March 5, 1940. C. F. THOMPSON 2,192,211

SWITCH

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Fig. 1

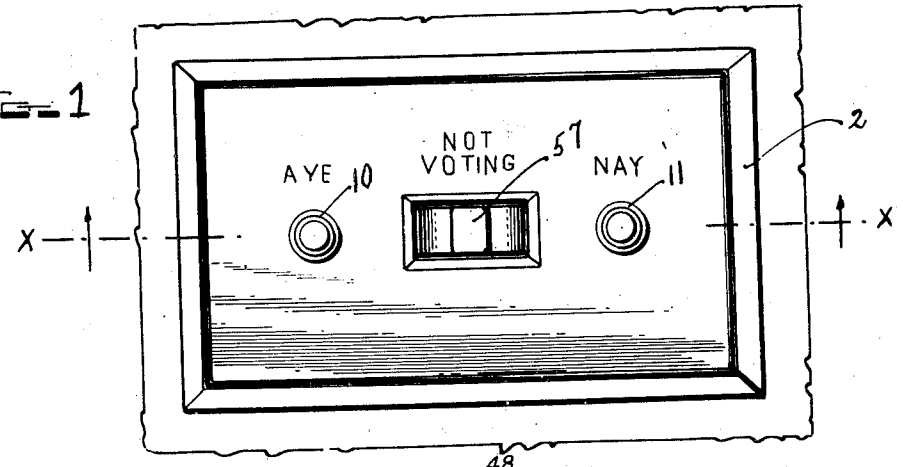


Fig. 2

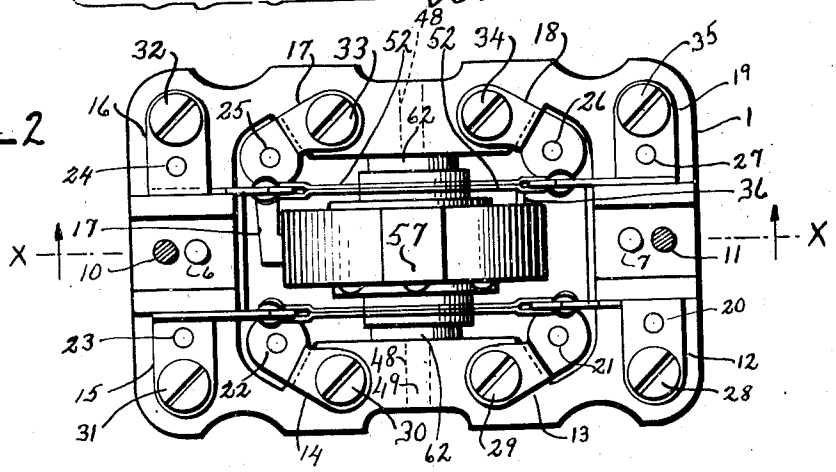
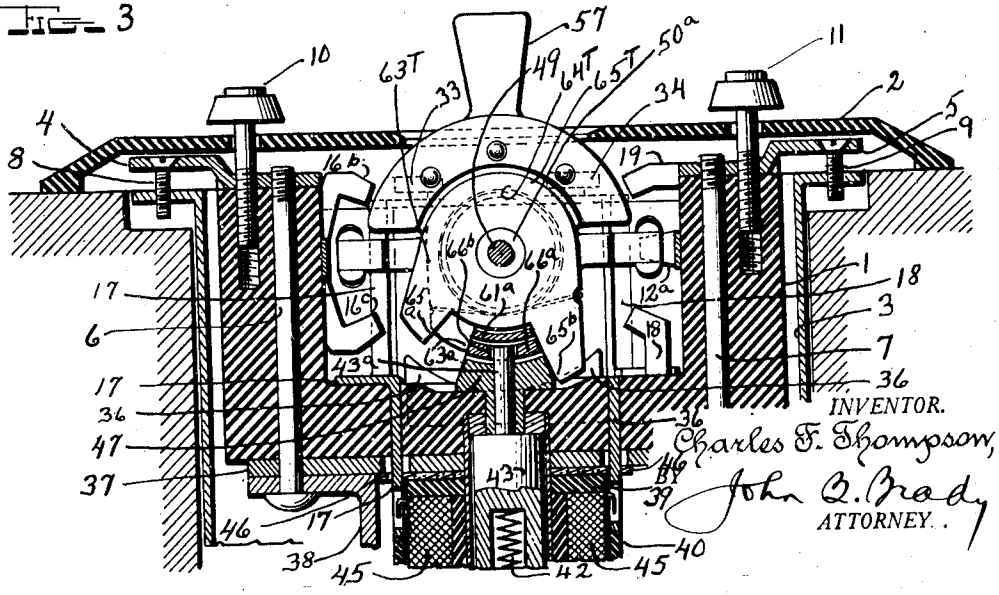


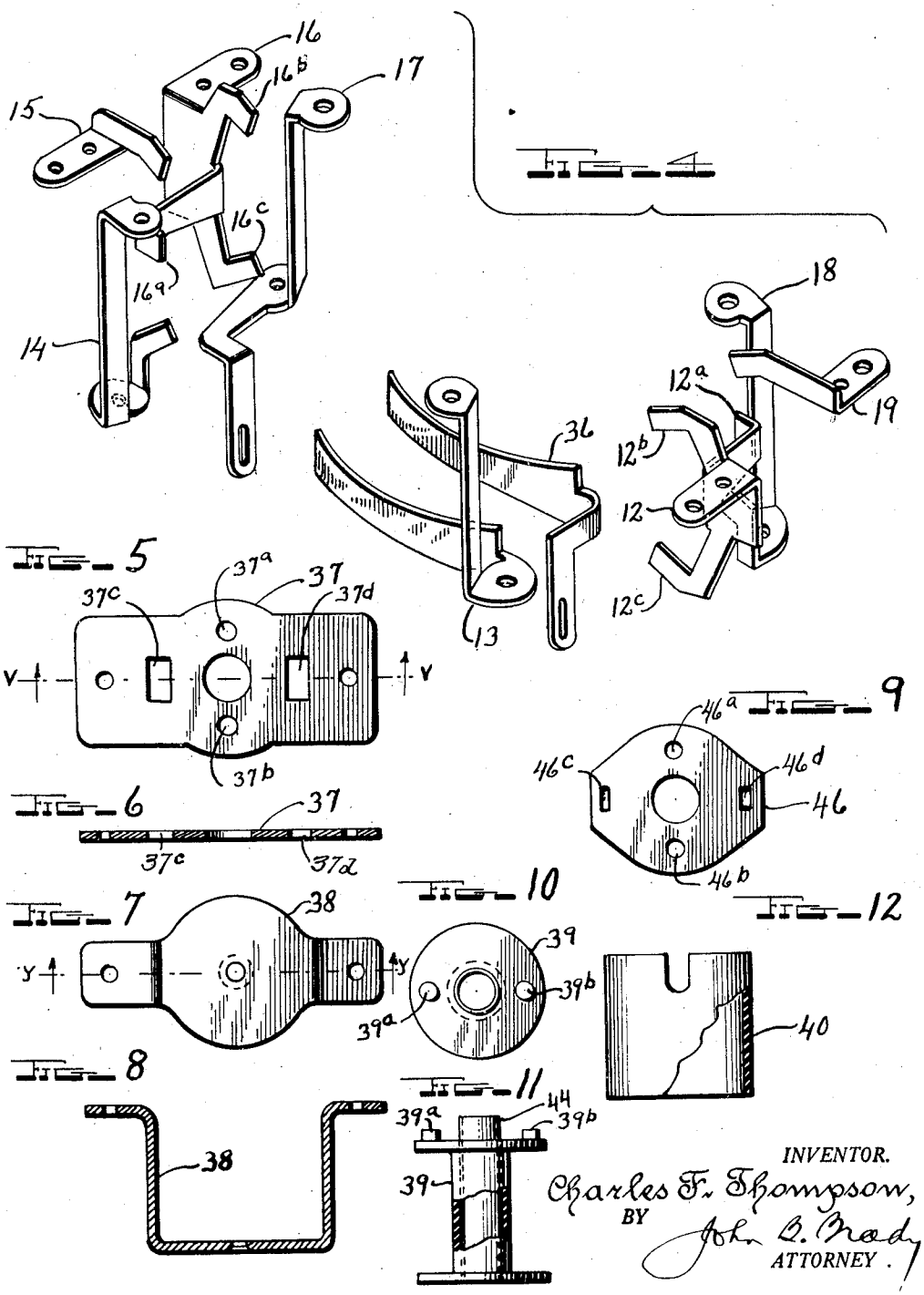
Fig. 3



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FIG. 14

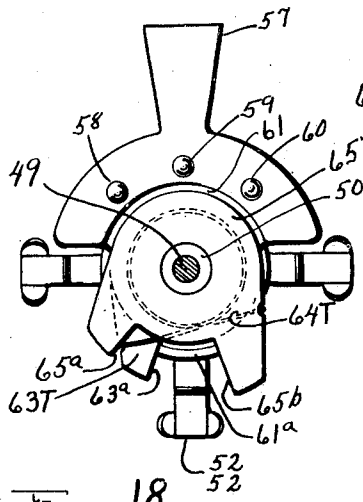


FIG. 13

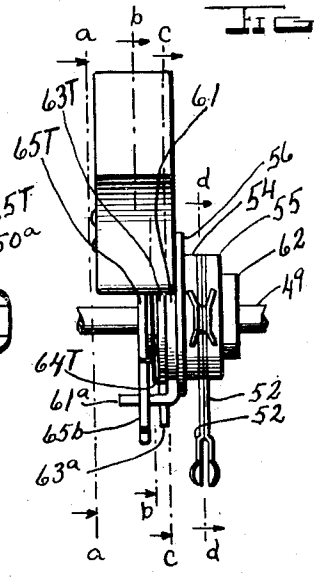


FIG. 15

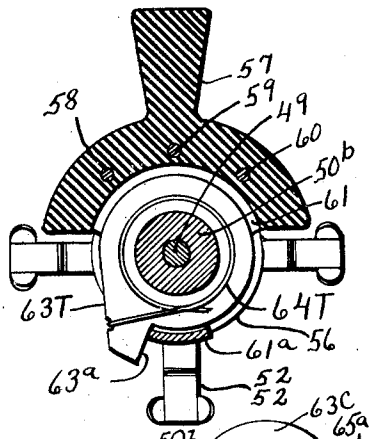


FIG. 18

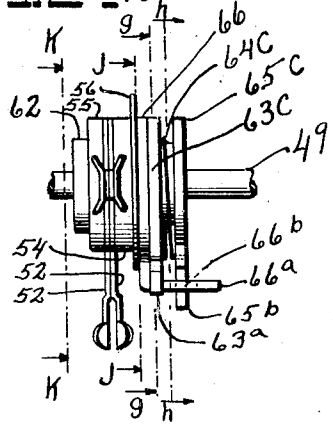


FIG. 19

FIG. 16

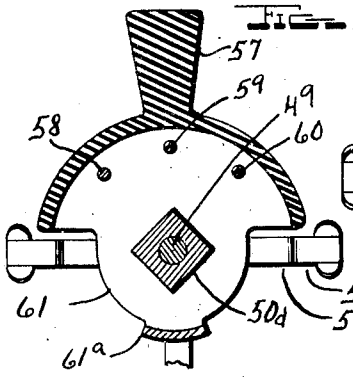


FIG. 21

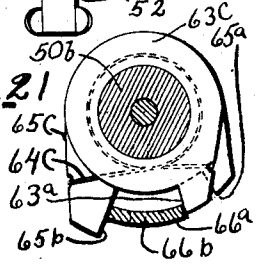


FIG. 17

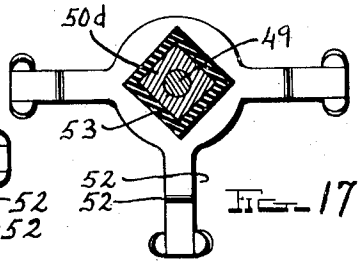


FIG. 20

FIG. 22

FIG. 23

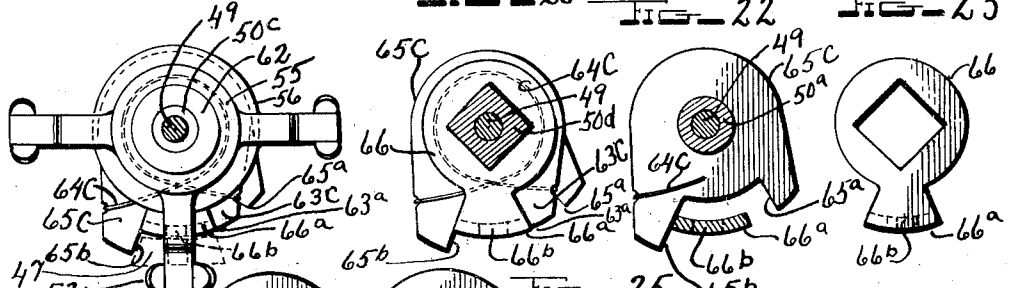


FIG. 24

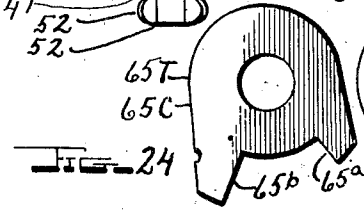
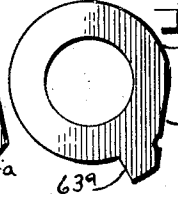


FIG. 25



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FIG. 30

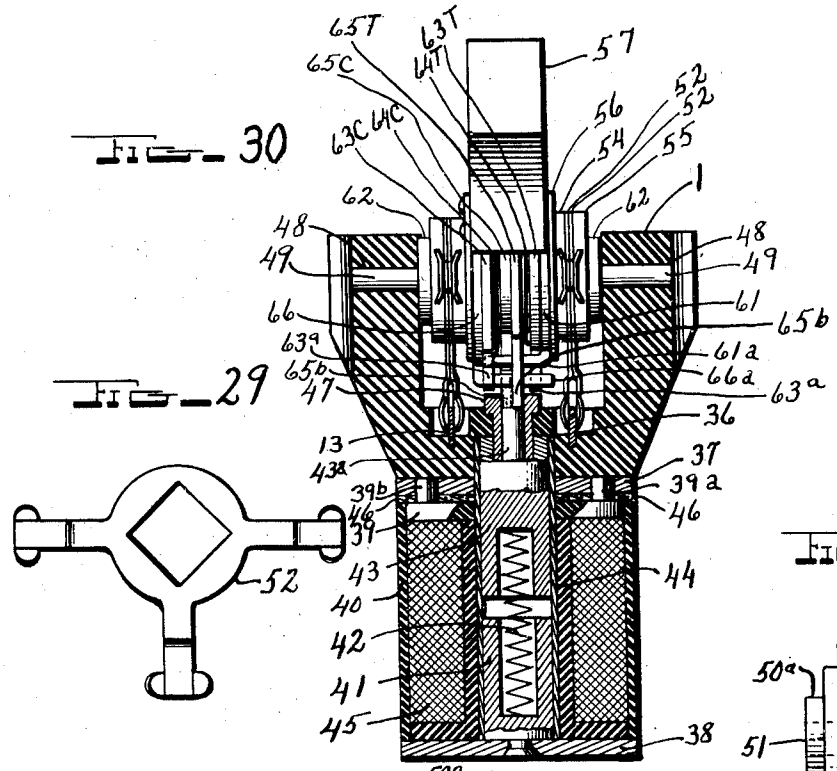


FIG. 29

FIG. 26

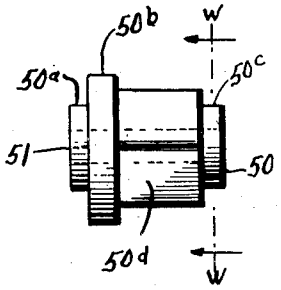


FIG. 31

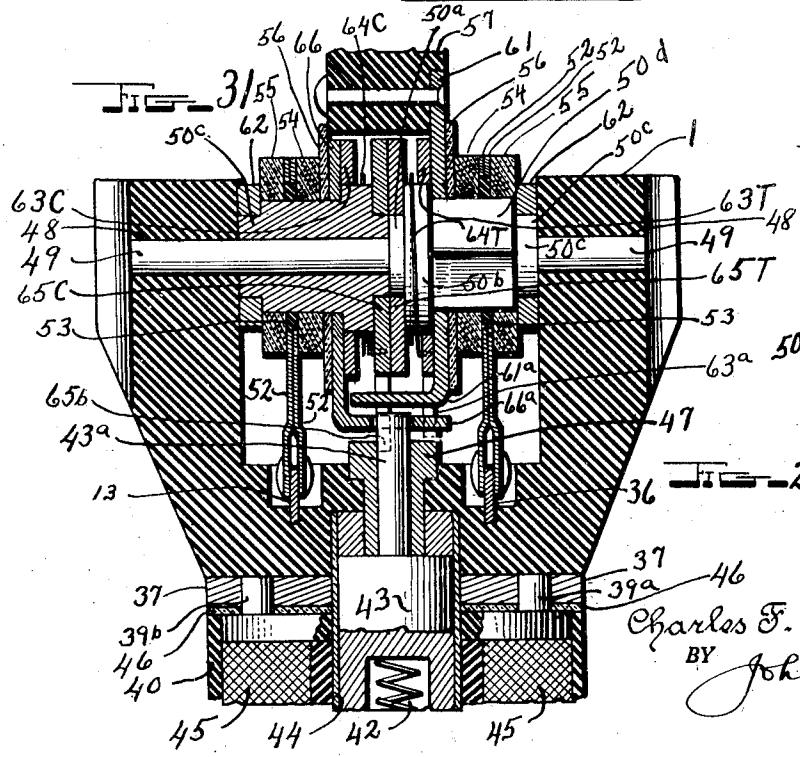


FIG. 27

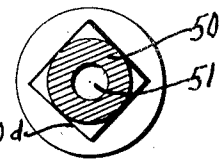
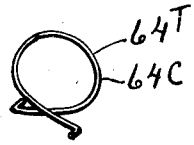


FIG. 28



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Fig. 32

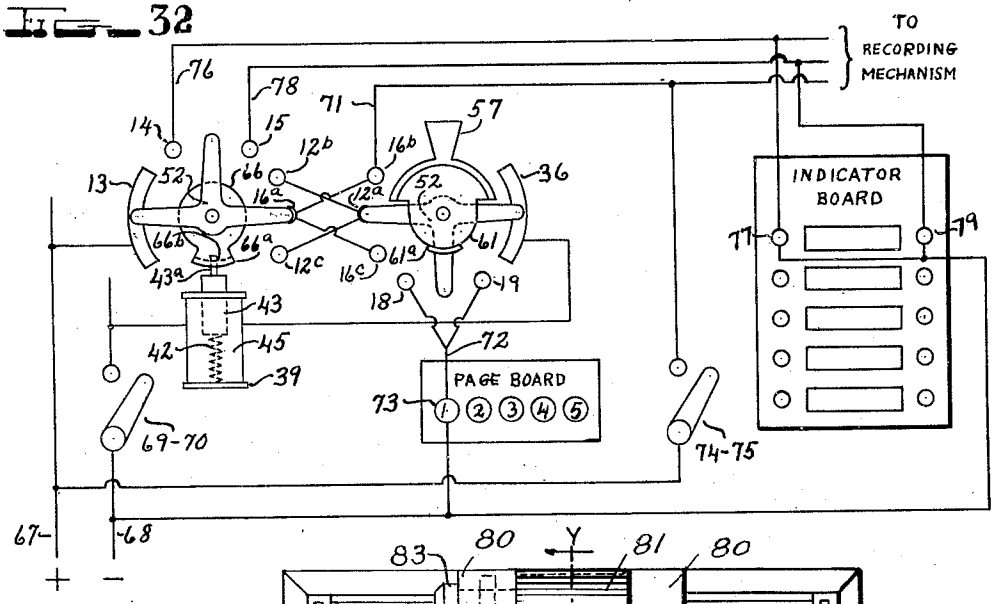


Fig. 33

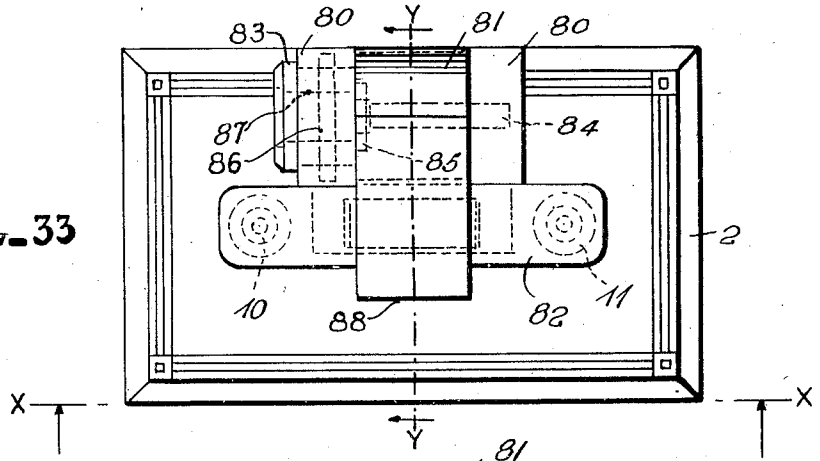


Fig. 34

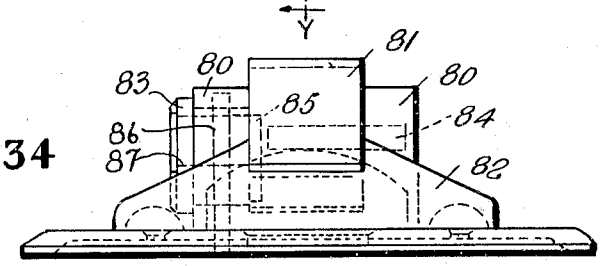
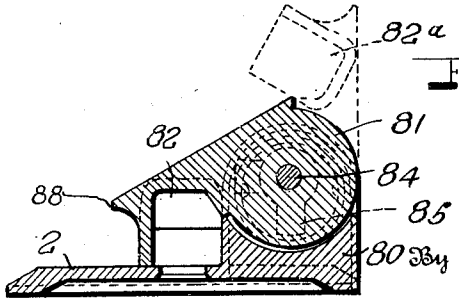


Fig. 35



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March 5, 1940. C. F. THOMPSON 2,192,211

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FIG. 36

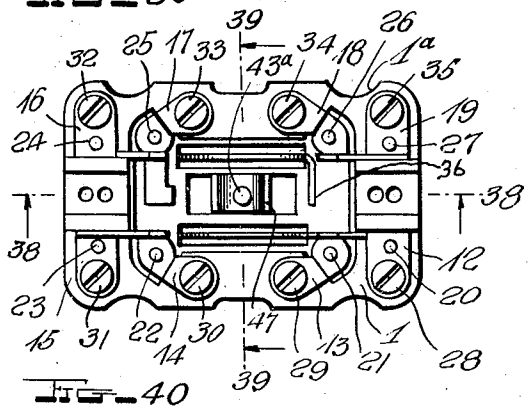


FIG. 37

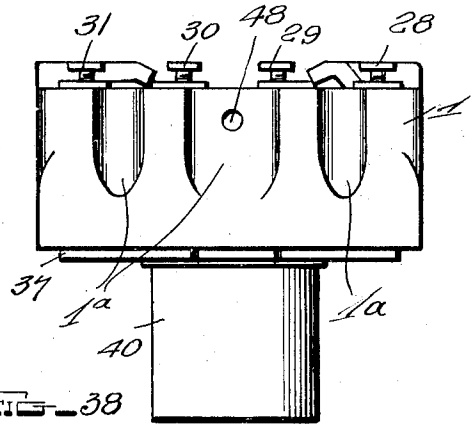


FIG. 40

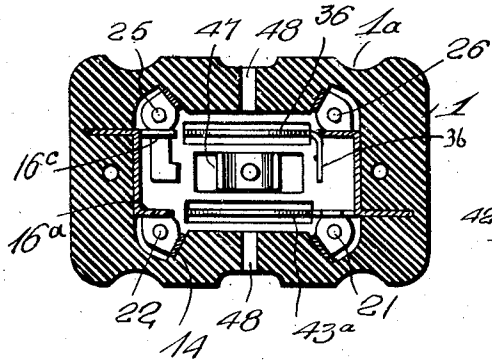


FIG. 38

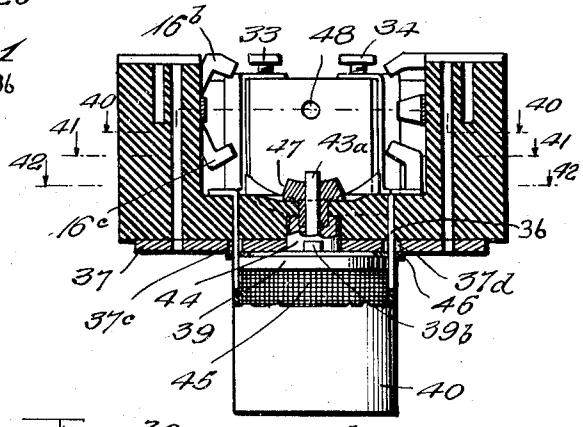


FIG. 41

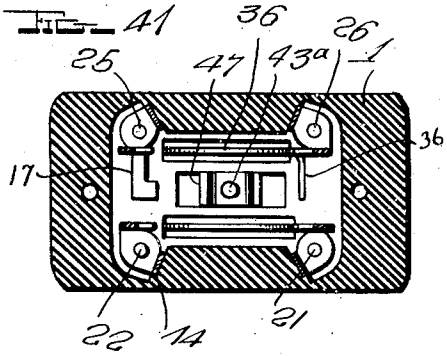


FIG. 39

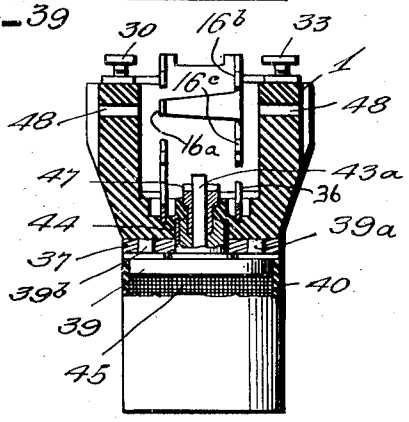
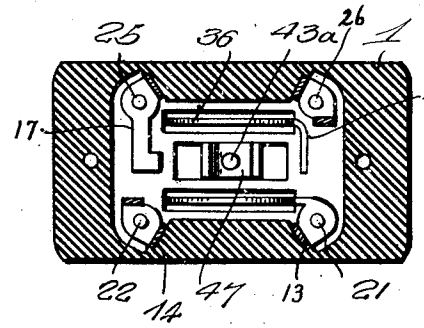


FIG. 42



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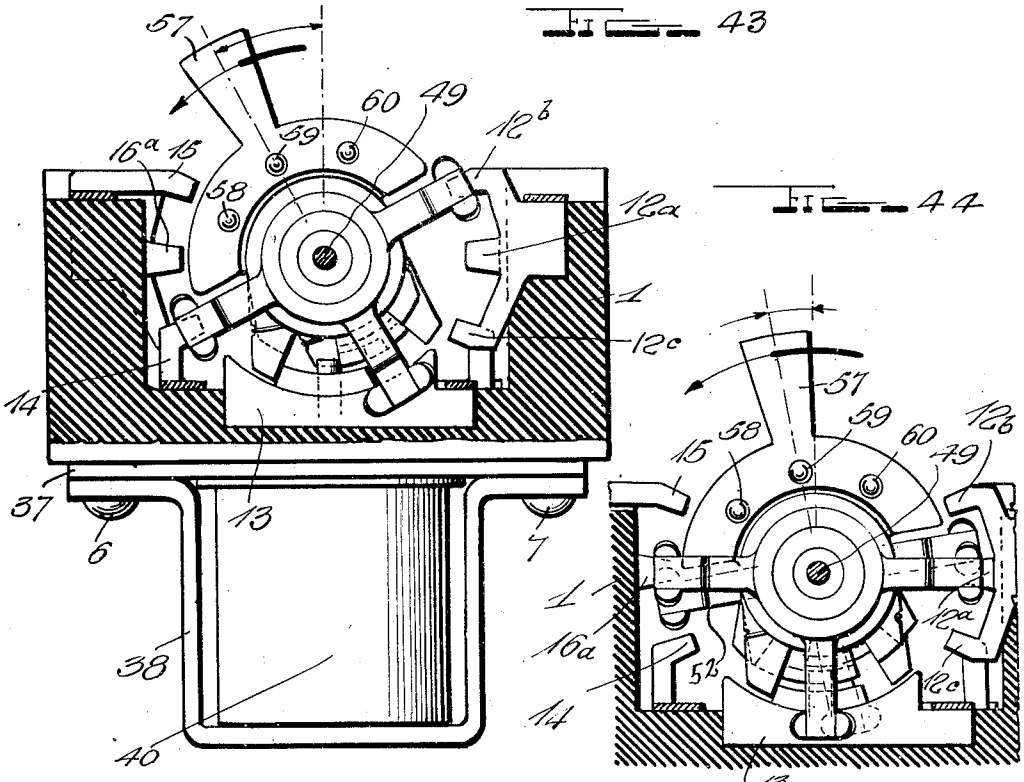


FIG. 43

FIG. 44

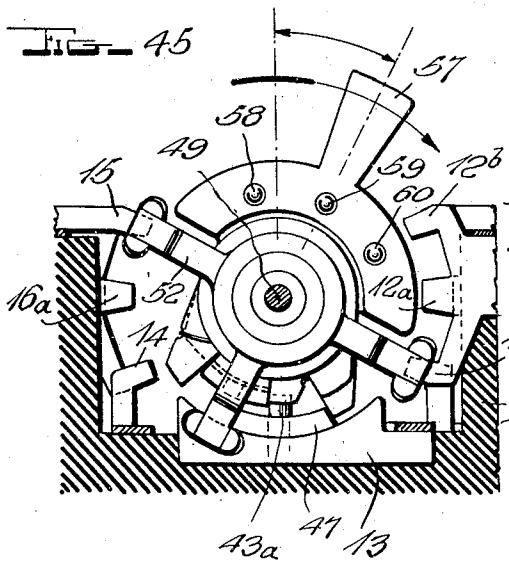


FIG. 45

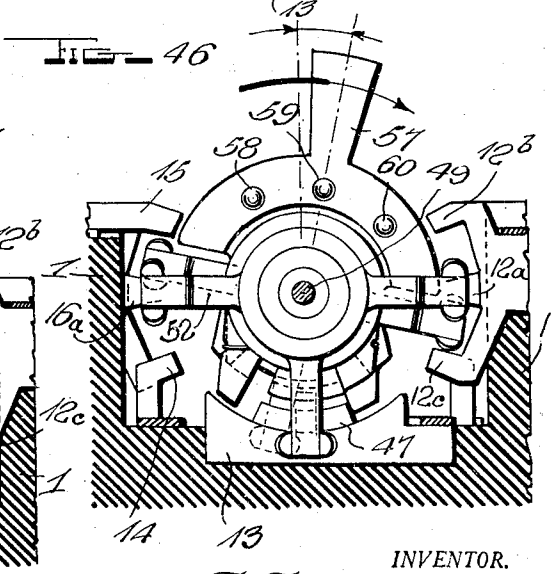


FIG. 46

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Patented Mar. 5, 1940 2,192,211

UNITED STATES PATENT OFFICE

2,192,211

SWITCH

Charles F. Thompson, Dumbarton, Va.

Application April 29, 1936, Serial No. 77,039
Renewed November 28, 1938

12 Claims. (Cl. 200—104)

My invention relates broadly to selective control devices and more particularly to an electric switch for multiple circuit operation.

Among the objects of the present invention are: to provide a switch of the pivoted lever type so that it may be covered with a standard switch plate and be installed in a standard switch box; to provide a switch of greatest simplicity and reliability, in which all parts are designed for commercial production and suitable to be stamped or die cast; to provide a switch of open circuit construction, so that it will not heat itself if left turned on, and so cause damage to itself or the furniture; to provide a switch of non-metallic exterior, so that a user cannot be shocked therefrom; and to provide a switch inexpensive to build and install, so that it and its co-related devices can be sold or leased on reasonable terms. While the switch of my invention is designed primarily for voting purposes, I do not limit its usefulness to this field alone as many needs may arise for remotely controlled multiple duty switches in other fields which would find this device particularly appropriate.

I attain the above objects by mechanism illustrated in the accompanying drawings, in which—

Fig. 1 represents a top view of my switch, which is covered with a standard switch plate of insulation or other suitable material suitably engraved.

Fig. 2 shows a top view of my switch with the cover plate removed.

Fig. 3 discloses a sectional view of my switch on lines *x*, *x*, of Fig. 1; and on lines *x*, *x*, of Fig. 2.

Fig. 4 is a perspective view of the electrical contactors used in my switch.

Fig. 5 shows a top view of the top magnet plate.

Fig. 6 shows a side sectional view of the top magnet plate on lines *v*, *v*, of Fig. 5.

Fig. 7 is a top view of the magnet yoke.

Fig. 8 is a side sectional view of the magnet yoke on lines *y*, *y*, of Fig. 7.

Fig. 9 shows an insulating washer.

Fig. 10 shows a top view of the magnet spool.

Fig. 11 shows a side view, partly sectional, of the magnet spool.

Fig. 12 shows a side view, partly sectional, of the magnet covering tube.

Fig. 13 represents an end view of the lever actuated primary control assembly.

Fig. 14 represents a side sectional view of the primary control assembly on lines *a*, *a*, of Fig. 13.

Fig. 15 shows a side sectional view of the primary control assembly on lines *b*, *b*, of Fig. 13.

Fig. 16 represents a side sectional view of the primary control assembly on lines *c*, *c*, of Fig. 13.

Fig. 17 shows a side sectional view of the primary control assembly on lines *d*, *d*, of Fig. 13.

Fig. 18 is a side view of the dependent secondary control assembly.

Fig. 19 is a side sectional view of the secondary control assembly on lines *k*, *k*, of Fig. 18.

Fig. 20 is a side sectional view of the secondary control assembly on lines *j*, *j*, of Fig. 18.

Fig. 21 is a side sectional view of the secondary control assembly on lines *g*, *g*, of Fig. 18.

Fig. 22 is a side sectional view of the secondary control assembly on lines *h*, *h*, of Fig. 18.

Fig. 23 represents a side view of the frame of the secondary control assembly.

Fig. 24 represents the double centering arm.

Fig. 25 represents the single centering arm.

Fig. 26 shows a side view of the journal used to support the primary and secondary control assemblies.

Fig. 27 is an end sectional view of the journal on lines *w*, *w*, of Fig. 26.

Fig. 28 shows the spring used in the primary and secondary control assemblies.

Fig. 29 shows the contact springs used in the primary and secondary control assemblies.

Fig. 30 is an end view partly in cross-section, of the switch housing *l*, with primary and secondary control and magnet assemblies applied.

Fig. 31 is an end view shown more completely in cross-section, of the switch housing *l*, with primary and secondary control and magnet assemblies applied.

Fig. 32 is a schematic electrical diagram of my switch employed as a voting unit.

Fig. 33 is a view of a lock-and-key type of top that may be used with my switch.

Fig. 34 is a view of the lock and key mechanism taken on line X—X of Fig. 33.

Fig. 35 is a view taken on line Y—Y of Fig. 33.

Fig. 36 is a plan view of the insulated housing of the switch.

Fig. 37 is a side elevational view of the insulated housing and the operating solenoid associated therewith.

Fig. 38 is a vertical sectional view on line 38—38 of Fig. 36 with certain of the parts indicated in side elevation.

Fig. 39 is a vertical sectional view on line 39—39 of Fig. 36.

Fig. 40 is a horizontal sectional view taken substantially on line 40—40 of Fig. 38.

Fig. 41 is a horizontal sectional view taken substantially on line 41—41 of Fig. 38.

Fig. 42 is a horizontal sectional view taken substantially on line 42—42 of Fig. 38.

Fig. 43 is a vertical sectional view partially in side elevation showing the parts of the switch enlarged and moved to one actuated position and indicating the lever actuated frame adapted to be shifted back to neutral position while the dependent frame is locked in the actuated position.

Fig. 44 indicates the action which takes place when the lever actuated frame is initially shifted toward the actuated position of Fig. 43 while the dependent frame is locked in neutral position.

Fig. 45 is a vertical sectional view showing the parts of the switch moved to the other actuated position and indicating the lever actuated frame adapted to be shifted back to neutral position while the dependent frame is locked in actuated position.

Fig. 46 indicates the action which takes place when the lever actuated frame is initially shifted towards the other actuated position of Fig. 45 while the dependent frame is locked in neutral position.

Similar numerals refer to similar parts throughout the several views.

The device of my invention consists of a switch housing 1, preferably of insulation, designed to be covered with a standard switch plate 2, suitably engraved, and designed also to be contained within a standard steel switch-box 3. Supporting ears 4 and 5, are attached to housing 1, by screws 6 and 7; and the said supporting ears are attached to steel switch box 3, by screws 8 and 9. Switch plate 2, is fastened to ears 4 and 5, by screws 10 and 11, which preferably have insulated heads. This is the same standardized construction found in practically all switches today. These details can be seen in Fig. 3.

Housing 1 contains eight electrical contactors 12, 13, 14, 15, 16, 17, 18 and 19, all of which are held in place with screws having their heads recessed into the bottom of housing 1, and which are threaded into holes 20, 21, 22, 23, 24, 25, 26 and 27 of said contactors. Contactors 12 to 19 inclusive, are also equipped with wire holding screws 28, 29, 30, 31, 32, 33, 34 and 35. In addition to the eight contactors thus far enumerated, one additional contactor 36, is molded in the bottom of the recess in housing 1. Fig. 4 shows all the above mentioned contactors in perspective.

A solenoid magnet assembly is attached to the bottom of housing 1, by screws 6 and 7. Said assembly consists of the top magnet plate 37, shown in Figs. 5 and 6 and elsewhere; magnet yoke 38, shown in Figs. 7 and 8 and elsewhere; the molded magnet spool 39, which contains studs 39*a* and 39*b*, shown in Figs. 10 and 11 and elsewhere; the magnet covering tube 40, shown in Fig. 12 and elsewhere; the magnet core 41, shown in Fig. 30 and elsewhere, which is riveted permanently in yoke 38; the spring 42; and the plunger 43 which carries a shank 43*a*, shown in Fig. 3 and elsewhere. A thin brass shell 44 is placed in-side magnet spool 39 to reduce wear, and the winding on spool 39 is indicated at 45, as shown in Fig. 30 and elsewhere.

The lower slotted ends of the contactors 17 and 36, project through the bottom of housing 1; through rectangular holes 37*c* and 37*d* in top magnet plate 37; through rectangular holes 46*c* and 46*d* in insulating washer 46; and terminate in the two recesses in the top of the magnet cover tube 40,—where the said slots of contactors 17 and 36 constitute soldering lugs for the leads from winding 45 on the spool 39. It will be noted that studs 39*a* and 39*b* of the magnet spool 39, will project through holes 46*a* and 46*b* in insulator 46 (Fig. 9), and through holes 37*a* and 37*b* in the top magnet plate 37 (Fig. 5), preventing the magnet spool from turning. Since rectangular holes 37*c* and 37*d* in the top magnet plate 37 are much larger than corresponding holes 46*c* and 46*d* in washer 46, and these parts are pinned together by studs 39*a* and 39*b* of the magnet spool 39, the slotted lower ends of contactors 17 and 36 cannot come in contact with the sides of holes 37*c* and 37*d* in the top magnet plate 37.

When magnet winding 45 is energized through contactors 17 and 36, the magnet plunger 43 and its shank 43*a*, will be pulled downward towards magnet core 41, which is the only magnetic action taking place in the unit.

To provide a bearing for the shank 43*a* of magnet core 43, as it passes through the bottom of housing 1, and to provide a fixed centering stop for the primary and secondary control assemblies about to be described, a small metal block 47, is molded into the center of the bottom of the housing 1, or riveted therein as illustrated.

A shaft hole 48 is located in both side walls of the housing 1. A shaft 49 is located in said hole. Pivoted on the shaft 49, is the lever actuated assembly shown in Fig. 13, which provides a mounting for primary circuit-closing means, and the dependent assembly shown in Fig. 18, which provides a mounting for secondary circuit-closing means. These two assemblies will be analyzed separately. On Figs. 30 and 31 and elsewhere they are shown together on the shaft 49 and contained in the housing 1.

A journal 50, shown in Figs. 26 and 27, containing bearing hole 51, suitable for the passage of the shaft 49, has an exterior surface consisting of three round shoulders 50*a*, 50*b*, 50*c*, and a square shoulder 50*d*. Upon one such journal the lever actuated assembly shown in Fig. 13 is constructed; and upon a second such journal the dependent assembly shown in Fig. 18 is constructed. Fig. 31 shows a journal 50 in outline, supporting the various parts making up the lever actuated assembly; and shows also a second journal 50 in sectional form, supporting the various parts that make up the dependent assembly.

Referring to Fig. 13, we can start analysis of the lever actuated primary control assembly. Sectional view *d*, *d*, of Fig. 13 is disclosed in Fig. 17, wherein we find a pair of contact springs such as are shown at 52 in Fig. 29. Said pair of contact springs in Fig. 17 are mounted on square shoulder 50*d* of journal 50, but insulated therefrom by square insulator 53. Fig. 13 further shows two insulating washers 54 and 55, one on either side of the pair of contact springs. This construction is also shown very clearly under the same numbers in Fig. 31. Figs. 13 and 31 also show an additional and larger insulator 56 mounted on journal shoulder 50*d*, and designed to further insulate contact springs 52 from other metallic parts. The lever handle 57, preferably made of insulation, is riveted by rivets 58, 59 and 60 to frame 61, which is shown in Figs. 14 and 31; and section lines *c*, *c*, of Fig. 13 disclose in Fig. 16 a clear view of the shape of frame 61. The frame 61, as shown in Fig. 16, is mounted on the shoulder 50*d*, of the journal 50; and at the bottom of the frame 61, there is a bent over projection 61*a*,

which is also very clearly shown in Figs. 13 and 31. The parious parts so far described, that is, the frame 61 with the handle 57 riveted thereto, and the pair of contact springs 52, 52, with their insulators 53, 54, 55 and 56, are firmly held on the square shoulder 50*d* of the journal 50, by a collar 62, best shown in Fig. 31. Collar 62 is pressed or riveted onto the shoulder 50*c* of the journal 50. On the shoulder 50*b* of the journal 50 is placed a centering arm shown at 63T in Fig. 25, which possesses a single stop 63*a*. A spring such as shown at 64T in Fig. 28 is next placed on shoulder 50*b* of the journal 50. The section lines *b*, *b*, in Fig. 13 disclose in Fig. 15 the position of the centering arm 63T and spring 64T very clearly. On the shoulder 50*a* of the journal 50 is placed the centering arm 65T shown in Fig. 24, which possesses two stops 65*a* and 65*b*. The section lines *a*, *a*, of Fig. 13 disclose in Fig. 14 a clear view of centering arms 63T and 65T, assembled on the journal 50, with the spring 64T causing stops 63*a* and 65*b* to be held with tension on projection 61*a* of the frame 61.

The dependent secondary control assembly shown in Fig. 18 is similar to the lever actuated assembly just explained, except that a frame 66 shown in Fig. 23, is substituted for the frame 61. On the square shoulder 50*d* of a second journal 50, are assembled the frame 66, a pair of contact springs 52, 52, similarly insulated by another set of insulators 53, 54, 55 and 56,—all of which are firmly held on the square shoulder 50*d* of the journal 50 by another collar 62, best shown in Fig. 31. Collar 62 is pressed or riveted onto the shoulder 50*c* of the journal 50. Section lines *h*, *h*, in Fig. 18 disclose in Fig. 22 a centering arm 63C mounted on the shoulder 50*a* of the journal 50. Section lines *g*, *g*, of Fig. 18 disclose in Fig. 21 the addition of a centering arm 63C and spring 64C to the assembly. Section lines *j*, *j*, of Fig. 18 show in Fig. 20 the whole frame 66, mounted on the square shoulder 50*d* of the journal 50. Section lines *k*, *k*, of Fig. 18, disclose in Fig. 19 a complete side view of the assembly, in which the spring 64C causes stop 63*a* of centering arm 63C, and the stop 65*b* of centering arm 65C, to be held with tension on the projection 66*a* of the frame 66.

When the primary control assembly of Fig. 13 and the secondary control assembly of Fig. 18 are mounted together on the shaft 49 in the housing 1, as shown in Fig. 30, it will be observed that the lever actuated frame projection 61*a* and the dependent frame projection 66*a*, are now clamped together by the centering arms 63C and 65C of the dependent assembly, and also by the centering arms 63T and 65T of the lever actuated assembly.

Fig. 3 shows movement of the frame 66 locked by plunger shank 43*a* resting in the hole 66*b* of the projection 66*a*, which means that the entire frame 66 can move only when the plunger shank 43*a* is withdrawn from the hole 66*b*. Shank 43*a*, with the actuating solenoid thus constitutes means for controlling the operation of the secondary control assembly through engagement with projection 66*a*.

The normal upright position of the lever handle 57 is maintained by the fact that the stop 65*b* of the centering arm 65C, and the stop 65*b*' of the centering arm 65T are held in abutment with metal block 47 by action of their respective springs.

The electrical operation is shown in Fig. 32, and from Fig. 3 a very clear view of the mechanical operation can be obtained. Fig. 3 omits all of the secondary control assembly except the frame projection 66*a*, but if the entire assembly were superimposed on Fig. 3 the drawing would not be intelligible. Therefore into Fig. 19 which shows the secondary control assembly, the metal block 47 has been added, which is sufficient to permit a clear understanding of the mechanical operation from joint consideration of Figs. 3 and 19. Figs. 3, 19 and 32 are therefore used mainly for description of the operation, but other views may be referred to if desired.

Fig. 32 shows the switch of my invention employed as a voting unit in a roll call system, and illustrates schematically the circuit connections to the electromagnet 45, and from the switch to a page board, an indicator board, and recording mechanism. In Fig. 32, 67 designates a positive battery lead and 68 indicates a negative battery lead containing switch 69—70, designed to lock or unlock all secondary control assemblies.

Operation.—Current leaving 67 enters any switch through the contactor 18 and travels through the secondary control contact springs 52, which normally rest on the contactor 16*a*, but can get no further until some movement occurs in the switch. Except when members are actually voting, switch 69—70 would be open, and when open, as drawn, the circuit through the winding 45 of the magnet 39 would likewise be open, and the secondary control assembly would be locked against motion by the magnet plunger shank 43*a* passing through the hole 66*b* in the projection 66*a*. With the frame 66 so locked, the handle 57 may still be pushed to either side, to call a page or give some other desired signal. If the handle 57 were pushed to either right or left, the primary control contact springs 52 would pick up current from the contact 16*b* or 16*c* and send current out of either contactor 18 or 19, through the conductor 72 and page signal 73 to the negative lead 68. If desired one of the two contacts 18 or 19 could be used alone for the page call, and the remaining contact used for some other purpose, such as operating a page call buzzer, or indicating on a special board on the speaker's desk that the member desired recognition from the chair. This extra circuit 18 or 19 might also be used for calling a stenographer. Once switch 69—70 is closed however, to permit a vote to be taken, the page call board, or buzzer circuit, or recognition board, or stenographer's call, or whatever signalling systems might be used from the contacts 18 and 19, would be no longer operative, because nothing more than an instantaneous flash of current can pass through the voting unit to the contactors 18 and 19 with the switch 69—70 closed. When operated between votes as an auxiliary signalling system, with the switch 69—70 open, the mechanical operation of the voting unit is as follows.

When the handle 57 is pushed to the right projection 61*a* moves to the left carrying the stop 63*a* of centering arm 63T with it and contracting spring 64T. This motion is arrested when the projection 61*a* strikes the stop 65*a* of the centering arm 65T,—the stop 65*b* of the centering arm 65T not being able to move to the left because of its abutment with the metal block 47. In moving to the left the projection 61*a* will also carry with it the stop 65*b* of the centering arm 65C, and therefore move the stop 65*a* of the same centering arm until it strikes the projection 66*a*, which doubly arrests movement, since 66*a* is locked by 43*a*. In moving the stop 65*b* of centering arm 65C to the left, the spring 64C will be

contracted, as the far end thereof is attached to the centering arm 63C which is held immovable because its stop 63*a* is in contact with the projection 66*a*, and that is locked by the magnet plunger shank 43*a* passing through the hole 66*b* therein. With the projection 66*a* thus locked by the shank 43*a*, both springs 64T and 64C are contracted when the handle 57 moves to the right, and when said handle is released said springs will furnish the power to return it to center and keep it there until again operated.

Precisely reversed actions take place when the handle 57 is pushed to the left. Then the projection 61*a* moves to the right carrying the stop 63*a* of centering arm 63C with it, and contracting the spring 64C. This motion is arrested when the projection 61*a* strikes stop 65*a* of centering arm 65C,—stop 65*b* of centering arm 65C not being able to move to the right because of abutment with the metal block 47. In moving to the right, projection 61*a* will also carry with it stop 65*b* of the centering arm 65T, and therefore move the stop 65*a* of the same centering arm until it strikes the projection 66*a*, which doubly arrests movement, since 66*a* is locked by 43*a*. In moving the stop 65*b* of the centering arm 65T to the right, the spring 64T will be contracted, as the far end thereof is attached to the centering arm 63T which is held immovable because its stop 63*a* is in contact with the projection 66*a*, and that is locked by the magnet plunger, shank 43*a* passing through the hole 66*b* therein. With frame 66 thus locked by the shank 43*a* both springs 64T and 64C are contracted when the handle moves to the left, and when said handle is released said springs will furnish the power to return it to center and keep it there until again operated.

The electrical operation will now be described with the switch 69—70 closed and the voting unit operating strictly as such. A member desiring to vote Aye would push the handle 57 to the left, establishing contact between primary control contact springs 52 and the contactor 16*c*, thus completing a circuit from positive contactor 13 to negative battery 68, through the contactor 36 and the magnet 39, whereupon the shank 43*a* is withdrawn from the frame 66 which is immediately pulled by action of one of the springs 64 until the projection 66*a* lines up again with the projection 61*a*. The current operating magnet 39 is only of instant duration because as soon as the primary control contact springs 52 touch the contactor 16*c*, establishing the circuit, the magnet 39 withdraws the shank 43*a* from the frame 66 and the dependent assembly, in flying around under action of one of the springs 64 to line up with the lever actuated assembly, causes the secondary control contact springs 52 to break contact from the contactor 16*a* and open the circuit to the magnet 39. With the circuit to the magnet 39 open, the spring 42 will cause the shank 43*a* of the magnet plunger to lock the frame 66 with the edge of the projection 66*a* on the side of shank 43*a* and in this position the secondary control contact springs 52 hold contact with the contactor 14 until released by another or subsequent impulse of current through the magnet 39. Such an impulse might be received by the magnet 39 any time before the switch 69—70 is opened by the member pushing the handle back to center. If the member should wish to release his vote by pushing the handle back to center, the primary control contact springs 52 would establish contact with the contactor 12*a*, and since the secondary control contact springs 52 are contacting the contactor 12*b* with an Aye vote registered, the magnet 39 will receive its resetting impulse by the contactors 13, 12*b*, 12*a* and 36. As soon as the magnet 39 receives the impulse just described, withdrawing the shank 43*a* from the edge of the projection 66*a*, the secondary control contact springs 52 leave the contactor 12*b* and frame 66 again lines up with frame 61, and the magnet circuit is again open. If an Aye vote had so been registered as described, and the switch 69—70 thereupon opened to lock all the secondary control assemblies, the member could not have reset his Aye vote by moving the handle 57 back to center. However the switch 69—70 and the switch 74—75, both of which would preferably be automatically controlled, would be momentarily closed simultaneously for the purpose of resetting all the voting units at one time, and would do so by the circuit through the switch 74—75, the conductor 71, the contactor points 16*b*, 16*a* and 16*c*, the primary control contact springs 52, the contactor 36, magnet 39 and the switch 69—70. Switch 74—75 would preferably be equipped with a separate contact for each voting unit. Switch 69—70 could be so equipped if so desired. A Nay vote could be registered from this unit by pushing the handle 57 to the right, completing the circuit to the magnet 39 through the contactors 13, 16*a*, 16*b* and 36, whereupon the frame 66 would be released and move to line up again with frame 61, thus breaking the magnet circuit at the contactor 16*a*, and establishing the Nay circuit at the contactor 15.

Whenever an Aye circuit is established on the contactor 14, current will pass over the conductor 76 to the recording mechanism, and through the indicator board signal 77 to the negative lead 68. Whenever a Nay circuit is established on the contactor 15, current will pass over the conductor 78 to the recording mechanism and through the indicator board signal 79 to the negative lead 68. Whenever the frame 66 is left in its normal position a Not-voting circuit would be established to the recording mechanism by contactors 16*a*, 16*b* and the conductor 71. That is to say, a connection may be taken from contactors 16*a*, 16*b*, 16*c*, to an indicating or recording mechanism to show the member not voting. A connection may also be taken to an indicating or recording mechanism from contactors 12*a*, 12*b* and 12*c* to indicate that the member is voting.

The schematic diagram in Fig. 32 is designed to show operation of the voting unit itself, and therefore does not show the switchboards or any other mechanism of a complete voting system. By operating the remotely controlled reset circuit, governed by the switches 69—70 and 74—75 over the Not-voting conductor 71, one wire is saved to each voting unit, that otherwise would be required for the remotely controlled reset circuit. Since the centering spring and the centering arms on the lever actuated assembly are identical with those on the dependent assembly, but in reversed relationship thereto, a description of the mechanical action during casting of an Aye vote is sufficient. The actions of the centering springs and the arms are simply reversed in casting a Nay vote, as could be seen when a double description was given of the handle moving both ways with the voting unit used as an auxiliary signalling device. Mechanical functioning of the lever actuated and dependent mechanisms when using the voting unit for registering or releasing votes, will now be described.

When the handle 57 is pushed to the right to register Nay, the projection 61*a* moves to the left, carrying the stop 63*a* of the centering arm 63T with it, and contracting spring 64T; and in moving to the left projection 61*a* will also carry with it the stop 65*b* of the centering arm 65C. When the handle 57 has been pushed towards the Nay position, the primary control contact spring 52 makes contact with the contactor 16*b*, operating the magnet 39, which releases the frame 66, whereupon the secondary control contact springs 52 break circuit to the magnet 39 at the contactor 16*a*, which allows the plunger shank 43*a* to rise and ride on the bottom of projection 66*a*, provided the handle 57 is operated slowly.

The position at which the secondary control assembly trips depends upon the speed at which the handle 57 is moved. If it is moved fast enough it might be all the way over to its limit of movement when the secondary control assembly trips. Thus when the handle 57 has been moved toward the Nay position, and the projection 66*a* is released, the secondary control assembly is pushed to the left by the spring 64C exerting a pull on the stop 63*a* of the centering arm 63C. When the handle 57 has been moved toward the Nay position the frame 66 is released and spring 64C becomes effective to line it up with the frame 61. When the projection 66*a* is released and pushed to the left by the spring 64C, actuating the stop 63*a* of the centering arm 63C,—the motion of projection 66*a* towards the left is arrested by the stop 65*b* of centering arm 65C, and also by the stop 63*a* of centering arm 63T. Continued pressure to the right on the handle 57, moves the projection 61*a* further to the left, carrying the projection 66*a* with it, by virtue of spring 64C holding the projection 61*a* and the projection 66*a* together. Projections 61*a* and 66*a* travel to the left until they strike the stop 65*a* of the centering arm 65T, which cannot itself move to the left because the projection 65*b* thereof is abutting the metal block 47. When the projections 61*a* and 66*a* are stopped by the stop 65*a*, said projections have moved slightly past and entirely clear of the magnet plunger shank 43*a*. Magnet plunger shank 43*a*, which in the latter part of the movement has been riding on the bottom of the projection 66*a*, is pushed upward by the spring 42 until its side surface rises beside the edge of the projection 66*a*, locking projection 66*a* in the Nay position. It will be remembered that the spring 64C is holding the projection 61*a* and the projection 66*a* together, hence the handle 57 stays in the Nay position solely by action of the spring 64C. Meanwhile the spring 64T has been contracted by the stop 63*a* of centering arm 63T being pushed to the left and locked behind the locked projection 66*a*. The voting unit is now in the mechanical condition of registering a Nay vote. It is quite apparent if the magnet 39 received another impulse of current at this stage, the magnet plunger shank 43*a* would be drawn down and the frame 66 released; whereupon the spring 64T by actuating stop 63*a* of the centering arm 63T, would restore the frame 66 and the frame 61 to their normal positions. When the dependent frame 66 is locked in the Nay position and the lever actuated frame is clamped thereto by the spring 64C, a resetting impulse of current 50 could be obtained by pushing the handle 57 to its normal position, contracting spring 64C, and establishing a circuit from the contactor 13 through the secondary control contact springs 52, and the contactor points 12*c*, 12*a*, the primary control contact springs 52 and the contactor 36. Or such a resetting impulse might be obtained by simultaneous and momentary closing of the switches 69—70 and 74—75 as previously described.

Where use of a lock and key for each device is desired, to prevent tampering with the switch, I provide a special form of top plate to replace that shown in Fig. 1. Figs. 33, 34, and 35 are views of the lock and key mechanism which I employ for this purpose. The switch plate 2 is in this case provided with a special molding which I have designated at 80, projecting upwardly from the rear of plate 2. The molded extension 80 has two upwardly projecting portions, between which an angularly shiftable block 81 is pivoted. The block 81 carries a housing portion 82 which is spaced to wholly cover the handle 57 of the switch, and to cover the heads of the securing screws 10 and 11. The block 81 carrying housing 82 therewith, is shiftable away from the switch plate 2, into the position shown in dotted lines at 82*a* in Fig. 35. The housing 82 is shiftable also into the solid line position, entirely preventing manual movement of the handle 57. I provide a lock insertable at 83 in one side of the molded extension 80, and held in position by a nut in recess 86. The lock 83 has attached to its barrel 87, a lock arm 85, engaging a part of the movable block 81. The movable block 81 is pivotally mounted on axis 84, and when the key is inserted in lock 83, so its barrel 87 and lock arm 85 are free to move, one may, by catching hold of projection 88, shift the block 81 and its attached housing 82, from a position in which the housing 82 completely covers the handle 57, to a position in which the handle is completely uncovered. The key cannot be removed from lock 83 unless housing 82 is completely covering handle 57, and when the key is removed the block 81 and housing 82 is prevented from moving out of the solid line position illustrated, by the pins and tumblers of the lock.

The structure illustrated is but one form of lock which I may employ, for other types of locks may be readily substituted for the construction of lock which I have shown.

In order to fully understand the parts of the housing for the device, reference is made to the several views illustrated in Figs. 36—39. The several parts as heretofore described may be identified from the reference characters as heretofore given. It has been necessary to show several horizontal views through the housing as illustrated in Figs. 40, 41, 42 in order to make clear the disposition of the several fixed contactors. The housing 1 is provided with suitable recesses 1*a* in the exterior surface thereof to enable wires to be readily brought up to the contact screws.

In order to explain the several positions of the switch as heretofore described, I have illustrated in Figs. 43–46 the different positions which the parts of the device assume. As illustrated in Fig. 44, the lever actuated frame may be shifted while the dependent frame is maintained in locked position. The lever actuated frame under this condition being automatically restored to neutral position when the finger pressure is removed, provided switch 69—70 is open. With switch 69—70 closed the magnet 39 will be energized as soon as the handle 57 is moved sufficiently toward the left actuated position for contact springs 52 to make contact with contactor

16c, which in Fig. 44 would be directly behind contactor 14, whereupon the dependent frame would be released and the line up with the lever actuated frame. Fig. 43 shows the position of the parts of the device in the left actuated position, with both lever actuated and dependent frames moved completely to the left side and locked in that position; although as heretofore explained the lever actuated frame is free to be moved to the neutral position while the dependent frame is locked in the left actuated position.

Fig. 46 illustrates the manner in which the lever actuated frame may be shifted independently of the dependent frame, toward the right actuated position, while the dependent frame is locked against movement. Fig. 46 is otherwise similar to Fig. 44. With switch 69—70 open further movement in this direction would operate the Page or Recognition Board or other signal, in the system of Fig. 32, by contact spring 52 contacting contactor 18, which in this view is immediately behind contactor 12c. With switch 69—70 closed said further movement in this direction would operate magnet 31 through contactor 16c, releasing the dependent frame to line up with the lever actuated frame, breaking the circuit to magnet 31 at contactor 16a. Fig. 45 shows the position of the parts of the device in the right actuated position, with both the lever actuated and dependent frames moved completely to the right side and locked in that position; although as heretofore explained the lever actuated frame is free to be moved to the neutral position while the dependent frame is locked in the right actuated position.

I have found the switch of my invention highly practical in its construction and method of operation. It will be seen that the device employs as its basic principle a system of open circuit operation as distinguished from closed circuit operation heretofore used, and for the first time all functions of a switch of this type are controlled by a single magnet.

While I have described my invention in one of its preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A switch comprising a housing, a shaft member extending laterally of said housing, primary manually controlled circuit-closing means and separate secondary circuit-closing means journaled on said shaft, said primary circuit-closing means being operable at will, means selectively interconnecting said primary and secondary circuit-closing means, and means for controlling the operation of the last said means, said secondary circuit-closing means being operable or inoperable in accordance with the operation of said controlling means.

2. A switch as set forth in claim 1 wherein said means for controlling the operation of the interconnecting means comprises a solenoid having a plunger operatively engageable and disengageable with said secondary circuit-closing means.

3. A selective control device comprising an insulated housing, a shaft member extending laterally of said housing, primary manually controlled circuit-closing means and separate secondary circuit-closing means journaled on said shaft, said primary circuit-closing means being operable at will, dual spring means interconnecting said primary and secondary circuit-closing means, and means releasably connected with said secondary circuit-closing means for holding said secondary circuit-closing means in locked position upon operation of said primary circuit-closing means, one of said spring means being operative upon release of the last said means for moving said secondary circuit-closing means to coincidence with said primary circuit-closing means.

4. A selective control device as set forth in claim 3 and including a stop fixed to said housing, with oppositely tensioned portions of said dual spring means engageable therewith with both said circuit-closing means in normal position, one of said portions remaining in engagement with said stop at all times whereby said spring means is operable to restore said circuit-closing means to normal position.

5. A selective control device as set forth in claim 3 and including a stop fixed to said housing, with oppositely tensioned portions of said dual spring means engageable therewith with both said circuit-closing means in normal position, one of said portions remaining in engagement with said stop at all times whereby said spring means is operable to restore said circuit-closing means to normal position, said stop having an aperture therein and said means releasably connected with said secondary circuit-closing means being operative through said aperture.

6. A selective control device as set forth in claim 3 wherein said means releasably connected with said secondary circuit-closing means is engageable therewith with said secondary means in operated position for locking said secondary circuit-closing means in operated position.

7. A selective control device comprising a housing, a shaft mounted therein, primary manually actuated control means and separate secondary control means journaled on said shaft, said primary control means being operable at will, means selectively interconnecting said primary and secondary control means, and means for controlling the operation of said interconnecting means, said secondary control means being operable or inoperable in accordance with the operation of the last said controlling means.

8. A selective control device comprising a housing, a shaft mounted therein, primary manually actuated control means and secondary control means journaled on said shaft, said primary control means being operable at will, dual spring means interconnecting said primary and secondary control means, and means releasably connected with said secondary control means for holding said secondary control means in locked position upon operation of said primary control means, one of said spring means being operative upon release of the last said means for moving said secondary control means to coincidence with said primary control means.

9. An electromagnetically controlled switch comprising a housing, an electromagnet mounted on said housing, primary circuit control means and secondary circuit control means supported by said housing, a plunger for said electromagnet controlled thereby and releasably engageable with said secondary circuit control means, electric circuit means including said electromagnet and said primary and said secondary circuit control means, manual means for actuating said

primary circuit control means for energizing said electromagnet and releasing said secondary circuit control means, and spring means tensioned by operation of said manual means for actuating said secondary circuit control means for deenergizing said electromagnet and releasing said plunger, said secondary circuit control means being maintained in actuated position by said released plunger.

10. An electromagnetically controlled switch as set forth in claim 35, said manual means being operable for moving said primary circuit control means from actuated position for reenergizing said electromagnet and releasing said secondary circuit control means, and duplicate spring means tensioned with the aforesaid spring means for restoring said secondary circuit control means to normal position for deenergizing said electromagnet and releasing said plunger, said secondary circuit control means being maintained in normal position upon its return thereto by said released plunger.

11. An electromagnetically controlled switch comprising a housing, primary and secondary circuit control means supported by said housing, an electromagnet and an enclosing shell therefor, a magnetic yoke member embracing said electromagnet and said shell and secured to said housing for mounting said electromagnet thereon, spring means interconnecting said primary and secondary circuit control means, and a plunger for said electromagnet releasably engageable with said secondary circuit control means.

12. A selective control device comprising a housing, primary and secondary control means supported in said housing, dual spring means interconnecting said primary and said secondary control means, a stop fixed to said housing with oppositely tensioned portions of said dual spring means engageable therewith with both said control means in normal position, one of said spring means being operative for moving said secondary control means to follow a movement of said primary control means in one direction while the other of said spring means has one portion thereof remaining in engagement with said stop for restoring both said control means to normal position.

CHARLES F. THOMPSON.

CERTIFICATE OF CORRECTION.

Patent No. 2,192,211. March 5, 1940.

CHARLES F. THOMPSON.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 7, line 11, claim 10, for the claim reference numeral "35" read 9; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 2nd day of April, A. D. 1940.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

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