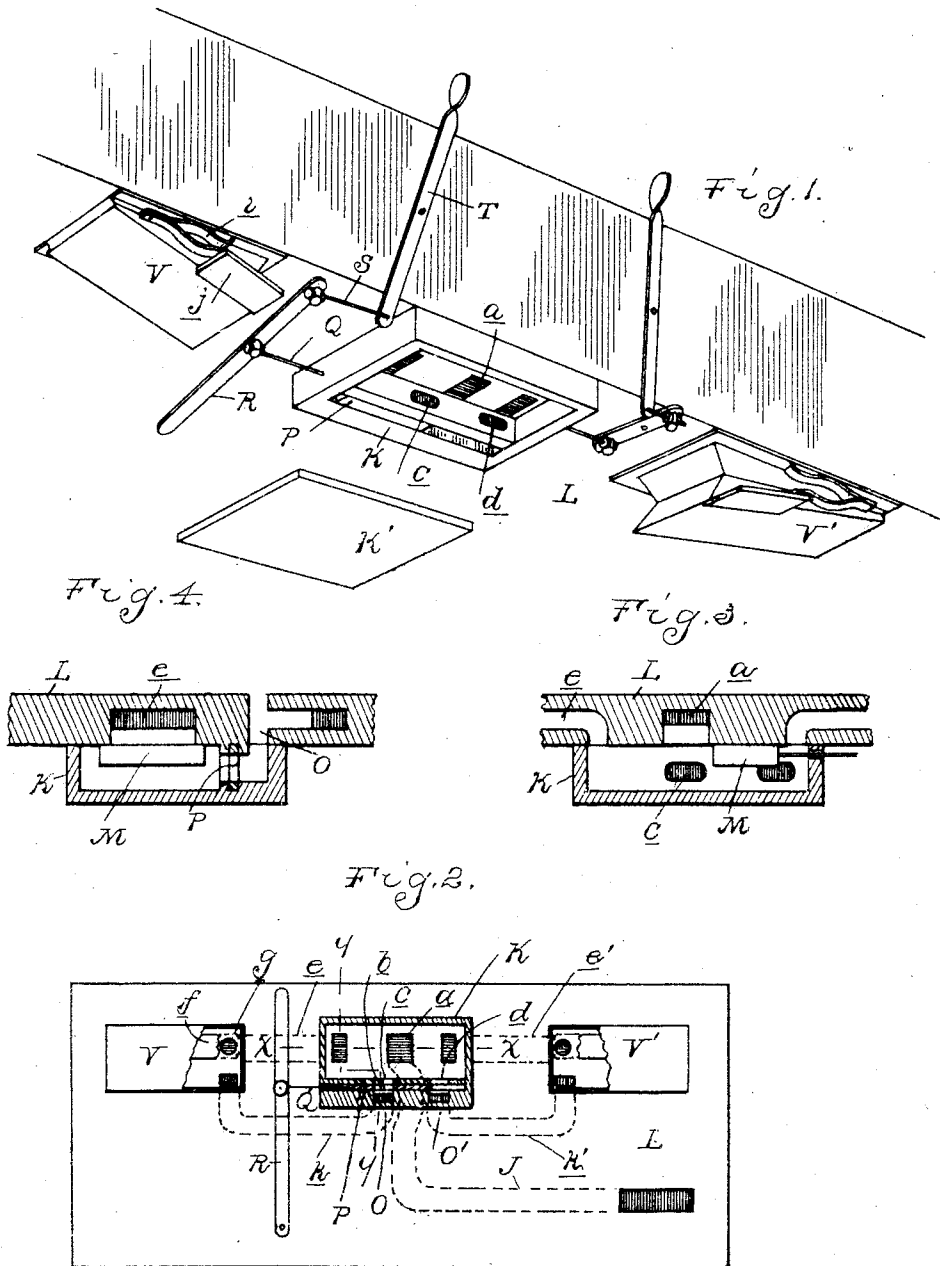


F. W. DRAPER.  
SELF PLAYING ATTACHMENT FOR MUSICAL INSTRUMENTS.

APPLICATION FILED MAY 27, 1901.

3 SHEETS—SHEET 1.



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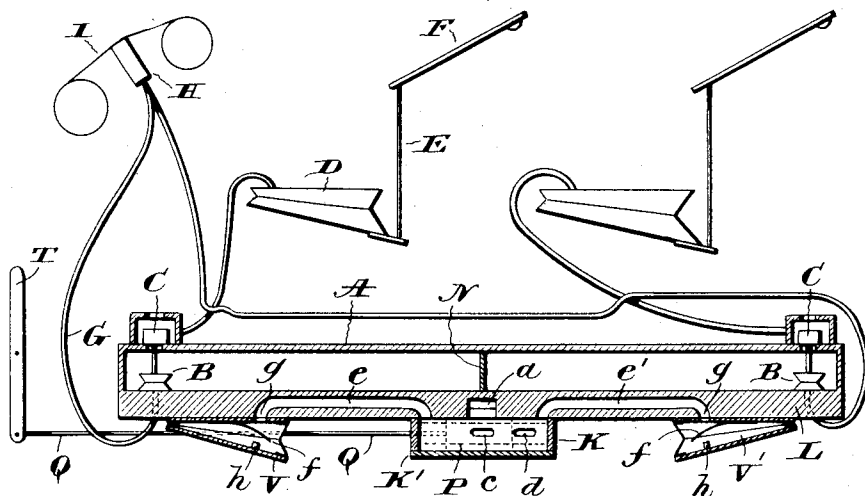
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3 SHEETS—SHEET 2.

Fig. 5.



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No. 791,458.

PATENTED JUNE 6, 1905.

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3 SHEETS—SHEET 3.

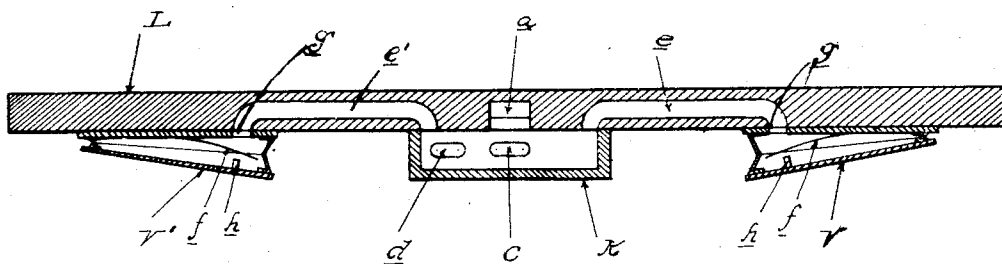


Fig. 6.

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# UNITED STATES PATENT OFFICE.

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## SELF-PLAYING ATTACHMENT FOR MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 791,458, dated June 6, 1905.

Application filed May 27, 1901. Serial No. 62,077.

*To all whom it may concern:*

Be it known that I, FRANCIS W. DRAPER, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Self-Playing Attachments for Musical Instruments, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to self-playing attachments for musical instruments, and more particularly to the construction of certain expression devices whereby various musical effects may be produced by the player.

It is the object of the invention, first, to provide means for emphasizing the solo note by suppressing the accompaniment; further, to provide means for executing a crescendo or a diminuendo.

It is a still further object of the invention to provide means for controlling said expression devices without complicating the mechanism or the introduction of a multiplicity of controlling-levers.

The invention consists in the peculiar construction, arrangement, and combination of parts, as hereinafter described and claimed.

In the drawings, Figure 1 is a perspective view of a portion of an autopneumatic action to which the improvements are applied. Fig. 2 is a bottom plan view thereof. Fig. 3 is a section on line *xx*, Fig. 2. Fig. 4 is a section on line *yy*, Fig. 2. Fig. 5 is a longitudinal sectional view. Fig. 6 is a longitudinal section of Fig. 2 looking from the rear side of the instrument.

Referring more specifically to the drawings, A is a wind-chest containing a series of primary-pneumatic motors B, adapted to actuate valves C, controlling the secondary or key-actuating pneumatics D. These pneumatics are suitably connected by the rods E with the finger-levers F for actuating the keys of the musical instrument. The primary pneumatics B are connected by conduits G with the channeled range or tracker board H, which is controlled by the perforated music-sheet I.

The wind-chest A is provided with connec-

tions to suitable wind-pumping devices, (not shown,) by means of which when the device is in operation a partial vacuum is formed in said chest. Thus when in the movement of the perforated music-sheet I one or more of the apertures in the tracker-board is open air under atmospheric pressure will pass through the conduits G and expand the normally collapsed pneumatics B, thereby shifting the corresponding valve C and causing the operation of the key-actuating pneumatics D.

It is one of the objects of the present invention to provide means for varying the force with which said pneumatics are operated by changing the operating pressure exerted thereon, the mechanism for effecting this result being constructed as follows:

J is an air-conduit leading from the pumping-bellows, (not shown,) and K is a wind-chest connected with said conduit and having a cover K'. As shown in dotted lines in Fig. 2, the conduit J is formed by a channel in the bottom board L of the wind-chest A, and the chest K is also secured to said bottom board.

M is a valve within the chest K, adapted in one position to close the port *a*, connecting the passage J with said chest.

The chest A is divided into two compartments by a partition, such as N, and each of these compartments is connected to the chest K by an air-conduit. These conduits O and O' are preferably formed, as shown in dotted lines in Fig. 2, in the bottom board L of the chest A.

P is a valve for variably restricting or completely closing one or both of the conduits O and O'. As shown in Figs. 1, 2, 4, and 5, this valve is formed by a registered slide engaging the channel in one wall of the chest K and adapted to be moved longitudinally by a rod Q, connected to a lever R, fulcrumed on the bottom of the chest A. The lever R in turn is connected by a rod S with a lever T, adapted to swing in a vertical plane and pivotally secured to the front wall of the chest A. The slide P is provided with an aperture *b*, adapted in the normal position of said slide to register with port *c*, connecting the chest K with

a conduit O. Upon opposite sides of this aperture *b* are imperforate portions of the slide of sufficient area so that a movement of the slide in either direction will close the port *c*, while a movement in one direction will simultaneously close the port *d*, connecting the chest K with a conduit O'. The ports *c* and *d* are preferably elongated, as shown in Fig. 3, so that a movement of the slide will gradually restrict said ports before completely closing the same.

In addition to the passages O and O' the two compartments of the chest A are connected with the chest K by two indirect conduits, and each of these conduits has connected therein an automatic regulator, respectively, V and V'. These conduits are preferably formed by channels in the bottom board L of the chest A, as shown in Figs. 2 and 5, in which *e* is a channel leading from the chest K to the left thereof and *e'* is a similar channel leading to the right. These channels *e* *e'*, respectively, connect chest K to the regulators V and V', which latter comprise collapsible chambers or bellows secured to the bottom board L of the chest A. Within each chamber is arranged a spring flap-valve *f*, adjacent to the port *g*, connecting with the passage *e* or *e'*. *h* is a stop secured to the movable wall of each of said chambers adapted when the latter is collapsed to bear upon the valve *f* and move the same to close the port *g*.

*i* is a spring for normally expanding the collapsible chamber which, as shown, is interposed between the bottom board L and the projecting ledge *j* on the movable wall of said chamber.

*k* and *k'* are channels formed in the base-board L and respectively connecting the regulators V and V' with the conduits O and O' beyond the valve P.

With the arrangement of parts as above described it will be understood that the air-suction developed by the pumping-bellows (not shown) is communicated through the conduit J to the chest K whenever the valve M is in a position to uncover the port *a*. The chest K in turn is connected to the two compartments of the chest A, first, directly by the valve-controlled conduits O and O', and, secondly, indirectly by the channels *e* and *k* and regulator *v* and conduit O and *e'* *k'* and regulator V' and conduit O'. The tension of the spring is so adjusted that it is incapable of sustaining the normal pressure developed by the pumping-bellows when acting upon the area of the regulator, and as a consequence whenever the suction is applied the regulators V and V' will be wholly or partially collapsed. In collapsing the stops *h* are pressed against the valve *f*, moving the latter, so as to restrict the area of the port *g*, connecting with the channel *e*. When the valve P is in its normal position, opening the conduits O and O', the chest K will be in direct commu-

nication with the two compartments of the chest A through said conduits, with the result that the pressure in said compartments will be substantially the same as that in the chest K. When, however, the valve P is shifted in position, so as to restrict or close one or both of said conduits, it will be evident that the air will pass by way of the connecting-passages—viz., the channels *e* *k* or *e'* *k'*. In traveling the latter course the air is obliged to pass the restricted ports *g*, with a consequence that different pressure is maintained in the chest A from that in the chest K, the former being determined by a spring *i* of the regulator, which is of less tension relative to the wind area acted upon than the springs of the pumping-bellows.

The partition N in the chest A is for the purpose of dividing the action, so that the pneumatics in one compartment may be operated at a different pressure from those in the other compartment. The positioning of the partition is such that it will separate the keys usually employed for the solo notes from those which were used for the accompaniment, and the exact point of division is preferably between G and G# above middle C. Thus when the device is in use the player may at his option operate all of the pneumatics under the same pressure—viz., that of the pumping-bellows—or he may vary the pressure in one or both compartments by an adjustment of the lever T. When this lever is moved to the right of its central position, as shown in Fig. 1, it will shift the valve P, so as to restrict or close the conduit O, the conduit O' remaining open. On the other hand, when the lever is moved to the left it will shift the valve in the opposite direction, so as to simultaneously restrict or close both conduits O and O'.

The construction and operation of the mechanism being as above described, it may be used as an expression device in the following manner: Supposing the player in operating the attachment notices a passage in the music marked "diminuendo," by moving the lever T gradually to the left both ports *c* and *d* are gradually restricted by the valve P, so as to diminish the quantity of air passing through the conduits O and O', and thereby compel the air to pass by way of the regulators. The result will be that the operating pressure upon the pneumatics will be gradually decreased, which will soften their action and produce the desired effect in the music. If, on the other hand, it is desired to merely suppress the accompaniment in order that the solo note may stand out in prominence, the player moves the lever T to the right, which restricts or closes the ports *c*, leaving the port *d* fully open. This will soften the action of the pneumatics in the left-hand portion of the chest A, which corresponds to the bass notes of the musical instrument, while the pneu-

matics in the right-hand compartment are actuated under full pressure.

It is desired to call attention to the fact that it is impossible to make any sudden break in the music by shifting the lever T, and this is for the reason that the central position of said lever fully opens both of the ports *c* and *d*, thereby restoring normal pressure on all parts of the action. At the same time by having a single lever instead of two separate levers for controlling the two separate regulators the operation is simplified.

What I claim as my invention is—

1. In an autopneumatic player for musical instruments, the combination with a store-bellows, of a divided action having separate exhausting-compartments and separate passages leading from the separate compartments thereof and connected with said store-bellows, and automatic pressure-regulators for separately controlling the air passing through said separate passages.

2. In an autopneumatic player for musical instruments, the combination with a store-bellows, of a divided action having separate exhausting-compartments, a wind-chest connected with said store-bellows and having

separate connections with the separate compartments of said action, automatic pressure-regulators for separately controlling the air passing through said separate connection, and means for opening or closing a shunt-air connection between each of said compartments and said wind-chest.

3. In an autopneumatic playing attachment for musical instruments, the combination with a pneumatic key-operating action and mechanism for developing a normal operating wind-pressure thereon, of means for diminishing the pneumatic pressure separately upon different complementary portions of said action, to soften the operation thereof, and a single controller for said pressure-diminishing means adapted in its normal position to place full pressure on said action and when moved upon either side of said normal position to gradually diminish the pressure respectively upon one or both portions of said action.

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS W. DRAPER.

Witnesses:

M. B. O'DOHERTY,  
H. C. SMITH.