

C. C. ABBOTT.
GROUPING MECHANISM FOR VOTING MACHINES.

APPLICATION FILED DEC. 17, 1907.

Patented Oct. 13, 1908.

2 SHEETS—SHEET 1.

900,906.

Fig. 2.

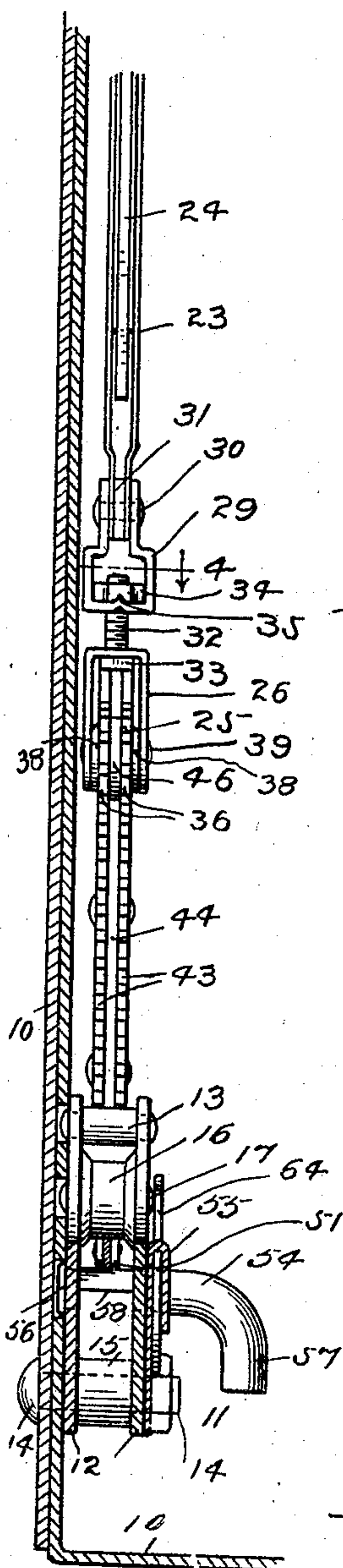


Fig. 4.

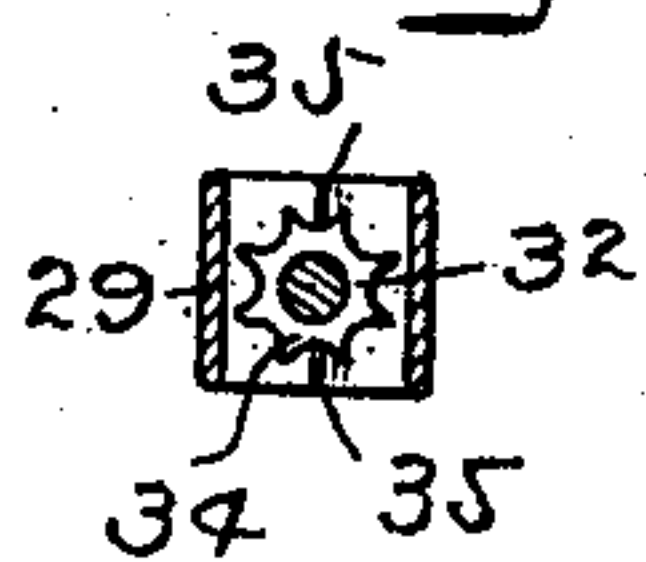


Fig. 1.

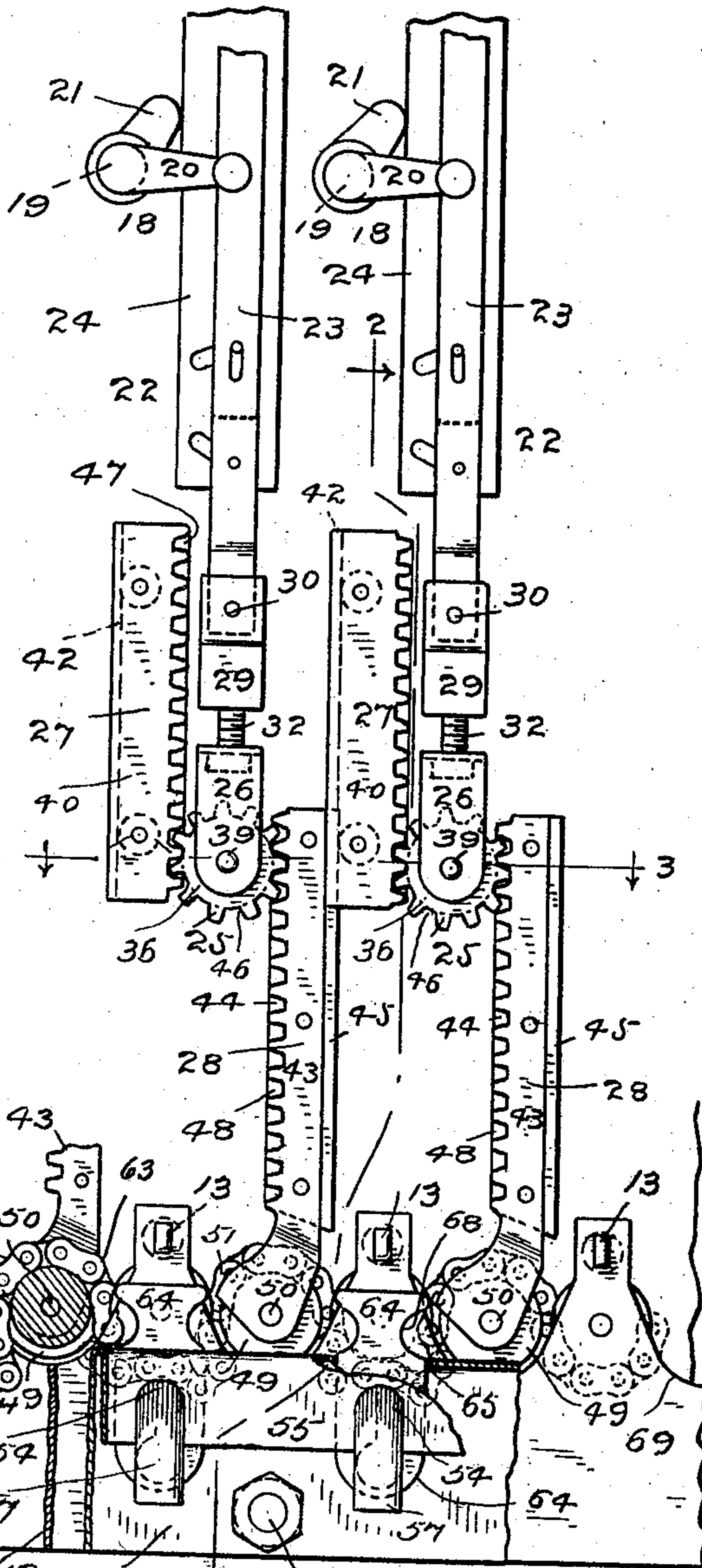
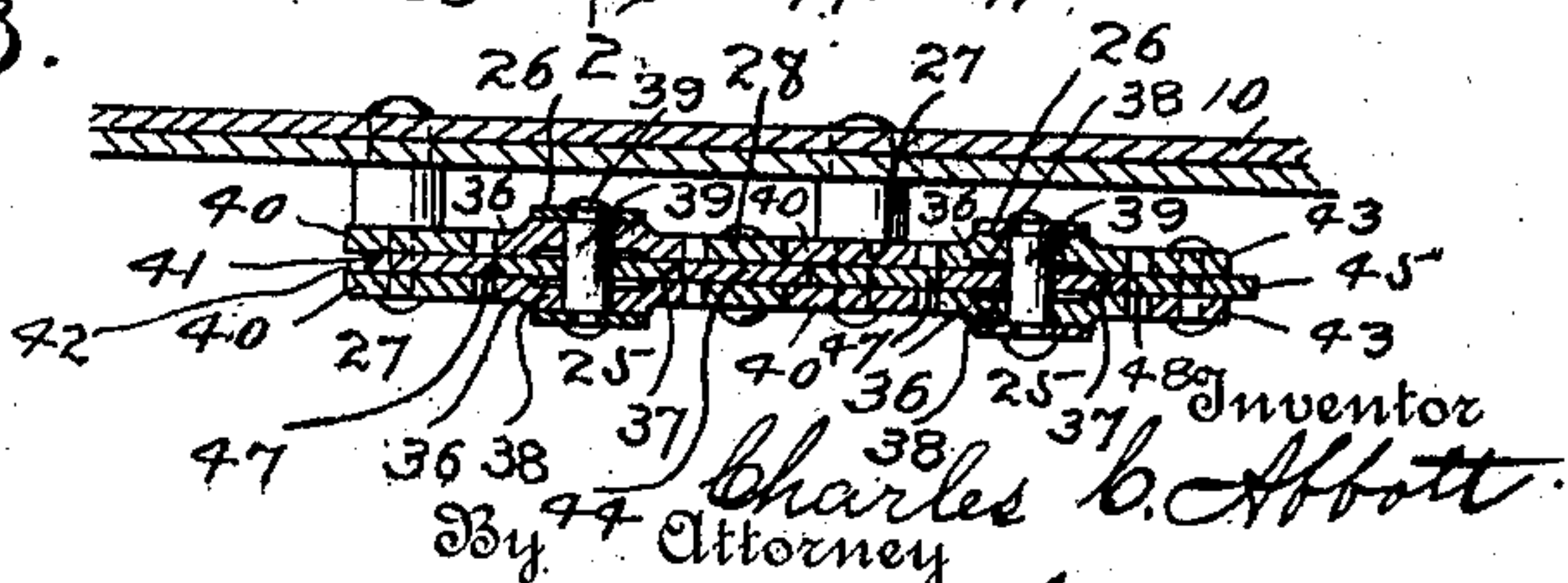


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 5.

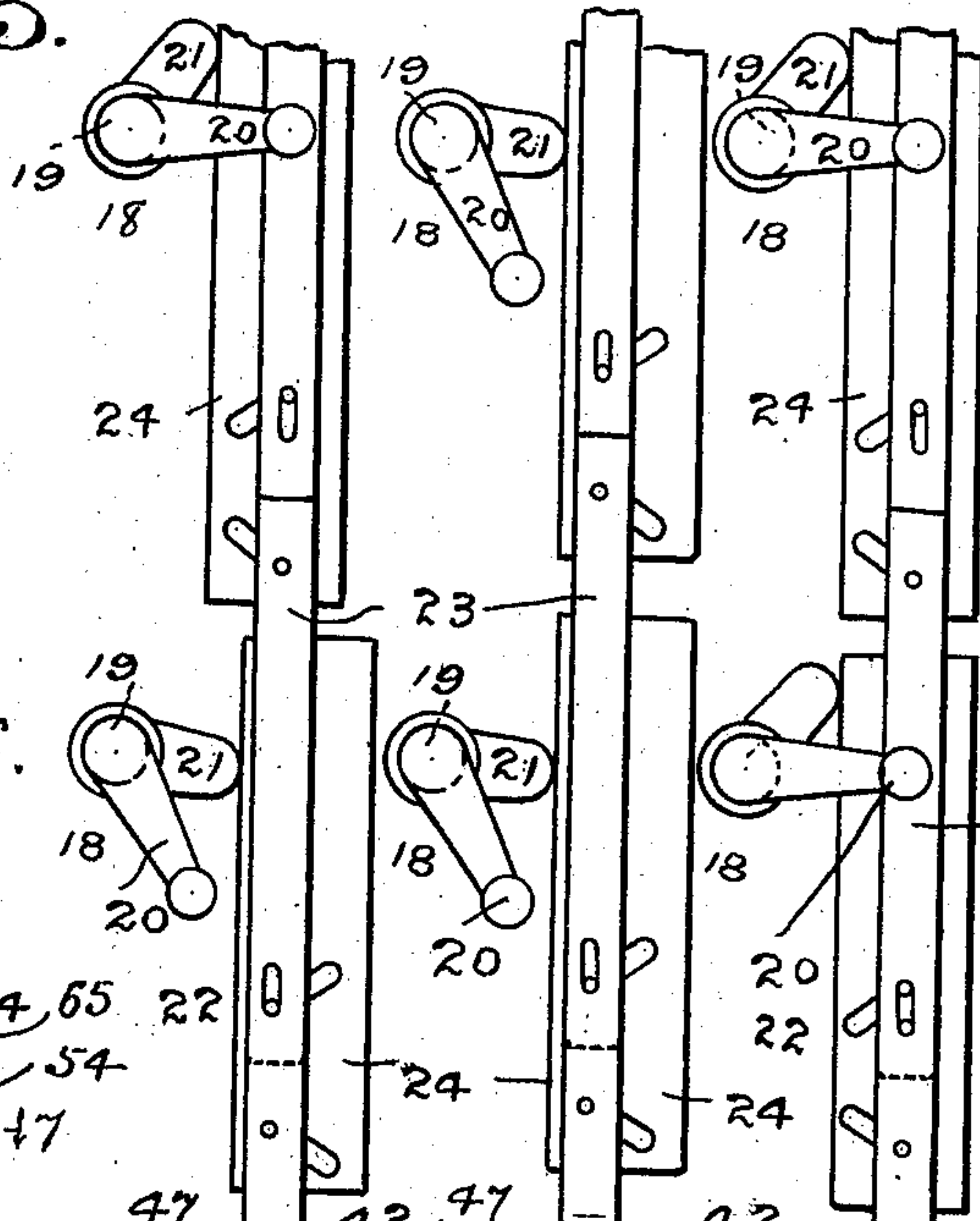


Fig. 6.

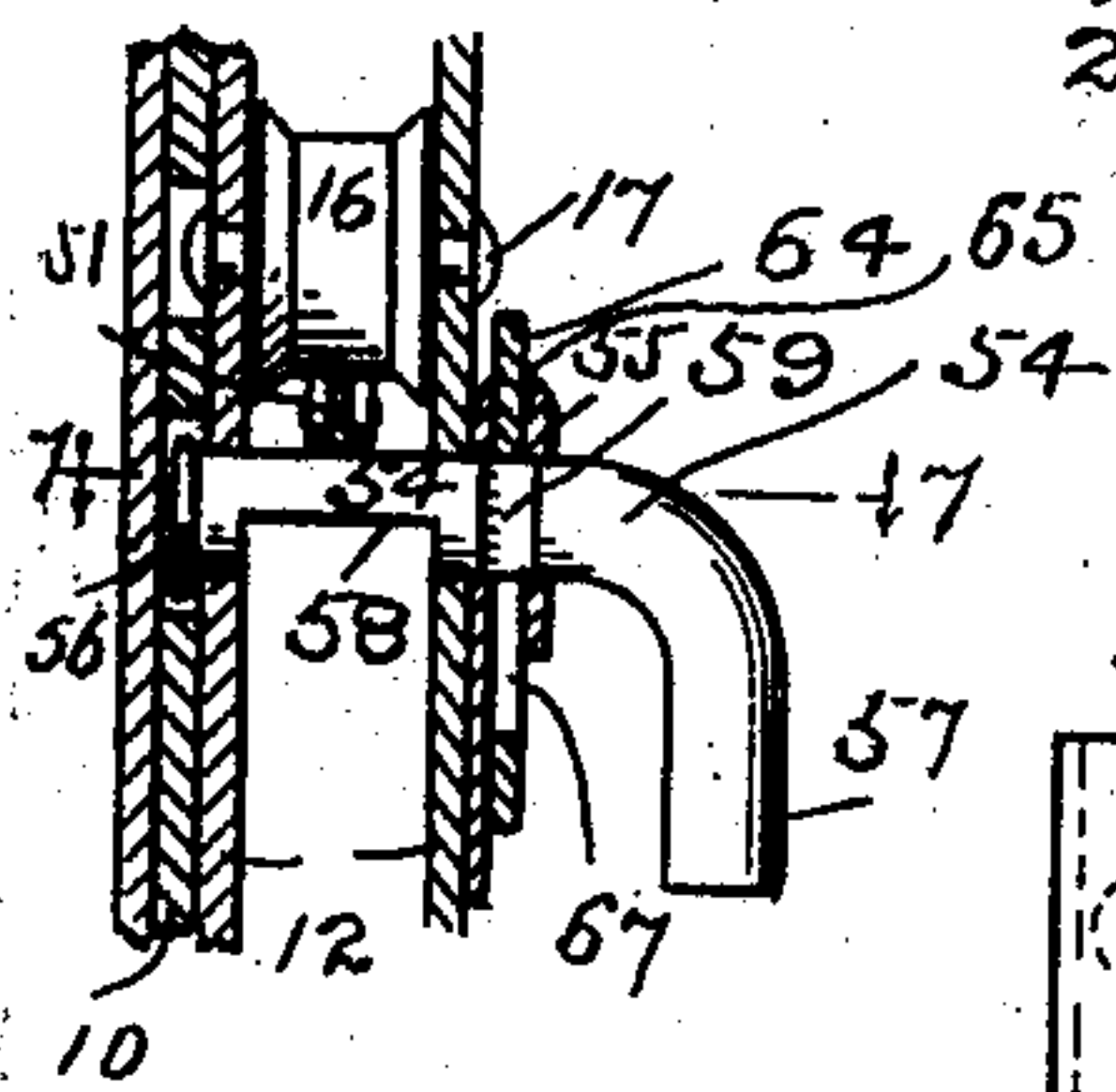


Fig. 7.

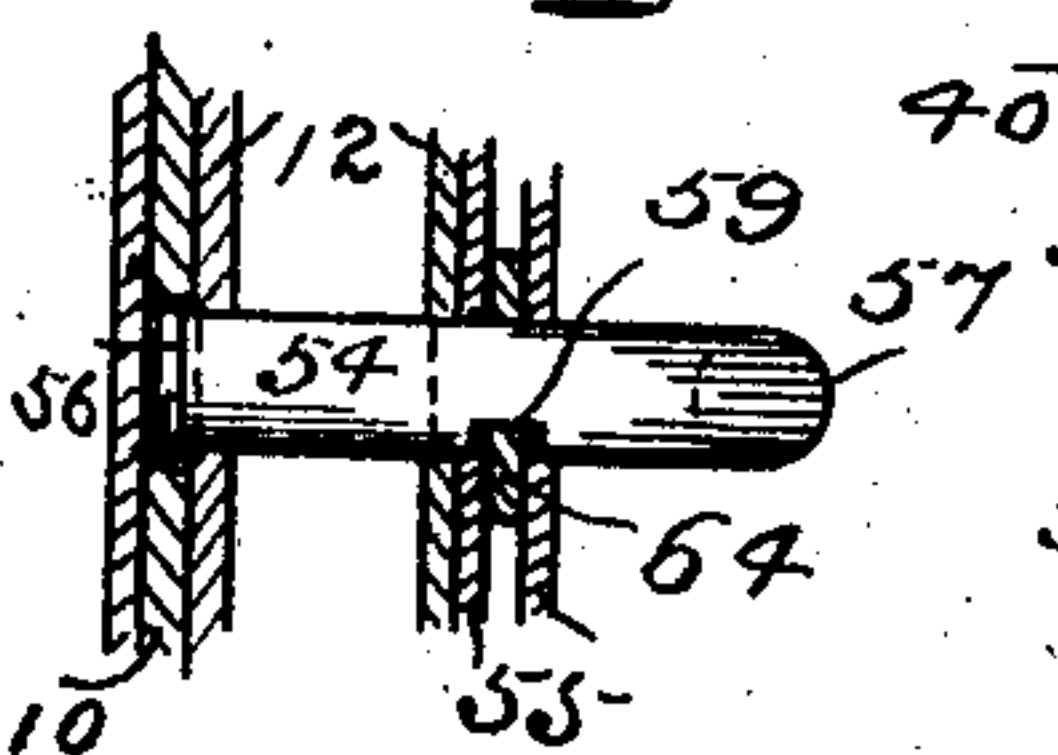


Fig. 11.

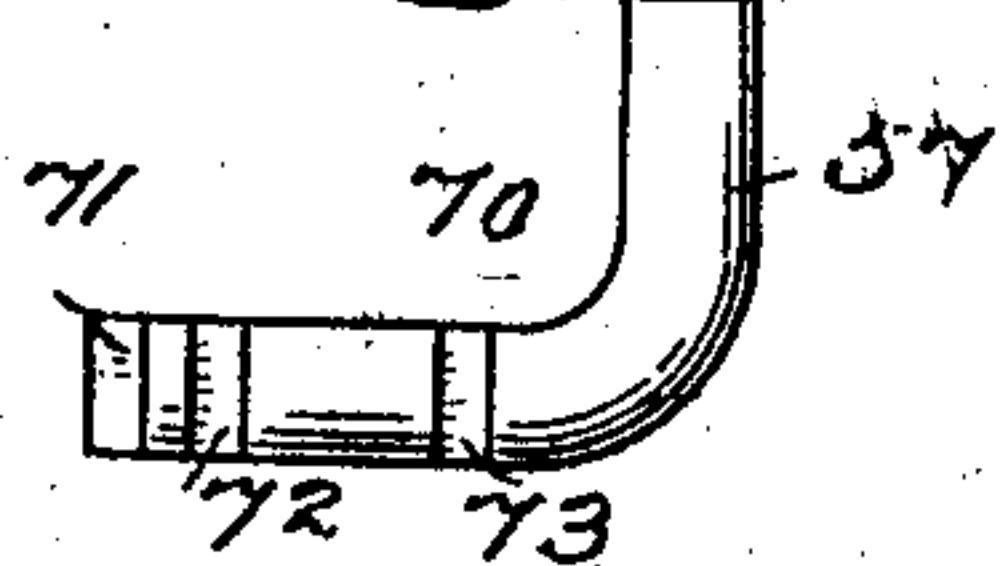


Fig. 12.

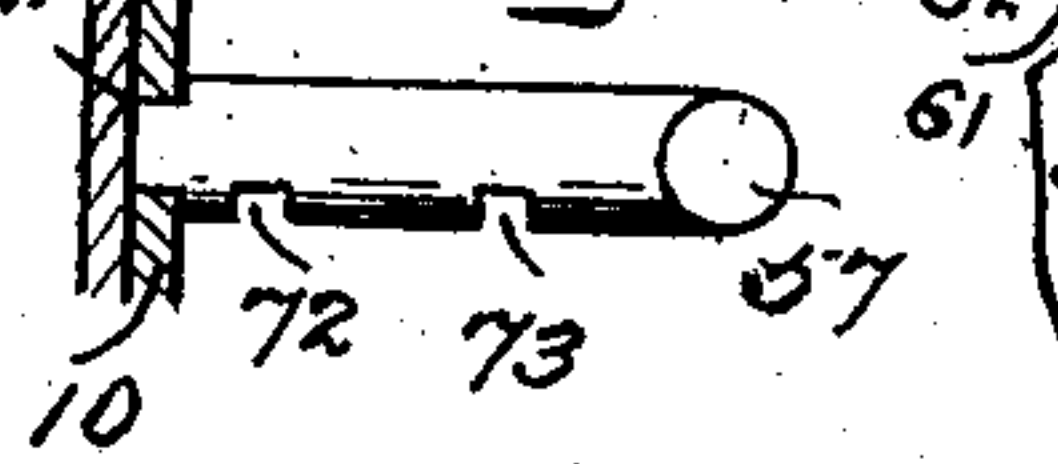


Fig. 8.

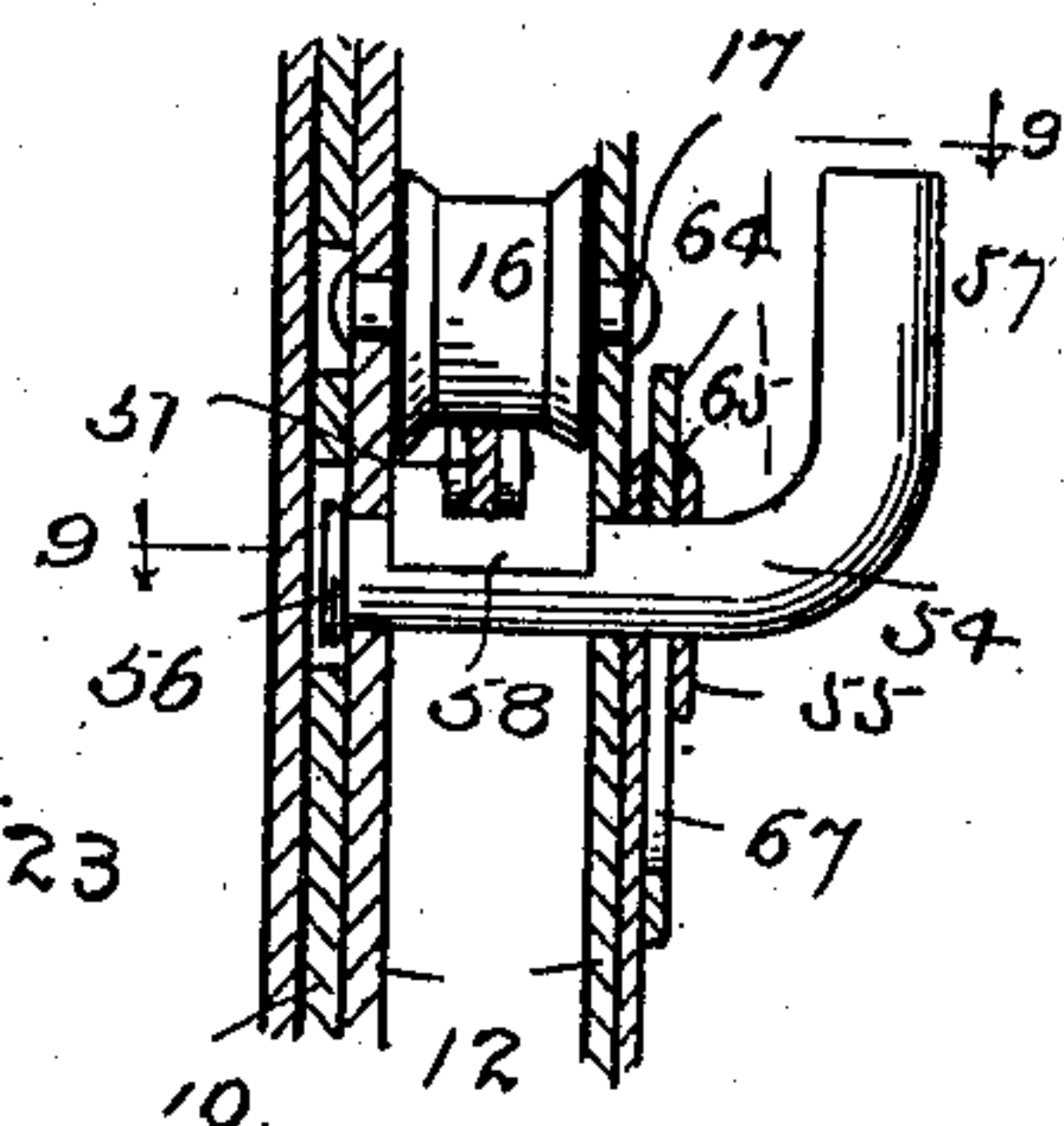


Fig. 9.

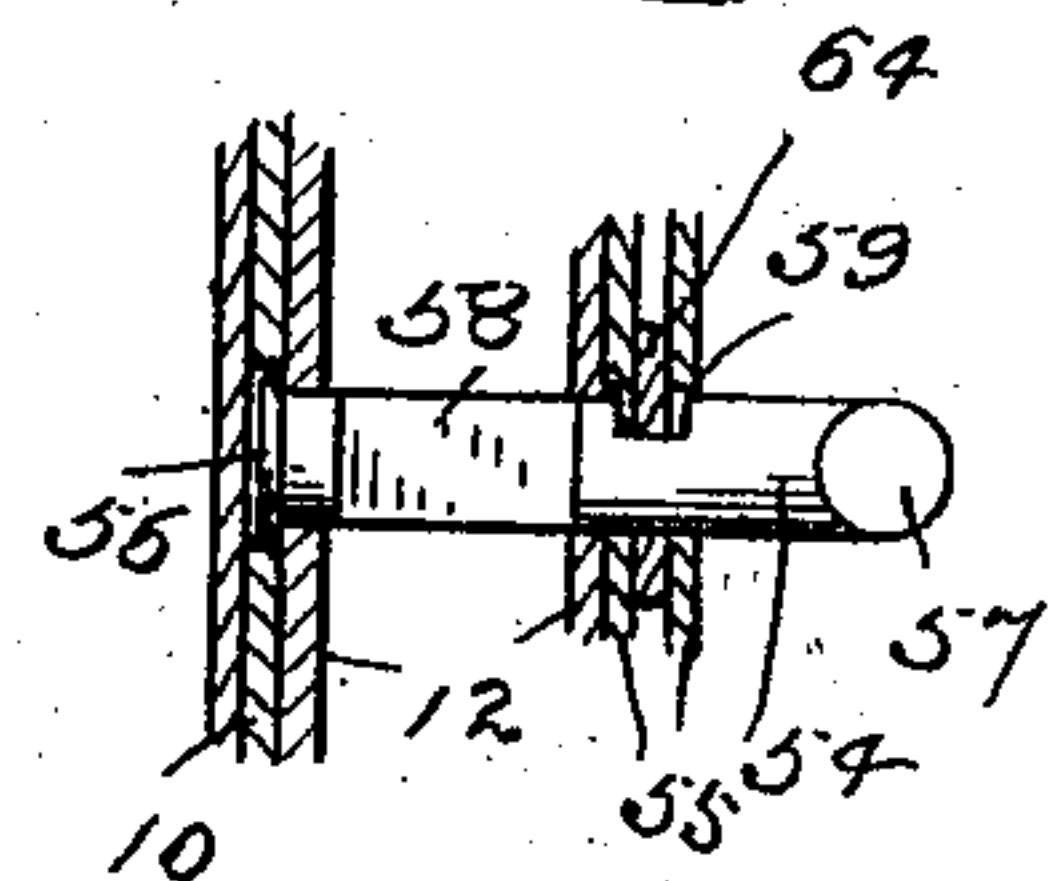
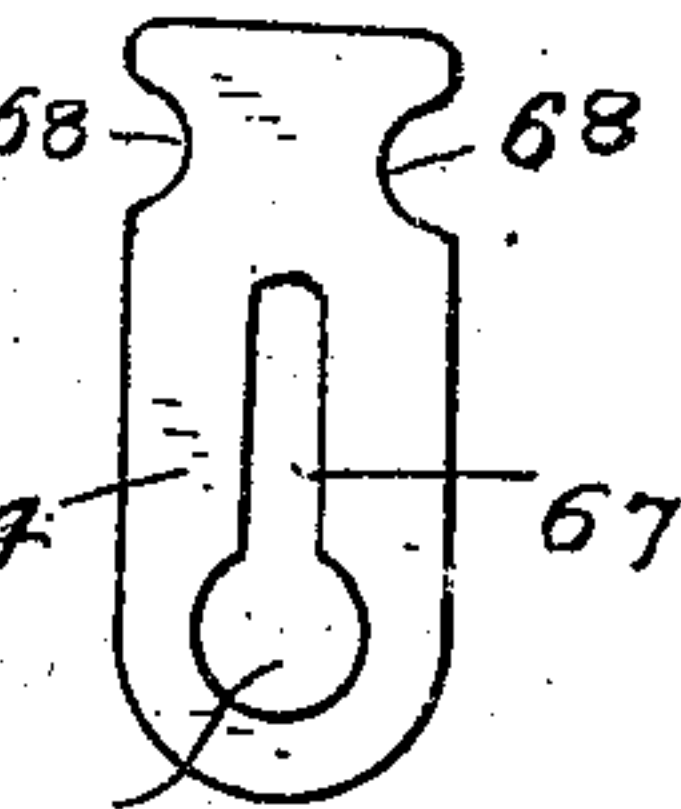


Fig. 10.



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UNITED STATES PATENT OFFICE.

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GROUPING MECHANISM FOR VOTING-MACHINES.

No. 900,906.

Specification of Letters Patent.

Patented Oct. 13, 1908.

Application filed December 17, 1907. Serial No. 406,841.

To all whom it may concern:

Be it known that I, CHARLES C. ABBOTT, a citizen of the United States, residing at Pittsfield, county of Berkshire, State of Massachusetts, have invented a new and useful Grouping Mechanism for Voting-Machines, of which the following is a specification.

This invention relates to that portion of the mechanism of a voting machine that has to do with group voting, so called.

The invention is shown as applied to a "horizontal" machine, in which the names of party candidates are placed in horizontal lines and the names of all candidates for the same office are placed in vertical columns. But the invention is, of course, equally applicable to a "vertical" machine in which the names of party candidates are placed in vertical columns and the names of all candidates for the same office are placed in horizontal lines, or to a machine in which the names of candidates for each office are placed in alphabetical order without party columns.

It is one of the objects of this invention to produce a grouping mechanism that will enable the parts to be made from sheet metal, practically all the parts of the present structure being punchings, thereby reducing the cost of production to the minimum.

A further object of the invention is to produce a grouping mechanism so constructed as to enable a maximum amount of slack in the grouping chain to be taken up with a minimum amount of longitudinal contracting movement of the interlocking members, and with the least possible number of joints that can permit elongation in continued use.

With these and other objects in view, the invention consists in certain constructions and in certain parts, improvements and combinations which will be hereinafter described and then specifically pointed out in the claims hereunto appended.

In the accompanying drawings forming a part of this specification, similar reference characters indicate the same parts in the several views.

Figure 1 is a front elevation of so much of the mechanism of a voting machine as is required to illustrate the present invention, the grouping chain being shown as locked against group voting and certain of the parts being shown in vertical section; Fig. 2 a vertical section on the line 2—2 in Fig. 1, looking in the direction of the arrows; Fig. 3 a

transverse section on the line 3—3 in Fig. 1 looking in the direction of the arrows; Fig. 4 a detail section on the line indicated by 2 in Fig. 2, looking in the direction of the arrow; Fig. 5 a detail front elevation illustrating the operation of group voting, certain of the parts being in vertical section; Fig. 6 a detail vertical section on a plane at a right angle to the plane of Fig. 1 and corresponding therewith, the grouping chain being locked against group voting; Fig. 7 a section on the line 7—7 in Fig. 6, looking in the direction of the arrow; Fig. 8 a view similar to Fig. 6 but corresponding with Fig. 5 and showing the grouping chain unlocked; Fig. 9 a section on the line 9—9 in Fig. 8, looking in the direction of the arrow; Fig. 10 a detail view of the grouping key locking slide detached; Fig. 11 a detail elevation of a variant form of grouping key; and Fig. 12 is a plan view corresponding with Fig. 11.

10 denotes the base of a voting machine and 11 the grouping horizontal as a whole, said horizontal consisting of two plates 12 secured together by spacing rivets 13 and stud bolts 14 which pass through spacers 15 and are riveted to the base.

16 denotes the grouping rollers which are journaled on pins 17 in the grouping horizontal.

18 denotes voting members which are suitably journaled in the framework of the machine (not shown in the drawings as it forms no portion of the present invention). Each voting member comprises, so far as the present invention is concerned, a shaft specifically indicated by 19, a voting lever indicated by 20 and a depressing arm indicated by 21.

22 denotes interlocking members as a whole. These interlocking members correspond in number with the columns of voting members and each comprises side plates 23 and cam plates 24 movable obliquely relatively to the side plates. The cam plates in each interlocking member correspond in number with the voting members in a column. When a voting member is operated, the depressing arm 21 of the voting member engages the corresponding cam plate of the interlocking member and displaces it laterally, as clearly shown in Fig. 5, the effect of which is to contract the interlocking member longitudinally by placing a slack therein. In setting up the machine, one voting member corresponding with each interlocking member is

operated, thereby placing a slack in the interlocking member, which is then so set that no further slacks can be placed therein, thereby rendering it impossible for any voter to vote for but one candidate for any office. At the lower end of each interlocking member is a gear wheel 25 journaled in a yoke 26 which is adjustably connected to the interlocking member. Each gear wheel meshes with a stationary rack 27 and a movable rack 28. The adjustable connection between each yoke 26 and the corresponding interlocking member comprises a yoke 29 which is pivoted to the lower side plates 23 of the interlocking member, as at 30, a spacer 31 being placed between said plates. A screw 32 passes through the base of each yoke 26 and is held against rotation by an angular, head 33 engaging the side pieces of the yoke. Each screw 32 also passes freely through the base of the corresponding yoke 29 and is engaged by a nut 34 lying between the side pieces of the yoke. In order to lock the nut against rotation after adjustment thereby preventing elongation of the connection, the nut is provided in its edge with grooves which are engaged by ribs 35 on the inner face of the yoke. To adjust the height of yoke 26 and gear wheel 25, said yoke and the corresponding movable rack 28 are raised to permit the nut to pass over ribs 35 on the inner face of the yoke. After adjustment, grooves in the nut are placed in engagement with the ribs and the weight of the parts will lock the nut against rotation.

A novel feature of both the racks and the gear wheels is that they are made of punchings from sheet metal, thereby reducing the cost of construction to the minimum. Each gear wheel comprises two outer members 36 which are provided with teeth and comprise the gear proper. Between these members is a spacing disk 37 whose diameter is approximately the diameter of the outer members at the base of the teeth. That is to say, the two rows of teeth of each gear wheel extend beyond the spacing disk or inner member of the gear wheel leaving a peripheral groove 46 between them. The outer members of each gear wheel are provided with outwardly-curved bosses as at 38, see Figs. 2 and 3, thereby forming a hub for each gear wheel which acts as a bearing against the inner sides of the yoke 26. The three members of each gear wheel are secured together by a shouldered stud 39 which also serves as the journal of the gear wheel in the side pieces of the yoke.

Each stationary rack comprises two outer members 40 which are provided with teeth and form the rack proper. Between these members is a spacing plate 41 which extends on the face or front side of the racks to approximately the tips of the teeth of members

40 forming ribs 47, for a purpose presently to be explained, but does not extend to the backs of the racks leaving grooves 42 between the outer members.

The movable racks likewise comprise two outer members 43 which are provided with teeth and form the rack proper. Between these members are spacing plates 44 which extend on the face or front side of the racks to approximately the tips of the teeth of members 43 forming ribs 48, and extend at the backs of the racks beyond outer members 43 leaving ribs 45.

The intermeshing of the gear wheels and racks is as follows: The ribs 47 of stationary racks 27 and the ribs 48 of movable racks 28 engage the grooves 46 in gear wheels 25, one side of the groove in each gear wheel receiving one of said ribs and the opposite side of the groove in the gear wheel receiving the other rib, and the ribs 45 on the backs of the movable racks engage the grooves 42 in the backs of the stationary racks. I thus insure free movement of the parts and prevent binding by preventing the teeth of the gear wheels from meshing too deeply with the teeth of the racks. In practice the gear wheels and racks fit very loosely, thereby insuring the most perfect freedom of movement and still retaining the gear wheels and racks in proper mesh and alignment. The lower ends of the movable racks are provided with rollers 49 which are journaled on pins 50 and lie between outer members 43. 51 denotes the grouping chain which passes alternately about rollers 49 on the movable racks and about grouping rollers 16 which are journaled on pins 17, the ends of which are riveted in the plates of the grouping horizontal. The ends of the grouping chain are adjustably connected to some fixed portion of the machine, ordinarily to the base, the connection not being shown as it forms no portion of the present invention.

In ordinary voting, the grouping chain is locked to each of the grouping rollers by a grouping key. The form of grouping key illustrated in Figs. 1 to 9, inclusive, is a rotary key which is indicated by 54. This key extends through holes in the plates of the grouping horizontal, turning freely therein, and also through holes in an inverted U-shaped supporting plate 55 which is rigidly secured to the grouping horizontal. The inner end of the key is headed, as at 56, on the outer side of one of the plates of the grouping horizontal to prevent its withdrawal and the other end is bent to form a hand piece 57 outside the supporting plate. In one side of each grouping key, between the plates of the grouping horizontal, is a recess 58 and at right angles to said recess and in alignment with the supporting plate is a groove 59. The links of grouping chain 51 are made nar-

rowest at their mid-length, leaving depressions 61 intermediate the rivets, which are indicated by 62. The grouping keys are so located relatively to the grouping rollers as to leave just sufficient space between each key and the corresponding roller to receive the mid-length of a chain link. That is to say, the depression 61 in a chain link will lie between a grouping key and the corresponding grouping roller but the ends of the links, which are specifically indicated by 63, will not pass between them, so that when a grouping key is turned to the locking position, that is with the recess 58 lying on the side opposite to the grouping chain, said chain will be rigidly locked against movement in either direction (see Figs. 1, 2, 6 and 7). By giving a grouping key a half turn from the locking position, it is placed in the unlocking position, that is with the recess on the side toward the grouping chain, as in Figs. 8 and 9. When a number of grouping keys are in this position, the unlocked portion of the grouping chain may be moved freely in either direction.

In order to lock the grouping keys in either the locking or the unlocking position, I provide key locking slides 64, which pass through slots 65 in the rounded upper edge of U-shaped supporting plate 55 and lie between the sides of said plate. These locking slides are retained in any position in which they may be placed by frictional engagement with the supporting plate. Each key locking slide is provided with an opening 66 which receives the corresponding grouping key and permits it to turn freely and with a slot 67 narrower than the opening and narrower than the diameter of the key which extends from the opening longitudinally of the slide. The upper end of each key locking slide is provided with a finger piece 68 for convenience in operation. Recesses 69 are provided in the upper edges of plates 12 of the grouping horizontal to provide clearance for movable racks 28. The operation of the key locking slides will be obvious. When a slide is raised and the grouping key is lying in opening 66, the key may be rotated freely to place it in the locking position, as in Figs. 1, 2, 6 and 7, or in the unlocking position, as in Figs. 8 and 9. When a grouping key is in either of these positions it may be locked there by pushing the corresponding key locking slide downward. In these positions of the grouping key, the groove 59 in the key will be in alinement with slot 67 in the locking slide so that the grooved portion of the key will pass into the slot in the slide when the latter is moved downward and the key will be thereby locked against rotation.

The modified form of grouping key illustrated in Figs. 11 and 12 differs from the other form in that instead of being rotary it

slides in and out and may be removed from the machine when it is set for group voting if preferred. 70 denotes a grouping key of the modified form which is adapted to slide in and out through holes in the plates of the grouping horizontal and also through holes in U-shaped supporting plate 55. The end of the key is made angular, as at 71, and in the locking position engages a corresponding angular opening in the inner plate of base 10 of the machine (see Fig. 12). Keys 70 are also provided with grooves 72 and 73, either of which is adapted to register with slots 67 in key locking slides 64, the same as in the other form, to lock the key in either the unlocking or locking positions, respectively. In group voting, a grouping key may be locked in the unlocking position by drawing it outward until slot 72 is in alinement with the slot in the corresponding locking slide and then moving the slide downward until the grooved portion of the key passes into slot 67 in the locking slide, or if preferred the grouping key may be removed, the slide being left raised. When the grouping key is withdrawn to the unlocking position or removed from the machine, the grouping chain will pass over the grouping rollers freely. When the grouping key is in the locking position, that is in engagement with a depression 61 in a chain link, the grouping key and the corresponding grouping roller will lock the grouping chain against movement in either direction, as in the other form. In moving the grouping key to the locking position, the angular end thereof may be turned horizontally or at any required angle, should a depression 61 in the chain not be in exact alinement therewith, and passed under the chain to raise the latter to the locking position, said angular end being then placed in engagement with the corresponding opening in the inner plate of base 10, and then the locking slide may be moved downward, groove 73 in the grouping key registering with slot 67 in the locking slide, thereby rigidly locking the grouping chain against movement in either direction.

It will of course be understood that in voting machines as ordinarily constructed, for example in the Triumph voting machine, the other end of each interlocking member (not shown) is connected to the corresponding portion of the independent voting mechanism (not shown as it forms no portion of the present invention). In ordinary voting, the grouping chain is locked to each of the grouping rollers by means of a grouping key, as in Figs. 1, 2, 6 and 7. In the normal position of the parts, that is when no voting member has been operated, the interlocking members will be at their elongated position and yokes 26 carrying gear wheels 25 and also movable racks 28 will be at their lowered

position, as in Figs. 1 and 2. When voting members are operated, a slack will be placed in the corresponding interlocking member by each operated voting member and the interlocking members will be correspondingly contracted, thereby raising yokes 26 and gear wheels 25 and also raising the corresponding movable racks 28, as in Fig. 5, in which the first and third movable racks are shown as raised one slack each and the second movable rack is shown as raised two slacks by the operation of two voting members, each of which has placed a slack in the corresponding interlocking member. Suppose, for example, that the operation of a voting member contracts the corresponding interlocking member longitudinally two-tenths of an inch; the corresponding gear wheel 25 will be raised the same distance and, being meshed with a stationary rack 27 and a movable rack 28, will raise the latter four-tenths of an inch and the raising of the movable rack will take up eight-tenths of an inch of slack in grouping chain 51. That is to say, the amount of slack taken up by the grouping chain will be equal to four times the amount the interlocking member is contracted longitudinally.

The operation is as follows: In setting up the machine for regular voting, one slack is placed in each interlocking member by operating one voting member corresponding therewith, then the grouping chain is tightened up so as to leave no slack therein and all of the grouping keys are placed in the locking position, thereby locking the grouping chain to the grouping rollers so that there can be no movement in either direction. The rule for setting up the machine for group voting is simply to place all grouping keys between the first and last column of the group in the unlocking position, as in Fig. 5. Suppose, for example, that the three interlocking members illustrated in Fig. 5 were to be grouped; that is to say, that a voter is to be permitted to vote for three candidates for the same office. The officials having the election in charge would place the two intermediate grouping keys in the unlocking position, as shown, thereby leaving the grouping chain free to move in either direction. As three candidates are to be voted for, it is necessary to provide for casting the three votes all in one column, or two in one column and one in either of the others, or if the voter so elects, one in each of the columns. In other words, it is necessary to make the slack in the interlocking members transferable, which is done by placing the grouping keys in the unlocking position, thereby permitting the slacks to be transferred from one interlocking member to another by means of the movable racks and the grouping chain. To set up the machine again for ordinary

voting, it would simply be necessary to place all the grouping keys in the locking position, as in Figs. 1, 2, 6 and 7, thereby locking the grouping chain again to the grouping rollers. It has already been explained that the amount of movement of a movable rack when the corresponding interlocking member is contracted longitudinally by the operation of a voting member will be double the amount of contraction of the interlocking member and that the amount of slack taken up in the grouping chain will be double the amount of movement of the movable rack or four times the longitudinal contraction of the interlocking member. This construction renders it practically impossible to produce sufficient strain upon the grouping chain to enable a voter to cast an additional or fraudulent vote, the construction being especially valuable when a large number of columns are included in the group, for the reason that the movement of the parts is always free, and the number of joints to which strain can be applied in use is reduced to the minimum, so that stretching of the members is rendered practically impossible.

Having thus described my invention I claim:

1. In a voting machine, the combination with voting members and interlocking members carrying gear wheels, of stationary racks and movable racks engaging opposite faces of the gear wheels, rollers carried by the movable racks, grouping rollers intermediate the rollers on the movable racks and a grouping chain passing alternately about the rollers on the movable racks and the grouping rollers.
2. In a voting machine, the combination with voting members and interlocking members carrying gear wheels, of stationary racks and movable racks engaging opposite faces of the gear wheels, rollers carried by the movable racks, grouping rollers intermediate the rollers on the movable racks, a grouping chain passing alternately about the rollers on the movable racks and the grouping rollers, and means for locking the grouping chain to the grouping rollers.
3. In a voting machine, the combination with voting members and interlocking members carrying gear wheels, of stationary racks and movable racks engaging opposite faces of the gear wheels, rollers carried by the movable racks, grouping rollers intermediate the rollers on the movable racks, a grouping chain passing alternately about the rollers on the movable racks and the grouping rollers, and grouping keys for locking the grouping chain to the grouping rollers.
4. In a voting machine, the combination with voting members and interlocking members carrying gear wheels, of stationary racks and movable racks engaging opposite faces

of the gear wheels, rollers carried by the movable racks, grouping rollers intermediate the rollers on the movable racks, a grouping chain, grouping keys adapted to engage the chain and lock the chain to the grouping rollers, and means for locking the grouping keys in the locking or unlocking position.

5. In a voting machine, the combination with voting members and interlocking members carrying gear wheels, of stationary racks and movable racks engaging opposite faces of the gear wheels, rollers carried by the movable racks, grouping rollers intermediate the rollers on the movable racks, a grouping chain passing alternately about the rollers on the movable racks and the grouping rollers, grouping keys for locking the grouping chain to the grouping rollers, and key locking slides for locking the grouping keys in the locking or unlocking position.

6. In a voting machine, the combination with voting members and interlocking members carrying gear wheels, of stationary racks and movable racks engaging opposite faces of the gear wheels, rollers carried by the movable racks, grouping rollers intermediate the rollers on the movable racks, a grouping chain comprising links having depressions at their mid-length and grouping keys adapted to engage said depressions to lock the grouping chain to the grouping rollers.

7. In a voting machine, the combination with voting members and interlocking members carrying gear wheels, of stationary racks and movable racks engaging opposite faces of the gear wheels, rollers carried by the movable racks, grouping rollers intermediate the rollers on the movable racks, a grouping chain comprising links having depressions at their mid-length and rotary grouping keys which are adapted to lock the grouping chain to the grouping rollers for ordinary voting and are provided in one side with recesses which permit the grouping chain to pass freely in group voting.

8. In a voting machine, the combination with voting members and interlocking members carrying gear wheels, of stationary racks and movable racks engaging opposite faces of the gear wheels, rollers carried by the movable racks, grouping rollers intermediate the rollers on the movable racks, a grouping chain, grouping keys adapted to lock the grouping chain to the grouping rollers for ordinary voting and having recesses which permit the grouping chain to pass freely in group voting and grooves and key locking slides having openings which receive the grouping keys and slots narrower than the openings and extending therefrom which are adapted to register with the slots in the grouping keys to lock the latter in the locking or unlocking position.

9. In a voting machine, the combination with movable racks carrying rollers, a group-

ing horizontal, grouping rollers journaled therein and a grouping chain passing alternately about the rollers on the movable racks and the grouping rollers, of rotary grouping keys which pass through the grouping horizontal, are headed to prevent withdrawal and are provided with recesses and grooves at right angles thereto, and key locking slides having openings which receive the keys and slots narrower than the openings and extending therefrom, said grouping keys being adapted to lock the grouping chain to the grouping rollers and when the recesses are turned toward the rollers to permit the chain to pass freely and the slots in the slides being adapted to register with the grooves in the keys to lock the keys in either the locking or unlocking position.

10. In a voting machine, the combination with voting members and interlocking members, of gear wheels, yokes in which they are journaled, adjustable connections between the yokes and the interlocking members and stationary and movable racks engaging the opposite faces of the gear wheels.

11. In a voting machine, the combination with voting members and interlocking members, of gear wheels, yokes in which they are journaled, yokes connected to the interlocking members and provided with ribs, screws passing through said yokes and having heads engaging yokes, nuts on the screws which engage the ribs, for the purpose set forth, and stationary and movable racks engaging the opposite faces of the gear wheels.

12. In a voting machine, the combination with voting members and interlocking members, of gear wheels carried by the interlocking members and having central peripheral grooves, stationary racks having central ribs engaging said grooves and central grooves in their backs and movable racks having central ribs engaging the grooves in the gear wheels and other ribs engaging the grooves in the backs of the stationary racks, substantially as described, for the purpose specified.

13. In a voting machine, the combination with voting members and interlocking members, of gear wheels comprising outer members provided with teeth, between the members spacing disks leaving grooves between the outer members and stationary and movable racks each comprising outer members having teeth engaging the gear wheels, said stationary racks having grooves in their backs and ribs on their faces engaging the grooves in the gear wheels and said movable racks having ribs on their faces engaging the grooves in the gear wheels and ribs on their backs engaging the grooves in the backs of the stationary racks, substantially as described, for the purpose specified.

14. In a voting machine, the combination with voting members and interlocking mem-

bers, of gear wheels carried by the interlocking members and comprising outer members having teeth with spacing disks between them and central peripheral grooves, and stationary and movable racks each comprising outer members having teeth engaging the gear wheels and spacing plates, said spacing plates forming grooves in the backs of the stationary racks and ribs on the faces thereof engaging the grooves in the gear wheels, and the spacing plates of the movable racks forming ribs on the faces thereof which engage the grooves in the gear wheels and ribs on the backs which engage the grooves in the backs of the stationary racks.

15. In a voting machine, the combination with an interlocking member and a double gear wheel carried by said member and having a groove in its periphery, of a stationary double rack engaged by said gear wheel and a movable rack comprising outer plates having teeth on their faces which engage the gear wheel, a roller journaled between the lower ends of said plates and a spacing plate between said outer plates which forms a rib between the teeth to engage the groove in the gear wheel and a rib on the back of said movable rack.

16. In a voting machine, the combination with an interlocking member and a double gear wheel carried by said member and having a groove in its periphery, of a stationary rack comprising outer plates having teeth on their faces and a spacing plate between said outer plates which forms a rib between the teeth to engage the groove in the gear wheel and leaves a central groove in the back of said stationary rack, and a double movable rack which also engages the gear wheel.

17. In a voting machine, the combination with an interlocking member and a gear wheel carried by said member and comprising outer plates having teeth on their peripheries and outwardly curved bosses, and a spacing plate between the outer plates which leaves a peripheral groove between said plates, of a double stationary rack and a double movable rack which engage the gear wheel and are provided with ribs engaging the groove in the gear wheel.

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

CHARLES C. ABBOTT.

Witnesses:

GEO. A. B. HAWLEY,
ROSCOE S. COLLIN.