C. O. GRAHAM.

ELECTRICAL SWITCH.

APPLICATION FILED AUG. 16, 1912.

1,187,303.

Patented June 13, 1916.

2 SHEETS—SHEET 1.

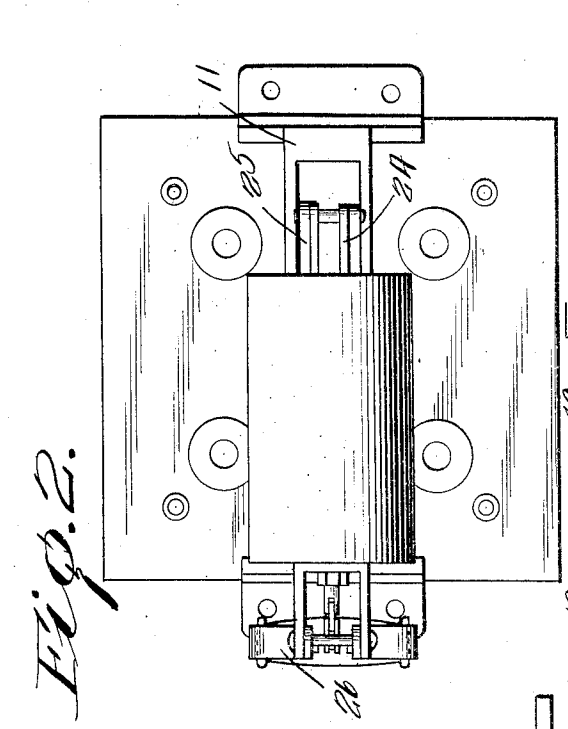


Fig. 2.

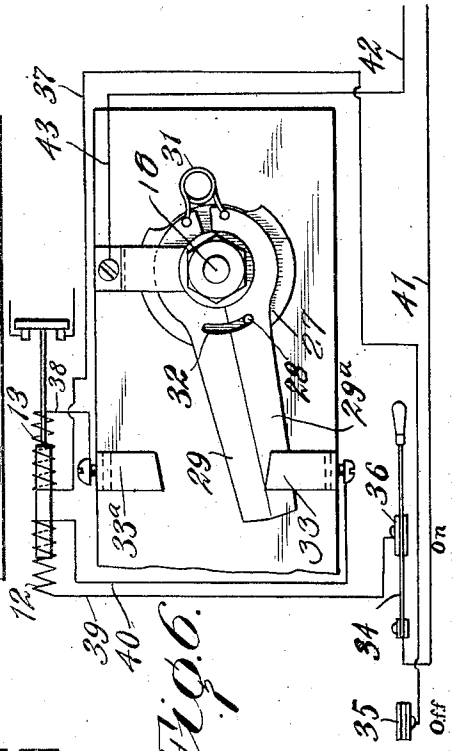


Fig. 6.

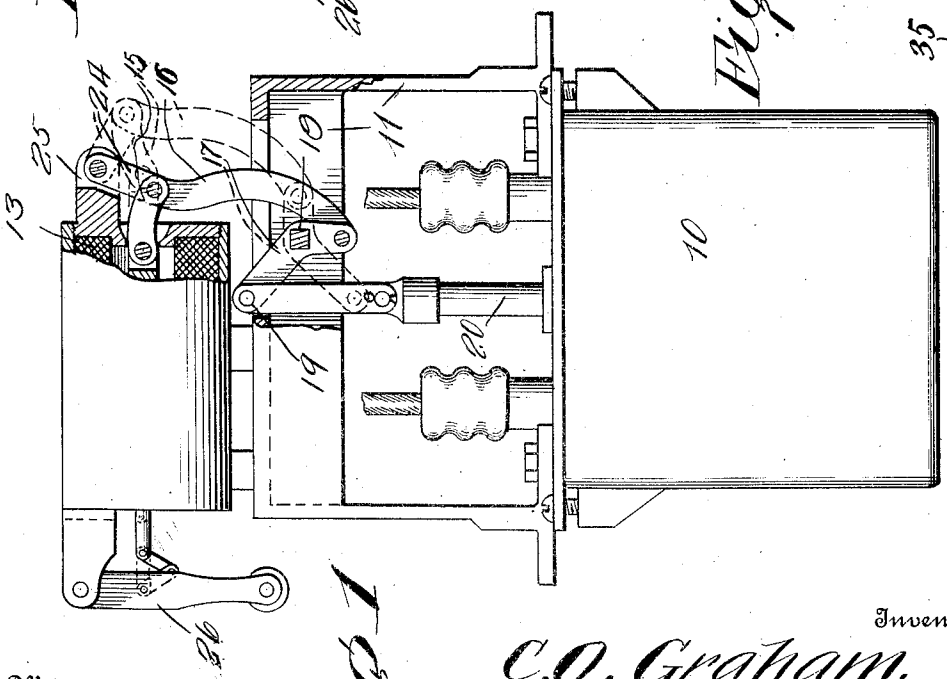


Fig. 1.

Witnesses

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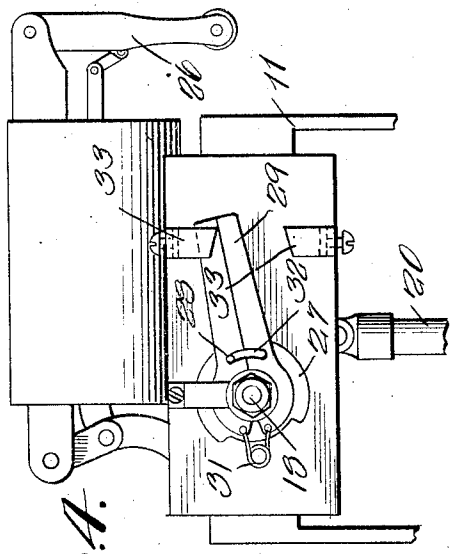


Fig. 4.

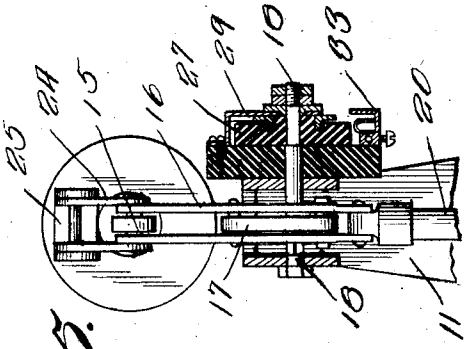


Fig. 5.

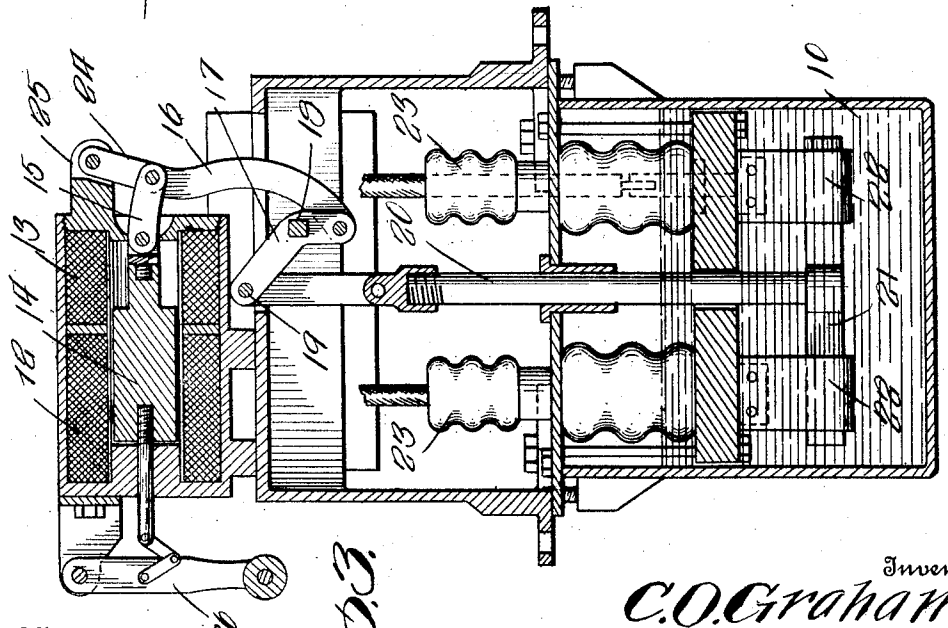


Fig. 3.

Witnesses

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ELECTRICAL SWITCH.

1,187,303. Specification of Letters Patent. Patented June 13, 1916.

Application filed August 16, 1912. Serial No. 715,479.

To all whom it may concern:

Be it known that I, CLARENCE O. GRAHAM, a citizen of the United States, residing at Seattle, in the county of King, State of Washington, have invented certain new and useful Improvements in Electrical Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to electric switches, particularly to oil switches, and has for its object the provision of novel means whereby a circuit of a high potential current, such as an arc lamp circuit, may be closed and opened by means of a control switch operated by a pilot switch in a low potential circuit, such as an incandescent lamp circuit.

An important object is the provision of an oil switch of this character by means of which the main circuit will be opened and closed positively and without dependence upon gravity or springs.

A further object is the provision of a switch of this character in which the controlling current will be practically instantly cut out after the main circuit is closed or opened, whereby cast iron parts may be used instead of laminated parts in case an alternating current instead of a direct current is employed for the control circuit.

Other objects and advantages will be apparent from the following description and with particular reference to the accompanying drawing.

In the drawings:—Figure 1 is an elevation of the oil switch having my improved control switch applied thereto, a portion of the casing being broken away, Fig. 2 is a top plan view, Fig. 3 is a vertical section through the device, Fig. 4 is a fragmentary side elevation, Fig. 5 is a detail transverse section through the control switch, and Fig. 6 is an enlarged detail view of the control switch showing the circuits.

Referring more particularly to the drawing, 10 represents the oil well of the switch upon which is mounted the support 11 supporting the solenoid coils 12 and 13. The core 14 has pivotally connected at one end, by means of the short links 15, the curved links 16, the opposite ends of said links 16 being pivotally connected to one arm of the bent lever 17. This lever 17 is secured to the square shaft 18 mounted in the support 11, and has its other arm pivotally connected at 19 to the upper end of the vertically reciprocating switch bar 20. The bar extends down into the oil well 10 and carries the cross bar 21 preferably of copper, which is adapted to engage between the jaws 22 of the terminals of the leads 23 of the main line. Pivotally connected to the upper end of the links 16 coincident with the pivot of the links 15 is an arm 25 pivotally suspended from the lugs 25 formed on the solenoid 11. On the opposite end of the core 14 is a lever 26 to adapt the device for hand operation for emergency control.

On the outer end of the shaft 18 is secured a disk 27, the disk having a square opening which snugly receives the squared shaft. On the outer face of the disk is an outwardly projecting pin 28. In the outer face of the fiber disk 27 is formed a circular groove 27^a. From the face of this disk extends a pin 28. A pair of blades 29 and 29^a are mounted on the shaft outwardly of the disk. The blades are formed with flanges 34 which work smoothly in said groove. A metal plate 35 is secured to the fiber block 36 and passes across the inner ends of the blades, said plate receiving the end of the shaft 18 therethrough. Nuts 18′ and a fiber washer 37 are engaged on the shaft 18, outwardly of the plate 35. A coil spring 31 has its ends secured to the inner ends of the blades for normally holding the blades in abutting relation with each other. Formed in the mutually adjacent edge portions of the blades, at the side of the shaft 18 opposite to the spring 31, are the curved slots 32, which are disposed in a line concentric with the center of the shaft. The before-mentioned pin 28 projects normally through the inner end of one of said slots, as shown.

In order to energize the solenoid coils for making and breaking the circuit of the main or high potential line by means of the bar 21 and the jaws 22, I provide a pilot switch 34 which is merely a single pole, double throw knife switch is adapted to be contacted with either one of jaws 35 and 36. The contact jaw 35 is connected by a wire 37 with one terminal of the winding of the solenoid 13 which has its other terminal connected with the contact 32 by a wire 38. The contact jaw 36 is connected by a wire 39 with one terminal of the winding of the solenoid 12 which has its other terminal connected by a wire 40 with the contact 33.

The switch plate 34 is connected to one wire 41 of the low potential line, which may be an incandescent lamp circuit. The other low potential line wire 42 is connected with the blades 29 and 29′ by a wire 43.

In the operation of the device, when it is desired to close the main or high potential circuit, the switch blade 34 is swung into contact with the contact 36, whereupon current will flow from the line wire 41, through the switch blade 34, contact 36, wire 39, solenoid winding 12, contact 33, blades 29 and 29′, the wire 43, and to the line wire 42. This will cause the energization of the solenoid 12, whereupon the core 14 will be drawn inwardly, causing the links 16 to be moved inwardly, rocking the links 17 and the shaft 18, moving the rod 20 upwardly and bringing the bar 21 into contact with the jaws 22. As the shaft 18 is rocked, the disk 27 will be rotated, carrying with it the pin 28 traveling in the notches 32 in the blades 29 and 29′. The movement of the pin 28 through these notches will have no effect upon the blades until it engages the end of the notch in the opposite blade. The links are so arranged and proportioned that the instant that the bar 21 engages the jaws 22, the pin 28 will engage the upper end of the notch 32 in the blade 29 and will force the blade 29 upwardly into engagement with the contact 33. By virtue of the spring 31, and the engagement of the inner end of the arm 29′ with the corresponding end of the arm 29, said arm will be snapped abruptly upwardly against the arm 29, thus breaking the circuit and deënergizing the solenoid 12. While the arm 29 is being moved upwardly by the pin 28, current will flow through the arm 29′ and the circuit is not broken until the arm 29ª is snapped away from the contact 33, thus making the breaking of the circuit practically instantaneous.

When it is desired to break the main or high potential circuit, the switch blade 34 is moved into contact with the jaw 35, whereupon current will flow from the line wire 41 through the blade 34, contact 35, wire 37, through the solenoid 13, wire 38, contact 33′, blades 29 and 29′, wire 43 and to the line wire 42. This will cause the energization of the solenoid 13, whereupon the core 14 will be forced outwardly, moving the links 16 outwardly, rocking the shaft 18 downwardly, moving the rod 20 downwardly, and moving the bar 21 out of contact with the jaws 22. This downward rotation of the shaft 18 will cause the disk 27 to be rotated, carrying the pin 28 downwardly within the notches 32 in the blades 29 and 29′ until the pin engages the lower end of the notch 32 in the blades 29′, whereupon the blade 29′ will be moved downwardly into engagement with the contact 33, after which the spring 31 will cause the blade 29 to be also snapped downwardly against the blade 29′. As soon as the blade 29 leaves the contact 33′, the solenoid 13 will be deënergized.

The position of the switch blade 34 will indicate whether the main switch has been opened or closed, as when the blade is in contact with the jaw 36, it will be readily seen that the main switch is at least supposed to be closed and that when the blade 34 is in contact with the jaw 35, the main switch is supposed to be open.

What is claimed is:

1. In an automatic cutout for an oil switch, the combination with the switch bar shaft thereof, of a disk of insulation secured on the shaft and movable therewith, a pair of blades each having a semi-circular recess in its edge partially embracing said shaft, contact members adapted to be engaged by the blades, a spring connecting the butt ends of said blades, the abutting edges of said blades being provided with alining arcuate slots, and a pin carried by said disk and engaging within said slots.

2. In an automatic cutout for an oil switch, the combination with the switch bar shaft thereof, of a disk of insulation secured on the shaft and movable therewith, a pair of blades each having a semi-circular recess in its edge partially embracing said shaft, contact members adapted to be engaged by the blades, a spring connecting the butt ends of said blades, the abutting edges of said blades being provided with alining arcuate slots, and a pin carried by said disk and engaging within said slots, the contacting edges of the butt end portions of said blades being diagonally cutaway.

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

CLARENCE O. GRAHAM.

Witnesses:
C. B. Bagley,
David Graham.