No. 732,255. PATENTED JUNE 30, 1903.

H. P. BALL.

OIL SWITCH.

APPLICATION FILED AUG. 18, 1902.

NO MODEL. 2 SHEETS--SHEET 1.

FIG. 1.

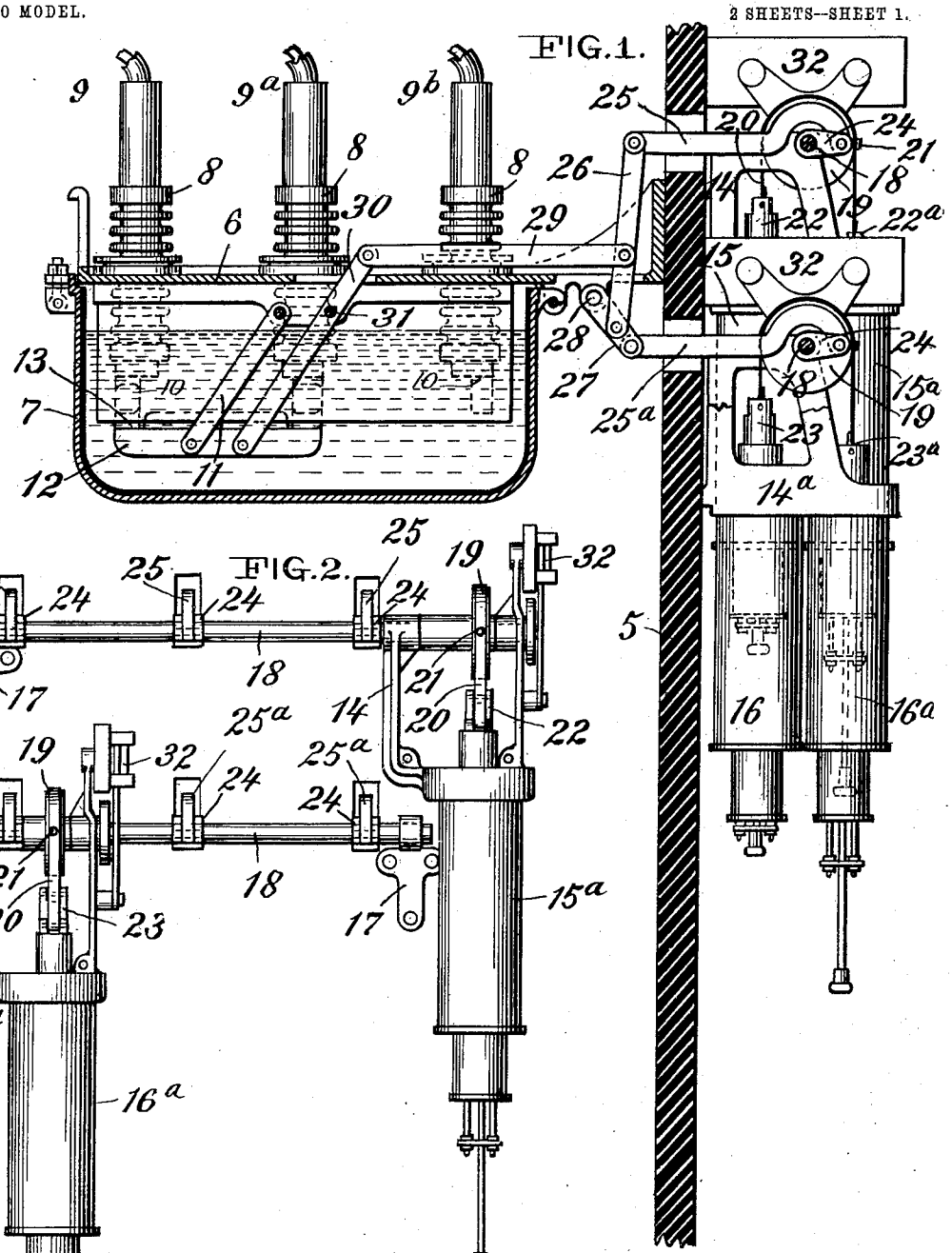


FIG. 2.

WITNESSES:

C. H. Pearson

W. H. Pumphrey

INVENTOR

H. P. Ball

BY

Geo. H. Benjamin

ATTORNEY

No. 732,255. PATENTED JUNE 30, 1903.

H. P. BALL.

OIL SWITCH.

APPLICATION FILED AUG. 18, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

FIG. 3.

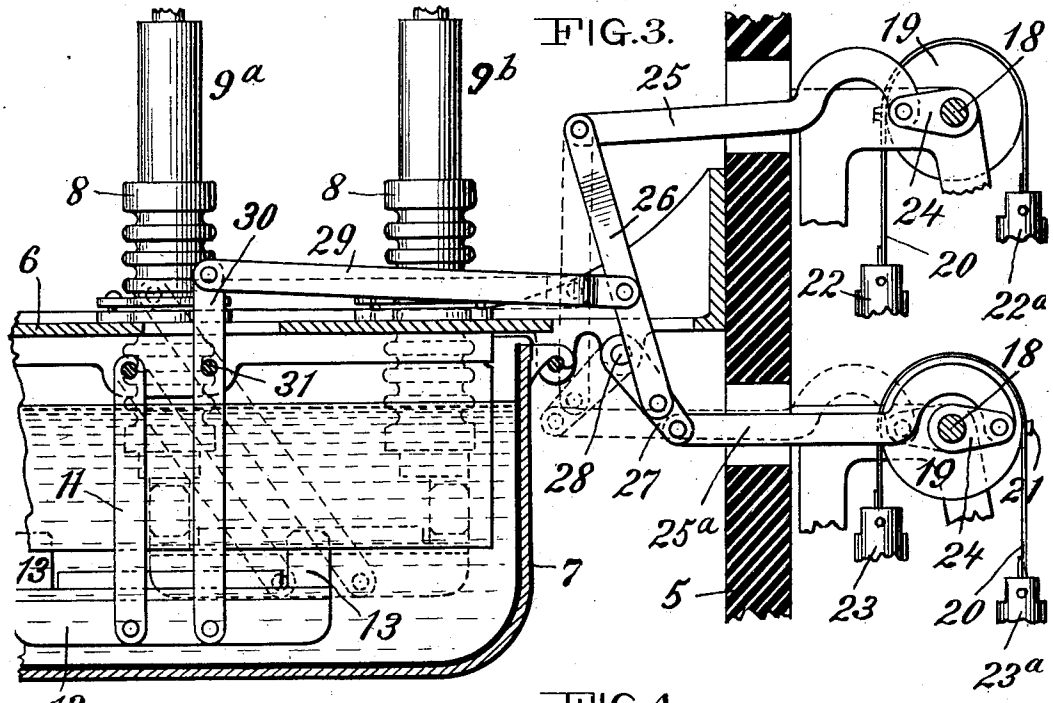


FIG. 4.

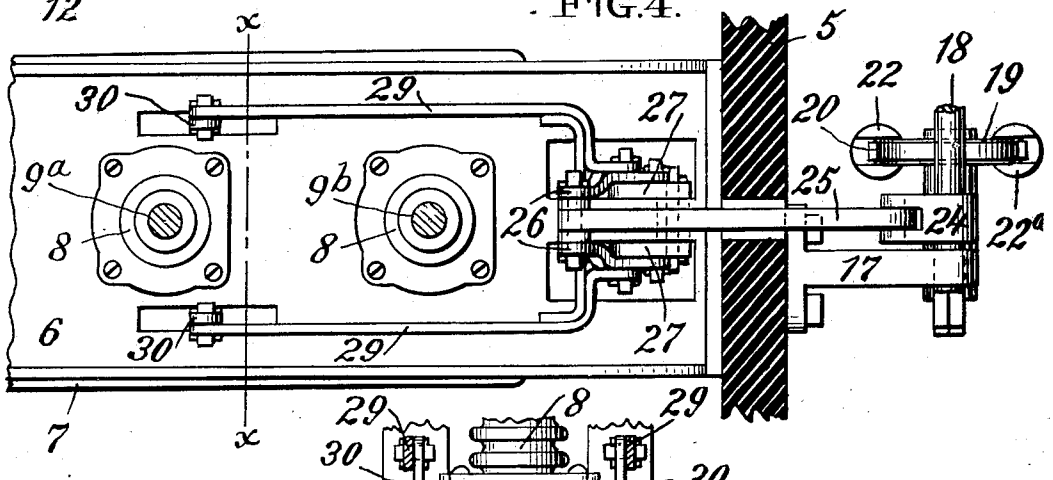
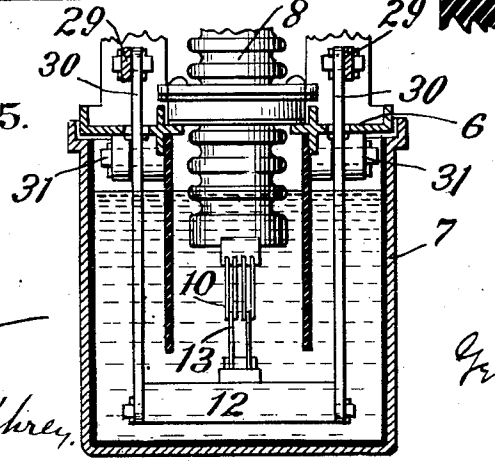


FIG. 5.



WITNESSES:

L. L. Pearson

W. H. Humphrey.

INVENTOR

H. P. Ball

BY

Geo. H. Benjamin

ATTORNEY

No. 732,255. Patented June 30, 1903.

UNITED STATES PATENT OFFICE.

HENRY PRICE BALL, OF NEW YORK, N. Y., ASSIGNOR TO GENERAL INCANDESCENT ARC LIGHT COMPANY, OF NEW YORK, N. Y., A CORPORATION.

OIL-SWITCH.

SPECIFICATION forming part of Letters Patent No. 732,255, dated June 30, 1903.

Application filed August 18, 1902. Serial No. 119,986. (No model.)

To all whom it may concern:

Be it known that I, HENRY PRICE BALL, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Oil-Switches, of which the following is a specification.

My invention relates to the construction of switches for high-tension circuits, particularly double-throw switches, as also to the mechanism for operating the switches by remote control.

The object of my invention is the construction of an oil-switch having submerged and protected terminals and a bridging member and provided with means for operating the bridging member of the switch to alternately throw the circuit from from one connection to another or break the circuit through the switch.

The accompanying drawings will serve to illustrate my invention and in which similar numerals indicate like parts.

Figure 1 is a vertical section through the switchboard and oil-well of the switch with the switch-terminals and actuating mechanism in elevation. Fig. 2 is a front view of the switch-actuating mechanism as applied to three switches. Fig. 3 is a view corresponding to Fig. 1 and illustrates the bridging device of a switch in its middle position with the circuit through the switch broken, also illustrating in dotted lines a third position of the bridging device and the actuating mechanism. Fig. 4 is a top view of one switch and its actuating mechanism. Fig. 5 is a transverse section of Fig. 4 on the line X X looking to the left.

In the drawings, 5 indicates a switchboard. Secured to the switchboard and extending horizontally backward therefrom is a bracket 6, from which is suspended an oil-well 7. Mounted in the bracket 6, which forms the top of the oil-well, are the insulators 8 and supported in the insulators are the conductors 9 9^a 9^b. Connected to the lower end of the conductors 9 9^a 9^b are the pairs of spring clip-plates 10, Fig. 5. Any other form of spring-contacts may be employed.

Pivoted to the lower sides of the bracket 6 through a suitable link 11 is the insulating bridging device 12, to the ends of which are connected the contact-plates 13, which are electrically connected across the top of bridging device 12. These contact-plates 13, it will be understood, are adapted to coact with the spring clip-plates 10 on the end of the conductors 9 9^a 9^b. In Fig. 1 the bridging device 12 is shown with the plates 13 bridging between the conductors 9 9^a, in Fig. 3 in full lines as occupying a midway position between the conductors 9 9^b and not bridging any of the conductors, and in Fig. 3 in dotted lines as bridging the conductors 9^a 9^b.

Secured to the front of the switchboard are the brackets 14 14^a and carried by these brackets are the pairs of solenoids 15 15^a, 16 16^a. Mounted on the front of the switchboard, in line with the brackets 14 14^a, are the brackets 17, and supported in these brackets are the shafts 18. Secured on these shafts are the band-wheels 19. Over each of these band-wheels is a band 20, secured thereto by means of a screw 21 or otherwise. The ends of the band 20 are connected to the cores 22 22^a, 23 23^a. The solenoids 15 15^a, 16 16^a and cores 22 22^a, 23 23^a form a motor device for moving the shafts 18 in either direction. Manifestly any other form of motor device capable of a reverse movement may be substituted.

Secured to the shafts 18 are the cranks 24. In Fig. 2 three cranks are shown on each shaft, and these cranks are assumed to be connected to three separate oil-switches. Pivotally secured to the cranks 24 at one end are the flat rods 25 25^a. The rod 25 is pivotally connected at its outer end to a lever 26, and the rod 25^a is pivotally connected at its outer end to a link 27, which is pivotally connected to the lower end of the lever 26 and the under side of the bracket 6 at 28. Pivotally connected to the lever 26 are the connecting-rods 29. These rods are pivotally connected at their outer ends to a pair of levers 30, pivoted at 31 to the under side of the bracket 6 and pivotally connected at their lower ends to the bridge-piece 12.

Depending from the bracket 6 on each side of the contacts 10 are plates, preferably of non-conducting material, which serve to screen the contacts and prevent an arc forming between the contacts and the levers 30 and links 11.

On the top of each solenoid is a device 32 for altering the circuit connections through the solenoids. No description of such device is given, as it forms no part of my invention and is now well known in the art. Any suitable device for altering the circuit connections may be used.

The operation of my improved switch and actuating mechanism is as follows: Assuming the parts to be in the position shown in Fig. 1, if the current is transmitted through the solenoid 15 it will attract its core 22. This core acting through the band-wheel 19 will produce a half-revolution of a shaft 18, which motion will be transmitted through one of the cranks 24, rod 25, lever 26, connecting-rod 29, and levers 30 to bridging device 12, thereby shifting the parts to the position shown in full lines in Fig. 3. If now the current is transmitted through the solenoid 16, it will attract its core 23, thereby rotating a shaft 18, which will transmit its motion to a crank 24, thence through rod 25^a to link 27, lever 26, connecting-rods 29, levers 30, thereby shifting the bridge-piece to the position shown in the dotted lines, Fig. 3, or assuming the parts to be in the position shown in Fig. 1 if a current is sent through solenoids 15 and 16 simultaneously the bridging device will be shifted from the position shown in Fig. 1 to the position shown in the dotted lines, Fig. 3. Manifestly if the current is first transmitted through the solenoid 15^a, then 16^a, or through 15^a 16^a simultaneously the movements of the parts just described will be reversed. When the parts are shifted from the position shown in Fig. 1 or the dotted position in Fig. 3 to the position shown in full lines, Fig. 3, the circuit through the switch will be broken.

I wish it understood that I do not limit myself to the precise motor mechanism or the precise arrangement of levers shown and described for moving the bridging devices to the different positions shown, as manifestly other mechanism may be employed to accomplish the same result.

One advantage of my improved construction is that the bridging devices during their movement are always immersed at practically the same depth in the body of oil, and they are positively stopped in their movement in any of the three positions at the will of the operator who is stationed at some remote place.

Having thus described my invention, I claim—

1. An oil-switch comprising a vessel containing a body of oil, a series of insulated contacts separated from each other, arranged in line and immersed in said body of oil, and a bridging member adapted to be moved across the oil-well to make or break circuits between pairs of contacts or bridge successive contacts.

2. An oil-switch comprising a vessel containing a body of oil, a series of insulated contacts separated from each other, arranged in line and immersed in said body of oil, and a bridging member adapted to be given a substantially horizontal movement across the oil-well to make or break circuits between pairs of contacts or bridge successive contacts.

3. An oil-switch comprising a vessel containing a body of oil, a series of insulated contacts separated from each other, arranged in line and immersed in said body of oil, a bridging member adapted to be moved across the oil-well to make or break circuits between pairs of contacts or bridge successive contacts, and electrically-actuated motor mechanism for moving said bridging member.

4. An oil-switch comprising a vessel containing a body of oil, a series of insulated contacts separated from each other, arranged in line and immersed in said body of oil, a bridging member adapted to be moved in the oil-well, and electrically-actuated mechanism for moving said bridging member; said mechanism consisting of two pairs of solenoidal magnets, cores therefor, and mechanism interposed between said cores and said bridging member.

5. An oil-switch comprising a vessel containing a body of oil, a series of insulated contacts separated from each other, arranged in line and immersed in said body of oil, a supporting-cover from which said contacts depend, protecting-screens also depending from said cover and arranged on opposite sides of said contacts, a bridging member adapted to be moved across the oil-well to bridge successive contacts, and means for reciprocating the bridging member, said means connected to the bridging member but external to said protecting-screens.

6. An oil-switch comprising a vessel containing a body of oil, a series of insulated contacts separated from each other, arranged in line and immersed in said body of oil, a bridging member adapted to be moved across the oil-well, means for moving said bridging member to break contact between one pair of contacts, and means for moving said bridging member to close contact between another pair of contacts.

7. In combination with an oil-switch provided with a reciprocating bridging member, motor mechanism therefor, comprising two pairs of solenoidal magnets and their cores, shafts operated by the movement of said cores, and connected rods, links and levers actuated by the movements of said shafts.

8. In combination with an oil-switch, provided with a reciprocating bridging member, motor mechanism therefor, comprising two sets of solenoids and cores, two shafts actuated by the movement of said cores, cranks on said shafts, a pair of rods reciprocated by the movements of said shafts, a lever connected to said bridging member, and the interposed lever, link and connecting-rod.

9. An oil-switch comprising a vessel containing a body of oil, a series of insulated contacts separated from each other, arranged

in line and immersed in said body of oil, a bridging member, motor devices for the bridging member, and means introduced between the bridging member and the motor devices, whereby said bridging member may be moved in one direction from a closed-circuited position with one pair of contacts to an open-circuited position, and finally, to a closed-circuited position with a second pair of contacts.

10. An operating mechanism for an oil-switch comprising a reciprocating bridging member capable of several distinct motions, and a mechanism having a motor device for each motion of the switch, the said motor devices adapted to be operated separately or in pairs.

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

HENRY PRICE BALL.

Witnesses:
W. H. PUMPHREY,
L. E. PEARSON.