

Sept. 29, 1953

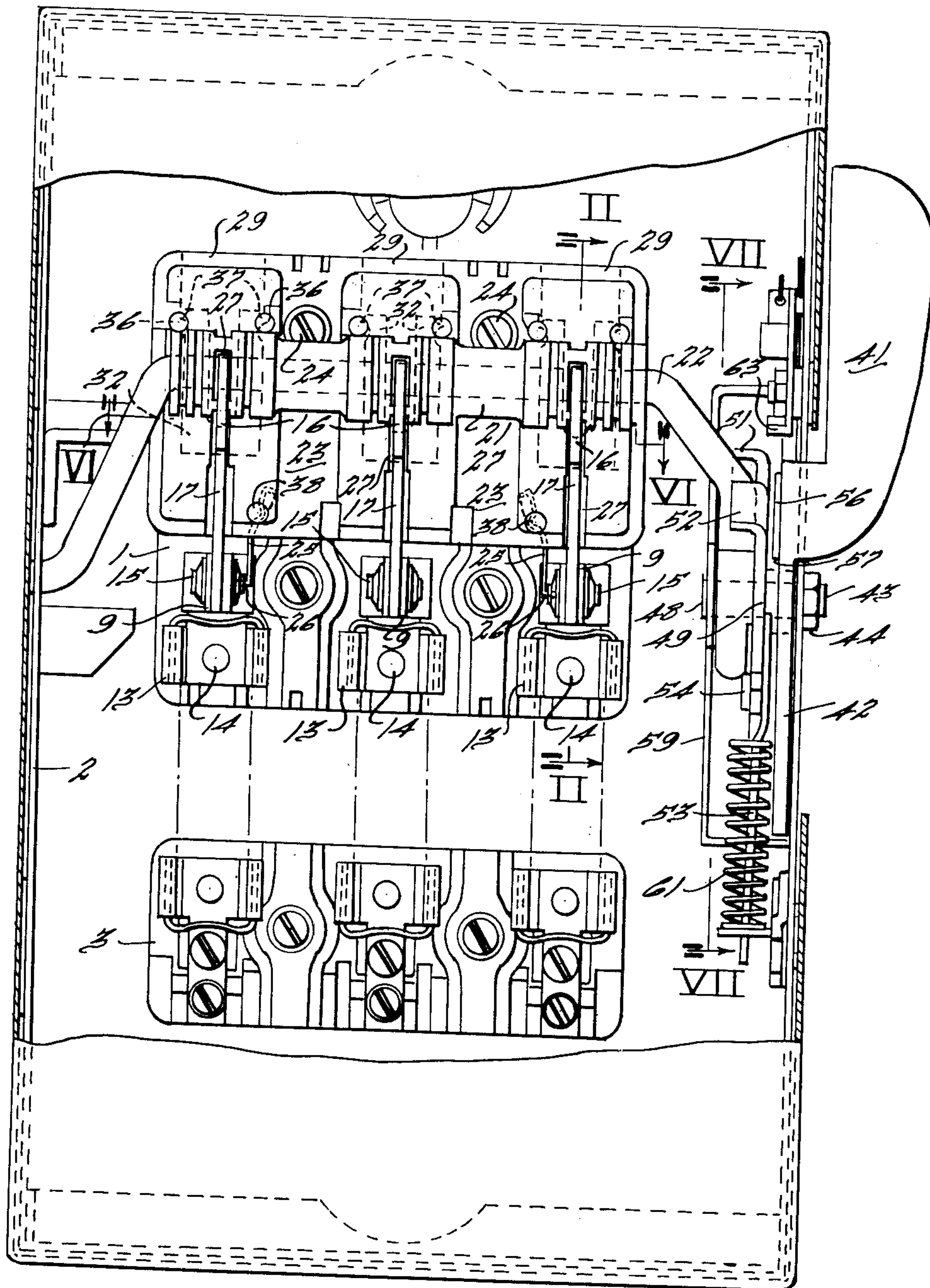
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2,654,011

ELECTRIC SWITCH

Filed July 14, 1950

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

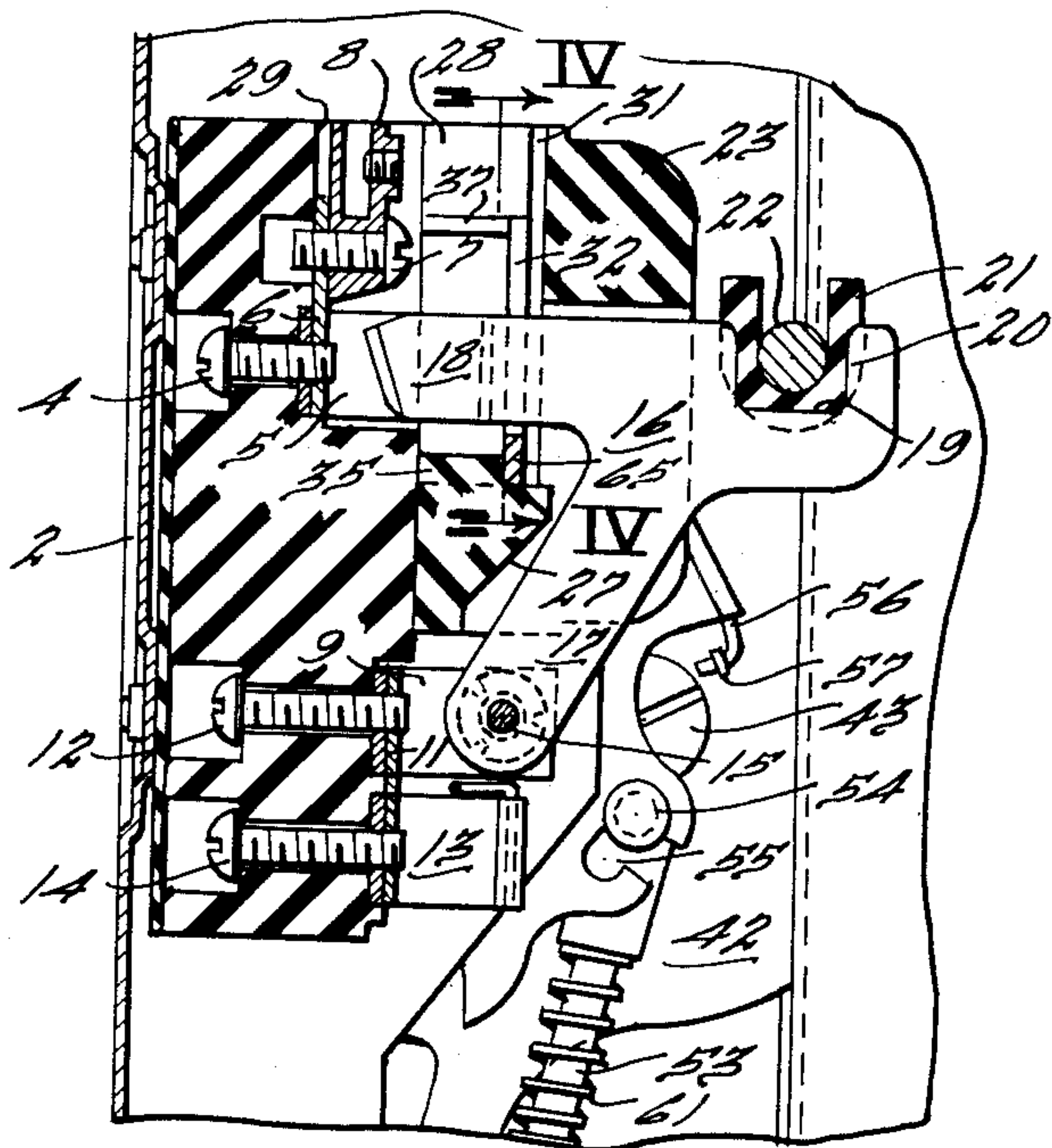


FIG. 2.

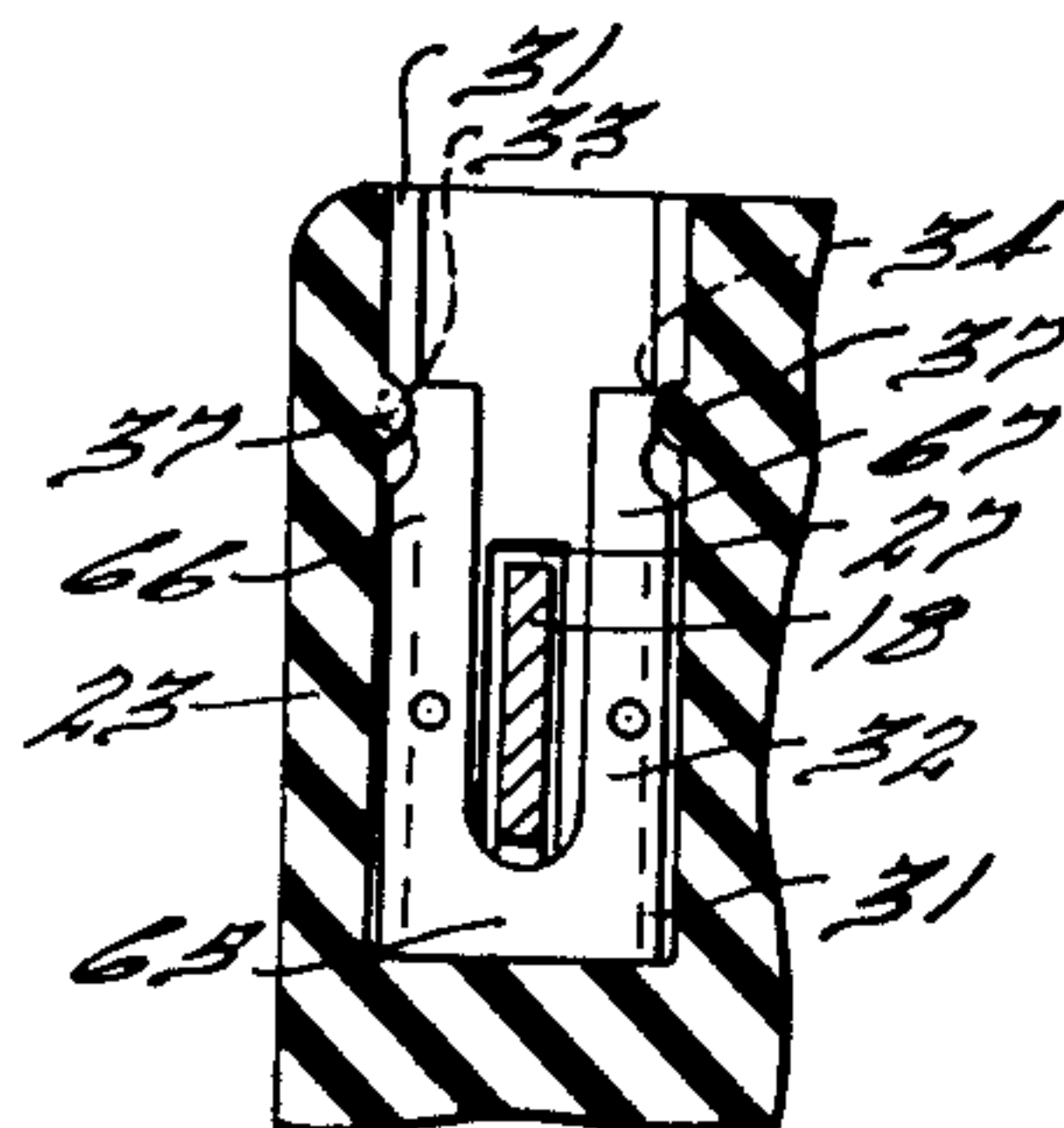


FIG. 4.

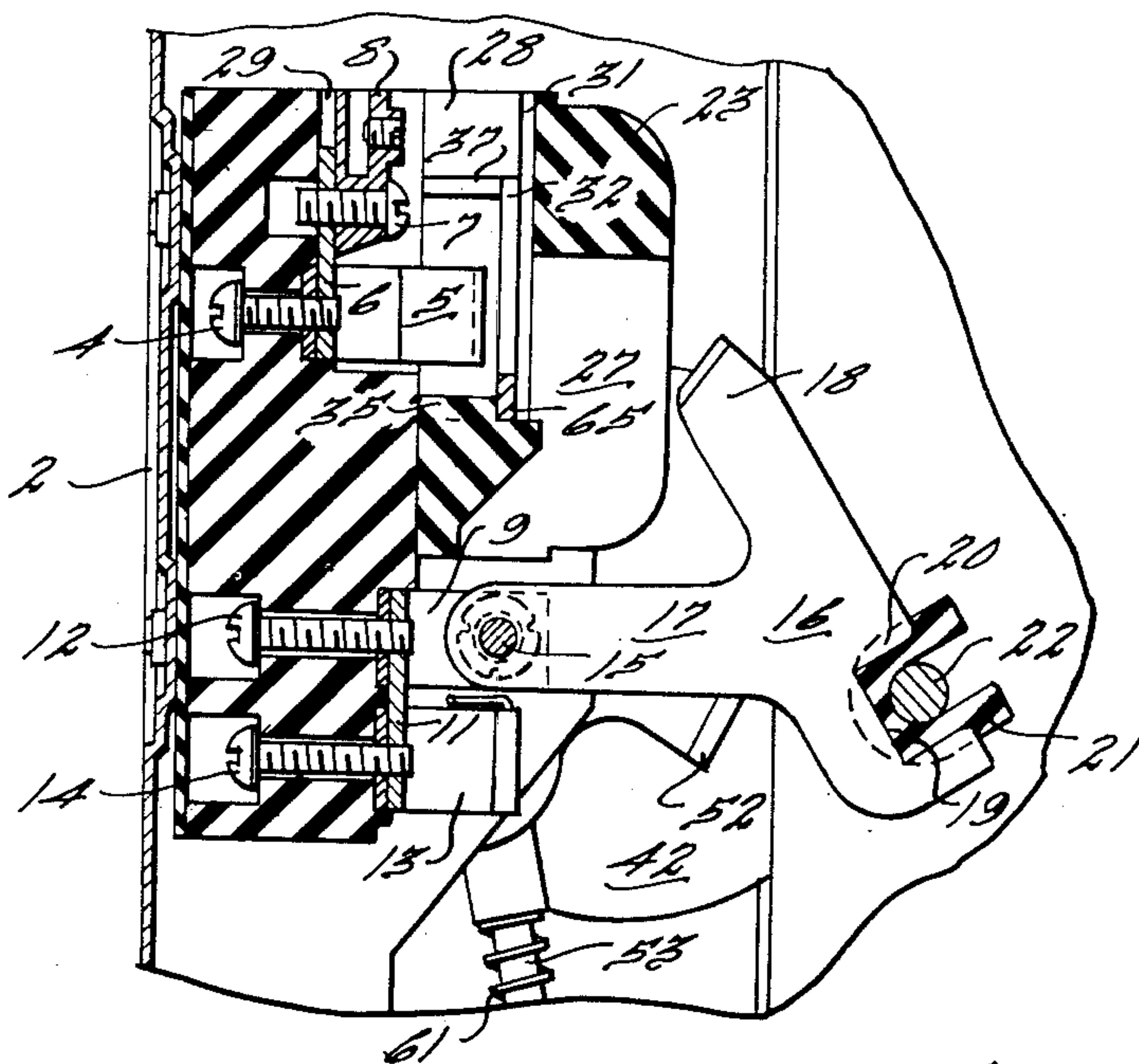


FIG. 3.

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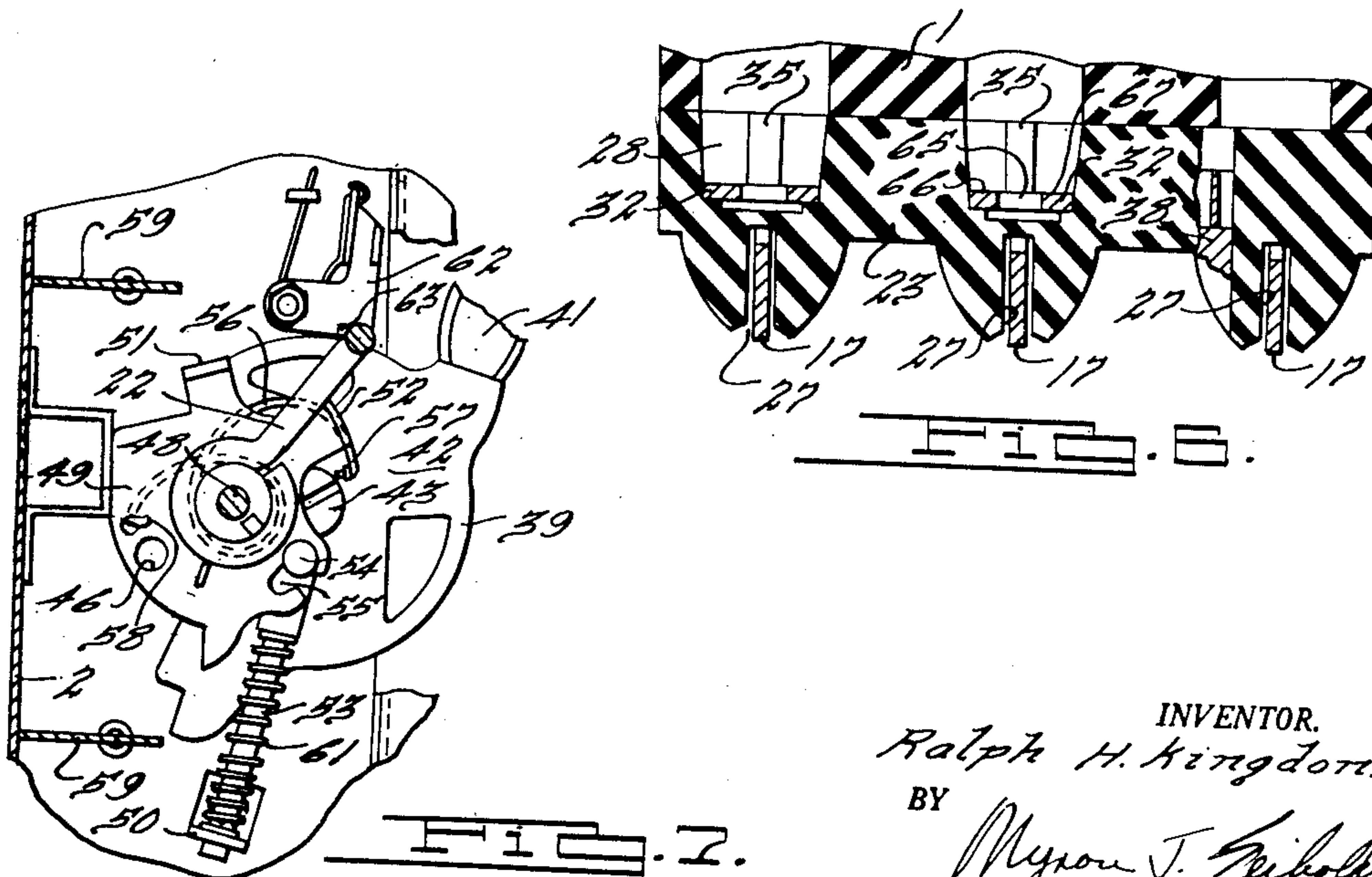
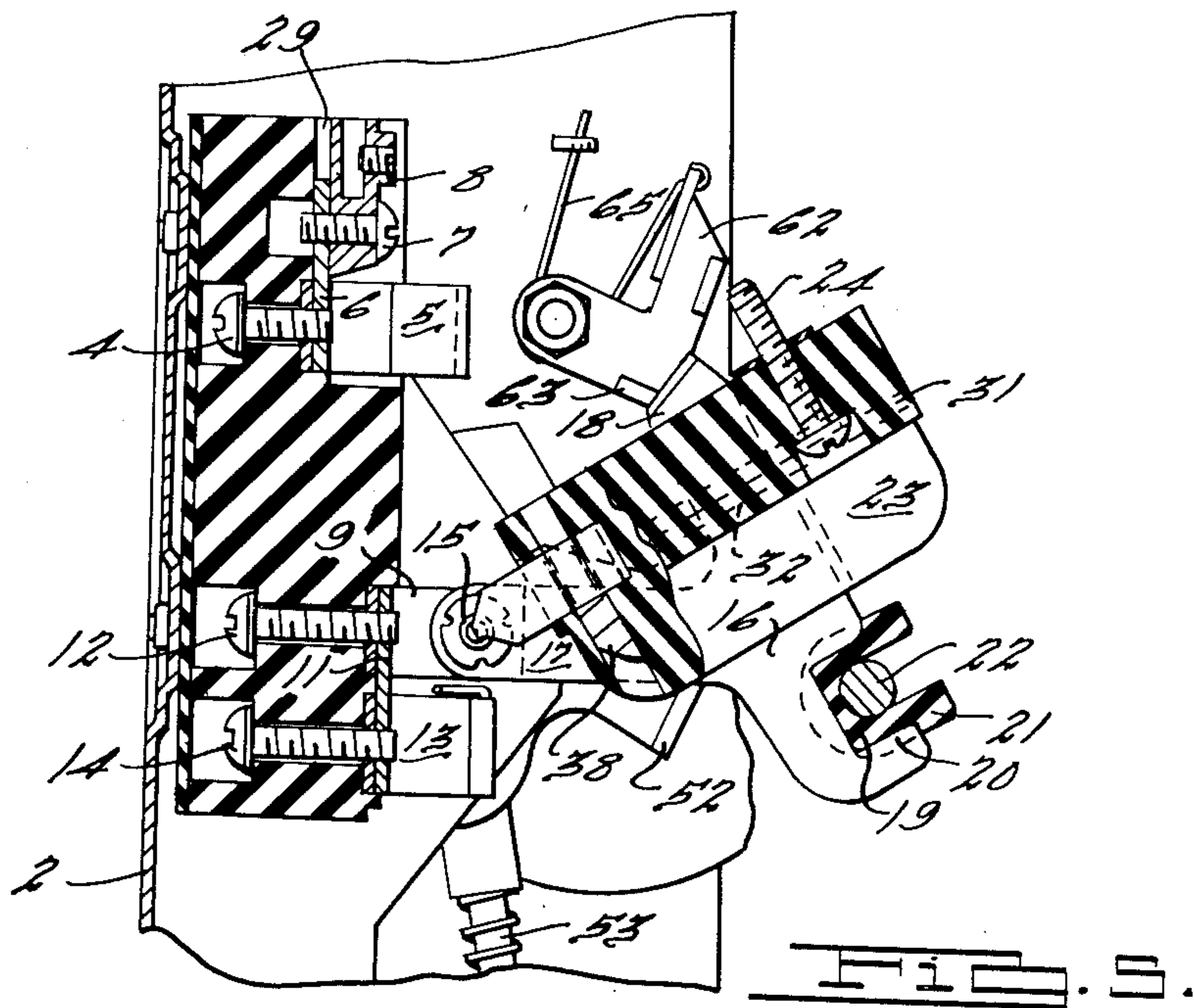
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R. H. KINGDON
ELECTRIC SWITCH

2,654,011

Filed July 14, 1950

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,654,011

ELECTRIC SWITCH

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Application July 14, 1950, Serial No. 173,820

21 Claims. (Cl. 200—144)

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This invention relates to apparatus for making and breaking electrical circuits and more particularly to electrical switches.

An object of the present invention is to provide an electrical switch with an improved form of contact cover and arc suppressor which provides an ease of access to the stationary contacts and terminals of the electrical switch with the contact cover supported on the switch.

Another object of this invention is to provide an electrical switch with an improved form of arc suppressor for arresting an arc which may be formed upon opening an electrical circuit with the switch.

A further object of this invention is to provide an improved form of construction for a pivoted blade member providing a switching surface on its end edge entering along its longitudinal axis to minimize arc suppressor opening.

Further objects and features of the invention will be readily apparent to those skilled in the art from the specification and appended drawings illustrating certain preferred embodiments in which:

Figure 1 is a front view of the switch with the cover removed showing the improved form of the contact cover and arc suppressor.

Figure 2 is a vertical sectional view along line II—II of Figure 1 showing the electrical switch in the closed circuit position.

Figure 3 is a vertical sectional view similar to Figure 2 but showing the electrical switch in the open circuit position.

Figure 4 is a vertical sectional view of the contact cover along line IV—IV of Figure 2.

Figure 5 is a vertical sectional view with the contact cover and arc suppressor swung open to provide access to the contacts and terminals.

Figure 6 is a horizontal sectional view along line VI—VI of Figure 1.

Figure 7 is a vertical sectional view along line VII—VII of Figure 1 showing the switch operating mechanism.

The invention is specifically illustrated in an outer enclosing metal box 2 within which is mounted an insulating base 1 with a second insulating member 3 mounted therein carrying fuse clips and terminals and spaced from the insulating base 1 in such a manner as to receive fuses extending from fuse clips 13 on the insulating base 1.

Mounted on the insulating base 1 by means of screws 4 are a plurality of stationary contact jaws 5 and conducting strips 6. Mounted on the opposite ends of conducting strips 6 by means of

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screws 7 are terminal connectors 8. In line with and spaced from the stationary contact jaws 5, hinge jaws 9 and conducting strip 11 are mounted on the insulating base 1 by means of screws 12, conducting strip 11 being connected to the fuse clips 13 by means of screws 14. Pivotaly mounted within the hinge jaws 9 by means of hollow rivets 15 are substantially Y-shaped blade members 16, the hollow rivets 15 passing through legs 17 of the blade members 16. The other legs 18 of the blade members 16 engage the stationary contact jaws 5 when the switch is in the closed position. Extensions of the bases of the blade members 16 have recesses 19 cut therein which receive an insulating bar 21 embracing the operating bail 22.

Covering the stationary contact jaws 5 and the terminals 8 is a slotted insulating cover 23 which may be secured to the insulating base 1 by suitable means such as screws 24. Secured in the insulating cover 23 by any suitable means such as a sealing cement at 38 are a pair of resilient strips 25 having their free end bent over so as to produce prongs 26 which engage within the hollow rivets 15 as shown in Figures 1 and 5. The insulating cover 23 has slots 27 through which legs 18 of the blade members 16 pass to engage jaws 5. The upper, back wall of the insulating cover 23 has recesses 28 cut therein such that the recesses 28 are complementary with similar recesses 29 in the insulating base 1 in which the stationary contact jaws 5 and the terminals 8 are mounted.

Shoulders 31 are provided in the recesses 28 against which U-shaped magnetic metal plates 32 are mounted in such a manner as to embrace the legs 18 of the blade members 16 when the switch is in the closed position. Ridges 33, 34, and 35 hold the plates 32 against the shoulders 31 and cutout portions in the ridges 33 and 34 receive fingers 37 at the ends of the legs of plates 32 to retain the plates in position.

The switch operating mechanism as shown in Figures 1 and 7 consists of an operator 39 having a handle 41 and a flat disc-like portion 42 pivoted on the side wall of the enclosing box 2 by means of a threaded shaft 43 and nut 44.

Upon the inside wall of the box 2 is mounted a shielding and supporting bracket 59 in spaced relation thereto. Between the bracket 59 and the box side wall is mounted a shaft 48 with the operating disc 42 provided with a suitable cutout portion, not shown, through which the shaft passes. Upon the shaft 48 is pivotally mounted an intermediate operating plate 49 and one end

of the operating bail 22, the other end of the bail being pivoted in the box wall. The plate 49 is provided with a pin 46 extending therefrom into engagement with a cutout portion, not shown, in the disc 42 so as to effect a lost motion connection therewith. The plate 49 is also provided with a pair of spaced flanges 51 and 52 embracing a leg of the bail 22 so as to provide a lost motion connection therewith. A spring guide 53, about which is disposed a main operating spring 61, is slidably mounted in a guide 50 swivelled on the side wall of the enclosing box and has a pin 54 on its other end received within a slot 55 in the intermediate operating plate 49. A light spring 56 has its opposite ends connected to the plate 49 at 58 and to the disc 42 at 57 so as to provide a resilient connection between the plate and disc so as to insure handle position and assist overcenter movement of the main operating spring 61.

A latch 62 is biased by a spring 65 and carries a flange 63 engageable with a suitable notch, not shown, in the disc 42 to normally prevent operation of the contacts to closed position when the box cover is open, the cover engaging and moving the latch to inoperative position when in the closed position.

The parts shown in Figures 1, 2, 4, 6 and 7 are in the closed circuit or contacts engaged position, with the legs 18 of the blade members 16 engaged with the contact jaws 5. To open the contacts, the handle 41 is moved downwardly as viewed in Figure 1 and in a clockwise direction as viewed in Figures 2 and 7. This rotates the disc 42 into engagement with pin 46 to effect rotation of the operating plate 49 also in a clockwise direction as viewed in Figure 7. As plate 49 rotates, it will rotate the spring guide 53 in a counter-clockwise direction and will move the flange 51 into engagement with the bail 22 so that there will be formed a direct positive connection between handle 14 and switch blades 16 to start the movements of the legs 18 out of the jaws 5. Before the blade leaves the jaws, the main operating spring 61 passes over center assisted by spring 55 and effects a rapid movement of the plate 49, bail 22 and switching blade 16 into the off position of Figure 3. In closing the contacts, a reverse action of the operating mechanism takes place to effect snap movement of the switching blades into engagement with the contact jaws.

As has been previously described, the blade members 16 are pivotally mounted within the jaws 9 on the insulating base 1 by means of hollow rivets 15 through legs 17 of the blade members 16 with the other legs 18 of the blade members disposed to engage the stationary contact jaws 5 which are mounted on the insulating base 1 in line with the hinge jaws 9. The slotted insulating cover 23 is pivotally mounted to the hollow rivets 15 by means of the prongs 26 on resilient strips 25 so as to fit flush on the surface of the insulating base 1 with the recesses 28 in complementary relationship with recesses 29 in the insulating base 1. The complementary recesses 28 and 29 thus form arc chambers about the contact jaws 5. The contacting legs 18 pass through narrow slots 27 through the insulating cover 23 which slots inhibit passage of the arc forwardly of the cover 23 and with the walls of the slots serving to cool ionized gases which tend to expel through the slots 27. Within the chambers formed by the recesses 28 and 29, the U-shaped magnetic plates 32 are magnetized by

the flow of arcing current between their legs to react with the arcs to draw them downwardly within the chambers toward the bights of the U's and thus inhibit passage of arc gases from the tops of the chambers and thus tend to prevent flashover between poles.

A distinctive feature of applicant's switch lies in the formation of legs 17 and 18 of member 16 such that the legs 18 enter the slots 27 and engage jaws 5 from an end edge thereof and along the longitudinal axis of the contacting edge as distinguished from a side edge and/or transverse axis of the contacting leg. This construction obviously minimizes the size of the slots through the insulating cover necessary to provide passage for the switching legs and also permits the proper placing of the U-shaped magnetic plates with their bights positioned to retain the arcs within the arc chambers.

In Figure 5 the insulating cover 23 is shown in its open position providing access to the contact jaws 5 and the terminal connectors 8. It will be noted that in this position the insulating cover 23 is supported on the switch by means of the prongs 26 on the resilient strips 25 engaging in the hollow rivets 15. With the switch in the off position, the screws 24 are loosened and the insulating cover swung to the open position of Figure 5, pivoting about the engagement of the prongs 26 in the rivets 15. After whatever manipulation or inspection of the jaws 5 and connectors 8 has been accomplished, the cover 23 is swung back counterclockwise into the position of Figure 3 and the studs retightened to place the switch again in operative condition.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. An electrical switch comprising in combination, an insulating base, stationary contacts and terminals mounted on said base, substantially Y-shaped blade members, said blade members pivotally mounted on said base adjacent to the end of one leg and having their other leg cooperating with a stationary contact, an insulating cover mounted over the stationary contacts and terminals, said insulating cover having slots therethrough through which the blade members travel to contact the stationary contacts, and means pivotally mounting said cover at the pivotal mounting of said blade members so that it will swing to uncover the contacts and terminals while remaining supported at said pivotal mounting.

2. An electrical switch comprising in combination, an insulating base, stationary contacts and terminals mounted on said base, substantially Y-shaped blade members, said blade members pivotally mounted on the base adjacent the end of one leg with the end of its other leg cooperating with a stationary contact, operating means insulated from said blade members and operable upon said blade members to open and close said electrical switch, an insulating cover for said stationary contacts and terminals hinged at the pivotal mounting of said blade members and having slots therethrough through which said blade members travel, and magnetic blowout means mounted in said insulating cover for directing

an arc which may be formed between said stationary contacts and said blade members away from said terminals and toward said insulating cover.

3. An electrical switch comprising in combination, an insulating base having cutout portions therein, stationary contacts and terminals mounted in said cutout portions, substantially Y-shaped blade members, said blade members pivotally mounted on the base adjacent the end of one leg and engaging said stationary contacts adjacent the end of the other leg, a bail member insulated from and operative upon said blade members to join said blade members for unitary operation, and an insulating cover for said insulating base hinged to the point of pivotal mounting of said blade members and having slots therethrough through which said contact legs of said blade members travel.

4. An electrical switch comprising in combination, an insulating base having a plurality of cutout portions therein, stationary contacts and terminals mounted in each of said cutout portions, substantially Y-shaped blade members, said blade members pivotally mounted on the base adjacent the end of one leg and engageable with said stationary contacts adjacent the end of the other leg, an operating bail member insulated from and operative upon said blade members to join said blade members for unitary operation, an insulating cover plate hinged to the pivotal mounting of the said blade members, said insulating cover plate having slots therethrough through which the blade members travel to engage said stationary contacts, and U-shaped magnetizable arc suppressor members mounted on said insulating cover plate around said slots with their bights directed toward the pivotal mounting of said blade members.

5. An electrical switch comprising in combination, an insulating base, stationary contacts and terminals mounted on said base, substantially Y-shaped blade members each pivotally mounted on the base adjacent the end of one leg and having its other leg cooperating with a stationary contact, an insulating cover, resilient spring members in said insulating cover, said insulating cover hinged to the pivotal mountings of said blade members by means of said resilient spring members, said cover covering said stationary contacts and terminals, and having slots therethrough through which the blade members travel to engage said stationary contacts.

6. An electrical switch comprising in combination, an insulating base, stationary contacts and terminals mounted on said base, blade members cooperating with said stationary contacts, stationary posts mounted on said base in line with said contacts and terminals, said blade members pivotally mounted to said stationary posts by means of hollow rivets, an insulating cover member for said stationary contacts having mounted thereon resilient strips carrying prongs, said resilient strips pivotally mounting said insulating cover to said stationary posts by engagement of said prongs in said hollow rivets, and operating means for engaging and disengaging said blade members and said stationary contacts.

7. An electric switch comprising in combination, an insulating base, stationary contacts and terminals mounted on said base, blade members, stationary hinge posts mounted on said base in line with said contacts, said blade members pivotally mounted to said stationary posts and cooperating with said stationary contacts, an insulat-

ing cover for said stationary contacts pivotally mounted to said stationary posts at the pivotal mounting of said blade members so as to swing to uncover the contacts and terminals while supported on said stationary post, and operating means for engaging and disengaging said blade members and said stationary contacts.

8. An electrical switch comprising in combination, an insulating base having a plurality of cutout portions therein providing unrestricted openings to the top of said insulating base, stationary contacts and terminals mounted in each of said cutout portions, substantially Y-shaped blade members cooperating with said contacts, said blade members having a recess in the base thereof, said blade members pivotally mounted to the base adjacent to the end of one leg and having their other leg entering the stationary contact at the end edge as distinguished from the side edge thereof and interposing the end portions of the leg itself in engagement with the stationary contacts, an insulating crossbar joining said blade members for unitary operation by engagement in said recess in said blade members, an operating bail engaging said insulating bar providing a means for opening and closing said electrical switch, an insulating cover for said insulating base having cutout portions therein providing unrestricted openings to the top of said insulating cover complementary with the cutout portions and openings in the insulating base, slots through said cover in line with said stationary contacts through which said blade members travel, and magnetizable, U-shaped, metallic plates mounted in the cutout portions of the cover with their legs embracing the path of movement of the blade members and pointing into said unrestricted openings in said insulating cover and their bights directed toward the pivotal mounting of the blade members.

9. An electrical switch comprising in combination, an insulating base having a plurality of cutout portions therein providing unrestricted openings to the top of said insulating base, stationary contacts and terminals mounted in each of said cutout portions, substantially Y-shaped blade members cooperating with said contacts, said blade members having a recess in the base thereof, said blade members pivotally mounted to the base adjacent to the end of one leg and having their other leg entering the stationary contact at the end edge as distinguished from the side edge thereof and interposing the end portions of the leg itself in engagement with the stationary contacts, an insulating crossbar joining said blade members for unitary operation by engagement in said recess in said blade members, an operating bail engaging said insulating bar and providing means for opening and closing said electrical switch, an insulating cover for said insulating base having cutout portions therein and an unrestricted opening to the top of said insulating cover complementary with said cutout portions and openings in said insulating base, a plurality of slots through said cover in line with said stationary contacts through which said blade members travel, means pivotally mounting said cover on said base, and magnetizable, U-shaped, metallic plates mounted in the cutout portions of the cover with their legs embracing the path of movement of said blade members and pointing into said unrestricted openings in said insulating cover and with their bights directed toward the pivotal mounting of said blade members.

10. An electrical switch comprising in combination, an insulating base having a plurality of

cutout portions therein, stationary contacts and terminals mounted in each of said cutout portions, substantially Y-shaped blade members cooperating with said contacts, said blade members having a recess in the base thereof, said blade members pivotally mounted on the base adjacent to the end of one leg and having its other leg engaging the stationary contact along the longitudinal axis of said other leg, an insulating bar joining said blade members for unitary operation by engagement in said recess in said blade members, an operating bail engaging said insulating bar and providing means for opening and closing said electrical switch, an insulating cover for said insulating base having cutout portions therein complementary with the cutout portions in said base, slots through said cover in line with said stationary contacts through which said switch blade members travel, means pivotally mounting said cover on the pivotal mounting of said blade members so that said cover will swing to uncover the contacts and terminals while supported on the base, and a plurality of magnetizable, U-shaped, metallic plates mounted in the cutout portions of the cover with their legs embracing the path of movement of said blade members and their bights directed toward the pivotal mounting of said blade members.

11. An electrical switch comprising in combination, an insulating base having a plurality of cutout portions therein providing unrestricted opening to the top of said insulating base, stationary contacts and terminals mounted in each of said cutout portions, a plurality of substantially Y-shaped blade members cooperating with said contacts, said blade members having a recess in the base thereof, said blade members pivotally mounted to the base adjacent the end of one leg and having its other leg entering the stationary contact at the end edge as distinguished from the side edge thereof and interposing the end portions of the leg itself in engagement with the stationary contacts, an insulating crossbar joining said blade members for unitary operation by engagement in said recess in said blade members, an operating bail engaging said insulating bar providing a means for opening and closing said electrical switch, an insulating cover for said insulating base having cutout portions therein and an unrestricted opening to the top complementary with said cutout portions and openings in said insulating base, a plurality of slots through said cover in line with said stationary contacts through which said blade members travel, and means pivotally mounting said cover on the pivotal mounting of said blade members so that said cover may swing to uncover the contacts and terminals while supported on said pivotal mounting, magnetizable, U-shaped, metallic plates mounted in the cutout portions of said insulating cover with their legs embracing the path of movement of the switch blades and pointing into said unrestricted opening and with their bights directed toward the pivotal mounting of the switch blade.

12. An electrical switch comprising in combination, an insulating base, stationary contacts and terminals mounted on said base, substantially Y-shaped blade members cooperating with said stationary contacts, stationary hinge jaws mounted on said base, said blade members pivotally mounted to said hinge jaws by means of hollow rivets, an insulating cover member for said stationary contacts, resilient strips carrying prongs mounted to said cover member, said in-

insulating cover pivotally mounted to said hinge jaws by means of said resilient strips engaging said hollow rivets whereby the insulating cover may be swung to uncover the contacts and terminals, and means for operating said blade members into and out of engagement with said stationary contacts.

13. An electrical switch comprising in combination, an insulating base having a plurality of cutout portions therein, stationary contacts and terminals mounted in each of said cutout portions, stationary hinge jaws in line with said stationary contacts, a plurality of substantially Y-shaped blade members, said blade members pivotally mounted on said stationary hinge jaws by means of a hollow rivet through said hinge jaw and one leg of said blade member, the other leg of said blade member engaging the stationary contact along its longitudinal axis, an insulating cover for said insulating base, resilient strips carrying prongs mounted on said insulating cover, said prongs engaging said hollow rivets so that said insulating cover may be swung to uncover the contacts and terminals and may be bodily removed by disengagement of said prongs and said hollow rivets, slots through said insulating cover in line with said stationary contacts through which said blade members travel, a plurality of U-shaped, metallic plates mounted in said insulating cover with their legs embracing the path of movement of said blade members and their bights directed toward the pivotal mounting of said blade members.

14. An electrical switch comprising in combination, an insulating base, stationary contacts and terminals mounted on said base, stationary hinge jaws mounted on said base in line with said stationary contacts and terminals, substantially Y-shaped blade members cooperating with a stationary contact and pivotally mounted to said stationary hinge jaws by means of hollow rivets, an insulating cover member for said stationary contacts, resilient strips carrying prongs mounted on said insulating cover, said insulating cover pivotally mounted to said hinge jaws by means of said resilient strips carrying prongs engaging said hollow rivets so that said insulating cover may be swung to uncover the contacts and terminals and may be bodily removed by disengagement of the prongs and the hollow rivets.

15. An electrical switch comprising in combination, an insulating base, a plurality of stationary contact jaws and terminals mounted on said base, a plurality of substantially Y-shaped blade members cooperating with said stationary contact jaws, said blade members having recesses in the base legs thereof, each of said blade members being pivotally mounted on the base adjacent to the end of one open leg and having its other open leg entering the contact jaw along its longitudinal axis and at its end edge as distinguished from the side edge thereof, and interposing the end portions of the leg itself in engagement with the stationary contact jaw.

16. An electrical switch comprising in combination, an insulating base, a plurality of stationary contact jaws and terminals mounted on said insulating base, a plurality of substantially Y-shaped blade members cooperating with said contact jaws, said blade members having recesses in the base legs thereof, each of said switch blade members being pivotally mounted on the base adjacent to the end of an open leg and having its other open leg engaging the stationary contact jaw along the longitudinal axis of said leg and

at its end edge as distinguished from the side edge thereof and interposing the end portions of the leg itself in engagement with the stationary contact jaw, an insulating bar joining said blade members for unitary operation by engagement in said recesses in said blade members, and an operating bail engaging said insulating bar and providing means for opening and closing said electric switch.

17. An electrical switch comprising in combination, an insulating base, a plurality of stationary contact jaws and terminals mounted on said insulating base, a plurality of substantially Y-shaped blade members cooperating with said contact jaws, said blade members having recesses in the base legs thereof, each of said switch blade members being pivotally mounted on the base adjacent to the end of an open leg and having its other open leg engaging the stationary contact jaw along the longitudinal axis of said leg and at its end edge as distinguished from the side edge thereof and interposing the end portions of the leg itself in engagement with the stationary contact jaw, an insulating bar joining said blade members for unitary operation by engagement in said recesses in said blade members, an operating bail engaging said insulating bar and providing means for opening and closing said electric switch, and an insulating cover in front of said stationary contact jaws and having slots therethrough in line with the stationary contact jaws through which said other open legs of the blade members travel in engaging and disengaging the contact jaws.

18. An electrical switch comprising in combination, an insulating base having a plurality of cutout portions therein, a plurality of stationary contact jaws and terminals mounted in each of said cutout portions, a plurality of substantially Y-shaped blade members cooperating with said contact jaws, said blade members having recesses in the base legs thereof, each of said switch blade members being pivotally mounted on the base adjacent to the end of an open leg and having its other open leg engaging a stationary contact jaw along the longitudinal axis of said leg and at its end edge as distinguished from the side edge thereof and interposing the end portion of the leg itself in engagement with the stationary contact jaw, means joining said blade members for unitary operation into and out of engagement with the contact jaw to perform the switching operation, and an insulating cover for said insulating base having cutout portions therein complementary with the cutout portions in said base, said cover having slots therethrough in line with said stationary contacts through which said other open legs of said blade members travel as they engage and disengage the stationary contact jaws.

19. In an electrical switch, an insulating base, a plurality of stationary contact jaws and terminals mounted upon said base, a plurality of conducting blade members cooperating with said stationary contact jaws, said blade members being pivotally mounted on the base for rotative movement into and out of engagement with the stationary contact jaws, the contact engaging portions of the blade members being constituted by legs disposed to enter the contact jaws along the longitudinal axis of the legs and at their end edges as distinguished from the side edges thereof, means for rotating said blade members

into and out of engagement with the contact jaws to effect the switching operation, and an insulating cover in front of said stationary contact jaws and cooperating with the insulating base to form individual chambers about the jaws, said cover having slots therethrough, major with respect to the front wall and minor with respect to the bottom wall, through which the legs of the blade members pass in engaging and disengaging the contacts.

20. In an electrical switch, an insulating base, a plurality of stationary contact jaws and terminals mounted on said base, a plurality of conducting blade members pivotally mounted on said base for rotative movement into and out of engagement with the stationary contact jaws, each of said blade members having one portion remote from said stationary contact jaws provided with a pivotal mounting at its end and a contact portion remote from said pivot end disposed at a substantial angle to said one portion and entering the stationary contact jaws along the longitudinal axis of the contact portion and at its end edge as distinguished from the side edge thereof, an insulating cover cooperating with the insulating base to form individual contact chambers about said contact jaws, said insulating cover having slots therein, major with respect to the front wall thereof and minor with respect to the bottom wall, the contact portions of said blade members passing through said slots with the longitudinal axes of the contact portions substantially at right angles to the front wall of the insulating cover, and means joining said blade members for common movement as a unit into and out of engagement with the stationary contact jaws to perform the switching operation.

21. In an electric switch, an insulating base, a plurality of stationary contact jaws and terminals mounted on said base, a plurality of conducting blade members pivotally mounted on the base for rotative movement into and out of engagement with the stationary contact jaws, each of said blade members having one portion remote from said stationary contact jaws provided with a pivotal mounting at its end and a contact portion remote from said pivot and disposed at a substantial angle to said one portion and entering the stationary contact jaws along the longitudinal axis of the contact portion and at its end edge as distinguished from the side edge thereof, extending portions on said blade members substantially in line with the contact portions thereof, recesses in said extending portions, insulating means engaged in said recesses to join said blades for common movement, and an operating bail engaging said insulating means to effect operation of the blades to perform the switching operation.

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