H. W. CHENEY.

OIL SWITCH.

APPLICATION FILED DEC. 23, 1907.

1,007,771.

Patented Nov. 7, 1911.

3 SHEETS—SHEET 1.

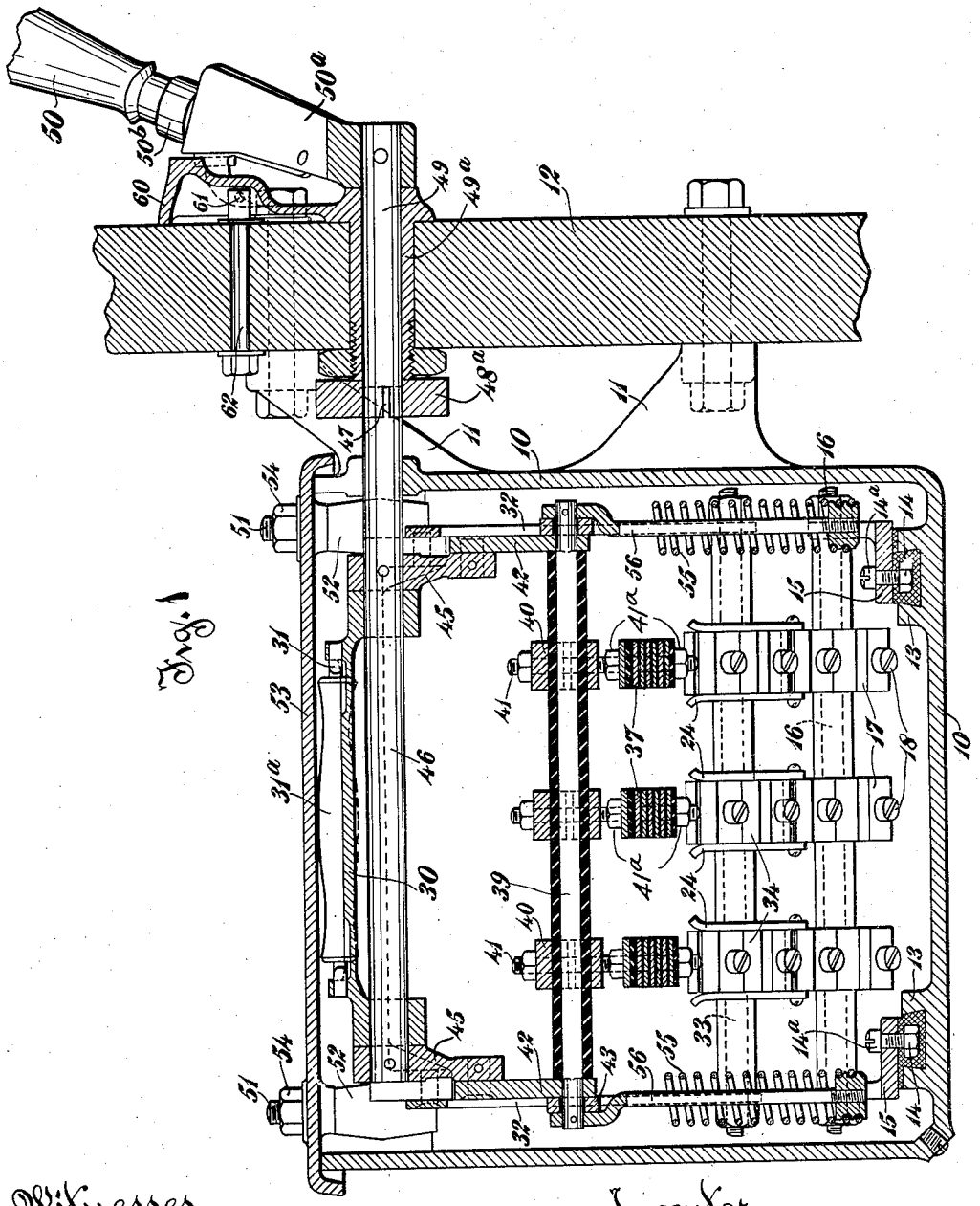

Fig. 1.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 2

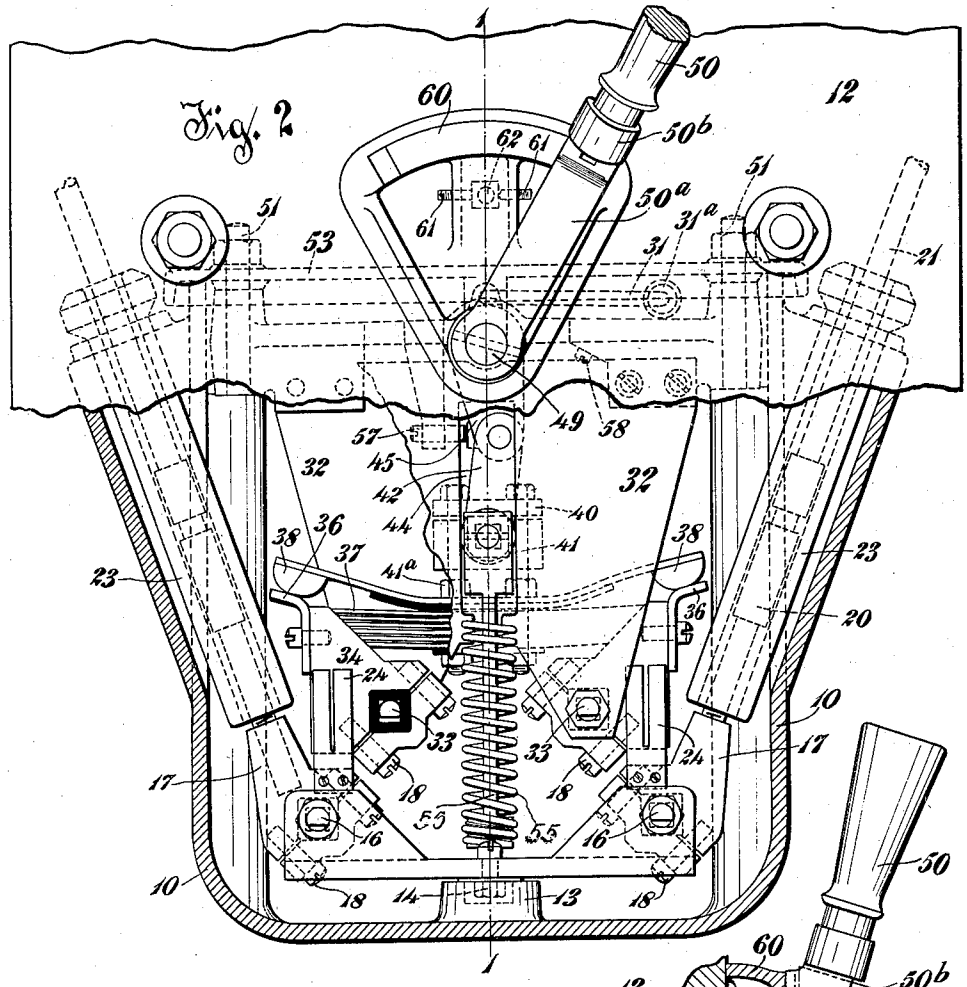


Fig. 4

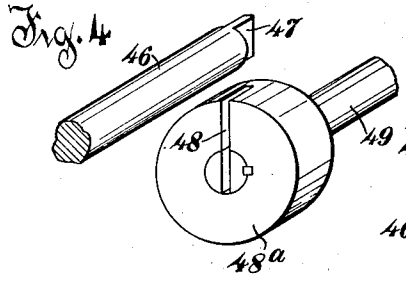
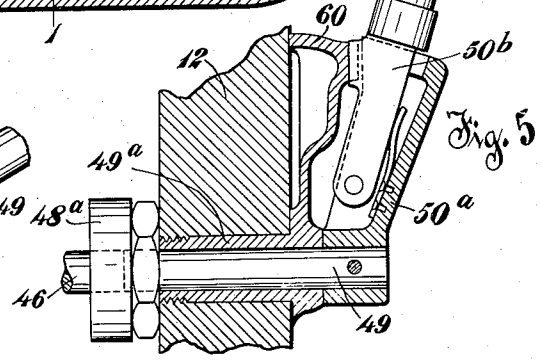


Fig. 5



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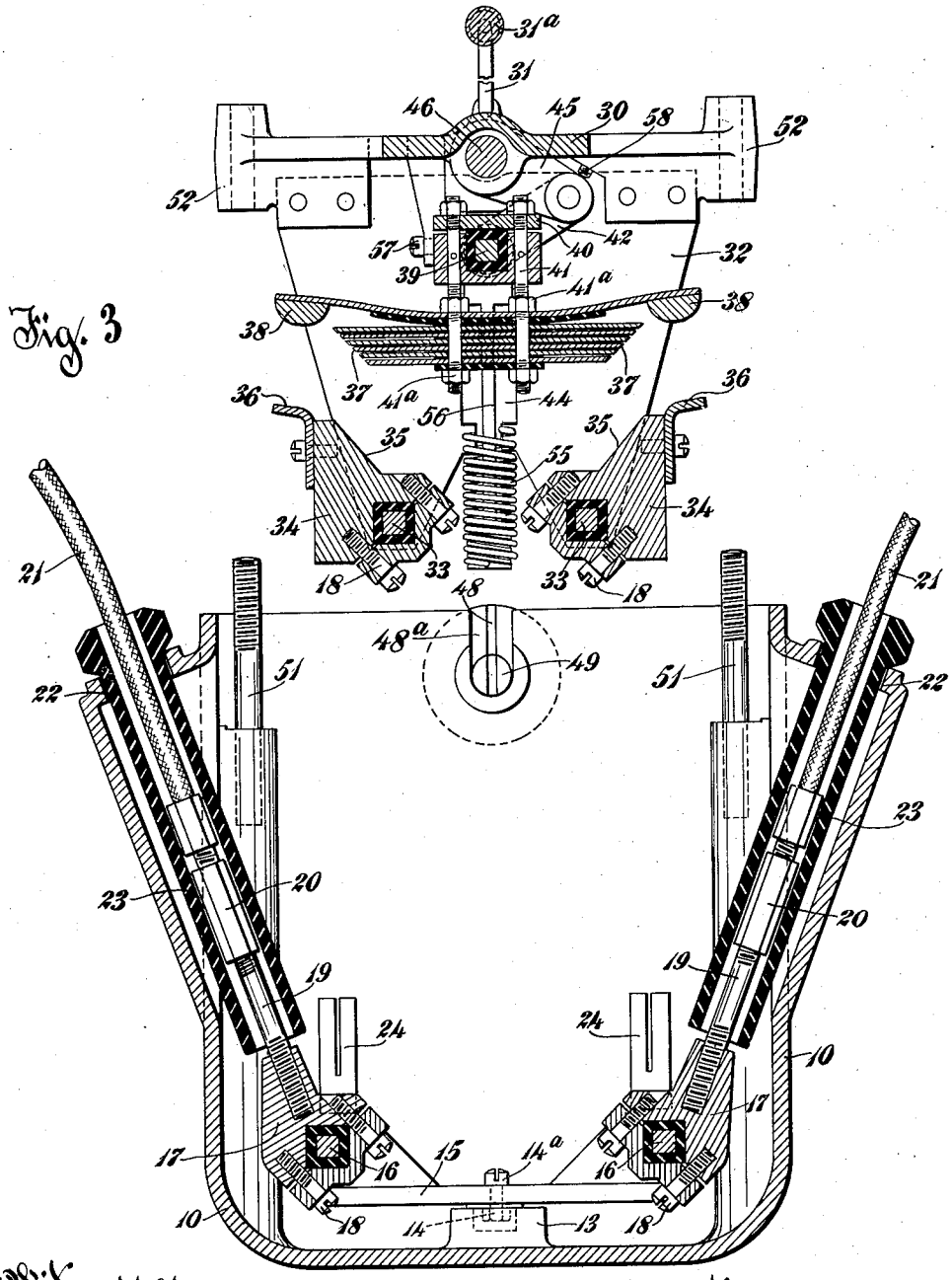
3 SHEETS—SHEET 3.

Fig. 3



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UNITED STATES PATENT OFFICE.

HERBERT W. CHENEY, OF NORWOOD, OHIO, ASSIGNOR TO ALLIS-CHALMERS COMPANY, A CORPORATION OF NEW JERSEY.

OIL-SWITCH.

1,007,771. Specification of Letters Patent. Patented Nov. 7, 1911.

Application filed December 23, 1907. Serial No. 407,724.

To all whom it may concern:

Be it known that I, HERBERT W. CHENEY, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Oil-Switches, of which the following is a full, clear, and exact specification.

My invention relates to the construction of switches for electric circuits, and especially to the construction of oil immersed switches.

In most of the oil immersed switches now in general use, the oil is held in a tank which can be lowered from the switch in order to allow inspection and repair of the latter. When the tank is so lowered, the switch parts proper remain in their operative position in relation to the switch-board and some of the parts remain alive unless other means are provided for disconnecting them. This is often a source of great inconvenience and even of danger, for in adjusting or repairing such a switch it is necessary to work right at the switch-board or behind it, where the light is often poor, where there are many exposed live conductors, and where the dripping oil from the recently immersed switch is extremely inconvenient and disagreeable.

It is the object of my present invention to provide a switch whereby the above mentioned difficulties may be avoided; specifically, to provide a switch the working parts of which may be entirely removed as a unit from the oil tank and at the same time disconnected from all circuits, and inspected and, if necessary, properly adjusted for contact or repaired at some other and perhaps remote point, without danger from neighboring live conductors, where the light may be as good as desired, and where it is not necessary to work beneath parts from which oil is dripping. With my invention the switch parts can be thus removed and disconnected, or replaced and re-connected after having been so removed, only when the switch parts and the operating handle are both in "off" position.

My switch is compact, simple, effective in its operation, and cheap to manufacture.

The various novel features of my invention will appear from the description and drawings and will be particularly pointed out in the claims.

Figure 1 shows a section through my improved switch or circuit-breaker substantially on the line 1—1 of Fig. 2; Fig. 2 shows a partial front elevation of a switch-board behind which my switch is located, the lower part of the switch-board and part of one of the end-plates 32 being broken away and the casing of the switch below such break being shown in section. In this view the switch is closed; Fig. 3 is a cross section through the switch with the parts in open position and with the removable parts of the switch raised partially out of the tank; Fig. 4 is an isometric view showing how the two parts of the shaft are connected and disconnected; and Fig. 5 is a longitudinal section through the handle.

The oil tank 10 is provided with means, such as lugs 11, for attaching it to the switch-board panel 12. Two bosses 13 are formed on the inside of the bottom of the tank, and embedded in solder or other readily fusible metal in openings in said bosses are nuts 14 of bolts 14^a holding in place two webbed cross-bars 15. The webs of the two cross-bars 15 are joined by two insulated rods or bars 16, which are round and threaded at their ends for the reception of nuts and are preferably square throughout the rest of their length. The otherwise round ends of the rods 16 may be flattened on one side, so that the rods are prevented from turning by the engagement of such ends in similarly shaped holes in the webs of the cross bars 15. The switch terminals 17 are mounted on the rods 16, there being one terminal on each rod for each pole of the switch, and the respective terminals on the two rods being directly opposite each other. In the arrangement shown there are three pairs of terminals 17. Each terminal is formed primarily of two members which are clamped together around the rod by bolts 18. An upward extension from each terminal is internally threaded to receive a conductor 19, to which is attached by a right-and-left-hand threaded coupler 20 one of the insulated leading-in conductors 21. The conductors 21 extend out through openings 22 at the side and near the top of the tank, and

bushings 23 of porcelain or other insulating material extend through said openings and around the conductors 21 and 19 and coupler 20 to protect the otherwise exposed parts thereof. On each side of each of the terminals 17 are fastened vertical spring blades 24. The above comprises the normally non-removable part of the switch.

The removable skeleton structure in which the switch proper is mounted comprises the cap plate 30 and the end plates 32, the lower ends of the latter being joined by two insulated rods or bars 33 substantially like the rods or bars 16. This structure is removable as a unit by means of the bail 31 provided with an insulating handle 31ª. On the rods 33 are mounted the switch contacts 34, there being one such contact for each of the terminals 17. When the switch is assembled and the parts are all in place, the contacts 34 fit in between the blades 24 on the respective terminals so that such contacts form easily disconnected electrical continuations of such terminals. The contacts 34 are clamped on the rods 33 in the same manner as the terminals 17 are clamped on the rods 16. The inside of the upper surfaces of the contacts 34 are beveled at 35, and the contacts are provided with arcing contacts 36 for engagement respectively with the beveled ends of the laminæ 37 and the arcing tips 38 of the respective bridging members of the switch. These bridging members are hung below an insulated rod 39, to which they are fastened by clamping members 40 and bolts 41. There is one bridging member for each pair of contacts 34. The rod 39 is preferably square throughout the greater part of its length, but is round at its ends for the reception of links 42, guides 43, and rods 56, the last being pinned to the rod 39. The guides 43 slide in slots 44 in the plates 32. The links 42 are loosely connected at one end to the rod 39 and at the other end to the ends of arms 45, which are fixed on the shaft 46 journaled in the plate 30. On the end of the shaft 46 toward the switch-board is a tongue 47 which is arranged to fit into a slot 48 in the end of a shaft 49 journaled in a bushing 49ª in the panel 12. Outward movement of the shaft 49 is prevented by a collar 48ª fixed to it and bearing against the bushing 49ª. The slot 48 extends through the collar 48ª as well as through the shaft 49. On the outer end of the shaft 49 is mounted the operating handle 50. When the tongue 47 and slot 48 are vertical, as they are when the switch parts and handle are in "off" position, the shafts 46 and 49 may be disconnected or connected by moving the former shaft vertically. When the removable member, after having been removed, is replaced, the parts are guided into proper position by vertical bolts 51, which are fixed in bosses in the corners of the tank 10, and over which perforated bosses 52 on the plate 32 fit. A cover 53 also fits over the bolts 51 and is fastened in place by nuts 54.

When the shaft 46 is turned in a clockwise direction (Fig. 2), the rod 39 is forced downward to bring the bridging members of the switch into engagement with their respective pairs of contacts 34. This downward movement of the bridging members is opposed by tension springs 55, which are fastened at one end to the lower ends of the rods 56 attached to the ends of the rod 39 and at the other end to the plates 32. The extent of the downward movement of the bridging members may be adjusted by a screw 57, and that of its upward movement by a screw 58. The switch is held in its proper closed position by the handle 50 and a coöperating notch plate 60. For this the handle 50 is composed of two members, one of which, 50ª, is fixed on the shaft 49, and the other of which, 50ᵇ, is pivoted in the member 50ª and spring-pressed toward the notch plate 60. A tooth on the member 50ᵇ is arranged to engage with a notch in the notch plate 60 which corresponds with the closed position of the switch. The notch plate 60 may be adjusted circumferentially around the shaft 49 by means of two screws 61 in such notch plate and a bolt 62 through the panel 12, the head of the bolt 62 being located between the screws 61. In order to open the switch, all that is necessary is to press the member 50ᵇ of the handle away from the notch plate 60, when the springs 55 will lift the bar 39 and the bridging members of the switch.

In assembling the switch, the parts of the removable member are put together at the workman's bench and the contacts and bridging members are properly spaced apart longitudinally on the rods 39 and 33. In the arrangement shown, the contacts of the three poles of the switch are evenly spaced. In spacing these parts all that is necessary is to loosen the clamping members 40 and the bolts 18 slip them along the rods 39 or 33, and tighten said clamping members and bolts. The screws 57 and 58 are next adjusted to obtain the proper closed and open positions, though if desired the screw 58 may be omitted. If necessary, the bridging members, composed of the laminæ 37 and arcing tips 38, may be adjusted vertically by means of the nuts 41ª on the bolts 41. The terminals 17 are then put upon the rods 16 and said rods secured to the webs of the bars 15. By now placing the bars 15 and parts carried thereby so that the blades 24 on the terminals 17 embrace their proper contacts 34, the proper positions of the terminals 17 along the rods 16 may be obtained. The terminals 17 are now clamped in place by the bolts 18. With the contacts 34 still held be-

tween the blades 24, the switch is lowered into the tank 10 so that the nuts 14 are received in the holes in the bosses 13. After getting the parts in proper positions, the member 15 is fastened to the tank 13 by pouring melted, easily fusible metal through a tube into the openings in the bosses 13, thus locking the nuts 14 firmly in place. By means of the bail 31 the removable part of the switch can now be lifted out of the tank 10 and the bars 15 and parts carried thereby left in place in such tank. The switch is now ready to be mounted on the switchboard, after which the notch-plate 60 is adjusted by the screws 61 so that the notch for the closed position of the switch corresponds with the adjustment of the screw 57. The proper connections can now be made by means of the couplings 20.

In case it is necessary to inspect or repair the switch, the whole removable part of the switch may be lifted out as indicated in Fig. 3, leaving the remaining parts and the connections unchanged. Any repairs can now be made to the removable part at any desired place, the cover 53 when inverted readily serving as a pan to catch the drippings of oil from the switch. When the removable part is thus removed for inspection or repair, it is entirely and absolutely dead and can therefore be handled with impunity. Because of the interlocking of the shafts 46 and 49 by means of the tongue 47 and slot 48, the switch can only be removed or replaced when both the handle 50 and the switch parts are in off position. Because of the collar 48ª, the removable part of the switch, once having been removed, can not be put back near enough into position to cause engagement of the contacts 34 and spring-blades 24 unless the bridging member 37 is in its full open position so that the tongue 47 is vertical.

Many modifications may be made in the precise arrangements here shown and described, and I aim to cover all such modifications which do not involve a departure from the spirit and scope of my invention as set forth in the following claims.

What I claim as new is:—

1. In combination, a stationary oil tank, a pair of adjustable switch terminals fixed in said tank on opposite sides thereof, a frame, a pair of fixed contacts adjustably fixed on the frame, and an adjustable bridging contact carried by the frame and movable into and out of engagement with said fixed contacts, said frame being movable into and out of said tank to bring said fixed contacts into or out of engagement with said respective switch terminals.

2. In combination, a stationary oil tank, a frame fixed in said tank and carrying a pair of adjustable switch terminals at opposite sides of said tank, and a second frame carrying a pair of adjustable contacts fixed relatively thereto and an adjustable movable bridging contact coöperating with said fixed contacts, said second frame being movable into and out of said tank to bring said fixed contacts into and out of engagement with the respective switch terminals.

3. In combination, a stationary oil tank, a frame fixed in said tank and carrying a pair of adjustable switch terminals at opposite sides of said tank, a second frame carrying a pair of adjustable contacts fixed relatively thereto and an adjustable movable bridging contact coöperating with said fixed contacts, said second frame being movable into and out of said tank to bring said fixed contacts into and out of engagement with the respective switch terminals, and means for preventing said second frame and the parts carried thereby from being moved into or out of the tank unless the bridging contact is out of engagement with the fixed contacts.

4. In combination, a stationary oil tank, a frame fixed in said tank, a plurality of pairs of switch terminals supported on said frame, the terminals being relatively adjustable and two terminals of each pair being on opposite sides of the tank, and a switch comprising a frame, a plurality of fixed contacts mounted on said frame and corresponding in number and arrangement to the switch terminals, said contacts also being relatively adjustable, and a relatively movable bridging member coöperating with each of said pairs of fixed contacts, the several bridging contacts also being relatively adjustable, said switch in its entirety being movable into and out of said tank to bring said fixed contacts into and out of engagement with the corresponding switch terminals.

5. In combination, a stationary oil tank, a frame fixed in said tank, a plurality of pairs of switch terminals supported on said frame, the terminals being relatively adjustable and two terminals of each pair being on opposite sides of the tank, a switch comprising a frame, a plurality of fixed contacts mounted on said frame and corresponding in number and arrangement to the switch terminals, said contacts also being relatively adjustable, and a relatively movable bridging member coöperating with each of said pairs of fixed contacts, the several bridging contacts also being relatively adjustable, said switch in its entirety being movable into and out of said tank to bring said fixed contacts into and out of engagement with the corresponding switch terminals, and means for preventing the movement of said frame unless the bridging contact is out of engagement with the fixed contacts.

6. In combination, one or more pairs of switch terminals, a frame, one or more pairs

of conducting devices carried by said frame, and one or more bridging contacts carried by said frame and movable relatively thereto into and out of engagement with said conducting devices, said conducting devices being movable into and out of engagement with said switch terminals, and said switch terminals, conducting devices, and bridging contacts being relatively adjustable perpendicularly to the direction of movement of said bridging contacts.

7. In combination, an oil tank, switch terminals at the bottom of the tank, conductors extending in substantially straight lines from said terminals through openings in the tank above the level of the oil, and a switch removable from the tank as a unit and comprising a bridging contact movable vertically and rectilinearly relatively to two other contacts, said latter contacts engaging said switch terminals when the switch is in place in the tank.

8. In combination, a stationary oil tank, a frame fixed in the bottom of said tank, a pair of switch terminals clamped to said frame on opposite sides of said tank, a second frame normally located in said tank but removable therefrom, a pair of contacts clamped to said second frame and engaging said switch terminals when said second frame is in place in the tank, and a movable contact carried by said second frame and movable into and out of engagement with said pair of contacts, said terminals and contacts being adjustable at right angles to the plane of movement of the movable contacts.

9. In combination, an oil tank, a frame fixed within said tank near the bottom thereof, a plurality of pairs of switch terminals clamped to said frame, the individual terminals of each pair being at opposite sides of the tank, and a switch normally located in said tank but removable therefrom as a unit, said switch comprising a plurality of pairs of contacts which may engage the switch terminals respectively when the switch is in place in the tank but are separated therefrom when the switch is removed from the tank, and a movable contact movable into and out of engagement with each of said pairs of contacts respectively, said terminals and contacts being adjustable at right angles to the direction of movement of the movable contacts.

10. In combination, an oil tank, a frame fixed within said tank near the bottom thereof, a plurality of pairs of switch terminals clamped to said frame, the individual terminals of each pair being at opposite sides of the tank, a switch normally located in said tank but removable therefrom as a unit, said switch comprising a plurality of pairs of contacts which may engage the switch terminals respectively when the switch is in place in the tank but are separated therefrom when the switch is removed from the tank, and a movable contact movable into and out of engagement with said pairs of contacts respectively, said terminals and contacts being adjustable at right angles to the direction of movement of the movable contacts, and means for preventing the removal of the switch from the tank save when the switch is open.

11. In combination, a stationary oil tank, two bars permanently located in said tank on opposite sides thereof, one or more switch terminals mounted on each bar, and a skeleton frame carrying coöperating fixed and movable contacts and removable from and replaceable in said tank, said fixed contacts and said switch terminals being arranged to engage only when said frame is in said tank.

12. In combination, a stationary oil tank, two bars permanently located in said tank on opposite sides thereof, one or more switch terminals adjustably mounted on each bar, a skeleton frame carrying coöperating adjustable fixed and movable contacts and removable from and replaceable in said tank, said fixed contacts and said switch terminals being arranged to engage only when said frame is in said tank, and a handle for operating said movable contact but mechanically disconnected therefrom when said frame is removed from the tank.

13. In combination, a stationary oil tank, a removable unitary switch structure within said tank, said switch comprising normally fixed and movable contacts, the movable contact being movable vertically and rectilinearly and the upward movement thereof being away from said fixed contact.

14. In combination, a rectilinearly upbreak switch located in a tank of oil and removable therefrom as a unit, an operating handle, and a mechanical coupling between the handle and the switch, which coupling is opened when the switch is removed from the tank.

15. In combination, a rectilinearly upbreak switch located in a tank of oil and removable therefrom as a unit, and means for electrically disconnecting such switch by such removal.

16. In combination, a stationary oil tank, a frame arranged to be placed in and removed from said tank, said frame including two bars on opposite sides thereof, fixed contact members mounted on said bars, and a bridging member coöperating with said fixed contact members and carried by and movable relatively to said frame.

17. In combination, a stationary oil tank, a frame arranged to be placed in and removed from said tank, said frame including two bars on opposite sides thereof, fixed contact members mounted on said bars, a bridging member coöperating with said fixed contact members and carried by and movable

relatively to said frame, and a shaft journaled in said frame and connected to said bridging member so that when turned it will move said bridging member into or out of engagement with said fixed contacts.

18. In combination, a stationary oil tank, a frame arranged to be placed in and removed from said tank, said frame including two bars on opposite sides thereof, fixed contact members mounted on said bars, a bridging member coöperating with said fixed contact members and carried by and movable relatively to said frame, a shaft journaled in said frame and connected to said bridging member so that when turned it will move said bridging member in a substantially vertical direction into or out of engagement with said fixed contacts, and an operating handle mounted on a second shaft, said last mentioned shaft being arranged to be connected to the first mentioned shaft when said frame is in said tank.

19. In combination, a switch, an adjustable stop for limiting the closing movement of said switch, an operating handle for said switch, a notch plate for marking the closed position of said switch, and means for adjusting said notch plate.

20. In combination, a switch biased to open position, an adjustable stop for fixing the closed position of the switch, a rotatable operating handle of the switch, a notch-plate for holding said handle with the switch in closed position, and means for circumferentially adjusting said notch-plate.

21. In combination, a stationary oil tank, a unitary switch structure arranged to be lowered into and raised out of said tank, said switch comprising one or more pairs of fixed contacts and one or more coöperating bridging contacts, a rotatable shaft forming part of said unitary switch structure, and means whereby rotation of said shaft causes rectilinear movement of said bridging contact or contacts.

22. In combination, a stationary oil tank, a bar fixed in said tank on each of two opposite sides thereof near the bottom, one or more switch terminals mounted on each of said bars, a frame removable from and replaceable in said tank, said frame including two bars which are adjacent and substantially parallel to the aforesaid bars respectively when the frame is in place in the tank, one or more fixed contacts mounted on each of said bars of said frame, said fixed contacts being connected to the corresponding switch terminals when the frame is in place in the tank, and movable contact mechanism carried by said frame for connecting each fixed contact on one side of the tank to a fixed contact on the other side thereof.

23. In combination, a stationary oil tank, a bar fixed in said tank on each of two opposite sides thereof near the bottom, one or more switch terminals mounted on each of said bars, a frame removable from and replaceable in said tank, said frame including two bars which are adjacent and substantially parallel to the aforesaid bars respectively when the frame is in place in the tank, one or more contacts mounted on each of said bars of said frame, and movable contact mechanism carried by said frame and when in closed position inter-connecting switch terminals on opposite sides of the tank through corresponding contacts on the two bars of said frame.

24. In combination, an oil tank, one or more switch terminals fixed in said tank, and switch mechanism removable as a unit from the tank and comprising one or more main movable contact members and one or more intermediate contact devices, the intermediate contact devices being interposed between and in engagement with the main movable contact members and the switch terminals when the removable unit is in place in the tank and the switch is closed, said switch terminals, main movable contact members, and intermediate contact devices being relatively adjustable to secure alinement.

25. In combination, an oil tank, a pair of switch terminals fixed in said tank, switch mechanism removable as a unit from the tank and comprising a movable bridging member and a pair of intermediate contact members, the intermediate contact members being interposed between and in engagement with the bridging member and the respective switch terminals when the removable unit is in place in the tank and the switch is closed, and means for preventing the removal of the switch mechanism from the tank unless the switch is open.

26. An oil tank, a pair of substantially parallel rods fixed in said tank, one or more contact terminals mounted on each of said rods, in combination with switch mechanism removable as a unit from the tank and comprising a frame including two rods which when the unit is in place in the tank are substantially parallel to the fixed rods, one or more movable bridging contacts movable toward and away from the contact terminals, and one or more intermediate contacts mounted on each rod of the removable unit, said intermediate contacts being interposed between and in engagement with the bridging contacts and the respective contact terminals when the removable unit is in place in the tank and the switch is closed.

27. An oil tank, a pair of substantially parallel rods fixed in said tank, one or more contact terminals mounted on each of said rods, in combination with switch mechanism comprising a frame including two rods which when the unit is in place in the tank are substantially parallel to the aforesaid

rods, one or more movable bridging contacts movable toward and away from the contact terminals, one or more intermediate contacts mounted on each rod of the removable unit, said intermediate contacts being interposed between and in engagement with the bridging contacts and the respective contact terminals when the removable unit is in place in the tank and the switch is closed, and means for preventing the removal of the switch mechanism from the tank unless the switch is open.

28. In combination, a stationary oil tank, a pair of adjustable switch terminals fixed in said tank on opposite sides thereof, a frame, a pair of intermediate contact devices adjustably mounted on the frame, and an adjustable bridging contact carried by the frame and movable into and out of engagement with said intermediate contact devices, said frame being movable into and out of the tank and the intermediate contact devices into and out of engagement with the respective switch terminals.

29. In combination, an oil tank, one or more switch terminals located in the lower part of said tank, and a switch comprising a frame carrying one or more intermediate contact devices and one or more rectilinearly movable contacts coöperating with said intermediate contact devices, said frame being movable into and out of the tank and the intermediate contact devices into and out of engagement with said switch terminals.

30. In combination, an oil tank, switch terminals in the tank, a switch removable from the tank as a unit and comprising a pair of intermediate contact devices and a bridging contact, the bridging contact being movable rectilinearly into and out of engagement with the intermediate contact devices, and the intermediate contact devices engaging the respective switch terminals and connecting them to the bridging contact when the switch is in place in the tank and closed.

31. In combination, a stationary oil tank, two bars located in said tank, one or more switch terminals mounted on each bar, and a skeleton frame carrying coöperating bridging and intermediate contacts and removable from and replaceable in said tank, said intermediate contacts being arranged to engage the respective switch terminals and to be engaged by the bridging contact when the frame is in the tank and the switch is closed.

32. In combination, a stationary oil tank, a unitary switch structure arranged to be lowered into and raised out of said tank, said switch structure comprising one or more bridging contacts and one or more pairs of coöperating contacts, a rotatable shaft forming part of said unitary switch structure, and means whereby rotation of said shaft causes rectilinear movement of said bridging contacts into or out of engagement with said pairs of contacts.

33. In combination, an oil tank, a pair of switch terminals located in said tank, a switch comprising a frame carrying a pair of adjustable intermediate contact devices and a coöperating bridging contact movable into and out of engagement with said intermediate contact devices, said frame being movable into and out of the tank and the intermediate contact devices into and out of engagement with said switch terminals.

34. In combination, an oil tank, a pair of switch terminals located in said tank, and switch mechanism comprising a frame including a pair of rods, a pair of intermediate contact devices adjustably mounted on said rods, and a coöperating movable bridging contact, said frame being movable into and out of the tank and the intermediate contact devices into and out of engagement with said switch terminals.

35. In combination, a rectilinear-break switch located in a tank of oil and removable therefrom as a unit, and means for electrically disconnecting said switch by such removal.

36. In combination, an oil tank, one or more pairs of switch terminals located in said tank, and a switch comprising a frame carrying one or more pairs of intermediate contact devices and one or more bridging contacts movable into and out of engagement with said intermediate contact devices, said frame being movable into and out of the tank and the intermediate contact devices into and out of engagement with the switch terminals, and said switch terminals, intermediate contact devices, and bridging contacts being relatively adjustable to secure alinement.

37. In combination, an oil tank, a bar located in said tank, a switch terminal adjustably mounted on said bar, a frame removable from and replaceable in said tank, and two relatively movable coöperating contact devices carried by said frame and adjustable relatively to the frame in a direction parallel to said bar, one of said contact devices engaging the other and the switch terminal when the frame is in place in the tank and the switch is closed.

38. In combination, an oil tank, a bar located in said tank, a switch terminal mounted on said bar, a frame removable from and replaceable in said tank, and two relatively movable coöperating contacts carried by said frame, one of said contact devices engaging the other and the switch terminal when the frame is in place in the tank and the switch is closed.

39. In combination, an oil tank, a bar located in said tank, a switch terminal adjustably mounted on said bar, a frame remov-

able from and replaceable in said tank and including a bar which is substantially parallel to the first-named bar when the frame is in place in the tank, a contact device adjustably mounted on the second bar, and a main movable contact movable into and out of engagement with said contact device, said contact device being in engagement with said switch terminal and said main movable contact when the frame is in place in the tank and the switch is closed.

40. In combination, an oil tank, a bar located in said tank, a switch terminal mounted on said bar, a frame removable from and replaceable in said tank and including a bar which is substantially parallel to the first-named bar when the frame is in place in the tank, a contact device mounted on the second bar, and a main movable contact movable into and out of engagement with said contact device, said contact device being in engagement with said switch terminal and said main movable contact when the frame is in place in the tank and the switch is closed.

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

HERBERT W. CHENEY.

Witnesses:
GEO. B. SCHLEY,
FRED J. KINSEY.