

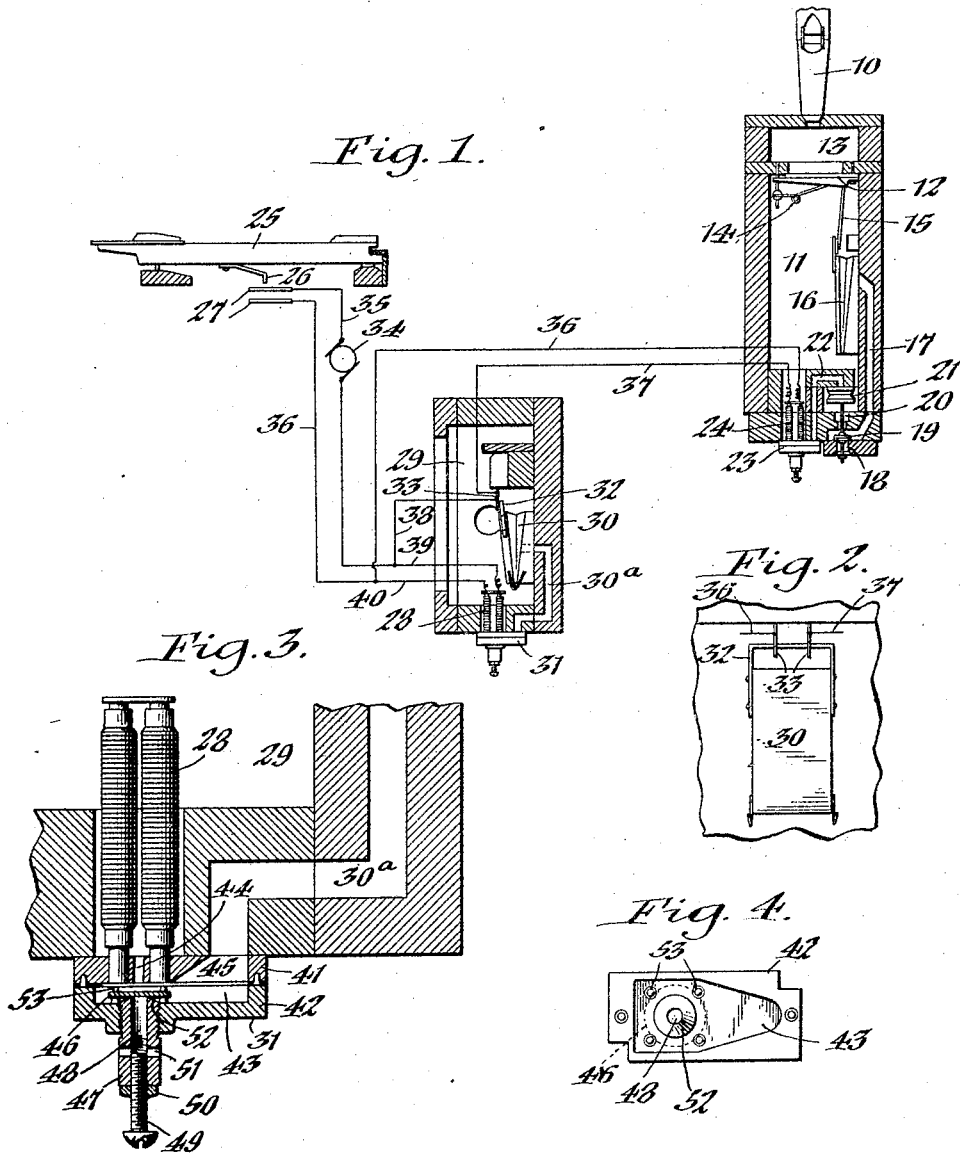
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ELECTROPNEUMATIC ORGAN VALVE

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# UNITED STATES PATENT OFFICE.

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## ELECTROPNEUMATIC ORGAN VALVE.

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This invention relates to the electro-pneumatic valves used more particularly in the construction of organs, and is an improvement in valves of the type shown in United States Patent No. 1,115,541, dated November 3, 1914, and United States Patent No. 1,201,585, dated October 17, 1916, both issued to the Rudolph Wurlitzer Manufacturing Company.

Its object is to improve the construction of such valves with a view of rendering the pizzicato or staccato actions of such instruments more effective and reliable in operation.

In the accompanying drawings:

Figure 1 is a diagrammatic view, partly in section, of a staccato mechanism embodying the invention. Figure 2 is an enlarged face view of the pizzicato control pneumatic and its electrical contacts. Figure 3 is an enlarged sectional view of one of the electro-pneumatic valves and its regulating device. Figure 4 is an inside view of the valve cap.

Similar characters of reference refer to like parts throughout the several views.

The present invention is illustrated in connection with a wind instrument or pipe organ, wherein 10 indicates an organ pipe which is supplied with air from the wind chest 11 under control of the usual pallet valve 12 applied to the port 13. This pallet valve is normally held closed by a spring 14 and is opened through the medium of its arm 15 by the collapsing of a pneumatic 16 located in the wind chest and exhausted through the passage 17 and port 18. The latter is controlled by the customary double-faced valve 19 which also controls the port 20 opening into the wind chest 11 said valve being actuated by a pneumatic 21 exposed to the interior of the chest and communicating therewith through a passage 22. An electro-pneumatic primary valve 23 controls said last-named passage so that when the magnet 24 thereof is energized the pneumatics 16 and 21 are collapsed and the pipe 10 is sounded, as more fully described in the aforesaid Letters Patent No. 1,201,585.

The playing key 25 carries a finger 26 which, when the key is depressed bridges a pair of contacts 27 and closes a circuit that includes the electromagnet 24 of the pipe action, and also an electromagnet 28 of a pneumatically-controlled circuit-breaker

which governs said pipe-action. This circuit-breaker comprises a wind chest or pressure chamber 29 which contains a pneumatic 30 communicating therewith through a passage 30<sup>a</sup> and controlled by an electro-pneumatic valve 31 identical with the valve 23. The pneumatic 30 carries a contact yoke 32 which in the normally inflated condition of said pneumatic bridges a pair of contacts 33 in the circuit of the pipe-action, as shown in Fig. 2, whereby when said pneumatic is collapsed through the depression of the key, the last-named circuit is broken. The main circuit includes a generator 34 from which a wire 35 leads to one of the contacts 27; a wire 36 leading from the other of said contacts, to one of the poles of the magnet 24; a wire 37 connected to the other pole of said magnet and leading to one of the contacts 33; and a wire 38 leading from the other of said last-named contacts back to the generator, the magnet 28 being connected to this circuit by wires 39, 40. When the playing key 25 is depressed this circuit is closed and the pipe 10 speaks in a very short, quick tone resembling a staccato or pizzicato note. Further explanation of this action is deemed unnecessary as it is fully disclosed in the aforesaid patent.

Turning now to the construction of the electro-pneumatic valves 23, 31 and their exhaust regulating devices, which form the subject matter of the present invention, each consists (as shown in Figs. 3 and 4) of a casing composed of upper and lower sections 41, 42, said upper section carrying the electro-magnet 24 or 28. A chamber 43 is formed in this casing and the upper section is provided with inlet ports 44, 45 opening therein. Said port 44, which is located between the poles of the magnet, communicates with the wind chest 29 while said port 45 communicates with the passage 30<sup>a</sup> leading to the pneumatic 30, said first-named port being controlled by the armature disk-valve 46. Arranged substantially in axial alinement with the port 44 and screwed or otherwise attached to the lower valve section 42 is an exhaust plug or stem 47 constructed of metal and having a bore or passage 48 which is threaded in its lower portion to receive a regulating valve or screw 49 provided with a lock-nut 50. This plug has a transverse exhaust port 51 which may be

regulated in size when necessary by the screw 49, so that the latter closes the port more or less. The upper end of the exhaust plug preferably projects above the bottom of the valve-chamber 43 to form a seat 52 for the disk-valve 46. Nipples or pins 53 formed in the valve section 42 and surrounding the valve-seat 52 serve to center and retain the valve disk in its proper position.

In the normal elevated position of the playing-key 25, the circuit is broken at 26, 27 and the disk-valve 46 rests by gravity on its seat 52, in which position the exhaust passage 48 is closed and the port 44 is open, thereby connecting the passage 30<sup>a</sup> with the wind chest 29, keeping the pneumatic 30 inflated and the circuit intact at 32, 33. Under these conditions, the pneumatic 16 is also inflated and the pipe-controlling pallet 13 is allowed to remain closed. When the playing key is depressed, the electric circuit is closed at 26, 27 and the disk-valve co-operating with the electro-magnet 28 is raised, closing the port 44 and opening the exhaust passage 48 and allowing the pneumatic 30 to exhaust through the latter and its regulatable port 51 into the atmosphere.

The closing of said circuit also energizes the electro-magnet 24, causing the pneumatic 16 to be likewise exhausted. By the resulting collapse of said pneumatic, the pallet 13 is opened and the organ pipe sounded, while the collapse of the pneumatic 30, which takes place an instant later, breaks the circuit at 32, allowing the pallet 13 to close promptly and causing the pipe to give forth a very short, quick tone resembling a staccato note, regardless of the length of time the playing key is held depressed, as more fully described in the aforesaid Letters Patent, No. 1,115,541.

To produce this effect, the circuit-breaking pneumatic 30, must lag an instant behind

the pallet-opening pneumatic 16. This is accomplished by regulating the quickness of exhaustion and collapse of the first-mentioned pneumatic. This can be done with nicety by regulating the size of the exhaust port 51 by means of the screw or valve 49. As this regulating screw engages a metallic member rather than a wooden part, it is not liable to be affected by changes in temperature, thus maintaining the desired adjustment or regulation when once made, and insuring a reliable action of the instrument at all times.

The construction of the regulating device is, moreover, such that it is not liable to become clogged with dust or dirt, while the arrangement of the regulating screw in the lower end of the exhaust passage 48 affords easy access to the screw for adjusting it.

The device is obviously useful in all cases where it is desirable to regulate the exhaustion of a bellows or pneumatic for any purpose.

I claim as my invention:

In an electro-pneumatic valve for musical instruments, the combination with a casing composed of separable sections having a chamber between them and an electro-magnet applied to one section, the latter being provided with an inlet port located between the pole pieces of the magnet, of a plug mounted on the other section and containing an exhaust passage, the upper end of said plug extending into said chamber and constructed to form a valve seat and the exposed end thereof having a transverse port communicating with said exhaust passage, a regulating screw inserted in the lower end of the latter for controlling said transverse port, and a valve-member normally engaging said seat to close the exhaust passage and adapted to be attracted by the magnet to open said passage and close the inlet port.

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