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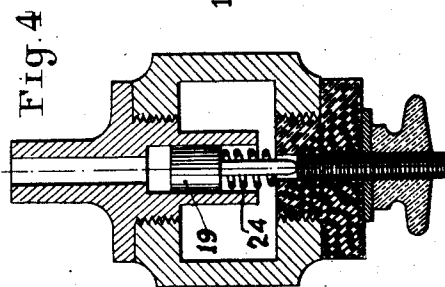
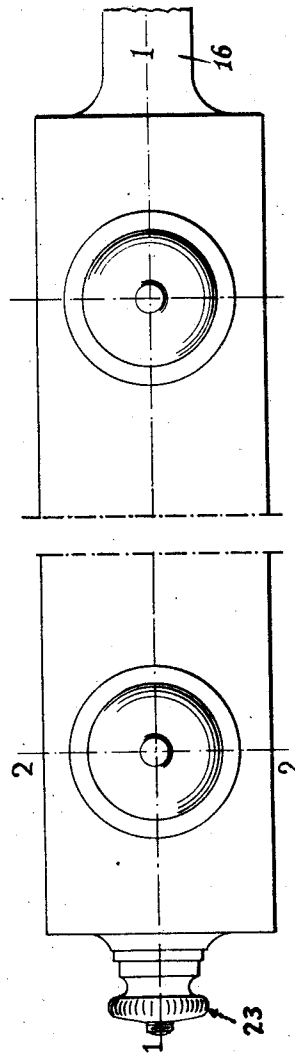
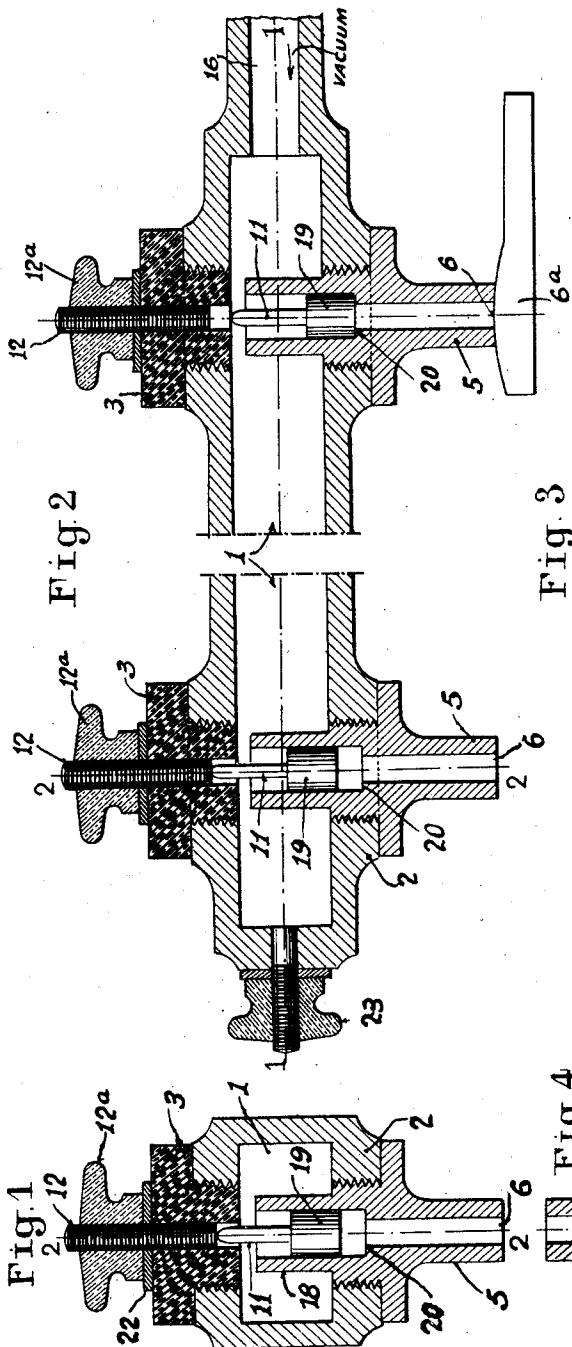
M. BERGOIN

1,911,259

PNEUMATIC CONTROLLING DEVICE

Filed June 9, 1928

2 Sheets-Sheet 1



INVENTOR
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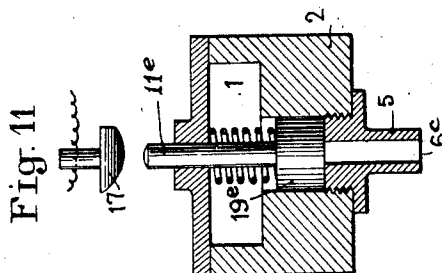
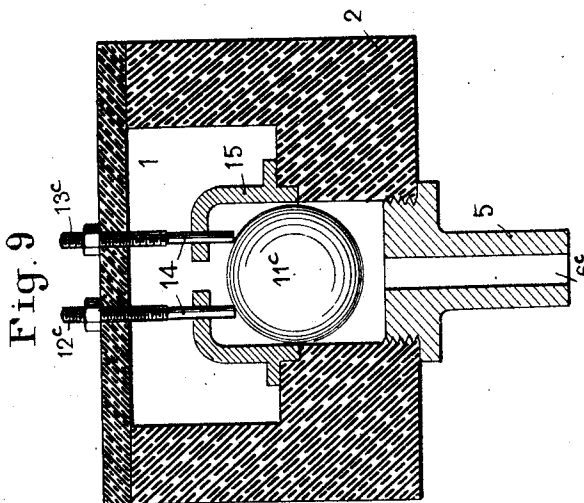
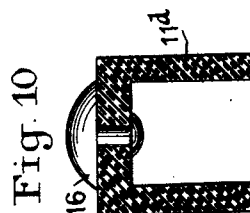
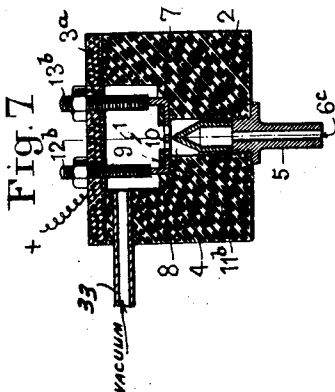
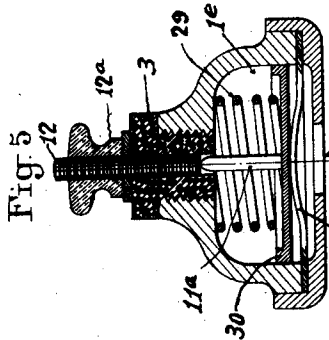
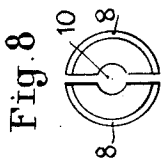
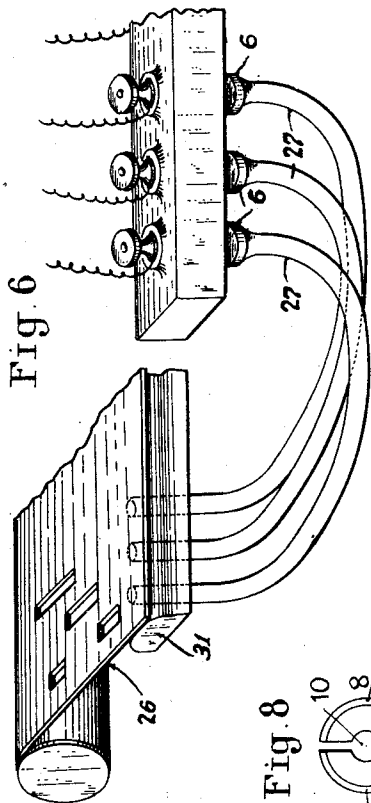
M. BERGOIN

1,911,259

PNEUMATIC CONTROLLING DEVICE

Filed June 9, 1928

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

MARCEL BERGOIN, OF COURBEVOIE-ON-THE-SEINE, FRANCE

PNEUMATIC CONTROLLING DEVICE

Application filed June 9, 1928, Serial No. 284,125, and in France June 11, 1927.

The device which constitutes the subject matter of my invention is characterized by the use of atmospheric pressure for moving contacts into circuit closing or circuit opening position.

My invention has the further advantage of rapid operation a reduction in size of the spark occurring in said operation. The proposed device comprises one or several switching devices which may operate either continuously or not, and may operate either together, or separately in a given order, or in any order.

In the accompanying drawings which show constructional forms of the invention:

Fig. 1 is a transverse cross section along the axis 2—2 of Fig. 2,

Fig. 2 is a longitudinal cross section along the line 1—1 of Fig. 3,

Fig. 3 is a plan view of the device of Figure 1,

Figs. 4 and 5 are modifications proposed,

Fig. 6 shows an example of an application of the invention,

Fig. 7 is a cross sectional view showing a form of construction disclosing a contact part,

Fig. 8 is a detail view of Fig. 7,

Fig. 9 is a cross section of a modification of a contact element or part,

Fig. 10 is a cross sectional view of a valve with changeable contact piece more particularly applied for high tension currents,

Fig. 11 is a cross sectional view of a contact part relating to the rupture of current outside the closed chamber.

My device comprises a closed chamber 1 (Figs. 1, 2, 4 and 5) in which there is a vacuum maintained by means of a pump not shown in Figures 2 and 3 which may be operatively connected with said chamber by nozzle 16. (Figs. 2 and 3.)

The pneumatically operated switch devices 5 are hermetically closed on one of the walls of the closed chamber in which the

same may be arranged in any number and manner, one and the same closed chamber or room being common with several mechanisms.

Every contact device comprises a tubular member or part 18 containing a valve 19. Said valve is kept by its weight on a shoulder 20 which constitutes its seat as shown by one of the positions of Fig. 2. The valve carries a stem 11.

Arranged on the wall of said closed chamber, in front of each mechanism 5 are stoppers 3 of insulating substance. Said stoppers carry, in their middle part a metallic stem 12 forming a contact piece. A washer 22 and a nut forming terminal 12a allow a lead wire to be affixed to said piece.

The lead wire connected with the source of electricity is connected with the earth by means of a terminal 23.

The construction is such that each valve 19 and the stem of the same are connected with the earth, and every time the stem 11 contacts with the stationary terminal 12 which corresponds with itself, the circuit is established and the current flows to the terminal 12a.

A port 6 which may be controlled by any appropriate means 6a allows the valve 19 to be brought into communication with the external air.

When a vacuum is maintained in the closed chamber 1 as in a device shown in Figures 1, 2 and 4 and the port 6 is closed (Figs. 1 and 2) the valve 19 rests on its seat 20. If the port 6 is then opened, the atmospheric pressure acts on the valve 19 which is displaced until its stem contacts with the contact piece 12. The circuit is thus completed, and the current flows to the terminal 12a while the port 6 remains open. When the port 6 is closed, the valve comes back upon its seat, and the passage of current is interrupted.

It is obvious that the return of the valve

to its original position can only take place when the cutting off device occupies a certain vertical position, or when the atmospheric pressure acts from below the device.

5 If the mechanism has to occupy any position in which the valve 19 cannot come back upon its seat owing to its own weight, then a return spring 24 will have to be provided, as shown in Fig. 4. Said spring 24 brings

10 back the valve 19 to its original position as soon as the atmospheric pressure ceases its action.

Fig. 5 shows a modification of the device which may be applied to one or several

15 switch devices.

In this constructional form, a vacuum is maintained inside the closed chamber 1^a (Fig. 5), a wall, or part of a wall of which is formed by an air tight elastic diaphragm

20 25. The valve in this form takes the shape of a plate 30 which is reciprocable within the chamber 1^a, and which has the under face thereof abutting against the elastic diaphragm 25. A stem 11^a, upstanding from

25 the plate 30 secures the contact as in the preceding case. A compensating spring 29, which acts upon the valve, keeps the elastic diaphragm 25 in a normal position so that when the port 6^b is closed the stem 11^a of

30 the valve does not contact with the contact piece 12.

The operation is the same as in the preceding case, and the contact will take place every time the port 6^b is opened.

35 My said invention may be used every time when electric contacts are to be obtained in a given order. When for instance Pandean pipes are to be used (Fig. 6) receiving a band of perforated paper 26, every hole of the

40 Pandean pipes being connected by means of a tube 27 with one of the ports 6 of the interrupters 28, the perforations will free one or several of the ports of the Pandean pipes, causing the atmospheric pressure to act, and

45 the contact to be secured by the corresponding interrupter or interrupters.

It is thus possible to use the editions of perforated music paper for electrically actuating the music instruments such as pianos

50 and the like. It may be in the same way used for the perforated papers, provided for a periodical lighting of electric lamps.

Instead of using Pandean pipes in which the perforations are arranged on the same

55 axis, I may use a fixed plate comprising holes, every hole being connected by a tube with a cutting-off device. A flat disc arranged on the plate has also openings and may assume a certain movement. Every time the openings

60 of the movable plate are in correspondence with those of the stationary plate, the contact will take place.

Another modification consists in creating in the closed chamber 1. by means of a pump

65 not shown in the drawings alternately pres-

ures and depressions for obtaining at the same time cutting-off and contacts. It is easily seen that in that way the contacts may be synchronized with the operation of the pump.

70 It is to be noted that in the modifications proposed the cutting off of the electric current is produced in vacuo or in a space crossed by a current of air, and said means has the advantage of greatly reducing the bad effects

75 of the spark which takes place at the time of cutting off, especially when the operation is made on electromagnets.

In the constructional form of Figs. 7 to 11, the closed room 1 (Fig. 7) has a wall 2 of

80 an insulating substance, and is hermetically closed by means of a cover 3^a. A cylindrical space 4 provided in the wall 2 has, at one of its ends a nozzle 5 provided with an orifice 6^c which secures the communication of the

85 room 1 with the external air, said orifice being at will either closed or not. A reduced pressure is maintained in the chamber 1 through a connection 33 leading to a vacuum pump or other suitable means (not shown).

90 At the other end of said casing 4 a shoulder 7 receives two metallic half washers 8 (Figs. 7 and 8).

A washer 9 of an insulating substance is forced upon the said half washers, and holds

95 the same apart while securing them in their recess, and keeping the same insulated. The said parts also receive an insulating varnish. Both half washers 8, together with the insulating washer 9 have a concentric orifice 10

100 which allows the casing 4 to be in communication with the room 1. A metallic valve 11^a, located in the said casing 4 may apply upon said half washers 8, thus closing the orifice 10.

In some applications, when for instance the power used for actuating the vacuum pump is weak, the device is more efficient if said valve 11 nearly completely closes the orifice

105 10, and for that purpose, the said valve has a convenient shape. It may for instance be conical in shape (Fig. 7), or it may be formed by a metallic ball 11^c (Fig. 9) which will close the orifice 10, the diameter of said orifice being conveniently less than that of the ball.

110 It is obvious that, due to the vacuum being made in the closed room 1, if the orifice 6^c is freed, the valve 11^b will be forced by the atmospheric pressure against the orifice 10, and will contact with both half washers 8, of Figure 8 or the poles 14 of the con-

115 tacts 12^c and 13^c of Figure 9.

Said half washers of the device of Figure 8 are connected respectively with contact pieces 12 and 13, said piece 12 being connected

120 with a source of electricity, so that the other contact piece 13 receives the electric current every time the valve 11 is in contact with said half washers 8.

Such an arrangement is advantageously

125 used for low tension current.

130

The metallic parts which are to be electrically connected by means of the valve 11° may be of any shape, and may be constituted by the half washer elements 15, the electrodes 14 (Fig. 9) are insulated from each other and each passes through one of the elements 15, and is connected with contact pieces 12°, 13°, respectively, arranged outside the room 1.

10 In such a plant using high tension currents, the security may be still increased by the arrangement of a pilot lamp on the distribution board, said lamp being so arranged that when the high tension current is broken, the valve 15 being then in its lower position, said valve completes another electric circuit lighting the said lamp.

In some applications, it is possible that the circuit might have to be broken outside of the said room 1. The valve is then connected with the mass as in the constructional form of Figs. 1 to 6. The stem 11° of the valve 19° (Fig. 11) goes out of said closed room 1 for contacting a corresponding contact piece 17. 25 Said stem 11° could also dip into a mass of mercury, the shape of said valve being conveniently devised for the results desired.

Said stem 11 could be connected, by means of any convenient mechanical transmission, or any other convenient transmission, with any controlling device.

As in the embodiment of Fig. 5, the valve 19° could be substituted for a diaphragm which controls the contacting device, the vacuum being kept in the several embodiments, in any convenient way.

It must be understood that the constructional forms which have been described in the above specification have been given only by way of example, and that it is possible to bring about many changes without departing from the scope of the invention. Thus, for instance, the current could be cut off instead of being completed, or any similar switching operation performed.

What I claim is:

1. In a pneumatically controlled electric switch, a housing having a vacuum chamber and a passage leading from said chamber to atmosphere, stationary contact means carried by said housing adjacent the inner end of said passage and partially closing the same comprising a pair of complementary half washer-like members insulated from each other and providing a central orifice, and a movable contact member within said passage and having a tapered end portion adapted to engage said half washer-like members and to close said orifice.

2. In a pneumatically controlled electric switch, a housing having a vacuum chamber and a passage leading from said chamber to atmosphere, stationary contact means carried by said housing adjacent the inner end of said passage and partially closing the

same comprising a pair of complementary half washer-like members insulated from each other and providing a central orifice, a piston element mounted for reciprocation in said passage and having a conical end portion formed therewith adapted to engage both of said half washer-like elements and to close said central orifice.

In testimony whereof I have hereunto set my hand this 29th day of May 1928.

MARCEL BERGOIN.