

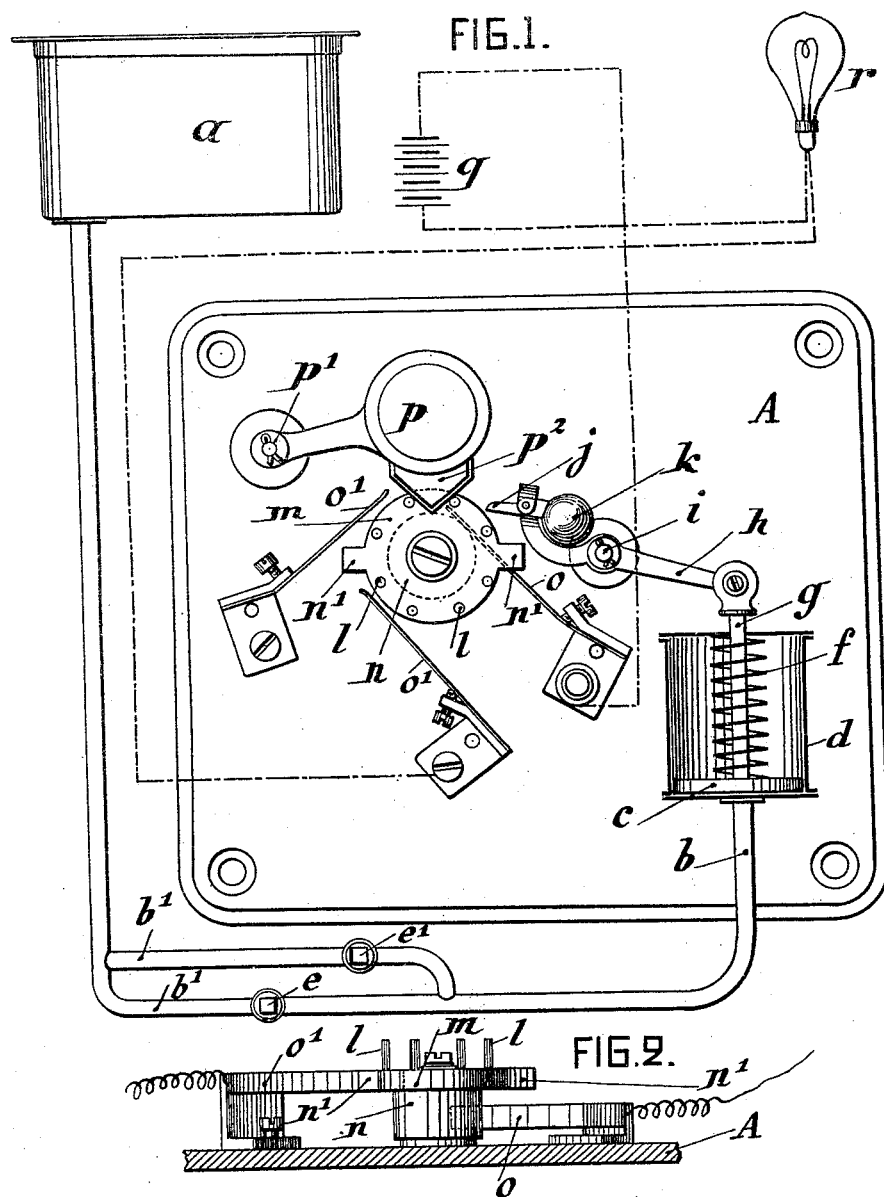
(No Model.)

4 Sheets—Sheet 1.

J. J. P. CLARIOT.
FLUID OPERATED ELECTRIC SWITCH.

No. 525,092.

Patented Aug. 28, 1894.



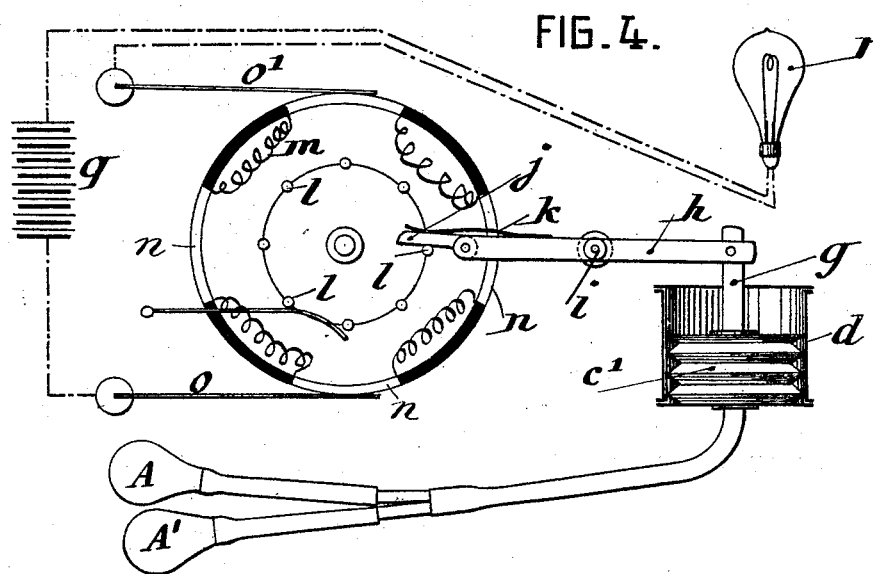
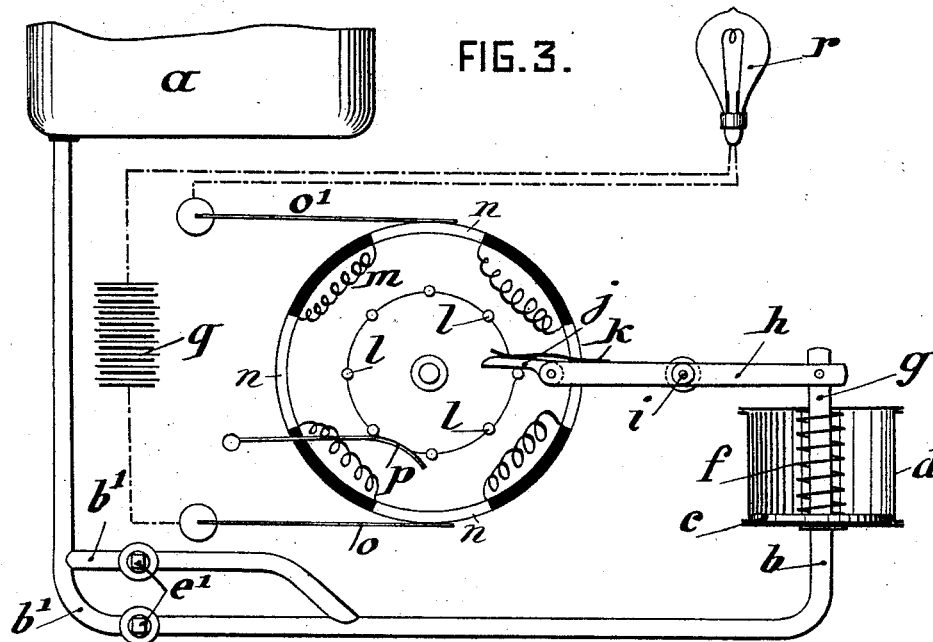
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(No Model.)

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FIG. 6.

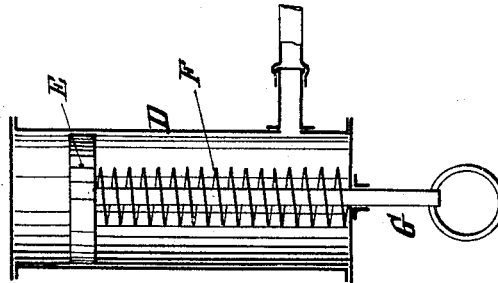


FIG. 5.

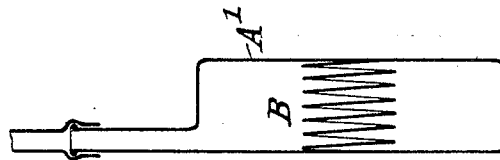
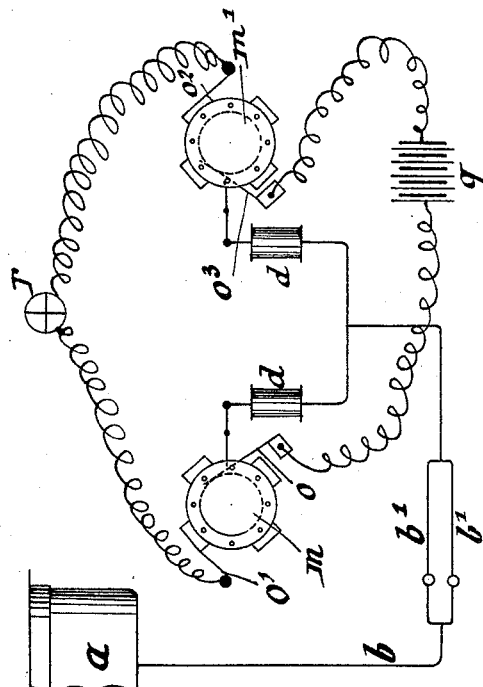


FIG. 8.



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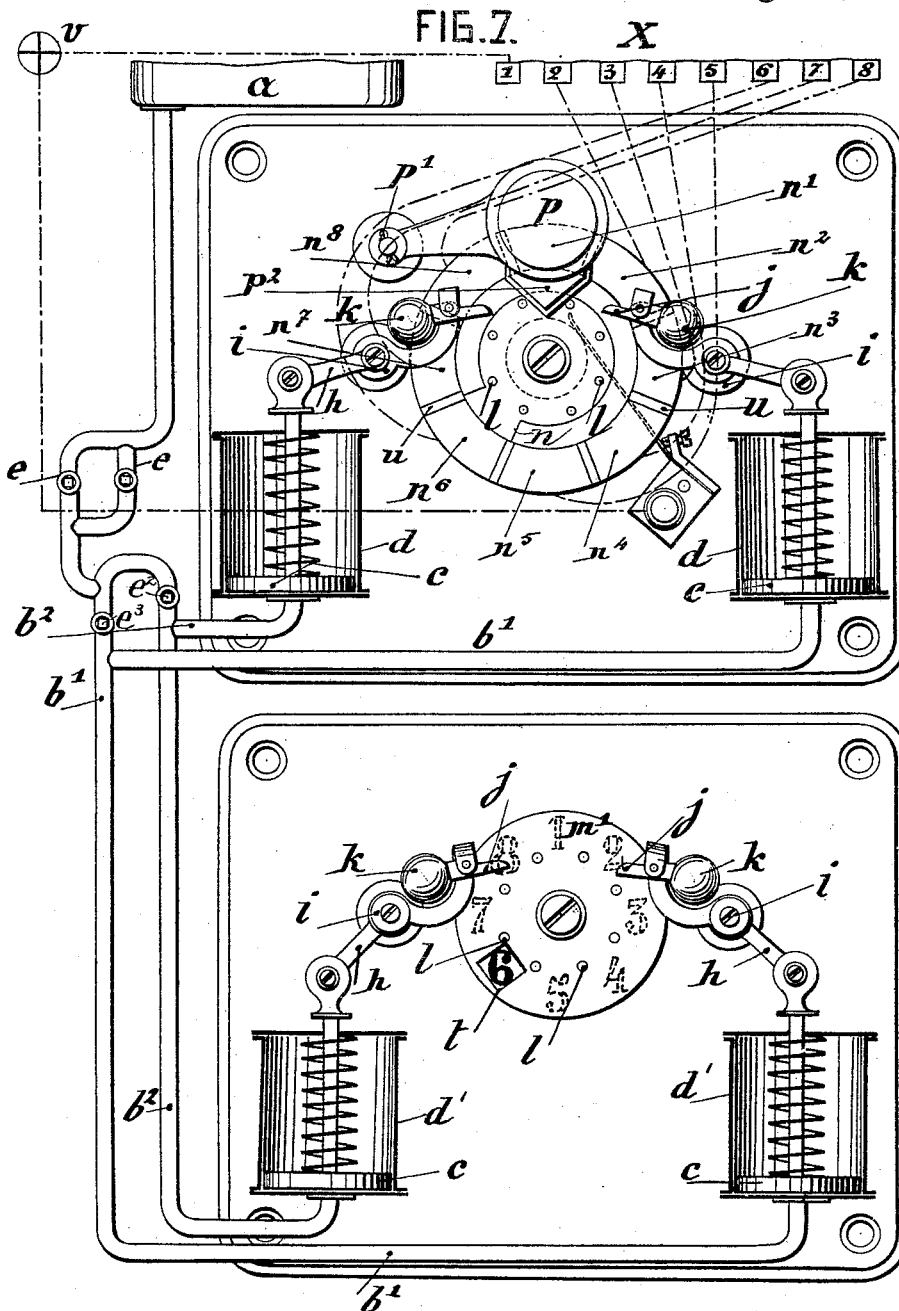
(No Model.)

4 Sheets—Sheet 4.

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FLUID OPERATED ELECTRIC SWITCH.

No. 525,092.

Patented Aug. 28, 1894.



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UNITED STATES PATENT OFFICE.

JEAN JOSEPH PAUL CLARIOT, OF PARIS, FRANCE.

FLUID-OPERATED ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 525,092, dated August 28, 1894.

Application filed August 5, 1893. Serial No. 482,492. (No model.) Patented in France February 16, 1893, No. 227,987.

To all whom it may concern:

Be it known that I, JEAN JOSEPH PAUL CLARIOT, of the city of Paris, France, have invented a Fluid-Operated Electric Switch, (for which I have obtained Letters Patent in France for fifteen years, dated February 16, 1893, No. 227,987,) of which the following is a full, clear, and exact description.

This invention relates to fluid operated electric switches for controlling—i. e., closing, breaking, varying or distributing electric currents from a distance without the use of conducting wires between the switch and the distant points whence it is operated whereby the consequences of imperfect insulation, and the danger of sparking are avoided since the apparatus which is liable to heating or sparking may be fixed at a distance from inflammable structures and be operated from any number of distinct points either simultaneously or separately.

Reference is to be had to the accompanying drawings, forming part of this specification, wherein—

Figure 1 is an elevation of one arrangement of the switch actuated by water pressure. Fig. 2 is a section of the switch, showing the brushes and contact wheel. Fig. 3 is a diagrammatic view of a modified arrangement. Fig. 4 shows the switch operated by pneumatic pressure. Fig. 5 is a section of the pneumatic bulb. Fig. 6 is a section of a pneumatic cylinder. Fig. 7 shows the apparatus as applied for putting resistances or cells in or out of circuit. Fig. 8 is a diagrammatic view of two switches operated simultaneously.

The same letters and figures of reference denote like parts in all the figures.

The switch is mounted upon an insulating plate A, as shown in Fig. 1, and supposing the fluid employed to be water under pressure, this is supplied from a reservoir *a* or main, through a pipe *b* connected to one end of a cylinder *d* containing a piston *c* and spring *f* acting in opposition to the fluid pressure, the access of which is controlled from different points by three way cocks *e*, *e'*, placed upon branches *b'* interposed in the main pipe *b*, two being shown in this example.

The piston rod *g* is jointed to a lever *h* pivoted at *i* and provided with a pawl *j* actuated

by a weight *k* or a spring *k'* (Fig. 3) and adapted to engage with the pins *l* of a metal wheel *m* and cause it to be propelled step by step at each forward oscillation of the lever *h*.

The wheel *m* has a cylindrical contact surface *n* against which bears a brush *o* and also a series of any number of peripherally-projecting studs *n'* for contact with brushes *o'* connected to different circuits.

A weighted click *p*, pivoted at *p'* and having a V-shaped surface *p²* bears on the pins *l*, and causes the wheel *m* to pass rapidly from one position to the next in its step by step motion, so that the circuit is made or broken quickly before the piston completes its stroke. The brush *o* is connected with one pole of the battery *g* and each brush *o'* is connected with the other pole through the lamp or other translating device *r* upon which the current is to act.

The current may be switched on the lamp *r*, the wheel *m* occupying the position shown in Fig. 1, by turning either of the cocks *e*, *e'*, so as to admit water under pressure to cylinder *d* whereby the piston *c* is moved against the spring, lever *h* oscillated, and wheel *m* rotated by the pawl the distance of one pin *l*, at the same time that the jumper is first raised, and then forces the wheel suddenly forward to its new position and holds it there, closing the circuit at one or more of the brushes *o'* and contacts *n'*. By completing the motion of the cock *e* or *e'* the fluid is free to escape from cylinder *d*, the cocks being three-wayed, and the spring *f* causes the piston to discharge the water and resume its initial position together with lever *h* and pawl *j*. In order to break the circuit, the action is similar, the wheel *m* rotates one tooth which breaks contact between brushes *o'* and projections *n'*.

In Fig. 3 the wheel *m* is made of insulating material and its periphery is divided into any number of equal parts, of which alternate ones constitute the contacts *n* which are connected together, the circuit being closed or broken according as the two brushes *o*, *o'*, which may also vary in number, bear upon the contact *n*, or upon the insulated portions.

A spring click *p* insures the sudden motion of wheel *m* to the extent of one division and

its retention in the position to which it is moved.

The pawl *j* and pins *l* may be replaced by a pawl and ratchet wheel mounted on the axis of wheel *m*. The hydraulic cylinder and piston may also be replaced by a pneumatic bellows, as shown in Fig. 4, which is expanded by compressing the india-rubber bulb *A'*, to move lever *h*, a spring *B* (Fig. 5) expanding the bulb when released at same time that the bellows *c'* is collapsed by the spring *f*, where-by equilibrium is quickly re-established.

The bellows *c'* may be operated from different points by two or more bulbs *A, A'* connected to the same pipe *b*. The bulb may also be replaced by an air-cylinder *D* (Fig. 6) in which a piston *E* when moved in opposition to a spiral spring *F* by pulling the piston rod *G* forces air into the bellows *d*, Fig. 4. Several switches may be thus operated simultaneously through the same line of piping, whether one or more batteries be used.

When applying the invention to work switches for putting resistances or cells in or out of circuit where a to and fro movement of the switch is required, the wheel *m* would have a single contact *n* rotating within a circle of contacts *n'* to *n^s*, insulated as at *u*, Fig. 7, and respectively connected, say to the corresponding numbered cells 1 to 8 of an accumulator *X*, so that the cells being also connected together, a progressively increasing number of cells will be switched into circuit accordingly as contact *n* is moved from *n'* to *n^s*. The motion of wheel *m* in opposite directions is produced by duplicating the pawls *j* and their fluid-operated actuating mechanism, the pawls being oppositely acting and their actuating cylinders being connected to different pipes *b², b³*, respectively furnished with cocks *c², c³*. With this apparatus is combined an indicator for showing the position of the contact and consequently the number of cells in circuit. For this purpose the pipes *b', b²* are prolonged and communicate with a second pair of cylinders *d'* whose pistons operate a wheel *m'* in an exactly similar manner and to the same extent as wheel *m*.

The wheel *m'* revolves in front of a disk bearing the numbers 1 to 8 corresponding to the contacts *n'* to *n^s*, and has an aperture *t* whose position always corresponds to that of contact *n* and at which the number exhibited indicates that contact is made between *n* and the similarly numbered one of the ring of contacts *n'* to *n^s*. The number of the contacts *n'* to *n^s* would vary according to the purpose for which the apparatus is to be applied. Two exactly similar wheels *m* may also be superposed and insulated from one another, so as to permit of acting simultaneously on both poles. The same object may also be attained by operating several switches at one time from the same point, as in Fig. 8, wherein the current from the battery *g* passes through the brush *o*, wheel *m*, and then, contact being established as shown, through the brush *o'* to the

translating device *r*, the return being through the brush *o²*, wheel *m'*, and brush *o³*, to the battery *g*.

It will be evident that the making and breaking of the circuit would be simultaneous in the two switches.

I claim—

1. The combination, with an electric switch constructed of contact segments and brushes substantially as described, of actuating mechanism therefor consisting of a pawl and lever acting on pins on the switch disk, a fluid pressure motor connected with a system of tubes containing fluid transmitted under pressure, and controlling mechanism for the fluid under pressure, as specified.

2. In an apparatus of the kind herein described for switching resistances, cells, or other electrical apparatus in and out of circuit, the combination with the switch wheel having a single contact, of a circle of contacts within which the wheel is caused to rotate, of a duplicate set of oppositely acting fluid pressure motors and pawl and ratchet mechanism operated thereby for rotating the switch in opposite directions, as hereinbefore specified.

3. The combination, with a switch having a single contact rotating within a circle of contacts and of oppositely acting fluid pressure motors and pawl and ratchet mechanism operated thereby, of an indicator disk and of a fluid pressure motor therefor operatively connected with the same source of fluid supply as the first mentioned motors, whereby the indicator disk is operated simultaneously with and in the same direction and to the same extent as the switch so as to indicate at all times on a number dial, the position of the switch, as described.

4. In a fluid operated electric switch, the combination of a fluid reservoir, a spring pressed piston contained in a cylinder, piping connecting the reservoir and cylinder, a three way cock intercepting the passage from the reservoir to the cylinder, a piston rod connected to said piston, a lever connected by one end to the piston rod and provided at its free end with a weighted pawl, a wheel carrying contacts and pins, said pins being adapted to be engaged by the pawl and the wheel stepped around to make and break circuits, and a click mounted in proximity to the wheel and co-operating therewith to facilitate the forward movement of the same and to retain it in the position to which it may be moved, substantially as described.

5. In a fluid operated electric switch, the combination of a spring pressed piston adapted to be moved by fluid pressure, a lever carrying a pawl and connected to the piston rod, a wheel provided with a contact hub and with contacts on its periphery, a brush connected with one terminal of a source of supply and adapted to bear on the hub, brushes connected with the opposite terminal of the source of supply and adapted to bear alternately on the

peripheral contacts, pins on the face of the wheel adapted to be engaged by the pawl to step it forward to make and break the circuits, a click co-operating with the wheel to
5 facilitate the forward movement of the same and to retain it in the position to which it may be moved, substantially as described.

The foregoing specification of my fluid-operated electric switch signed by me this 20th day of July, 1893.

JEAN JOSEPH PAUL CLARIOT.

Witnesses:

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