

J. H. CHAMP & T. H. SCHUTT.
ELECTRIC SWITCH.
APPLICATION FILED NOV. 27, 1908.

956,679.

Patented May 3, 1910.

2 SHEETS—SHEET 1.

Fig. 1

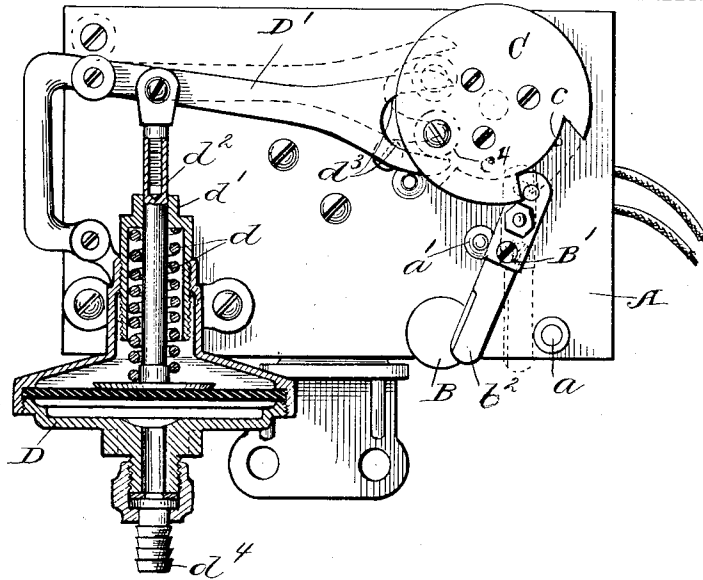
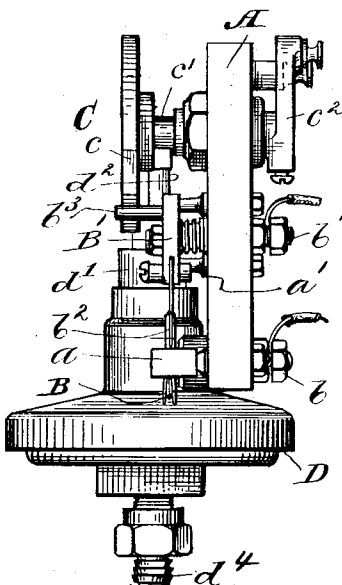
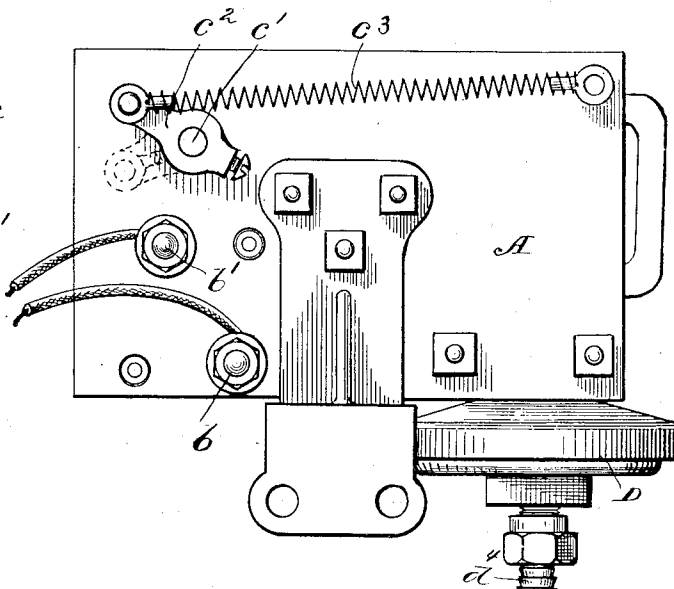


Fig. 2



Witnesses:
Mary Gladwell
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Fig. 3



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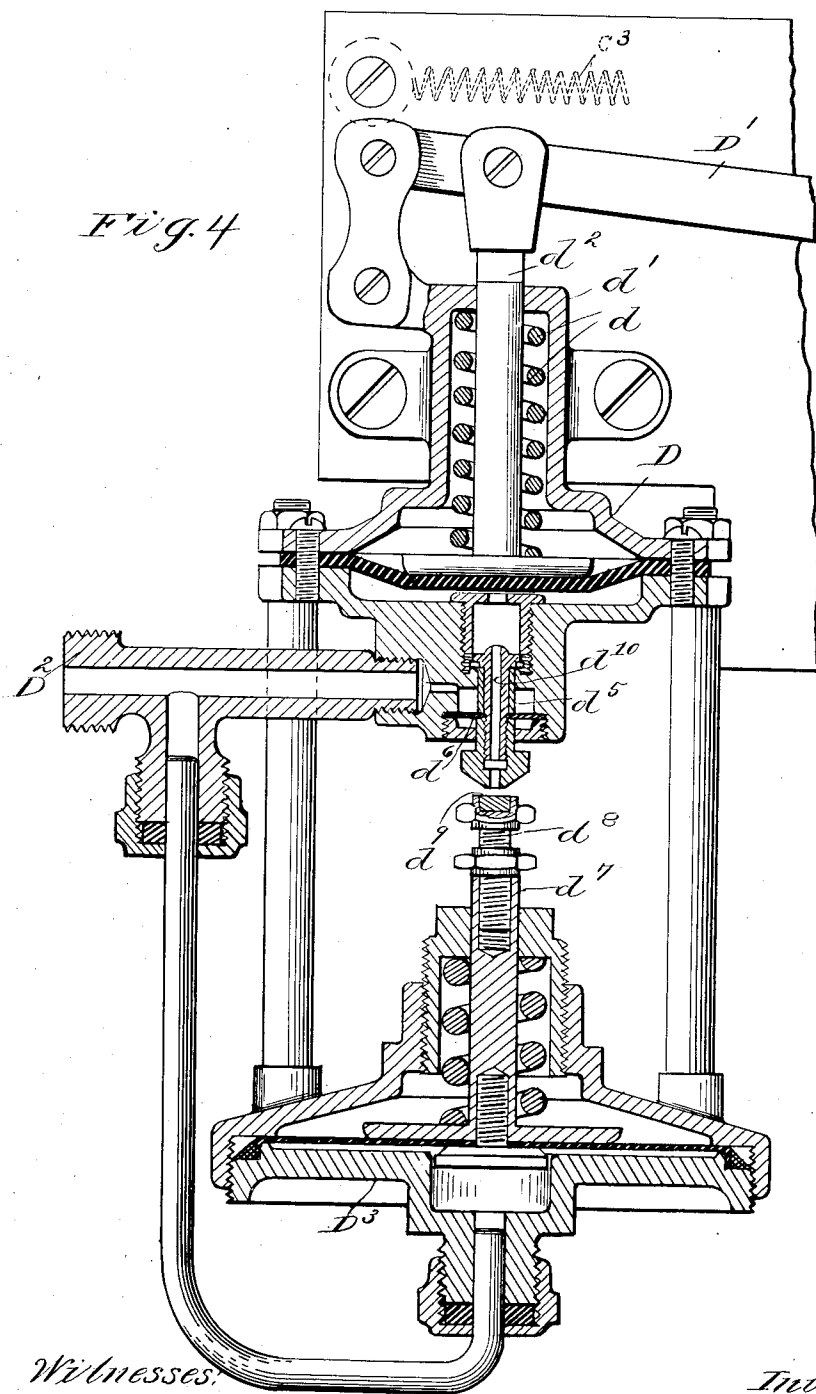
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Witnesses:
Mary Gladwell
Jno. F. Oberlin

Inventors,
Joseph H. Champ
and Thomas H. Schutt
by J. B. Fay
Attorney.

UNITED STATES PATENT OFFICE.

JOSEPH H. CHAMP AND THEODORE H. SCHUTT, OF CLEVELAND, OHIO, ASSIGNORS TO
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OHIO.

ELECTRIC SWITCH.

956,679.

Specification of Letters Patent.

Patented May 3, 1910.

Application filed November 27, 1908. Serial No. 464,694.

To all whom it may concern:

Be it known that we, JOSEPH H. CHAMP and THEODORE H. SCHUTT, citizens of the United States, and residents of Cleveland, county of Cuyahoga, and State of Ohio, have jointly invented a new and useful Improvement in Electric Switches, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention relating to electric switches has more particular regard to electric switches for use in connection with electrically driven air pumps or compressors, where it is desired to maintain by means of the pump, a pre-determined pressure in a tank or the like receptacles.

As it is well understood in the construction of switches of the character in hand, it is necessary, in order to avoid burning of the terminals, that the circuit be made and broken quickly so as to prevent arcing.

The present invention, accordingly, has as its object the provision of means whereby such making and breaking may be obtained through the medium of the pressure built up by operation of the pump.

To the accomplishment of this and related objects, said invention consists of the means hereinafter fully described and particularly pointed out in claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—Figure 1 is a front elevation, with a part shown in section, of a switch embodying our several improvements; Fig. 2 is an end elevation of the same as viewed from the right in Fig. 1; and Fig. 3 is a rear elevation thereof; while Fig. 4 is a sectional view of the detail shown in Fig. 1 in section but on a larger scale, and including a modification in construction adapting the switch for use with increased pressures.

Referring first of all to the form of switch illustrated in Figs. 1, 2 and 3, which is designed primarily for use with moderate pressures ranging below 30 lbs., such switch

will be seen to comprise a base A preferably constructed of non-conducting material in order to simplify the problem of insulation. Two binding posts b b' on the rear of such base, provide terminals for the connection of the switch in circuit as will be readily understood, and the switch proper comprises a disk-like contact member B on the front face of such base connected with one such binding post b and a pivotal arm B' connected with the other post b' such pivotal switch arm being movable substantially in the same plane as disk B and consisting of two spring leaves b^2 disposed to engage opposite sides of said disk. Lugs a a' provide suitable stops for limiting the motion of said pivotal switch member. For the actuation of said member an oscillatory member C is provided, having a notch c in its periphery, the opposite edges of which are adapted to engage with a pin b^3 borne by the rear end of switch member B' to move and retain the same in operative and inoperative position, respectively. Actuating member C is borne on a rock shaft c' that extends through the base A and is provided on its rear end with a lever arm c^2 disposed as shown, so that a tension spring c^3 connected therewith, will be effective to retain the member with the switch in either position, providing it is otherwise undisturbed. To oscillate said actuating member, C and thereby to move the switch member from closed to open position, and vice versa as the pressure rises above and falls below the degree determined upon as desirably to be maintained, a diaphragm chamber D adapted to be connected with the pressure supply line (not shown) at nipple d^4 is provided. The diaphragm in such chamber is designed to be responsive to a pressure in said line determined by the strength of the opposing spring d the degree of compression of which may be furthermore varied to adjust the diaphragm as desired within suitable limits by rotating in one direction or the other the threaded sleeve d' , within which one end of said spring is mounted. The stem or plunger d^2 is reciprocally held in the same sleeve, and is connected at its outer end with a lever arm, D' of which the free end d^3 is forked, so as to loosely engage with a pin c^4 mounted upon switch actuating member C. The range of movement

or throw of such forked lever end is designed to be sufficient to rotate the arm c^2 of member C from either of its positions of rest until said arm passes across the center of shaft c' , whereupon the remainder of its movement will be effected by action of the spring c^3 connected with such arm. The final movement accomplished by such action of the spring is alone effective to move the pivotal switch member B' since only upon such movement of the actuating member do the edges of the notch c therein contact with the pin b^3 borne by the switch member. As a result of the foregoing construction, the effect of an increase in pressure, such as to raise the plunger of the diaphragm chamber, will be to throw the switch open by a sudden movement, such as has been explained is desirably had. In this position the parts are retained so long as the pressure admitted to the diaphragm chamber does not fall. Once it falls, however, reverse actuation of the switch takes place with the same quick movement.

Where it is desired to operate under a high pressure in the supply line a corresponding stronger spring must be, of course, employed in the diaphragm chamber to provide the necessary counter-pressure. Inasmuch as it would be difficult to obtain, with such a spring, the necessary amount of throw for the lever D', we have devised the modified arrangement illustrated in Fig. 4 to meet the contingency in question. In such modified construction we do not admit the full pressure directly to the primary diaphragm chamber D, the diaphragm in which is connected with the lever just named, but control such admission, by means of a small piston valve, d^5 mounted in the lower portion of the diaphragm chamber casing, and normally held by resilient means, such as a diaphragm d^6 , in a position to cut off connection between chamber D and the pressure supply line D². Such control valve d^5 is longitudinally perforated moreover so as to provide a "leak" for the diaphragm chamber, D that the pressure therein admitted when the control valve is open, may be relieved upon such valve again being closed. Closure of this relief opening d^{10} in the control valve and actuation of said valve to admit the pressure to the primary diaphragm chamber, are simultaneously had by operation of a secondary diaphragm chamber D³ whenever the pressure in the pressure line rises to a predetermined point. This chamber is provided with a spring of suitable strength, to be thus operated only under the high pressure desired, and the slight movement only that is obtainable will still be effective to operate the control valve of the primary diaphragm chamber. The plunger d^7 of the secondary chamber is provided with an

adjustable extension, d^8 so that such operation of the control valve can be varied to give the latter the proper amount of movement, such adjustable member having inserted in its end a block d^9 of rubber or like material that is adapted to close the relief opening d^{10} in said control valve as previously described. The operation of such modified construction of diaphragm chamber for the handling of high pressures should be fully apparent from the preceding description of its construction, and the operation of the switch mechanism, proper, derived therefrom need not be repeated being the same as where the simple primary diaphragm chamber D alone is utilized under lower pressure conditions.

The foregoing construction of switch has been found to be admirably suited to the special requirements of the service in question. Obviously it is immaterial whether as described, the switch be utilized to control the supply of current of a motor directly connected to maintain the pressure in the pressure line, or for some other analogous purpose, it being with the details of the switch construction, whereby the latter may be operated by changes of pressure in such pressure line, however derived, and for whatever purpose maintained, that the present invention is concerned.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and distinctly claim as our invention:—

1. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, a member oscillatory about an axis other than that of said pivotal contact member and having a peripheral notch adapted to engage the pivotal member to open and close the circuit but permitting limited movement relatively to said pivotal contact member without such actuation, and a tension spring connected to said actuating member eccentrically of its axis, whereby said actuating member is maintained in a position either to open or close said pivotal contact member.

2. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, an actuating member for the latter oscillatory about an axis other than that of said pivotal contact member and having limited movement relatively to said pivotal member, a spring connected to said actuating member eccentrically of its axis, whereby said actuating member is maintained in a position either to open or close said pivotal contact member, and a

second oscillatory member connected to operate said actuating member and having limited movement relatively to the same.

3. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, an oscillatory member having a peripheral notch adapted to engage said pivotal contact member to open and close the same but permitting limited movement relatively thereto without such actuation, a tension spring connected to said actuating member eccentrically of its axis, whereby said actuating member is maintained in a position either to open or close said pivotal contact member, and a lever having a forked end engaging said actuating member to oscillate the same while still permitting limited movement relatively thereto.

4. In a device of the character described, the combination of a fixed contact member, a movable contact member, an actuating member for the latter having limited movement relatively to the same, means adapted to maintain said actuating member in a position either to open or close said movable contact member, a lever having a forked end engaging said actuating member to oscillate the same while still permitting limited movement relatively thereto, a diaphragm chamber connected with a pressure supply line, a diaphragm within said chamber and adapted to operate said lever, a tension member connected with said diaphragm, and means whereby the diaphragm will operate said lever only under a predetermined pressure in said supply line.

5. In a device of the character described, the combination of a fixed contact member, a movable contact member, an actuating member for the latter having limited movement relatively to the same, means adapted to maintain said actuating member in a position either to open or close said movable contact member, a lever having a forked end engaging said actuating member to oscillate the same while still permitting limited movement relatively thereto, a primary diaphragm chamber adapted to be connected with a pressure supply line, a diaphragm within said chamber and adapted, when the chamber is thus connected, to operate said lever, a valve controlling connection between such primary diaphragm chamber and supply line, a secondary diaphragm chamber connected with said supply line, and a diaphragm within said secondary chamber and adapted to operate said control valve.

6. In a device of the character described, the combination of a fixed contact member, a movable contact member, an actuating member for the latter having limited movement relatively to the same, means adapted to maintain said actuating member in a position

either to open or close said movable contact member, a lever having a forked end engaging said actuating member to oscillate the same while still permitting limited movement relatively thereto, a primary diaphragm chamber adapted to be connected with a pressure supply line, a diaphragm within said chamber and adapted, when the chamber is thus connected, to operate said lever, a valve controlling connection between said primary diaphragm chamber and supply line, a secondary diaphragm chamber likewise connected with said pressure supply line, a diaphragm within said secondary chamber and adapted to actuate said controlling valve, a tension member connected with the diaphragm in said secondary chamber and means for adjusting the tension of said member so that the diaphragm will operate said control valve only under a predetermined pressure in said supply line.

7. In a device of the character described, the combination of a fixed contact member, a movable contact member, an actuating member for the latter having limited movement relatively to the same, means adapted to maintain said actuating member in a position either to open or close said movable contact member, a second member adapted to operate said actuating member and having limited movement relatively to the same, a primary diaphragm chamber adapted to be connected with the pressure supply line, a diaphragm within said chamber and adapted, when the chamber is thus connected, to operate said second member, a valve controlling connection between said primary diaphragm chamber and supply line and provided with an opening normally relieving any pressure in said diaphragm chamber, a secondary diaphragm chamber likewise connected with said pressure supply line, the movable element of said secondary diaphragm chamber being adapted operatively to engage said control valve and when thus engaging the same to close the opening therein, a tension member connected with the movable element of said secondary chamber, and means for adjusting the tension of said member thus to operate said control valve only under a predetermined pressure in said supply line.

8. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, an oscillatory member having a peripheral notch adapted to connect said pivotal contact member to open and close the same but permitting limited movement relatively thereto without said actuation, a tension spring connected to said actuating member eccentric to its axis whereby said actuating member is maintained in a position either to open or close said pivotal contact member, a lever having a forked end engaging said actuating member to oscillate

the same while still permitting limited movement relatively thereto, a diaphragm chamber connected with a pressure supply line, a diaphragm within said chamber and adapted to operate said lever, a tension member connected with said diaphragm, and means whereby the diaphragm will operate said lever only under a predetermined pressure in said supply line.

9. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, an oscillatory member having a peripheral notch adapted to engage said pivotal contact member to open and close the same but permitting limited movement relatively thereto without said actuation, a tension spring connected to said actuating member eccentric of its axis, whereby said actuating member is maintained in a position either to open or close said pivotal contact member, a lever having a forked end engaging said actuating member to oscillate the same while still permitting limited movement relatively thereto, a diaphragm chamber adapted to be connected with a pressure supply line, a diaphragm within said chamber and adapted, when the chamber is thus connected, to operate such lever, a valve controlling connection between said primary diaphragm chamber and supply line and provided with an opening normally relieving any pressure in said diaphragm chamber, a secondary diaphragm chamber likewise connected with said pressure supply line, the movable element of said secondary diaphragm chamber being adapted operatively to engage said control valve and when thus engaging the same to close the opening therein, a tension member connected with the diaphragm in said secondary chamber, and means for adjusting the tension of said member so that the diaphragm will operate said control valve only under a predetermined pressure in said supply line.

10. In a device of the character described, switch actuating mechanism, comprising a primary diaphragm chamber adapted to be connected with a pressure supply line, a valve controlling connection between such primary diaphragm chamber and supply

line, a secondary diaphragm chamber connected with said supply line, and a diaphragm within said secondary chamber and adapted to operate said control valve, said diaphragm being effective to thus operate said control valve during a portion only of its travel.

11. In a device of the character described, switch actuating mechanism, comprising a primary diaphragm chamber adapted to be connected with a pressure supply line, a valve controlling connection between such primary diaphragm chamber and supply line and provided with an opening normally relieving any pressure in said diaphragm chamber, a secondary diaphragm chamber likewise connected with said pressure supply line, and a movable element within said secondary diaphragm chamber adapted to operatively engage said control valve during a portion only of its travel, and when thus engaging the same to close the opening therein.

12. In a device of the character described, switch actuating mechanism, comprising a primary diaphragm chamber adapted to be connected with a pressure supply line, a valve controlling connection between said primary diaphragm chamber and supply line, and provided with an opening normally relieving any pressure in said diaphragm chamber, a secondary diaphragm chamber likewise connected with said pressure supply line, a movable element within said secondary diaphragm chamber adapted to operatively engage said control valve during a portion only of its travel, and when thus engaging the same to close the opening therein, a tension member connected with said movable element, and means for adjusting the tension of said member thus to operate said movable element only under a predetermined pressure in said supply line.

Signed by us this 24th day of November, 1908.

JOSEPH H. CHAMP.
THEODORE H. SCHUTT.

Attested by—
D. T. DAVIES,
GRACE B. CAIN.