the lever 19, and said shaft may be operated from the outside of the casing by a milled wheel 22. By turning the milled wheel 22 the armature 12 will be depressed, releasing the disk 6 and permitting it to return to its normal position, as will be explained, when the voter desires to change his vote before it has been recorded.

In the front of the casing is an opening 23, behind which is a screen 24, carried on an arm 25 from the disk 6. The screen 24 carries the words "Yes" and "No" and the

abbreviation "O. K." or any other desired arrangement to indicate the character of the vote, and preferably also the fact that the vote has been received when the disk returns to its normal position.

The receiving apparatus, in the broad sense, comprises a polarized relay or a pair of relays, which control a suitable recording or registering mechanism, or both. This receiver, in the embodiment of the invention illustrated, comprises a suitable base 26, a relay 27, one or more sets of contact-plates 28 and 29, and co-operating devices controlled by the relay for effecting the desired indication of the vote. Mounted in suitable bearings supported by the base 26 is a main shaft 30, carrying a cam 31, which vertically reciprocates a slide-head 32. Pivoted in the slide-head 32 is a tongue 33, adapted to be brought into coöperative relation with an oscillating frame 34 or 35, one controlling the recording of affirmative and the other of negative votes. The polarized relay which I prefer to use is a well-known modification of a British postal relay and comprises the controlling-magnets 36, which move armatures 37 37 in one direction or the other, according to the polarity of the current, and magnets 38 permanently energized for magnetizing the armatures. The armatures 37 are carried on a rock-shaft 39, from the front of which depends an arm 40, connected by a link 41 with the tongue 33. Normally—i. e., when no current energizes the polarized relay—the armatures 37 occupy an intermediate position between the poles of the magnets 36 and the tongue 33 occupies a corresponding position between the two frames 34 and 35, so that a downward movement of the slide-head 32 will not operate either frame. When, however, the magnets 36 have been energized by a current of one polarity or the other, the armatures 37 will be moved in the proper direction to carry the tongue 33 over the frame 34 or 35, as the case may be, so that a vertical downward movement of the slide-head 32 will operate the particular frame which has thus been selected. After the slide-head has been moved down the armatures 37 are restored to their normal position midway between the poles of the magnets 36 by a restoring-arm 42, working between cams 43 43 on a drum 44, the latter being keyed to the main shaft 30. When two sets of contact-plates 28 and 29 are used, the shafts 45 and 46 thereof are operated through suitable gearing, as illustrated, so that the collecting device of the set 28 will move over the entire stretch of contact-plates during the time that the collecting device of the set 29 is moving from one plate to another. The driving mechanism for thus operating the shafts 45 and 46 may derive its power from the shaft 30, as shown. When the receiving apparatus contemplates mechanism for effecting a positive record of the vote, the oscillating frames 34 and 35 carry impression-rollers 47, which co-operate with type 48, removably carried on the

rim of a wheel 49 or on any other suitable moving surface, like a tape. The type 48 are arranged in two corresponding sets arranged side by side. An ink-ribbon 50 passes around the printing-drum and over an idler 51, so that the length of the ribbon will be greater than the circumference of the printing-drum, and in consequence the ribbon will constantly change its relation with respect to the drum while it is being fed thereby. The type may, however, be inked in any other way. The printing-drum 49 is carried on a strongly-supported stub-shaft 52 and is connected to a worm-gear 53, driven by a worm 54 from the shaft 30 through bevel-gearing 55 55, as shown. The gearing is such that the printing-drum 49 moves the distance between adjacent lines of type at each complete rotation of the main shaft 30. Two strips of paper 56 and 57 are carried on suitable separate independent reels and pass over a roller 59, around the impression-rollers 47, and between two feed-rollers 60. The lower feed-roller is impelled upward by springs 61, so as to frictionally grip the strips 56 and 57 and feed them forward at the same speed as that of the printing-drum, so that when the paper is held in engagement with the printing-drum to effect a registration therefrom there can be no objectionable blurring of the impression. The oscillating frames 34 and 35 are returned to their normal position by springs 62. When the receiving apparatus contemplates the employment of registers or totalizers only, the oscillations of the frames 34 and 35 or their equivalent may determine the actuation of proper totalizing mechanism. Therefore each frame may be provided with a contact-spring 63, adapted to engage a contact-screw 64 at each movement of the oscillating frames. The closing of a circuit between the spring 63 and the screw 64 effects the operation of an affirmative or negative totalizer, as the case may be. I have illustrated and described the operation of the totalizing mechanism by means of circuit-controlling devices actuated by the oscillating frames 34 and 35 in order to emphasize the independence of the recording and totalizing mechanism. Thus the movement of either swinging frame can be utilized to effect a permanent record or to actuate the totalizer, or to perform both of such functions. In practice, however, I prefer to actuate the registers or totalizers from the relay-shaft 39, a movement in one direction closing the circuit to one totalizer and in the other direction closing the circuit to the other totalizer.

The preferred construction of registering or totalizing mechanism is shown in Figs. 10 to 16, inclusive, to which attention is now directed, it being of course understood that two distinct totalizers are employed, one for the affirmative votes and the other for the negative votes. Each totalizer comprises a plurality of shafts 65 for units, tens, hundreds, or thousands, as may be required,

mounted in suitable bearings and driven in any desired way—as, for example, by weights 66 for each shaft, the weight-drum being geared to the shaft as shown as in some forms of printing-telegraph receivers. Mounted on each shaft 65 is a number-disk 67, the drawings illustrating a transparent disk with opaque numbers, but the reverse arrangement being obviously capable of use. Splined on each of the shafts 65, so as to be movable longitudinally thereon, is an escapement-wheel 68, with which coöperates an escapement 69, mounted on a standard 70 and operated by magnets 71. Each escapement-wheel 68 is provided with a single wide tooth 72, and one of the fingers of the escapement 69 is provided with an extension 73, as shown. By moving the escapement-wheel longitudinally on the shaft it will be obvious that it will become disengaged from the fingers of the escapement, and the shaft will therefore be permitted to turn until the wide tooth 72 comes into engagement with the extension 73, bringing the escapement-wheel to rest and disclosing the zero on the several disks, after which the escapement-wheel will be returned to its normal position with respect to the escapement to permit a totalizing operation to again take place. This lateral movement of the several ratchet-wheels can be effected in any suitable way from restoring-magnets 74, one for each shaft. The armature 75 of each of the restoring-magnets is connected to a sleeve 76, surrounding the shaft 65 and bearing against the escapement-wheel 68, as shown. Non-magnetic pins 77 prevent the armature 75 from turning with the shaft. Stops 78 78 limit the movements of the escapement-wheel in either direction, and a spring 79 normally keeps the escapement-wheel in its proper operative relation to the coöperating escapement therefor. The energizing of the magnets 71 moves the escapements in one direction and springs 80 effect a reverse movement. The magnets 71 for the units-shaft of the negative totalizer are connected in circuit, as will be explained, with the circuit-closer 63 64 of one of the frames, while the corresponding magnet of the units-shaft of the affirmative totalizer is correspondingly connected with the circuit-closer of the other frame. The magnet 71 for the tens-shaft of each register or totalizer is included in a circuit with a suitable source of current, which circuit is adapted to be closed between the contact-fingers 81 by means of the contact-plate 82 at each rotation of the units-shaft of the same register. The magnet 71 for the hundreds-shaft of each register is included in a corresponding circuit between the contact-fingers 81 of the tens-shaft, and so on. In this way the tens-shaft will partake of a single feed movement for each rotation of the units-shaft, and the hundreds-shaft will partake of a single feed movement for each rotation of the tens-shaft. The magnets 71 for the hundreds-disk are correspondingly operated by contact-fingers 81 co-

operating with the tens-disks, and if a thousands-disk is employed its shaft may be operated by fingers 81, cooperating with the hundreds-disk, as shown. The number-disks 67
 5 are made as light as possible in order that the registering or totalizing mechanism may be capable of high speed. In order that the numbers may, therefore, be disclosed in such a way as to be readily observable from considerable
 10 distances, I prefer to utilize the number-disks like lantern-slides, and therefore arrange behind each number-disk a prism 83 for reflecting light from a lamp 84 onto a screen 85. Obviously the number-disks may be separated
 15 farther than I have shown and the reflected numerals on the screen 85 can be increased to any desired extent.

The particular arrangement of circuits is shown in the diagram Fig. 17, to which attention is now directed. The main source of supply may be a three-wire system 86, the polarity of the wires of which is indicated. The contact-plates 29, which select the groups of transmitting - stations, are arranged in two
 25 sets, as shown, and cooperating with each set is a collecting-ring 87 88. Extending between the collecting-ring 87 and one set of the group contacts is a brush 89, and extending between the other set of group contacts and the collecting-ring 88 is a brush 90.
 30 The brushes 89 and 90 are insulated from each other and are carried from the shaft 46, as will be understood. The collecting-ring 87 is connected to one of the outside wires of the distributing-circuit and the collecting-ring 88 to the other outside wire. The transmitting-stations are, as shown, arranged in several sets or groups corresponding in number to the plates 29. There being four of these
 40 plates in a complete circle, the transmitting devices are arranged in four groups, any desired number being in each group. Feeder-circuits 91 and 92 extend adjacent to each group of transmitters and are connected to
 45 corresponding contact-plates 29 in the outer and inner rings, as shown. The contact-springs 7 and 8 connect with these circuits 91 and 92. The restoring-magnet 11 is in circuit with the disk 6, as shown. The number of
 50 transmitting-stations in each group depends on the number of contact-plates in the set 28 of such plates—in the present instance four. All of the disks 6, either directly or through the restoring-magnets 11, of the first station
 55 of the several groups are connected together, as shown, and to one of the plates of the set 28, and so on. The contact-plates 28 are provided with a collecting-ring 93, which connects with the polarized relay 27, as shown, the return from the latter leading to the neutral wire of the distributing system. I illustrate the contact-plates 28 as being provided with an extended insulating-section 94, the purpose of which is more apparent in connection with apparatus using a large number of
 65 stations than in connection with apparatus having only sixteen stations, as shown. If,

for example, an apparatus is constructed to accommodate four hundred stations divided into twenty groups of twenty each, the brushes 89 and 90 of the group contacts will move
 70 only one-twentieth of the width of each of said contact-plates during the time that the brush 95 of the individual plates 28 is moving from one plate to the other. Hence the insulation
 75 separating the group plates 29 will have to be very thin, (unless of course the collecting devices for the group contacts are moved intermittently,) and any lost motion might destroy the proper operation of the devices. By providing an extended insulating-section 94 on the individual plates 28, as shown, the brush
 80 95 will be in contact with said extended section during the time that the brushes 89 and 90 are passing over the gap between the plates 85 of the group contacts 29, so that the difficulty noted will in this way be overcome. It will be of course understood that when the extended section 94 is employed in connection with the individual plates 28 a corresponding
 90 gap will have to be made between such of the type on the printing-drum as correspond with this gap.

As shown in Fig. 17, the magnet 71 for one of the totalizers is connected from the positive
 95 wire to the neutral wire through the circuit-closer which is operated by the swinging frame 35, while the corresponding magnet 71 of the other totalizer is connected from the negative wire to the neutral wire through the
 100 circuit-closer which is controlled by the swinging frame 34. The contact-fingers 81 for operating the magnets for the tens and hundreds totalizing disks are also shown as connected
 105 in multiple between the neutral and positive or negative wires, as the case may be. The restoring-magnets 74 for shifting sidewise the several escapement-wheels of all the totalizing-shafts are illustrated as being connected
 110 across the outside wires of the circuit and as being operated from a switch 96, whereby all the disks of both totalizers will be simultaneously returned to zero.

The operation of the apparatus is as follows: Each member who desires to vote inserts his key in the barrel of the lock of
 115 his transmitter, the latter being preferably mounted upon the member's desk when used. If he desires to vote affirmatively, the key is turned to the right; if negatively, to the left. The turning of the barrel causes the stud 5
 120 to engage with either of the studs 5' 5' to turn the disk 6 to the right or left and engage the circuit-closing device 7 or 8 therewith, as the case may be. The first movement of the disk carries one of the pins 17
 125 through the slot 16 of the extension 15, and after the said pin has passed through the slot the tooth 14 depresses the armature-lever 12 until the lug 13 drops in behind said tooth. This locks the disk in its extreme position
 130 and discloses the word "Yes" or "No" at the opening 23. If the operator moves the disk 6 in the wrong way and the latter be-

comes locked in its extreme position, the shaft 20 may be rotated to cause the cam 21 to oscillate the shaft 18 and withdraw the lug 13 from the tooth 14, permitting the disk 6 to be returned to its original position by the action of one of the levers 9, as will be understood. The movement of the disk 6 to its extreme position is limited, as stated, by the hook on the end of one or the other of said levers 9. As stated, the disk 6 is in circuit with one terminal of the restoring-magnets 11, the other terminal from said magnets leading to the proper contact-plate of the individual contacts 28. The operations which have been described do not effect a record of the vote, but only place the transmitters in proper condition to effect a record of the vote when the receiver has been operated. Obviously the operations of inserting a key in the lock and turning it to the right or left consume only an instant of time, thus permitting the member to leave the transmitter feeling assured that his vote will be eventually properly registered. After all the members present have properly operated their transmitters to register their votes the receiving apparatus is started, power being applied to the shaft 30, driving the printing-drum one step for each complete rotation of said shaft, rotating the collecting-brush 95 from one segment to the other of the individual contacts 28, and moving the collecting-brushes 89 and 90 of the group contacts over a single one of said plates during the time that the brush 95 is making a complete rotation. At the commencement of the operation the brushes 89 and 90 will be in engagement with the first contact-plate of the group contacts 29, and hence only the stations in the first group can receive current from the source of supply. The engagement of the brush 95 with the first segment of the individual contacts closes the circuit through the first transmitter of the first group. If the disk 6 of that transmitter has been moved to the right, the circuit will be closed at the contact 7, the circuit through the relay being traced from the negative wire to the collecting-ring 88, brush 90, the first inner group-contact 29, feeder 91, contact 7, disk 6, restoring-magnet 11, to the first plate of the individual contacts 28, to polarized relay 27, to neutral wire. The energization of the coils 36 results in the movement of the armatures 37 in one direction or the other, moving the tongue 33 over one of the limits of the swinging frame 34 or 35, as the case may be. The movement of the shaft 30 depresses the slide-head 32, and the engagement of the tongue 33 forces one frame or the other downward, engaging the strip 56 or 57 with the particular line of type and printing on the selected strip the member's name corresponding to the station in question. The friction-rollers 60 feed the strips 56 and 57 forward at the same speed as that of the printing-drum, so that no blurring can take

place. The closing of the circuit through the relay energizes the restoring-magnets 11 and draws the armature 12 downward. The disk 6 therefore tends to return to its original position; but one of the pins 17 will engage with the projection 15 above the slot 16, so that the disk cannot return to its normal position, but the circuit will be closed between it and the contact-spring 7 or 8. When, however, the brush 95 passes beyond the first contact-plate of the individual contacts 28, the circuit will be broken at the first transmitter, deenergizing the restoring-magnets 11 thereof, and the armature 12 will be returned to its original position, permitting the pin 17 to pass through the slot 16, whereby the disk 6 will be moved to its central position, exposing the letters "O. K." or giving some other indication that the vote has been received and recorded. When the brush 95 passes to the second plate of the individual contacts, the circuit will be closed through the second transmitter of the first group and a corresponding operation takes place, and so on until the votes transmitted by all the transmitters of the first group have been received and registered. When the brush 95 has made a complete rotation, the brushes 89 and 90 will pass to the second plates of the group-contacts, so that the transmitters of the second group will be brought into circuit, and such transmitters will be successively connected with the relay as the brush 95 again traverses the individual contacts. Thus the operation of the relay in one direction or the other will result in the printing upon the strip 56 of the names of all members voting affirmatively, for example, and upon the strip 57 of the names of all members voting negatively. In each case the closing of the circuit at each transmitter energizes the restoring-magnets 11 thereof, withdrawing the lug 13 from the tooth 14; but the pin 17 will engage the extension 15 to prevent the disk 6 from returning to its central position, which position is not reached until the circuit has been broken and the armature 12 returned to permit the pin to pass through the opening 16. After the relay 27 has operated each time the rotation of the shaft 30 causes the resetting-cams 43 to engage the upper end of the arm 42 to restore the relay to its neutral position ready to be influenced by the next impulse which energizes it. Whenever the frame 34 is depressed, the units-magnet 71 of one of the totalizers will be energized. When, on the other hand, the frame 35 is depressed, the corresponding magnet of the other totalizer will be energized. The energization of the units-magnets 71 at the totalizers permits the units-shaft to advance step by step. When the units-shaft of either totalizer has made a complete rotation, the contact-fingers 81 will close the circuit through the actuating-magnet 71 of the tens-shaft and the tens-disk will advance one step. When the tens-disk has made a complete rotation, the contact-fingers

81 thereof will close the circuit through the actuating-magnets 71 of the hundreds-shaft and the corresponding disk will also be advanced one step. In this way the total movements of the frames 34 and 35 or, in other words, the affirmative or negative votes will be totalized. The representation of the figures on the number-disks will be enlarged and thrown on the screen 85 of each totalizer, as will be understood. When the printing-drum has made a complete turn, movement of the shaft 30 is arrested, the strips 56 and 57 are torn off beyond the feed-rollers 60, and the lists of the votes can be then read. When it is desired to return the totalizers to zero, the switch 96 is closed, energizing the magnets 74 and shifting all of the escapement-wheels 68 longitudinally of the shafts with which they turn. This movement carries each escapement-wheel out of line with the teeth of the escapement and permits the shafts to turn until the wide tooth 72 of each wheel engages the extension 73 of the escapement, at which time the zero of each disk will be disclosed. The switch 96 is now opened and the springs 79 will return the escapement-wheels to their former position, bringing them again into line with the teeth of the escapements, ready for a repetition of the operations described.

In effecting a roll-call with the apparatus it will be only necessary for all the members to vote either affirmatively or negatively, when the apparatus will obviously print a full list on one of the strips of all the members present, and one of the totalizers will indicate the total of such members.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In an apparatus for ascertaining and registering the sense of an assembly, the combination with a receiver, of a series of transmitting-stations, a contact device in each transmitting-station, and a lock the movement of which effects the operation of the contact device, substantially as set forth.

2. In an assembly voting apparatus, the combination with a transmitter employing a contact device and a lock the barrel of which effects the operation of said contact device, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

3. In an assembly voting apparatus, the combination with a transmitter employing a contact device, a lock the barrel of which effects the operation of said device, and means for locking the contact device in the position to which it may be moved, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

4. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, two contacts coöperating therewith, and a lock the barrel of which effects the operation of said disk, of a receiver elec-

trically connected to and operated by said transmitter, substantially as set forth.

5. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, two contacts coöperating therewith, a lock the barrel of which effects the operation of said disk, and means for locking the disk in either extreme position, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

6. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, means for operating said disk, and means for locking said disk in either extreme position of movement, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

7. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, two contacts coöperating therewith, means for operating the disk, and means for locking the disk in either of its extreme positions, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

8. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts coöperating therewith, means for locking the disk in either of its extreme positions, and a restoring-magnet for releasing the disk, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

9. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts coöperating therewith, a restoring-magnet, and an armature for said magnet for locking the disk in either of its extreme positions, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

10. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts coöperating therewith, a restoring-magnet, an armature for said magnet for locking the disk in either of its extreme positions, a slotted extension on said armature, and a pin on the disk coöperating with said slot, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

11. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts coöperating therewith, a restoring-magnet, an armature for said magnet for locking the disk in either of its extreme positions, a slotted extension on said armature, and two pins on the disk coöperating with said slot, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

12. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts coöperating therewith, means for locking the disk in either of its extreme positions, and a lock the barrel of which effects the movement of said

disk, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

13. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts coöperating therewith, means for locking the disk in either of its extreme positions, a restoring-magnet for unlocking the disk, and a lock the barrel of which effects the movement of said disk, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

14. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts with which said disk coöperates, means for locking the disk in either of its extreme positions, and means for manually unlocking the disk, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

15. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts with which said disk coöperates, means for locking the disk in either of its extreme positions, and means for manually and electrically unlocking the disk, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

16. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts with which said disk coöperates, a restoring-magnet, an armature therefor for locking the disk in either of its extreme positions, and means for manually operating said armature for unlocking the disk, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

17. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts coöperating therewith, means for locking the disk in either of its extreme positions, and two spring-actuated levers for centering the disk when unlocked, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

18. In an assembly voting apparatus, the combination with a transmitter employing a contact-disk, a pair of contacts coöperating therewith, means for locking the disk in either of its extreme positions, two spring-actuated levers for centering the disk when unlocked, and hooks on the ends of said levers for limiting the movement of said disk in either direction, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

19. In an assembly voting apparatus, the combination with a transmitter employing a disk, means for actuating the same, means for locking the disk in either of its extreme positions, and an indicator movable with the

disk to give a visual indication of its position, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

20. In an assembly voting apparatus, the combination with a transmitter employing a disk, means for actuating the same, means for locking the disk in either of its extreme positions, and a screen movable with the disk and indicating the position thereof, of a receiver electrically connected to and operated by said transmitter, substantially as set forth.

21. In a receiver for the purpose described, the combination of a carrying-body, two lines of type carried thereby, an impression-roller coöperating with each line, a paper strip passing over each impression-roller, a slide-head, means for operating said slide-head, and means controlled electrically for engaging the slide-head with either impression-roller, substantially as set forth.

22. In a receiver for the purpose described, the combination of a carrying-body, two lines of type carried thereby, an impression-roller coöperating with each line, a paper strip passing over each impression-roller, a slide-head, means for operating said slide-head, and a polarized relay for engaging the slide-head with either impression-roller, substantially as set forth.

23. In a receiver for the purpose described, the combination of a carrying-body, two lines of type carried thereby, a swinging frame mounted above each line, an impression-roller in each frame, a slide-head, means for operating the slide-head, a tongue carried by the slide-head for engaging either of said frames, and means for operating said tongue electrically, substantially as set forth.

24. In a receiver for the purpose described, the combination of a carrying-body, two lines of type carried thereby, a swinging frame mounted above each line, an impression-roller in each frame, a slide-head, means for operating the slide-head, a tongue carried by the slide-head for engaging either of said frames, and a polarized relay for operating said tongue, substantially as set forth.

25. In a receiver for the purpose described, the combination of a carrying-body, two lines of type carried thereby, a swinging frame mounted above each line, an impression-roller in each frame, a slide-head, a cam-shaft for operating the slide-head, a tongue carried by the slide-head for engaging either of said frames, a polarized relay for operating said tongue, and means carried by the cam-shaft for resetting said polarized relay, substantially as set forth.

26. In a receiver for the purpose described, the combination of a printing-drum, two lines of type carried thereon, a swinging frame coöperating with each line, an impression-roller in each frame, a slide-head, means controlled electrically for causing the slide-head to depress either of said swinging frames, and

means for reciprocating said slide-head and for rotating said printing-drum, substantially as set forth.

27. In a receiver for the purpose described, the combination of a printing-drum carrying two lines of type, two impression-rollers co-operating with said lines, a slide-head, a tongue carried by said slide-head, means for electrically engaging said tongue with either impression-roller, and means for simultaneously reciprocating said slide-head and rotating said drum, substantially as set forth.

28. In a receiver for the purpose described, the combination of a printing-drum carrying two lines of type, an impression-roller co-operating with each line, a slide-head, a tongue carried by the slide-head, a polarized relay, connections between the relay and said tongue, and means for reciprocating the slide-head, substantially as set forth.

29. In a receiver for the purpose described, the combination of a printing-drum carrying two lines of type, an impression-roller co-operating with each line, a slide-head, a tongue carried by the slide-head, a polarized relay, connections between the relay and said tongue, and means for reciprocating the slide-head and for resetting the polarized relay, substantially as set forth.

30. In a receiver for the purpose described, the combination of a printing-drum carrying two lines of type, an impression-roller co-operating with each line, a slide-head, a main shaft, a cam on said shaft for reciprocating the slide-head, a tongue on the slide-head, means for electrically engaging said tongue with either impression-roller, and connections between said shaft and the printing-drum for rotating the latter, substantially as set forth.

31. In a receiver for the purpose described, the combination of a printing-drum carrying two lines of type, an impression-roller co-operating with each line, a slide-head, a tongue carried by said slide-head, a polarized relay for operating said tongue, a main shaft, a cam on said shaft for reciprocating said slide-head, and cams on said shaft for restoring the polarized relay, substantially as set forth.

32. In a receiver for the purpose described, the combination of a suitable carrier, two lines of type carried thereby, an impression-roller co-operating with each line, a slide-head, a polarized relay which causes the slide-head to actuate either impression-roller, contact-plates, a collecting device co-operating with the contact-plates and connected electrically with said relay, and means for simultaneously actuating the slide-head, carrier and collecting device, substantially as set forth.

33. In a receiver for the purpose described, the combination of a printing-drum carrying two lines of type, an impression-roller co-operating with each drum, means controlled electrically for selecting and operating either of said impression-rollers, a paper strip engaging each impression-roller, feed-rollers for said strips, and means for rotating said feed-

rollers and said printing-drum at the same surface speed, substantially as set forth.

34. In an assembly voting apparatus, the combination with a transmitter, of a totalizer electrically connected to and operated from said transmitter and employing a number-disk, means for intermittently feeding said number-disk electrically, a screen, and means for projecting light through the disk and upon the screen, substantially as set forth.

35. In an assembly voting apparatus, the combination with a transmitter, of a totalizer electrically connected to and operated from said transmitter and employing a plurality of number-disks, means for electrically actuating said number-disks, a screen, and means for projecting light through the number-disks and upon the screen, substantially as set forth.

36. In an assembly voting apparatus, the combination with a transmitter, of a totalizer electrically connected to and operated from said transmitter and employing a shaft, means for driving the shaft, a number-disk on the shaft, an escapement-wheel, an escapement for permitting feed movements of said wheel, a magnet for actuating said escapement, a wide tooth on the escapement-wheel, an extension on the escapement, and means for shifting the escapement-wheel and escapement relatively to each other, substantially as set forth.

37. In an assembly voting apparatus, the combination with a transmitter, of a totalizer electrically connected to and operated from said transmitter and employing a shaft, means for driving the shaft, a number-disk on the shaft, an escapement-wheel, an escapement for permitting feed movements of said wheel, a magnet for actuating said escapement, a wide tooth on the escapement-wheel, an extension on the escapement, and means for shifting the escapement-wheel on said shaft, substantially as set forth.

38. In an assembly voting apparatus, the combination with a transmitter, of a totalizer electrically connected to and operated from said transmitter and employing a shaft, means for driving the shaft, a number-disk on the shaft, an escapement-wheel, an escapement for permitting feed movements of said wheel, a magnet for actuating said escapement, a wide tooth on the escapement-wheel, an extension on the escapement, and a magnet for shifting the escapement-wheel on said shaft, substantially as set forth.

39. In an assembly voting apparatus, the combination with a transmitter, of a totalizer electrically connected to and operated from said transmitter and employing a shaft, means for driving the shaft, a number-disk on the shaft, an escapement-wheel, an escapement for permitting feed movements of said wheel, a magnet for actuating said escapement, a wide tooth on the escapement-wheel, an extension on the escapement, a restoring-magnet, an armature for said magnet, and a sleeve

surrounding the shaft and engaging the escapement-wheel to effect a longitudinal shift thereof, substantially as set forth.

40. In an assembly voting apparatus, the combination with a transmitter, of a totalizer electrically connected to and operated from said transmitter and employing a shaft, means for driving the shaft, a number-disk on the shaft, an escapement-wheel, an escapement for permitting feed movements of said wheel, a magnet for actuating said escapement, a wide tooth on the escapement-wheel, an extension on the escapement, a restoring-magnet, an armature for said magnet, a sleeve surrounding the shaft and engaging the escapement-wheel to effect a longitudinal shift thereof, and stops for limiting the extreme movements of said disk, substantially as set forth.

41. In an assembly voting apparatus, the combination with a transmitter, of a totalizer electrically connected to and operated from said transmitter and employing a shaft, means for driving the shaft, a number-disk on the shaft, an escapement-wheel, an escapement for permitting feed movements of said wheel, a magnet for actuating said escapement, a wide tooth on the escapement-wheel, an extension on the escapement, a restoring-magnet, an armature for said magnet, a sleeve surrounding the shaft and engaging the escapement-wheel to effect a longitudinal shift thereof, stops for limiting the extreme movements of said disk, and a spring for returning the disk to its normal position, substantially as set forth.

42. Means for selecting a plurality of electrical devices arranged in groups, comprising two sets of contact-plates, the plates of one set being connected to the devices of corresponding groups and the plates of the other set being connected to corresponding devices of the several groups, and current-collecting devices coöperating with said contact-plates and operated at different relative speeds, substantially as set forth.

43. Means for selecting a plurality of electrical devices arranged in groups, comprising two sets of contact-plates, the plates of one set being connected to the devices of corresponding groups and the plates of the other set being connected to corresponding devices of the several groups, current-collecting devices for said contact-plates, and means for moving the current-collecting device of one set at a speed which will carry it into engagement with all the plates of that set while the collecting device of the other set is moved from one plate to the other of that set, substantially as set forth.

44. Apparatus for successively bringing into circuit with a common electrical receiving device a plurality of electrical devices arranged in groups, comprising in combination a plurality of electrical devices arranged in groups, a common receiving electrical device, two sets of contact-plates, the plates of one set being connected to the several groups and

the plates of the other set being connected to corresponding devices of the several groups, current-collecting devices coöperating with said contact-plates, and means for operating said current-collecting devices at different relative speeds, substantially as and for the purposes set forth.

45. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of transmitting circuit-closing devices, a set of contact-plates with which said circuit-closers are connected, a current-collector coöperating with said contact-plates, a magnetic receiver connected to said current-collector, and means controlled by said receiver for effecting a registration of the condition in which the transmitting circuit-closers are placed, substantially as set forth.

46. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of transmitting circuit-closing devices, a set of contact-plates with which said circuit-closers are connected, a current-collector coöperating with said contact-plates, a magnetic receiver connected to said current-collector, and means controlled by said receiver for effecting a printed registration of the condition in which the transmitting circuit-closers were placed, substantially as set forth.

47. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of transmitting circuit-closing devices, a set of contact-plates with which said circuit-closers are connected, a current-collector coöperating with said contact-plates, a magnetic receiver connected to said current-collector, means controlled by said receiver for effecting a printed registration of the condition in which the transmitting circuit-closers were placed, and means for effecting a total of the circuit-closers which were moved in one direction and a corresponding total of the circuit-closers which were moved in the opposite direction, substantially as set forth.

48. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of circuit-closing disks, a pair of contact devices with which each circuit-closing disk coöperates, a source of polarized current for said contacts, a set of contact-plates connected with said circuit-closers, a current-collector coöperating with said plates, an electromagnetic receiving apparatus connected to said current-collector, and means controlled by said receiving apparatus for effecting a registration of the votes, substantially as set forth.

49. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of circuit-closing disks, a pair of contact devices with which each circuit-closing disk coöperates, a source of polarized current for said contacts, a set of contact-plates connected with said circuit-closers,

a current-collector cooperating with said plates, a polarized relay connected to said current-collector, and means controlled by said polarized relay for effecting a registration of the votes, substantially as set forth.

50. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of circuit-closing disks, a pair of contact devices with which each circuit-closing disk cooperates, a source of polarized current for said contacts, a set of contact-plates connected with said circuit-closers, a current-collector cooperating with said plates, a polarized relay connected to said current-collector, and means controlled by the relay for effecting a printed record of the votes, substantially as set forth.

51. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of circuit-closing disks, a pair of contact devices with which each circuit-closing disk cooperates, a source of polarized current for said contacts, a set of contact-plates connected with said circuit-closers, a current-collector cooperating with said plates, a polarized relay connected to said current-collector, and means controlled by the relay for effecting a printed record of the votes and simultaneously effecting a totalization of such votes, substantially as set forth.

52. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of circuit-closing disks, a pair of contact devices cooperating with each disk, a source of polarized current connected to said contact devices, a set of contact-plates connected to said disks, a current-collector cooperating with said plates, a polarized relay connected with said current-collector, means controlled by the relay for effecting a printed record of the votes and for simultaneously effecting a totalization thereof, and means for simultaneously restoring

the totalizing devices, substantially as set forth.

53. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of circuit-closing disks, a pair of contact devices cooperating with each disk, a source of polarized current connected to said contact devices, a set of contact-plates connected to said disks, a current-collector cooperating with said plates, a polarized relay connected with said current-collector, means controlled by the relay for effecting a printed record of the votes and for simultaneously effecting a totalization thereof, means for simultaneously restoring the totalizing devices, means for locking the circuit-closing disks in either of their extreme positions, and means for electrically releasing said disks, substantially as set forth.

54. In an apparatus for ascertaining and registering the sense of an assembly, the combination of a plurality of circuit-closing disks, a pair of contact devices cooperating with each disk, a source of polarized current connected to said contact devices, a set of contact-plates connected to said disks, a current-collector cooperating with said plates, a polarized relay connected with said current-collector, means controlled by the relay for effecting a printed record of the votes and for simultaneously effecting a totalization thereof, means for simultaneously restoring the totalizing devices, means for locking the circuit-closing disks in either of their extreme positions, and a magnet in circuit between each of the disks and the contact-plates for releasing the disks, substantially as set forth.

This specification signed and witnessed this 26th day of March, 1901.

FRANK L. DYER.

Witnesses:

JNO. R. TAYLOR,
ISABEL MCINTOSH.