

J. SCHWERTNER.
VALVE STRUCTURE.
APPLICATION FILED MAR. 30, 1911.

1,060,030.

Patented Apr. 29, 1913.

Fig. 1,

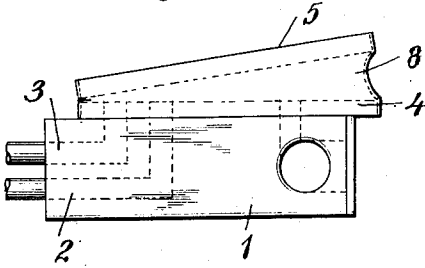


Fig. 2,

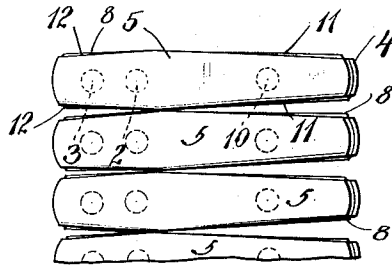


Fig. 3,

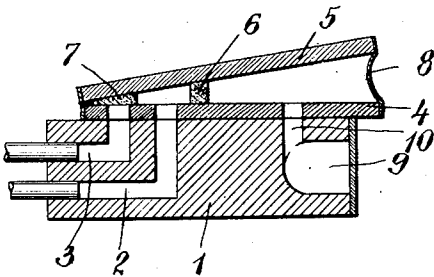


Fig. 4,

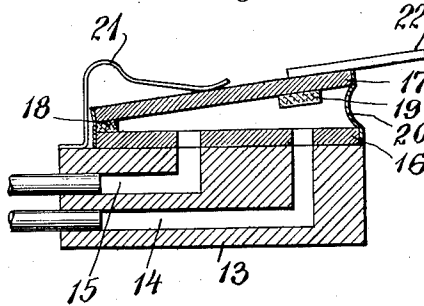
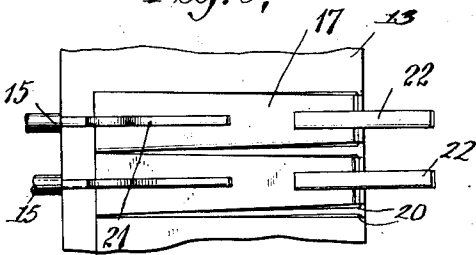


Fig. 5,



WITNESSES:

Edw. Molnar
John O. Gumpel

INVENTOR

Joseph Schwertner
BY
Kempson & Kempson
ATTORNEYS

UNITED STATES PATENT OFFICE.

JOSEPH SCHWERTNER, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO HEERWAGEN COMPANY, A CORPORATION OF NEW YORK.

VALVE STRUCTURE.

1,060,030.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed March 30, 1911. Serial No. 617,969.

To all whom it may concern:

Be it known that I, JOSEPH SCHWERTNER, a citizen of the United States, and a resident of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Valve Structures, (Case 10,) of which the following is a specification.

My invention relates to improvements in valve structures, and more particularly to pneumatic coupling valve structures adapted for use in musical instruments.

The general features of the improvements described and claimed in this application have been previously described and shown in my co-pending applications, Serial No. 535,585; filed December 30, 1909, for automatic playing instruments, and Serial No. 596,196; filed December 8, 1910, for improvements in musical instruments.

One object of my invention is to provide a coupling valve structure for coupling two air ducts or openings and closing one air duct, which valve structure will take up only a very small amount of room, much less room than prior structures of this class have occupied.

A further object of my invention is to provide such a valve structure, so arranged and constructed that a plurality of them may be placed side by side and in very close proximity to one another without one interfering with another.

A further object of my invention is to provide a valve structure which is reliable in operation and which may be pneumatically operated and although it has two bellows or their equivalents opposing one another, one of them will always predominate at the proper time, and this with the same pressure in the two bellows.

A further object of my invention is to provide such a valve structure, which, although taking up a very small amount of room, is quickly responsive, and especially efficient in operation and economical in construction.

Further objects, features and advantages will more clearly appear from the detailed description given below, taken in connection with the accompanying drawings, which form a part of this specification.

Referring to the drawings, Figure 1 is a side view of a valve structure, embodying one form of my invention. Fig. 2 is a top

plan view of a series of the main parts of valve structures shown in Fig. 1. Fig. 3 is a vertical sectional view of the valve structure shown in Fig. 1. Fig. 4 is a vertical section of a modified form of valve structure embodying certain of my improvements. Fig. 5 is a top plan view of structures shown in Fig. 4.

Referring to Figs. 1, 2 and 3, 1 represents a wooden block or base, into which pass two air ducts 2 and 3. The air ducts 2 and 3 pass upwardly through the block 1 and through a member 4, which rests on the top of the block 1. Arranged over the block 1 is a movable member 5 pivotally mounted with respect to the member 4 and fulcrumed between its ends, as upon a piece of felt 6, which extends from one side of the members 4 and 5 to the other side of the members 4 and 5. The member 5 thus comprises two arms of a lever member, the arm on the right-hand side of the fulcrum 6 being much longer than the arm on the left-hand side of the fulcrum. Both of the wind ducts 2 and 3 pass through the member 4 on the left-hand side of the fulcrum 6. The short arm of the member 5 carries a valve closure 7, preferably of felt, and when the long arm of the member 5 is raised, the valve closure 7 is moved downwardly to close the wind duct 3.

The members 4 and 5 are entirely surrounded by a flexible membrane 8, so as to exclude atmospheric pressure. Thus, by surrounding the members 4 and 5 by the membrane 8, the device is divided into two compartments, one on the right-hand side of the fulcrum 6 and the other on the left-hand side of the fulcrum 6. The block 1 contains a chamber 9, and from the chamber 9 an air duct 10 leads into the right-hand compartment above. When it is desired to close the valve 7, air pressure is exerted within the chamber 9, which air pressure acts on the long arm of the lever member 5, thus forcing the short arm thereof downwardly to close the valve. When it is desired to couple the air ducts 2 and 3, the air pressure from chamber 9 is removed in any suitable manner, thus allowing the air pressure within the ducts 2 and 3 to exert itself upon the short arm of the lever and the atmospheric pressure to exert itself upon the long arm which forces the short arm up-

wardly and the long arm downwardly, so that the valve is opened and the ducts coupled together. Thus the membrane together with the members 4 and 5, forms a bellows or the like acting on the long arm of the lever and a bellows or the like acting on the short arm of the lever, but one arm being longer and the bellows acting on that arm being larger, it will predominate over the bellows on the short arm so that with equal pressure or suction in each bellows the valve closure will be caused to close the wind duct 3.

In order that these valve structures or that portion of the same comprising the members 4 and 5 and intermediate parts may be placed closely adjacent one another without the membranes 8 interfering with the operation of one another, I taper off the members 4 and 5 in a direction away from the fulcrum 6. This tapering is clearly shown in Fig. 2, wherein the sides of the members 4 and 5 are shown tapered away from the fulcrum toward the right at 11, and away from the fulcrum toward the left at 12.

Referring to Figs. 4 and 5, I there show a modified form of valve structure, in which the block 13 is provided with two air ducts 14 and 15, which pass upwardly through a member 16, as clearly shown in Fig. 4. Arranged above the member 16 is a movable member 17, fulcrumed at one end upon a piece of felt 18. Near its other end the member 17 carries a piece of felt 19, which acts as a valve closure for closing the air duct 14. Two members 16 and 17 are entirely surrounded by a flexible membrane 20, to exclude atmospheric pressure. A spring 21, normally acts to force the member 17 downwardly, thus tending to normally close the valve. A member 22, rigid with the member 16, projects outwardly to the right and the valve may be manually or mechanically lifted by this member, as clearly shown in the drawing. When it is desired to couple the duct comprising the air passages 14 and 15, the member 22 is raised, thus raising the valve closure 19 to open the valve and couple the air passages. Upon releasing the member 22, the spring 21 forces the member 17 downwardly to close the valve.

As shown in Fig. 5, the sides of the members 16 and 17 are tapered off from the fulcrum 18 toward the right, so that these valve structures may be placed closely together without their operation interfering with one another. In fact, the valve structures of either Figs. 1, 2 and 3, or Figs. 4 and 5, may be placed side by side, and so closely together that the fulcrum parts 6 or 18 may substantially touch one another except for the intervening membranes and yet the tapering away of the movable members gives ample room for the expansion or movement

of the flexible membranes 8 or 20, so that these members do not interfere with the operation of adjacent valve structures.

From the above, it will clearly appear that the valve closures shown are extremely simple and easy to manufacture, and that they can be placed very closely side by side one another and take up a very little room in any direction. This is of great importance in connection with valves used in pneumatically operated musical instruments.

I use the term "tapered" in its broad sense to include any structure in which the sides of members are reduced to accomplish the object stated and do not limit it to a taper on straight symmetrical lines.

Although I have described my improvements in great detail, nevertheless, I do not desire to be limited to such details, except as clearly specified in the appended claims, since many changes and modifications may well be made without departing from the spirit and scope of my invention in its broadest aspects.

However, having fully and clearly described my improvements, what I claim as new and desire to secure by Letters Patent, is:

1. The combination of a plurality of pneumatic valve structures for musical instruments or the like, each comprising two relatively movable members one fulcrumed with respect to the other, and a flexible membrane extending from one member to the other to form a bellows, said bellows tapering off away from the fulcrum along both members whereby the structures may be placed close together with the axes in the same line without interfering with one another.
2. The combination of a plurality of pneumatic valve structures for musical instruments or the like, each comprising two relatively movable members one fulcrumed with respect to the other, a flexible membrane extending from one member to the other to form a bellows, said bellows tapering off away from the fulcrum along both members whereby the structures may be placed close together with the axes in the same line without interfering with one another, one of said members having a valve opening and the other carrying a valve closure inside the bellows for closing said opening, and means whereby said valve is normally maintained closed.
3. A pneumatic valve structure for musical instruments or the like, comprising a relatively fixed member and a relatively movable member fulcrumed thereto intermediate their ends, and a flexible membrane extending from one member to the other to form a bellows on each side of the fulcrum, one bellows being larger than the other whereby with the same pressure in both the larger bellows will predominate.

4. A pneumatic valve structure for musical instruments or the like, comprising a relatively fixed member and a relatively movable member fulcrumed thereto intermediate their ends, a flexible membrane extending from one member to the other to form a bellows on each side of the fulcrum, one bellows being larger than the other whereby with the same pressure in both the larger bellows will predominate, two ducts leading into the smaller bellows through the fixed member, and a valve closure carried by the movable member inside said smaller bellows for closing one of said ducts.

5. A pneumatic valve structure for musical instruments or the like, comprising a relatively fixed member and a relatively movable member fulcrumed thereto intermediate their ends, and a flexible membrane extending from one member to the other to form a bellows on each side of the fulcrum, one bellows being larger than the other whereby with the same pressure in both the larger bellows will predominate, both of said bellows being tapered off along both members away from the fulcrum.

6. The combination of a plurality of pneumatic valve structures for musical instruments or the like, each comprising a relatively fixed member and a relatively movable member fulcrumed thereto intermediate their ends, a flexible membrane extending from one member to the other to form a bellows on each side of the fulcrum, one bellows being larger than the other whereby with the same pressure in both the larger bellows will predominate, two ducts leading into the smaller bellows through the fixed member, and a valve closure carried by the movable member inside said smaller bellows for closing one of said ducts, both of said bellows being tapered off along both members away from the fulcrum, whereby the structures may be placed close together with their axes in the same line without interfering with one another.

7. A pneumatic valve structure for musical instruments or the like, comprising a relatively fixed member and a relatively

movable member fulcrumed thereto intermediate their ends, a flexible membrane extending from one member to the other to form a bellows on each side of the fulcrum, one bellows being longer than the other whereby with the same pressure in both the longer bellows will predominate, two ducts leading into the shorter bellows, a valve carried inside the shorter bellows for closing one of said ducts, and means whereby the longer bellows may be inflated to close said valve.

8. The combination of a plurality of pneumatic valve structures lying side by side, each comprising a relatively fixed member and a relatively movable member fulcrumed thereto intermediate their ends, and a flexible membrane extending from one member to the other to form a bellows on each side of the fulcrum, both of said bellows being tapered off along both members away from the fulcrum, whereby the structures may be placed close together with their axes in the same line without interfering with one another.

9. The combination of a plurality of pneumatic valve structures lying side by side, each comprising a relatively fixed member and a relatively movable member fulcrumed thereto intermediate their ends, a flexible membrane extending from one member to the other to form a bellows on each side of the fulcrum, two ducts leading into one bellows through the fixed member, and a valve closure carried by the movable member inside said last mentioned bellows for closing one of said ducts, both of said bellows being tapered off along both members away from the fulcrum, whereby the structures may be placed close together with their axes in the same line without interfering with one another.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOSEPH SCHWERTNER.

Witnesses:

GORHAM CROSBY,
EDWIN SEGER.