

A. C. GRISCOM.
AUTOMATIC SWITCH MECHANISM.
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953,028.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.

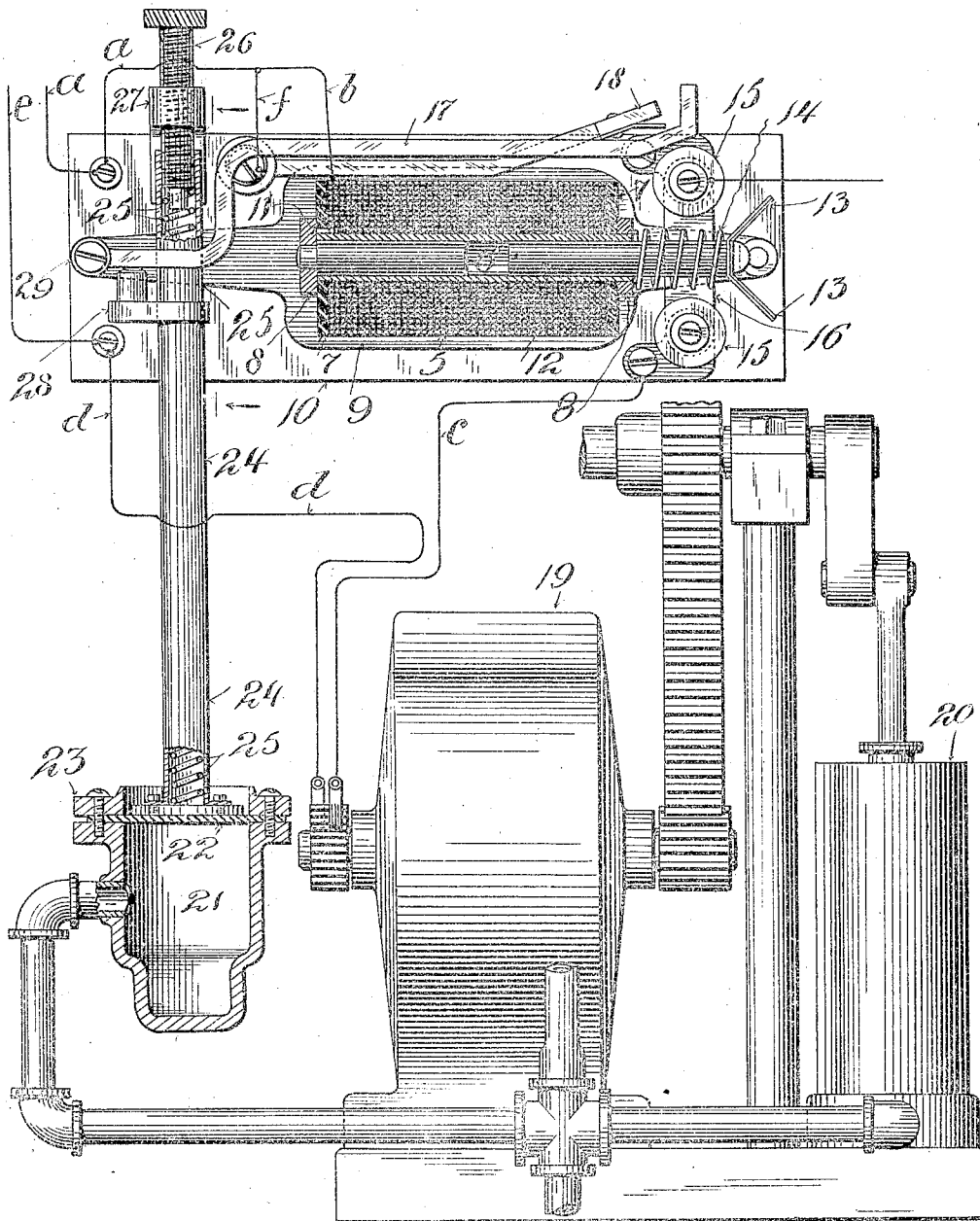


Fig. 1.

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2 SHEETS—SHEET 2.

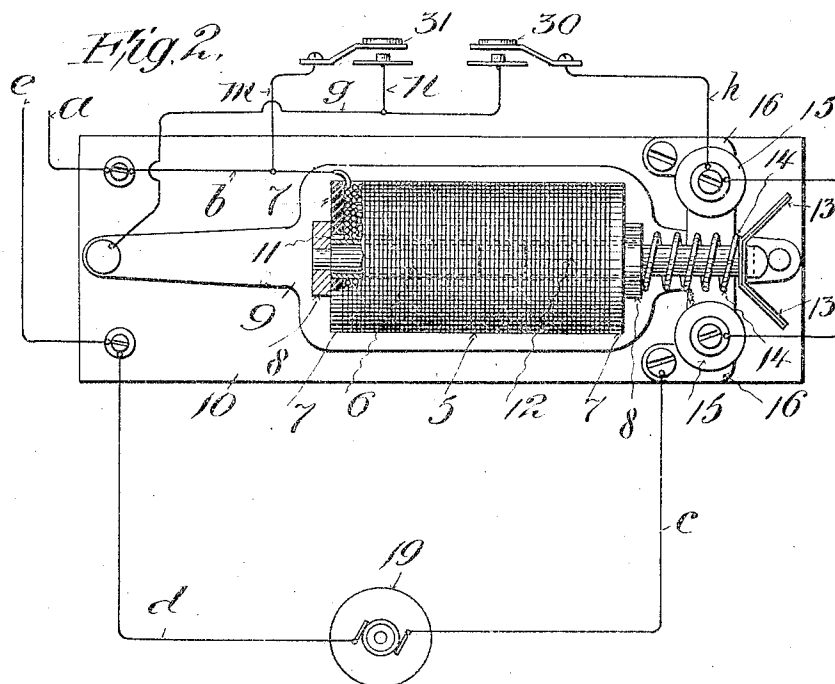


Fig. 3.

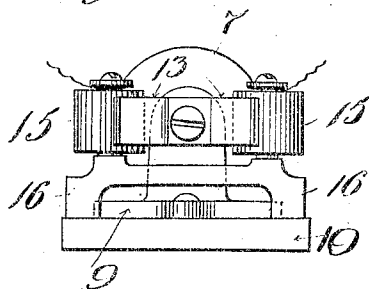
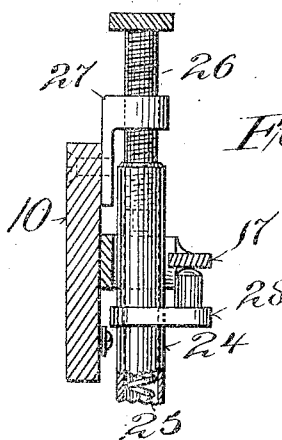


Fig. 4.



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AUTOMATIC SWITCH MECHANISM.

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To all whom it may concern:

Be it known that I, ALFRED C. GRISCOM, a citizen of the United States, and resident of the city, county, and State of New York, have made a certain new and useful invention in Automatic Switch Mechanism, of which the following is a specification.

This invention relates to automatic switch mechanism.

The object of the invention is to provide a switch mechanism of simple and inexpensive construction, and which is efficient in operation, for breaking an electric circuit without the formation of destructive arcs.

A further object is to provide an apparatus of the character referred to wherein are employed electro-magnetic means for completing a shunt or branch circuit around the switch, and means whereby the branch or shunt circuit is automatically short circuited to permit of a quick opening of the circuit.

A further object is to provide an automatically operating switch mechanism which operates to divide the current and to effect a quick opening of the circuit, thereby avoiding the damage and the danger of arcing at its contacts.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawing, and finally pointed out in the appended claims.

Referring to the accompanying drawing and to the various views and reference signs appearing thereon,—Figure 1, is a view in elevation, parts in vertical section, showing an automatic switch mechanism embodying the principles of my invention, as applied to an air pump. Fig. 2, is a view, somewhat diagrammatic, showing a modified arrangement embraced within the spirit and scope of my invention. Figs. 3 and 4 are elevations of the respective ends of the switch mechanism.

The same part is designated by the same reference sign wherever it occurs throughout the several views.

In carrying out the principle of my invention, I propose to employ a solenoid, and, in starting up the device, to include

the coils of the solenoid in circuit with the contact to be broken. I also propose to provide means, operated by the energization of the solenoid, to establish a branch or shunt circuit around the contact to be broken, and then to provide means for short circuiting the solenoid circuit whereby the main circuit is quickly opened, thereby avoiding the formation of destructive arcs. These objects and purposes may be carried out in a wide variety of different constructions, and for different uses, without departing from the spirit and scope of my invention.

In the drawings reference sign 5 designates a solenoid coil, which, in the particular form shown, is wound upon a tube 6, and between end plates 7 carried thereby, said tube being supported in stands 8, of a bracket or plate 9, the latter being conveniently mounted on an insulating slab or other suitable support 10. One end of the wire forming the winding of the solenoid coil is connected electrically as at 11, with the tube 6, thereby forming a circuit through the tube, and thereby through the supporting bracket or plate 9, constituting the switch frame-work. The movable core 12, of the solenoid carries the spring contact plates 13, at its end, said core being normally but yieldingly pressed and held outwardly by spring 14, or other suitable means. When the solenoid coil is energized, however, then this core is drawn into the coil, thereby causing the spring contact plates 13, to make contact with the carbon or other suitable contacts 15, which are suitably mounted on the insulating base plate 10, and thereby insulated from the frame work. In practice I prefer to employ cylindrical carbon blocks for the contacts 15, but my invention is not to be limited in this respect as other forms of contact may be employed. The contacts 15, are mounted upon a bracket 16, which is arranged to straddle the plate 9, as most clearly shown in Fig. 3.

Coöperating with one of the contacts 15, is a movable contact arm 17, which is arranged to be moved back and forth between the contact 15, and a fixed insulated contact 18, which is mounted upon the insulating base plate 10.

In the particular embodiment of my invention as shown in Fig. 1, I have shown the same as applied to the automatic operation

of an air pump. The motor 19, is arranged to operate a pump 20, by which air is compressed into a suitable or convenient reservoir (not shown). A chamber 21, is in communication with the pump, or reservoir or intermediate pipe connections between the same. In this chamber is arranged a flexible diaphragm 22, suitably held in place by a cap 23, whereby it is subjected to variations in the air pressure produced by the pump. A tube 24, is carried by the diaphragm in such manner that it will be moved longitudinally by such diaphragm. The movement of said tube under the influence of increased air pressure in the chamber 21, is yieldingly opposed by a spring 25, arranged within said tube, the tension of said spring being adjustably regulated by a set screw 26, tapped through a bracket 27, mounted on the insulating base plate 10. Carried by the tube 24, is an arm or projection 28 arranged to engage the movable contact arm 17, and move the same out of contact with contact 15, and into contact with contact 18, whenever said tube is moved under the influence of increased or excessive pressure in the pressure chamber 21. To this end the contact arm 17, is pivotally mounted as at 29, upon the frame plate 9, and in position to be engaged by the arm or projection 28, said contact arm 17, being, in this instance, normally held by gravity in contact with the contact block 15.

The circuit, in starting up, is as follows:— from main supply wire *a*, through wire *b*, the coils of solenoid 5, to point 11, thence through the tube 6, standards 8, frame plate 9, to lever 17 at 29, through said lever 17, contact 15, frame 16, the other contact 15, wire *c*, motor 19, wire *d*, and return *e*. The energization of the solenoid causes the core 12, thereof to be drawn into the solenoid against the action of spring 14, till the spring contact plates 13, make contact with the contacts 15, thereby establishing a shunt or branch circuit around the contact arm 17, since, instead of the current flowing, through the tube 6, standards 8, frame plate 9, and arm 17 to contact 15, the current will now flow directly from the tube 6 and frame 9 through core 12 and contacts 13, to contacts 15, and on as before. Thus the contact 17 is short circuited by the branch or shunt so established around it. By the completion of the circuit through the motor 19, said motor starts up and operating the pump 20, supplies pressure to the reservoir and to the pressure chamber 21. When the pressure in the pressure chamber 21, exceeds a predetermined degree, as determined by the tension to which the spring 25, may be adjusted by set screw 26, the tube 24, is moved longitudinally by the diaphragm 22, thereby causing the arm or projection 28, to engage the contact arm 17, and move the same out

of contact with contact 15, and into contact with the contact 18, this breaking off the main contact being effected without the formation of an arc since at this time the contact 17 is short circuited as above explained. When contacts 17, and 18 are closed upon each other, as above explained, the circuit of the motor is completed from main supply wire *a*, through wire *f*, contact 18, contact 17, frame plate 9 standards 8, tube 6 core 12, contacts 13 and 15 and thence on through the motor to return as before, thereby short circuiting or shunting the coils of the solenoid 5. Thereupon, under the influence of the spring 14, the core 12, is quickly forced outwardly carrying the contact 13 out of contact with the carbon blocks 15, and hence effecting a quick opening of the motor circuit and without forming destructive or objectionable arcs. This action arrests the motor and maintains the same arrested until the pressure falls to or below the predetermined degree to permit the tube 24 to return toward its initial position sufficiently to withdraw the arm or projection 28, from the movable contact 17, thereby enabling said contact to again make contact with the carbon block 15, and thereby completing the motor circuit and starting up the motor, at the same time energizing the solenoid, and causing the contacts 13, to make contact with the carbon blocks 15, to short circuit the contact 17 all as above explained. In this manner the switch operates automatically to arrest and start the motor whereby substantially uniform pressure is maintained in the reservoir, and the formation of destructive and objectionable arcs, when the circuit is opened, is avoided, this result being effected by the completion of a shunt or branch circuit around the contacts when the circuit is completed through the energization of a solenoid which is included in the motor circuit, and which operates, when energized, auxiliary contacts, and then, through the pressure developed in the operation of the motor, the main contact is broken and an auxiliary circuit around the solenoid completed, thereby causing the auxiliary contacts to open and hence opening the circuit, until the motor is again required to be started, by the fall of pressure in the reservoir, when the main contact is again closed and the above operation repeated.

While I have explained my invention as applied to the automatic operation of air pumps, it is to be understood that my automatic switch mechanism is not to be limited or confined to such use as it may be employed in many other situations where an automatically operating switch is desired. In Fig. 2, I have shown my invention as applied to a motor starter. In this case the construction of the solenoid and the manner

of mounting the same, the carbon contacts, the solenoid core and auxiliary contacts carried thereby and the motor connections therefrom remain the same, as above described with reference to Fig. 1. The manner of completing the initial circuit, and the shunt circuit around the solenoid, however, are somewhat different. In this instance I employ two circuit closers which, if desired, may be in the form of push buttons, 30, 31, one controlling a circuit to one of the carbon contacts 15, and the other a shunt circuit around said contact 15. In order to start up the motor the push button 30 is pressed thereby completing circuit from the main supply wire *a*, wire *b*, the coils of solenoid 5, the frame parts 6, 8, and 9, wire *g*, wire *h*, contacts 15, and on through the motor and return the same as above described with reference to the arrangement and construction disclosed in Fig. 1. This starts the motor and energizes the solenoid. Thereupon the solenoid core 12, is drawn in causing the auxiliary contacts 13, to make contact with the carbon blocks 15, and hence establishing a short circuit around the push button 30. Under these conditions the motor continues to operate until it is desired to arrest the same, when the push button, or other form of contact at 31 is depressed. Thereupon the circuit is completed from main supply wire *a*, through wires *m*, and *n*, wire *g*, the frame plate and parts 9, 8, and 6, core 12, auxiliary contacts 13, contacts 15, and on through the motor as before. This establishes a short circuit around the coils of the solenoid and instantly the core 12, is forced outwardly by its spring and opens the motor circuit by breaking contact between contact 13, and carbon blocks 15, by a quick operating break.

It is obvious that my invention may also be practically applied in many other ways and for many other purposes.

Having now set forth the object and nature of my invention and the manner of its operation, and various modes of application thereof, what I claim as new and useful, and of my own invention, and desire to secure by Letters Patent is:—

1. In a switch mechanism, a main motor circuit including separable contacts and a solenoid, means operated by the solenoid for short circuiting said separable contacts and means for short circuiting the solenoid to open the motor circuit.

2. In a switch mechanism, a main motor circuit including separable contacts adapted to be closed upon each other to complete said circuit, means arranged in said circuit for establishing a shunt circuit around said contacts and means for opening said shunt circuit to break the motor circuit.

3. In a switch mechanism, a main motor circuit including separable contacts, elec-

trical devices arranged in said circuit and controlling a shunt circuit around said contacts, and automatic devices for shunting said electrical devices.

4. In a switch mechanism, a main motor circuit including separable contacts, a solenoid arranged to be included in said circuit when said contacts are closed upon each other, a shunt circuit around said contacts, means actuated by the energization of said solenoid for closing said shunt circuit, whereby said contacts may be broken without arcing, and means for cutting said solenoid out of circuit to open the shunt circuit.

5. In a switch mechanism, a main motor circuit including separable contacts, a normally open shunt circuit around said contacts, a solenoid arranged in said main motor circuit and operating, when energized, to close said shunt circuit, whereby said main circuit may be opened at said contacts without arcing, and automatic means for shunting said solenoid from main circuit to open said shunt circuit.

6. In a switch mechanism, a main motor circuit including separable contacts adapted to be closed upon each other, a shunt circuit around said contacts, means operated by the closing of said contacts upon each other for closing said shunt circuit, and means operated by the opening of said contacts for opening the shunt circuit.

7. In a switch mechanism, a main motor circuit including separable contacts adapted to be closed upon each other, a shunt circuit around said contacts, means operated by the closing of said contacts upon each other for closing said shunt circuit and automatic devices for effecting a quick opening of said shunt circuit.

8. In a switch mechanism, a main motor circuit including separable contacts adapted to be closed upon each other, a shunt circuit around said contacts, means operated by the closing of said contacts upon each other for closing said shunt circuit, and automatic means controlled by the opening of said contacts for opening said shunt circuit.

9. In a switch mechanism, a main motor circuit including separable contacts adapted to be closed upon each other, a shunt circuit around said contacts, a solenoid arranged in the main motor circuit, means operated by the said solenoid for closing said shunt circuit, and automatic devices operated by the separation of said contacts for shunting the solenoid to open said shunt circuit.

10. In a switch mechanism, a main motor circuit including separable contacts, a shunt circuit around said contacts, a solenoid, a spring pressed core therefor, contacts carried by said core and adapted to close said shunt circuit when said solenoid is energized, said solenoid being included in the main motor circuit, whereby when said main mo-

tor circuit is completed said shunt circuit is established and means for shunting said solenoid to open said shunt circuit.

11. In a switch mechanism, a main motor circuit including separable contacts, a shunt circuit around said contacts, a solenoid having a core, a spring for normally pressing said core outwardly, contacts carried by said core and adapted to close said shunt circuit when said solenoid is energized to attract said core, said solenoid being arranged in said main motor circuit, and means for shunting said solenoid whereby said shunt circuit is quickly opened.

12. In a switch mechanism, a main motor circuit including separable contacts, a shunt circuit around said contacts, a solenoid having a core, a spring normally operating to press said core outwardly, contacts carried by said core and operating, when the core is attracted by the energization of said solenoid, to establish said shunt circuit, said solenoid being arranged in the main motor circuit, a shunt circuit around said solenoid, said last mentioned shunt circuit being established by the separation of separable contacts.

13. In a switch mechanism, a main motor circuit including separable contacts, a shunt circuit around said contacts, a solenoid and core, a spring normally pressing said core outwardly, contacts carried by said core and controlling said shunt circuit, said solenoid being included in the main motor circuit, means operated by the motor for separating said movable contacts, and means operated by the separation of said contacts for shunting said solenoid.

14. In a switch mechanism, a main motor circuit including separable contacts, a shunt circuit around said contacts, means arranged in the main motor circuit for establishing said shunt circuit when said main motor circuit is closed, means operated by the motor for separating said separable contacts and means operated by the separation of said contacts for opening said shunt circuit.

15. The combination of a motor, a circuit therefor, a pressure mechanism controlled by the motor, contacts controlling said cir-

cuit, automatic devices arranged in said circuit for establishing a shunt circuit around the contacts means operated by the pressure mechanism for opening said contacts and means operated by the opening of said contacts for breaking the said shunt circuit.

16. The combination of a motor, a circuit therefor including separable contacts, a pressure mechanism controlled by the motor, means for adjusting said pressure mechanism to a predetermined pressure, a shunt circuit around said contacts, means arranged in the main motor circuit for establishing said shunt circuit, means operated by the pressure mechanism under excessive pressure for separating said contacts, and means operated by the separation of said contacts for breaking said shunt circuit.

17. The combination of a motor, a pressure mechanism controlled thereby and including a member movable under variations of the pressure, a spring opposing such movement, means for adjusting the tension of said spring, a switch mechanism for controlling the circuit of said motor and means operated by the movement of said member for controlling said switch mechanism.

18. The combination of a motor, a circuit therefor, a movable contact for controlling said circuit, a solenoid arranged in said circuit, and adapted, when energized, to close a shunt circuit around said contact, a pressure device controlled by the motor and including a member movable under the influence of variations in the pressure, an arm carried by said member and arranged to move said contact to open circuit position, a shunt circuit around the solenoid, and a contact cooperating with said movable contact when the latter is moved into open circuit position for closing said last mentioned shunt circuit.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this 20th day of September A. D. 1907.

ALFRED C. GRISCOM.

Witnesses:

SAMUEL E. DARBY,
JOSEPH KLEIN.