

No. 684,389.

Patented Oct. 8, 1901.

J. H. VAIL.
OIL SWITCH.

(Application filed Dec. 28, 1900.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.

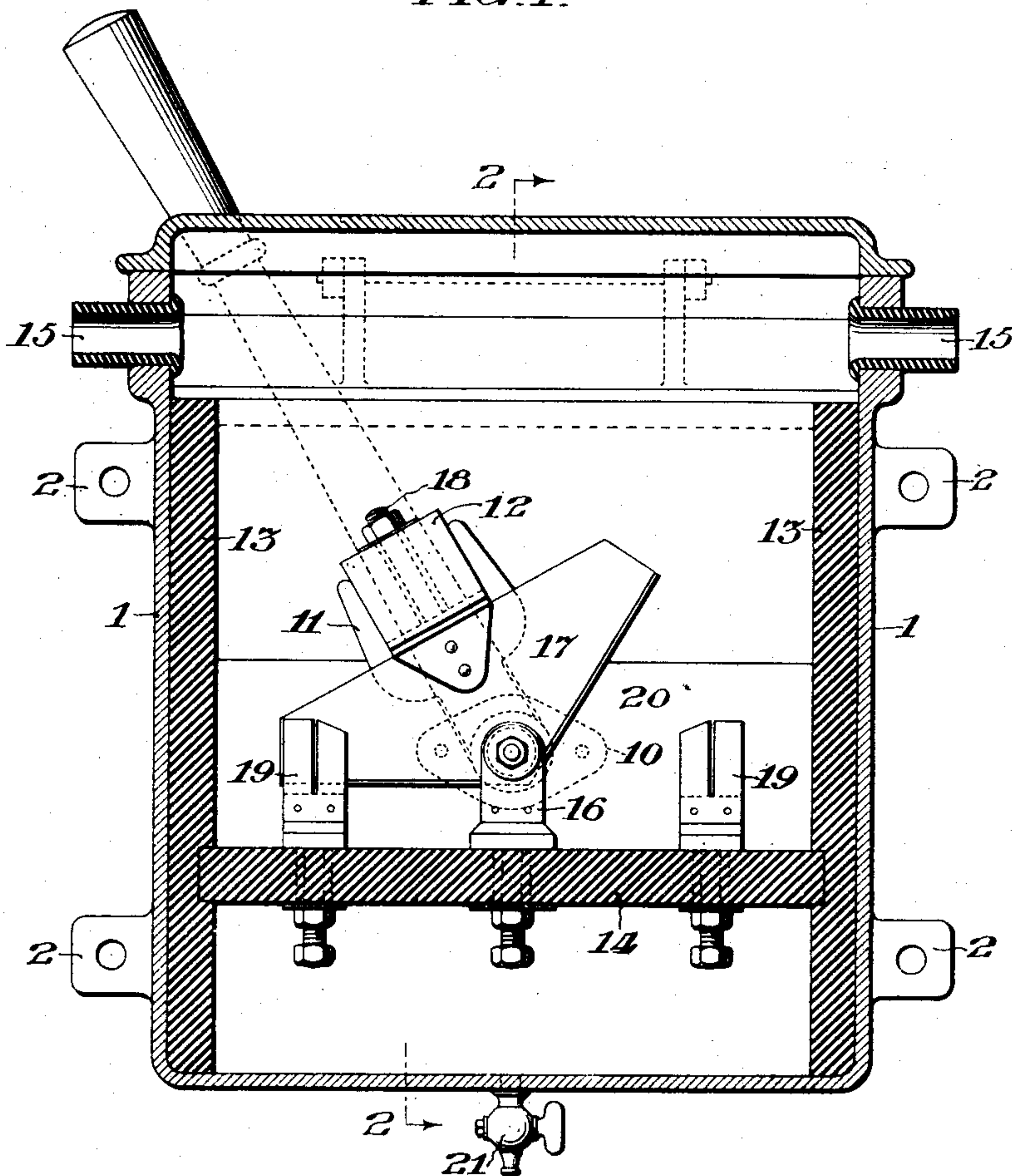


FIG. 3.

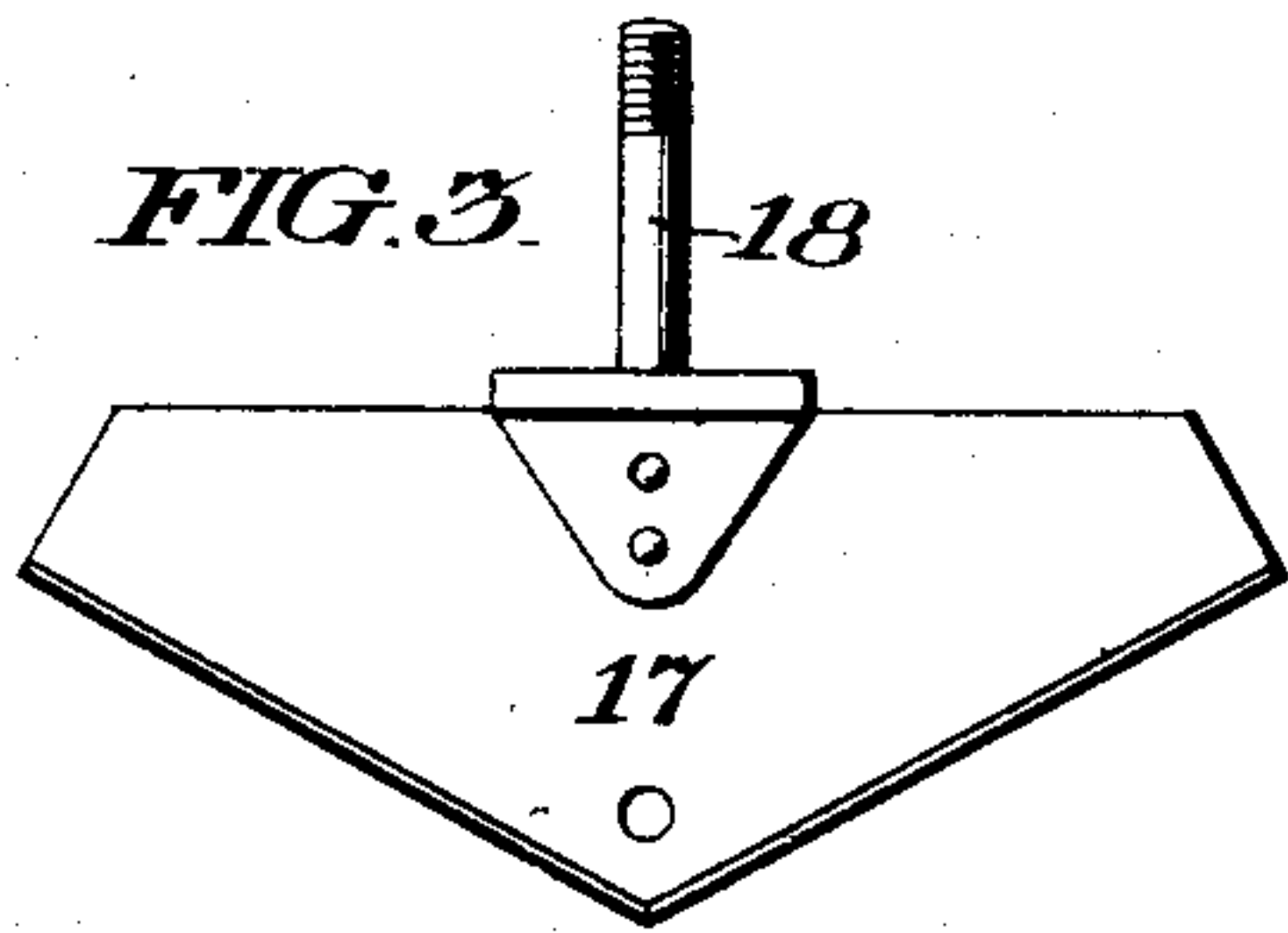
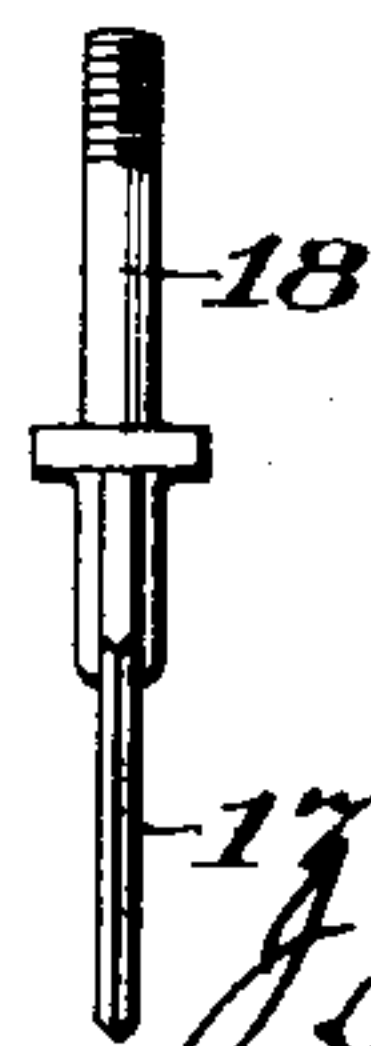


FIG. 4.



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2 Sheets—Sheet 2.

FIG. 2.

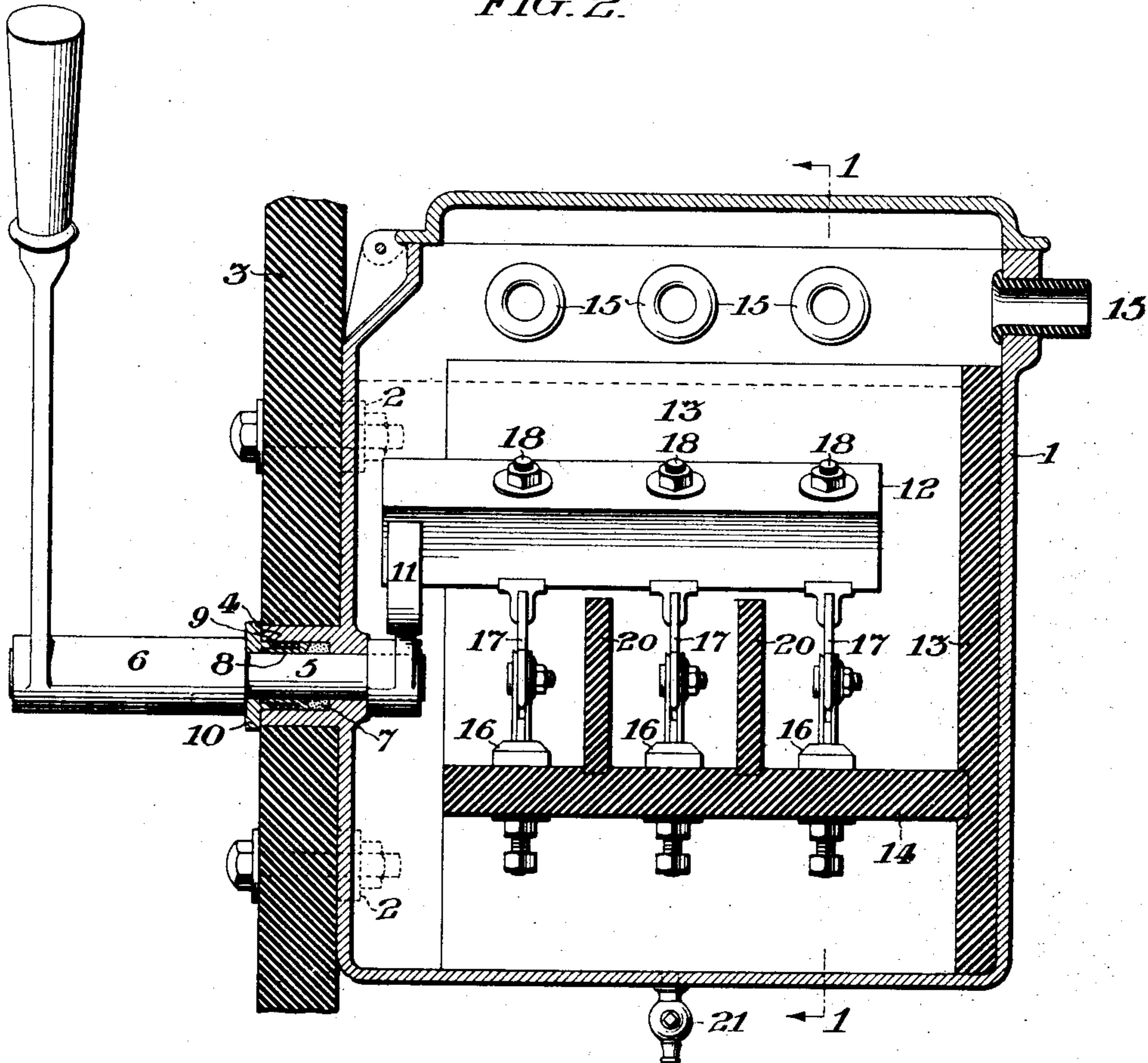


FIG. 5.

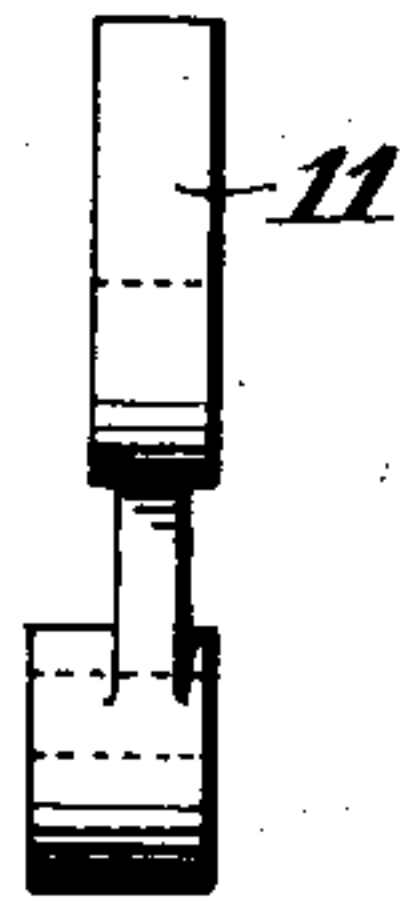
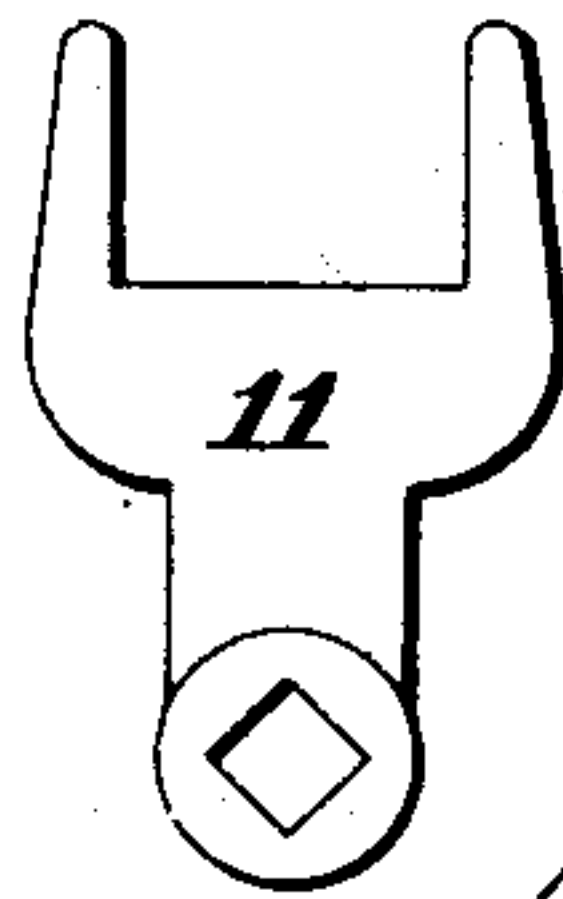


FIG. 6.



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UNITED STATES PATENT OFFICE.

JONATHAN H. VAIL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
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OIL-SWITCH.

SPECIFICATION forming part of Letters Patent No. 684,389, dated October 8, 1901.

Application filed December 28, 1900. Serial No. 41,344. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN H. VAIL, a citizen of the United States, residing in the city of Philadelphia, in the county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Oil-Switches, of which the following is a specification.

My improvements relate to the class of switches for conductors for high tension currents, the working parts of which are, to avoid the sparking incident to their operation, submerged in a volume of oil, and it is the object of my invention to provide an efficient switch of this character of simple and compact form, and tight and strong construction.

In the accompanying drawings I show, and herein I describe, a good form of a convenient embodiment of my invention, the particular subject-matter claimed as novel being hereinafter definitely specified.

In the accompanying drawings,

Figure 1 is a vertical, sectional, elevation of my switch, section being supposed on the dotted line 1—1 of Figure 2.

Figure 2 is a vertical, sectional, elevation on the dotted line 2—2 of Figure 1.

Figure 3 is a view in side elevation and Figure 4 a view in edge elevation of one of the blades of the switch.

Figure 5 is a view in edge elevation, and Figure 6 a view in face elevation, of the rock arm.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings,

1 is a box-like inclosing casing conveniently formed of cast iron, provided at its top with a hinged lid, and as to one face or side, conveniently that on which are mounted the hinges of the lid, provided with integral lugs 2, adapted to be secured by screws or otherwise to the marble panel 3 of an electric switch board, or other support.

The rear face of the casing is conveniently provided with an integral bearing boss 4 which extends through a suitable opening formed in the panel 3, through which boss 5 extends a countersunk opening in which is seated a reduced portion 5, of a rock shaft 6.

Within the countersink of the boss is mounted a gland of packing material 7, maintained in place by an annular follower 8, driven forward by a spiral spring 9, backed by a washer 10, having an annular projection extending within the countersink.

The shoulder of the shaft 6 abuts against said washer and holds it firmly in position.

The outer end of the shaft 6 is provided with any suitable operating handle.

On the inner end of the rock shaft 6 is formed a squared shank upon which is mounted and secured the hub of a rock arm 11, the upper end of which is provided with a squared recess in which is entered the correspondingly shaped end of what I term the carrier bar 12, being a bar of insulating material extending partly across the interior of the casing parallel with the axis of the rock shaft.

The insulating support for the working parts of the switch is constituted by vertically disposed wooden or other plates 13, preferably three in number, assembled or arranged so as to rest upon the floor of the casing, and rest against three of its walls, a groove formed in the inner faces of the three plates constituting a seat for an insulating base plate 14 the edges of which are engaged therein.

Three of the sides of the casing are, above the region occupied by the supporting plates, each formed with three conductor openings, in which are mounted insulating eyelets 15 of porcelain, or other insulating material, each consisting of a short tube with an end lip or flange. Said insulating eyelets are inserted in position in said openings from the interior of the casing, so that their flanges rest against the inner faces of the walls thereof.

16 indicate pivot terminals, three in number, disposed upon the insulating base plate, and having each a threaded shank extending through an opening in said base plate and equipped below said base plate with a nut by which the terminal is drawn and held firmly against said base plate.

Each of said terminals consists as to its upper portion, in the embodiment illustrated, of a pair of plates and a transverse pivot or pivot screw as shown particularly in Figure 2.

The carrier arm or bar 12 is formed of in-

insulating material and provided with three switch blades 17, conveniently of the form shown in Figure 3, applied thereto and held in place thereon by means of threaded shanks, 5 18, with one of which each of said blades is provided. Said shanks extend upward through suitable openings formed in the carrier bar and are on the upper face thereof provided with nuts by which the shanks and blades 10 are held in position.

The lower central portions of the said blades are respectively engaged by the pivots of the respective pivot terminals so as to be free for rocking movement with respect thereto.

15 In connection with each of the pivot terminals is provided a pair of clip terminals 19 of the character shown in Figure 1, said clip terminals being arranged respectively one on either side of a pivot terminal, and each 20 provided with a threaded shank extending through the base plate and maintained in position by a nut applied to said shank below said plate, said clip terminals being adapted to be alternately encountered by the switch 25 blade in its throw to one side and the other.

Each of the pivot and clip terminals is as to its threaded shank provided with a second nut, between which second nuts and the shank holding nuts may be placed upon the shanks 30 the lugs at the extremities of the conductors (not shown) led into the casing. Any desired form of connection between said conductors and said terminals may, of course, be made.

35 In the particular embodiment of my invention illustrated, provision is made for nine independent conductors, three being engaged with the three pivot terminals, and the remaining six being engaged respectively one 40 with each of the six clip terminals.

The apparatus illustrated is adapted to make connection between the three conductors connected to the three pivot terminals and the three conductors connected to the 45 three right hand clip terminals,—or the three conductors connected to the three left hand clip terminals.

To prevent the jumping of sparks from one clip terminal to another or from one pivot 50 terminal to another I provide the base plate with upwardly extending insulating walls 20, which extend between the respective sets of pivot and clip terminals.

The operation of my apparatus will be 55 readily understood.

The throw of the operating handle, of course, will carry the carrier arm or bar to the right or left, throwing its blades which are permanently in circuit with the pivot terminals, 60 into contact with the right or left hand clip terminals as the case may be.

Said handle may, of course, when desired, be set at an intermediate position in which the switch blades will be out of contact with 65 all of the clip terminals.

The operation of the apparatus, which would ordinarily be attended by sparking,

is, by reason of the presence of a volume of non-conducting oil or other liquid filling the casing preferably nearly to the top, as indicated by the dotted line, protected against 70 such sparking.

The oil is, of course, poured in at the top of the casing and may be when desired drawn off through the cock 21 at the bottom. 75

When it is desired to remove the working parts from the casing the eyelets 15 may be pushed inward clear of their openings so as to be suspended upon the conductors within the casing, and the insulating support carrying the working parts may thereupon be 80 lifted out through the top of the casing; the carrier bar 12 being connected with the rock arm 11 merely by engagement in a fork or recess of said arm, is, of course, free to be 85 lifted away from said arm in the removal of the parts.

The conductors, being carried below the base plate and making connection below said plate with the shanks of the terminals which 90 constitute connecting studs, are kept clear of the moving parts of the switch, and, therefore, avoid liability to become entangled therewith.

The word "oil" as employed in the claims 95 is used generally as covering various kinds of oils and liquids useful for the purpose of preventing sparking.

Having thus described my invention, I claim— 100

1. In an oil switch, a containing casing formed as a cast chamber provided with an integral recessed outwardly extending bearing lug adapted to extend into an opening 105 formed in a supporting panel, a rock shaft journaled in said bearing lug, and provided at its outer end with an operating device or handle, a moving switch member connected to the inner end of said shaft, and terminals in connection with which said switch member 110 operates, substantially as set forth.

2. In an oil switch, a containing casing formed as a cast integral chamber provided with securing lugs or devices, and an integral outwardly extending bearing lug adapted 115 to extend into an opening formed in a supporting panel, a countersunk opening formed in said bearing lug, a rock shaft journaled in said opening, a packing ring or gland in said opening, and a collar which holds 120 said packing ring therein, a moving switch member connected to the inner end of said shaft, and a number of terminals in connection with which said switch member operates, substantially as set forth. 125

3. In an oil switch, a containing casing provided with an integral outwardly extending bearing lug adapted to extend into an opening formed in a supporting panel, a countersunk opening in said lug, a rock shaft 130 journaled in said lug, a packing ring, a follower, and a spring arranged within said recess and retained therein by a shoulder or enlargement on the rock shaft, a moving

switch member connected to the inner end of said shaft, and a number of terminals in connection with which said switch member operates, substantially as set forth.

5 4. In an oil switch, in combination, an oil containing casing, an insulating support consisting of a base plate supported above the floor of the casing, terminals mounted on said base plate, a moving switch member acting
10 in connection with said terminals, and an operating shaft mounted in the wall of said casing and engaged with but freely separable from said moving switch member, substantially as set forth.

15 5. In an oil switch, in combination, an oil containing casing, an operating shaft mounted in the wall thereof, a carrier bar removably engaged with said operating shaft, a switch blade or member, a terminal to which said
20 blade or member is connected, a second terminal with which said blade or member is adapted to make contact, and a removable insulating support on which the terminals are mounted, substantially as set forth.

25 6. In an oil switch, in combination, an oil containing casing within which is a removable insulating support, terminals on said support, a moving switch member adapted to make contact with said terminals, and mounted on
30 a carrying arm or bar, a rock shaft, and a rock arm mounted thereon having a forked recess in which the end of said carrying arm engages, substantially as set forth.

35 7. In an oil switch, in combination, an oil containing casing, an insulating support consisting of uprights fitted against the inner walls of said casing, and a base plate fitted in a horizontal groove in the inner faces of said uprights, switch members mounted on said
40 base plate, a rock shaft mounted in the wall of said casing, a movable switch blade or member, and a connection between said rock shaft and said switch blade or member, substantially as set forth.

45 8. In an oil switch, in combination, an oil containing casing, an insulating support consisting of plates arranged against the walls of said casing, and a base plate connected to said plates, sets of switch members each set consisting of a pivotal terminal, a switch blade
50 or member, and a clip or contact terminal, mounted on said base plate, and insulating partitions mounted upon the base plate and extending between adjacent sets of switch members, substantially as set forth.

55 9. In an oil switch, in combination, an oil containing casing, an insulating support consisting of vertically disposed plates arranged against the inner faces of the said casing, and
60 an insulating base plate connected to said plates, pivot and clip terminals mounted on said base plate and having shanks extending below said base plate for the attachment of conductors, a shaft mounted in the wall of said
65 casing, a rock arm, a carrier bar, and switch blades connected to said carrier bar, substantially as set forth.

10. In an oil switch, in combination, an oil containing casing, an insulating support consisting of upright insulating plates arranged
70 against the inner faces of said casing, a base plate mounted on said uprights, switch members mounted on said plate, means for operating the same, conductor openings formed in the wall of the upper portion of the casing, and non-conducting thimbles removably
75 mounted in said openings, substantially as set forth.

11. In an oil switch, in combination, a containing casing, an insulating support consisting of upright insulating plates arranged
80 against the inner faces of said casing, a base plate mounted on said uprights, switch members mounted on said plate, means for operating the same, conductor openings formed in the wall of the upper portion of the casing, and non-conducting thimbles removably
85 mounted in said openings, said thimbles having flanges or enlargements at their inner ends which abut against the inner face of the casing, substantially as set forth.

12. In an oil switch, in combination, an oil containing casing, an insulating base plate supported therein, a pivot terminal mounted on said base plate, a number of clip terminals mounted on said base plate, a switch
90 blade pivotally connected to said pivot terminal, a carrier arm connected to said switch blade, a rock arm in a recess in which said carrier arm rests, and a rock shaft on which
100 said carrier arm is mounted, substantially as set forth.

13. In an oil switch, in combination, an oil casing, an insulating support mounted therein and free for removal therefrom, terminals
105 mounted on said support, a moving switch member making contact with said terminals, and a device extending through the side wall of said casing for the actuation of said moving switch member, said moving switch member being freely removable from said device,
110 substantially as set forth.

14. In an oil switch, in combination, an oil containing casing, an insulating support consisting of vertically arranged plates of insulating material, an insulating base plate
115 supported thereon, a pivot terminal mounted in said base plate with a shank extending through and below said base plate, a clip terminal mounted on said base plate and having a shank extending through and below
120 said base plate, a switch blade pivotally connected to said pivot terminal, a carrier bar to which said switch blade is connected, a rock arm with which said carrier bar is connected, and a rock shaft, extending through the wall of the casing, on which said rock arm is mounted, substantially as set forth.

15. In an oil switch, a containing casing formed as a cast chamber provided with an
130 integral outwardly extending bearing lug adapted to project into an opening formed in a supporting panel, said lug having a channel extending through it, a terminal and a

movable switch member arranged within said casing, conductors connected with said terminal and member respectively, and an operating device extending through the channel 5 of said lug and connected with said movable switch member, substantially as set forth.

16. In an oil switch, in combination, an oil containing casing, an operating device extending through the wall thereof, a carrier 10 bar engaged with but freely removable from said operating device, a switch member mounted on said carrier bar, terminals which said switch member serves to connect, and a support removably mounted within the casing 15 upon which the terminals and switch member are mounted, substantially as set forth.

17. In an oil switch, in combination, a containing casing, a rock shaft mounted in the wall thereof, an arm mounted on said rock shaft and having an open recess in its outer 20 portion, a switch member mounted on a bar set in said open recess, and terminals adapted to be connected through said switch member, substantially as set forth.

In testimony that I claim the foregoing as 25 my invention I have hereunto signed my name this 18th day of December, A. D. 1900.

JONATHAN H. VAIL.

In presence of—

S. SALOME BROOKE,
THOS. K. LANCASTER.