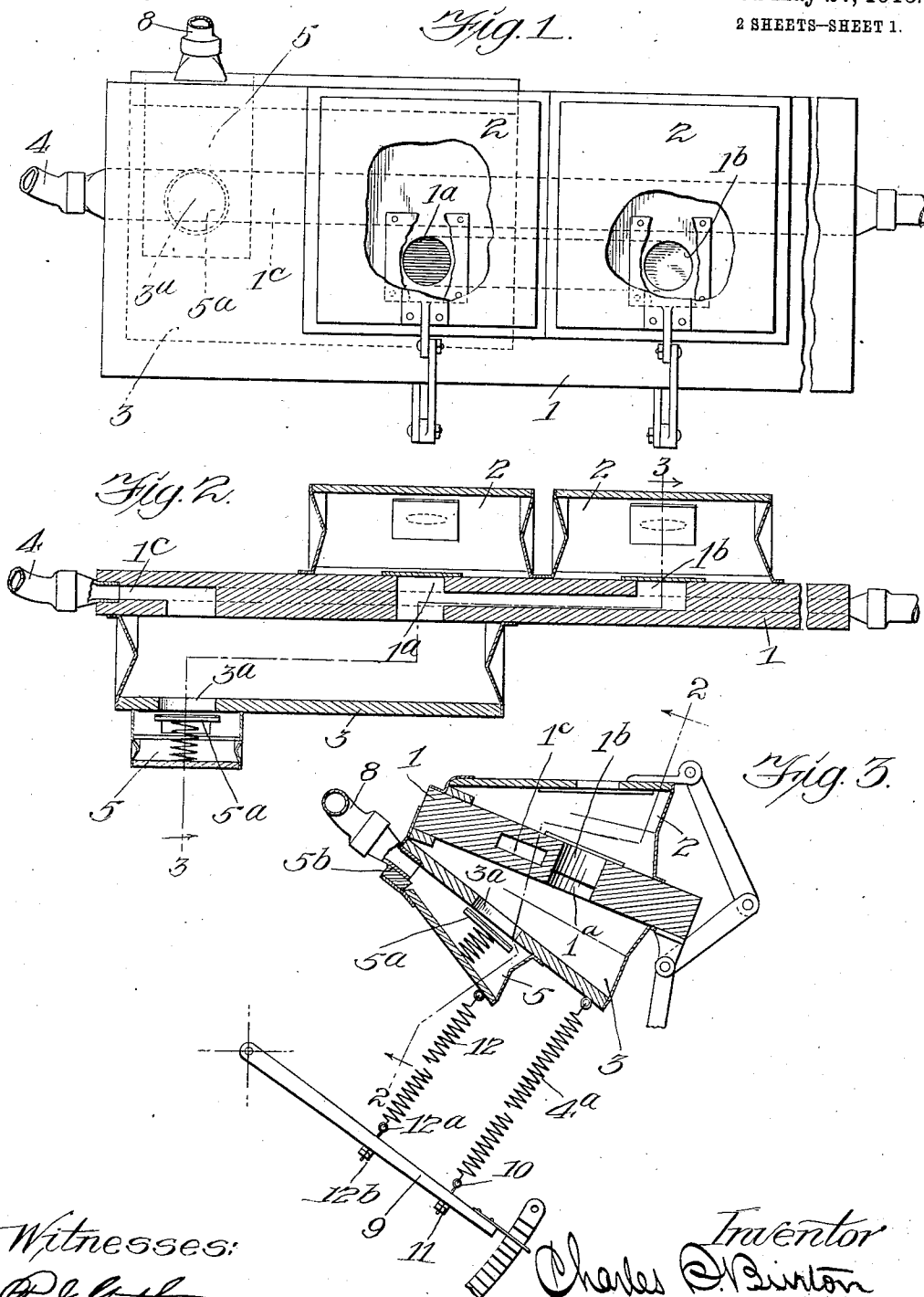


C. S. BURTON.
 BELLOWS ACTION FOR AUTOPNEUMATIC MUSICAL INSTRUMENTS.
 APPLICATION FILED JAN. 5, 1910.

1,062,885.

Patented May 27, 1913.

2 SHEETS—SHEET 1.



Witnesses:
 P. J. Gathmann
 C. J. Schussel

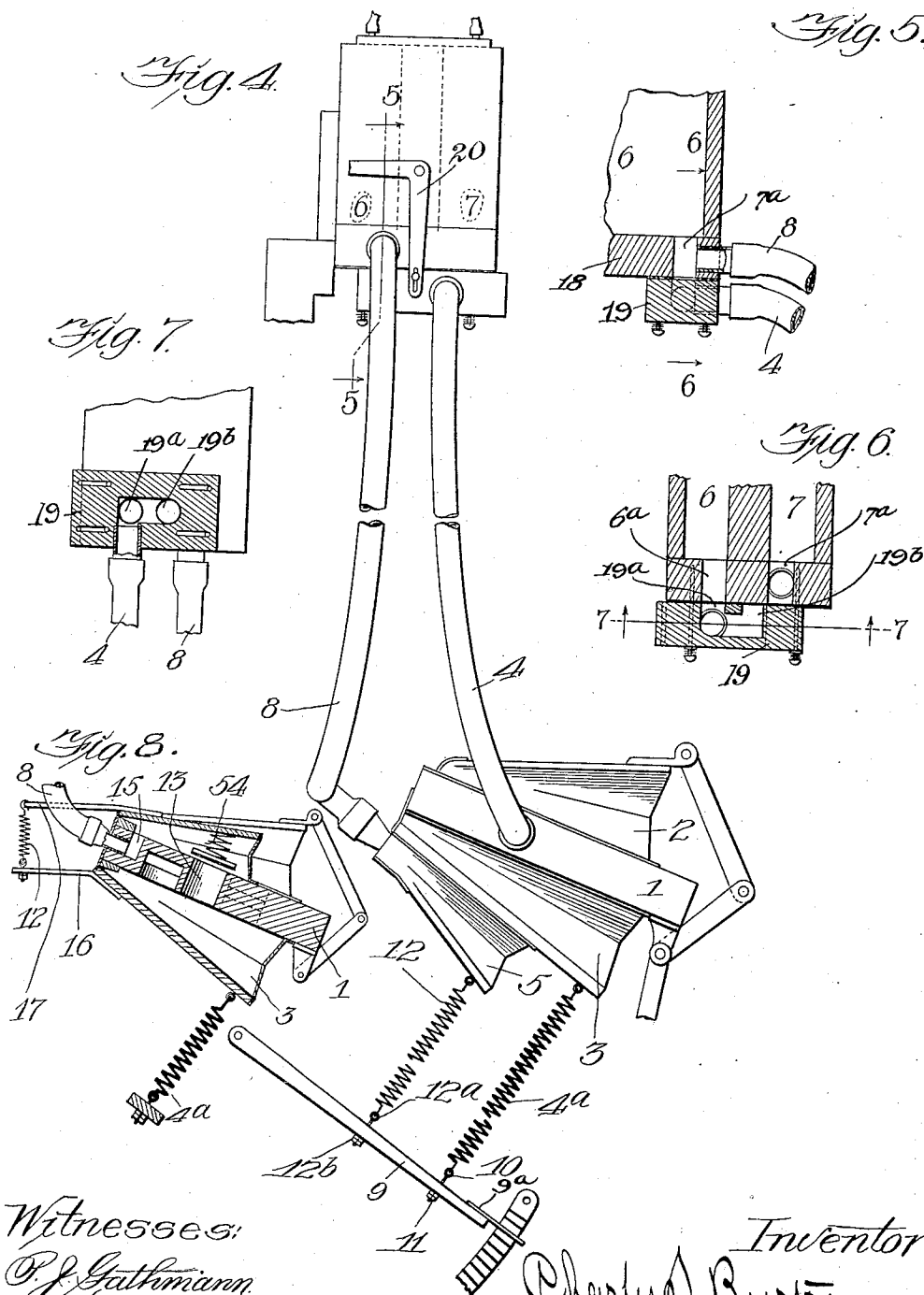
Inventor
 Charles S. Burton
 By his Attorneys:
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UNITED STATES PATENT OFFICE.

CHARLES S. BURTON, OF OAK PARK, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO MELVILLE CLARK PIANO COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF
ILLINOIS.

BELLOWS-ACTION FOR AUTOPNEUMATIC MUSICAL INSTRUMENTS.

1,062,885.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed January 5, 1910. Serial No. 536,460.

To all whom it may concern:

Be it known that I, CHARLES S. BURTON, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented new and useful Improvements in Bellows-Action for Autopneumatic Musical Instruments, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved construction of a bellows action and governing devices for producing and controlling the exhaust tension or rarefaction of the air for operating the motor pneumatics of an autopneumatic instrument.

It consists in the elements and features of construction and their combination shown and described, as indicated in the claims.

In the drawings: Figure 1 is a partly sectional top plan view of the same the portions of the pumper bellows being broken away. Fig. 2 is a section at the line 2—2 on Fig. 3. Fig. 3 is a section at the line 3—3 on Fig. 2. Fig. 4 is an end elevation of the structure shown in Figs. 1 and 3. Fig. 5 is a section at the line 5—5 on Fig. 4. Fig. 6 is a section at the line 6—6 on Fig. 5. Fig. 7 is a detail section at the line 7—7 on Fig. 6. Fig. 8 is a view similar to Fig. 3, showing a modification.

The result to be accomplished by this invention is the maintenance of any desired or predetermined relation or ratio between the tensions produced by the same pumps in two different air chambers or pneumatic actions where differing tensions are required for playing different parts of music with different degrees of intensity, as for accenting or for playing a solo and accompaniment so that whether the music of the whole is played loudly or softly the relative difference between the accented and unaccented parts of the solo and accompaniment shall be maintained without the necessity of the special attention of the operator to this feature, the change of intensity of one part resulting automatically from the change of intensity of the other part.

As illustrated in the drawings, the invention is applied to a bellows action in which all changes of intensity or force in playing are effected by the operator increasing or diminishing the rapidity of the pedal ac-

tion operating the pumps, so that such change is at all times under the control of the operator and subject to his mood or interpretation of the music played; but it will be understood that the invention is equally applicable to structures in which the change of intensity is controlled or effected otherwise than by varying the pumping.

The drawings show the bellows foundation board, 1, having pumps, 2—2, mounted on its upper side, and exhausting the air from a receiver, 3, mounted upon the underside of the foundation board, both pumps operating upon the one receiver as usual, through the passages, 1^a, 1^b, in the foundation board leading from the respective pumps to said receiver. From the receiver communication which so far as this invention is concerned, may be uncontrolled, is afforded by passage, 1^c, in the foundation board, leading out at the edge of said board by a trunk pipe, 4, to any chamber which is to afford the higher of the two tensions desired, such chamber being represented at 6, in Fig. 4 without regard to its relative position with respect to the bellows action.

Upon the moving wall of the receiver, 3, there is mounted a governor pneumatic, 5, which communicates with the receiver, 3, by a port, 3^a, in the moving wall of said receiver, the moving wall of the pneumatic carrying a valve, 5^a, which closes the port, 3^a, upon the collapse of the governor pneumatic. This governor pneumatic forms part of a conduit communicating with any chamber in which the lesser tension is desired, represented at 7, in Fig. 4, without regard to the relative position of said chamber and the bellows action. The remainder of said conduit consists of a passage, 5^b, leading out of the governor pneumatic through the moving wall of the receiver, 3, and connected at the edge of said moving wall with a pipe, 8, which extends to the chamber, 7. The collapse of the receiver, 3, is resisted by a spring, 4^a, attached at one end to the moving wall and at the other end to a support, as a lever, 9, mounted and adapted to be fixed on the fixed casing of the instrument. Provision for varying tension of this spring can be made if desired by making the connection of the spring to the lever by means of an eyebolt, 10, on which the nut, 11, may be adjusted, to stretch the spring more or

less independently of the collapse of the pneumatic. The collapse of the governor pneumatic, 5, is yieldingly resisted in like manner by a spring, 12, similarly connected and provided with similar means, viz. eye bolt, 12^a, and nut 12^b, for varying its tension independent of the collapse of the pneumatic.

For adjusting both the springs, 12 and 4^a, proportionately by movement of the lever, 9, there is provided a ratchet segment, 21, mounted on any convenient fixed support not shown, adjacent to the path of movement of the free end of the lever, 9, with which a suitable tooth, 9^a, on said lever engages to retain the lever at any position to which it may be moved within the range of the segment. Upon considering this structure, it will be observed that the tension produced in the chamber 7 exhausted through the governed conduit which comprises the governor pneumatic, 5, is limited to that which will collapse the governor pneumatic against the tension of its spring, 12, sufficiently to seat the valve, 5^a, while the tension produced in the chamber, 6, is unlimited except by the capacity of the pumpers; but it will be understood that the tension which can be maintained so as not to be sensibly affected by each stroke of the pumpers, is that which is necessary to collapse the receiver fully against the resistance of the spring, 4^a. The tension of this spring, 4^a, being adjusted so as to yield the maximum tension desired in the chamber 6, and the length of the spring, 4^a, being so related to the range of the collapsing movement of the receiver, 3, as to afford desired range of tension in the collapse of the receiver, and like adjustment being made between the length of the spring, 12, and the range of collapsing movement of the governor pneumatic, 5, the collapse of the receiver, 3, produced by pumping in excess of the amount of air supplied through the pneumatic action (varying according to the number of notes being played), by reason of the fact that the governor pneumatic, 5, is carried bodily with the moving wall of the receiver, increases the tension of the spring, 12, proportionately as the tension produced in the receiver, 3, is increased and indicated by its collapse against resistance of its spring, 4^a; and the desired result sought is thereby accomplished, namely, that the louder or more intense the playing of the parts of the music produced by the action of the high or ungoverned tension chamber, the louder or more intense will be the playing produced by the action operated by the low or governed tension chamber, while both are varied according to the rapidity of the pumping and consequent degree of collapse of the receiver, 3.

Obviously it is not essential that the gov-

ernor pneumatic, 5, should be mounted on the moving wall of the receiver. Any other position and connections by which the movement of the moving wall of the receiver tensions the springs of the governor pneumatic will give the desired result.

Fig. 8 shows a modification in which the structure is in all respects as already described, except that the governor pneumatic, 54, is mounted on the upper side of the foundation board at a point conveniently situated for communicating with the receiver through a passage, 13, in the foundation board, and with the pneumatic action chamber, 6, by way of a passage, 15, in the foundation board connecting with the trunk pipe, 8, leading to the said pneumatic action chamber. In this form the spring, 12, which determines the tension to which the air is controlled by the governor pneumatic, is connected at one end to a lever arm, 17, of the moving wall of the governor pneumatic, and at the other end to a lever arm, 16, of the moving wall of the receiver bellows, said lever arm projecting off rearwardly from the heels or hinged edges of said moving walls respectively. This construction it will be seen results in stretching the spring, 12, to increase its tension and pull upon the governor pneumatic when the receiver, 3, is collapsed, being the same result effected by the other structure, as in the first described construction. The length and stiffness of the springs and the lever arms to which they are attached, will be proportioned so as to allow any desired ratio between the tension produced in the said receiver and pneumatic respectively by any given amount of collapse.

In the construction illustrated in the drawings, provision is shown for shifting the air connection of the ungoverned receiver so that it shall communicate at will with either or both of the chambers, 6 and 7, rendering either or both effective at the high tension which may be maintained in the receiver governed only by the pumping and the adjustment of the lever, 9, for tensioning the spring, 4^a. This provision consists in mounting on the ported board, 18, which forms one end or side of both chambers, 6 and 7, a slidable ported bar of the nature of a valve bar, 19, to which the duct, 4, is connected, said slidable bar having ports, 19^a and 19^b, both leading from the connection of the duct, 4, and opening at the face of the bar which seats on the board, 18, for registering with the ports, 6^a and 7^a, respectively, to give the duct, 4, communication with the chamber, 6, or other chamber, 7, according to the position of the slidable bar, 19. Said bar is shifted at will by a lever, 20, fulcrumed on any convenient fixed support and operated by any convenient connection not shown.

I claim:

1. In an auto pneumatic musical instru-

ment in combination with two air chambers, pumpers and receiving bellows exhausted by the pumpers, conduits from the receiving bellows to the air chambers respectively, one
 5 of said conduits comprising a governor pneumatic mounted upon the moving wall of the receiver; springs which yieldingly resist the collapse of the receiver and said
 10 governor pneumatic respectively, both said springs having one end held independently of said moving wall of the receiver whereby the movement of the latter modifies the tension of the governor or spring.

2. In an auto pneumatic musical instrument in combination with pumpers and receiver bellows exhausted by the pumpers, two conduits leading from the receiver, air chambers to which they respectively lead, a
 15 governor pneumatic in one conduit, springs connected at one end to the moving members of the receiver and governor pneumatic respectively, a lever device to which the other
 20 ends of the springs are connected, means for adjusting and securing the lever, the points of attachment of said springs to said lever being distant respectively from the fulcrum

of the lever proportionately to the length of the springs, whereby they are proportionately modified in tension by movement of the lever. 30

3. In an autopneumatic musical instrument, in combination with pumpers and a receiver exhausted thereby, two conduits leading from the receiver; air chambers to which they respectively lead; a governor
 35 pneumatic in one conduit; springs which resist the collapse of the receiver and governor pneumatic respectively, said springs being connected at one end to the moving walls of the receiver and governor pneumatic re-
 40 spectively; a lever to which they are connected at their other ends, and means for adjusting the lever to vary the tension of the springs.

In testimony whereof I have hereunto set
 45 my hand at Chicago, Illinois, this third day of January, 1910.

CHARLES S. BURTON.

Witnesses:

C. J. CHRISTOFFEL,
 M. GERTRUDE ADY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."