No. 806,149. PATENTED DEC. 5, 1905.

L. U. JOBES.

AUTOMATIC MUSICAL INSTRUMENT.

APPLICATION FILED JULY 1, 1906.

2 SHEETS—SHEET 1.

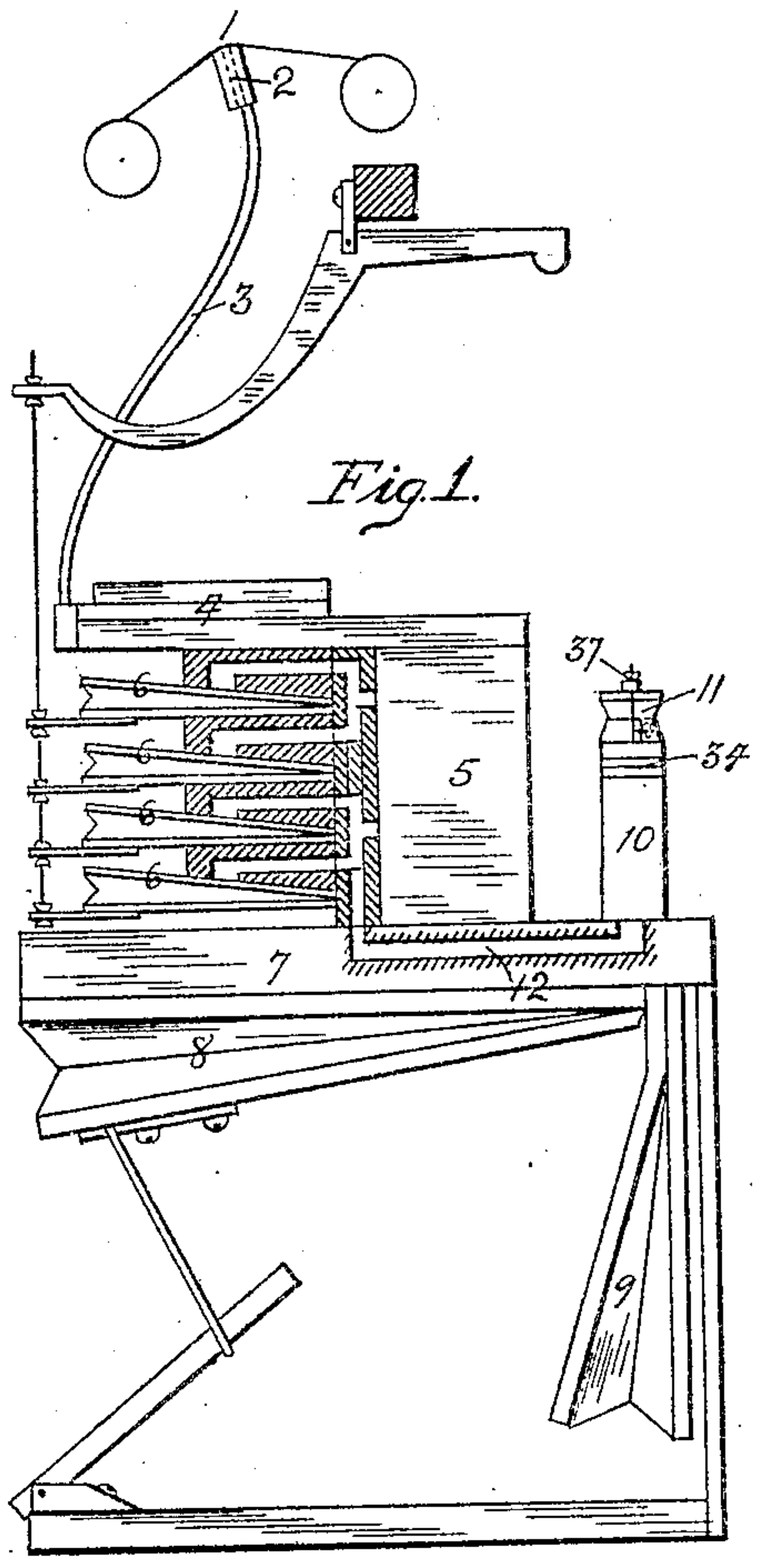

Fig. 1.

WITNESSES:

J. W. Macy.

A. K. Klimm.

INVENTOR.

Lawrence U. Jobes.

No. 806,149. PATENTED DEC. 5, 1905.

L. U. JOBES.

AUTOMATIC MUSICAL INSTRUMENT.

APPLICATION FILED JULY 1, 1905.

2 SHEETS—SHEET 2.

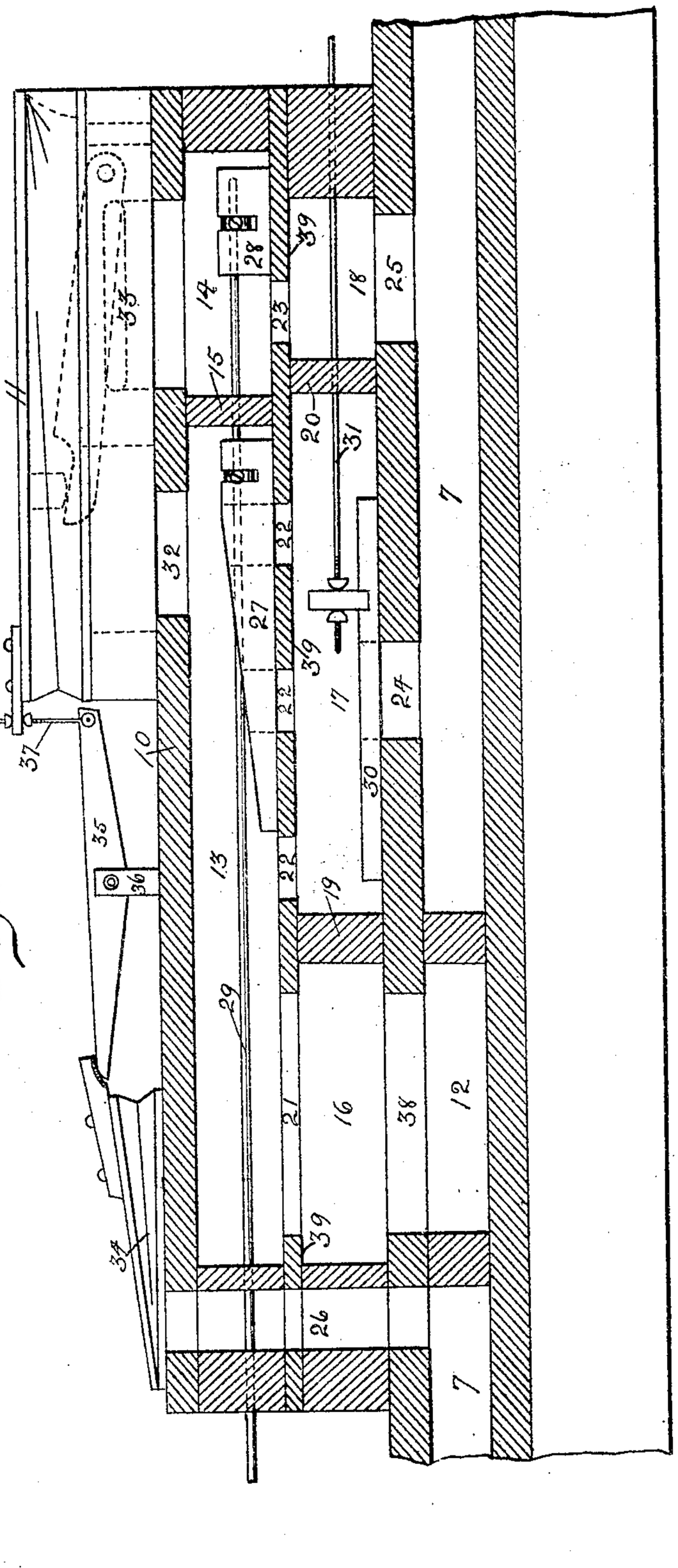

Fig. 2.

WITNESSES:
J. M. Macy.
H. K. Blinn.

INVENTOR.
Laurence U. Jobes.

UNITED STATES PATENT OFFICE.

LAWRENCE U. JOBES, OF CINCINNATI, OHIO, ASSIGNOR TO THE BALDWIN COMPANY, OF CINCINNATI, OHIO.

AUTOMATIC MUSICAL INSTRUMENT.

No. 806,149. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed July 1, 1905. Serial No. 267,875.

To all whom it may concern:

Be it known that I, LAWRENCE U. JOBES, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Automatic Musical Instruments, of which the following is a specification.

My invention relates to that class of automatic musical instruments which consist of pneumatic actuating devices for pianos or similar instruments controlled by rolls of perforated paper; and the object of my invention is to provide means for musical expression in the class of instruments referred to.

To this end my invention consists of the parts and combination of parts, as hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 shows an end view, partly sectional, of a pneumatic piano-player embodying my invention. Fig. 2 is a longitudinal sectional view of my expression-box and governor, showing the details of construction.

Similar numerals of reference indicate corresponding parts.

The pneumatic device for musical instruments constructed according to my invention consists of exhaust and equalizing bellows, wind-chest or vacuum-chamber, primary and intermediate valve-chambers, a tracker-board, ducts or passages leading from the tracker-board to the primary pneumatics, striking-pneumatics and valve-controlled passages connecting the intermediate valve-chamber with the striking-pneumatics, and an expression-box and governor for controlling the striking force of the striking-pneumatics.

In the drawings, 1 designates the usual or any suitable tracker-board. The ducts 2 of the tracker-board communicate in any suitable manner, as by means of flexible or metal tubes 3, with a primary valve-chamber 4, which may be of any approved or known construction. The valves in the primary chamber control the intermediate valves in the intermediate chamber 5 through suitable airways, and the intermediate valves in turn control the striking-pneumatics 6 through suitable operative air connections. The valve-chambers and striking-pneumatics are preferably grouped as indicated in my application for Letters Patent filed July 6, 1903, Serial No. 164,390, and placed upon an air-chamber or wind-chest 7, to the under side of which are attached the exhaust-bellows 8 and equalizing-bellows 9.

The expression-box 10 and governor 11 are placed on the wind-chest to the rear of the intermediate valve-chamber and communicate with the airway 12, leading through the wind-chest and intermediate valve-chamber to the striking-pneumatics and also communicating with the exhaust-bellows through the wind-chest. By so placing my expression device in the general windway leading from the exhaust-bellows to the striking-pneumatics the action of the latter may be regulated to impart a stroke of maximum, minimum, or intermediate force, as may be desired.

The expression-box 10 is divided horizontally into two parts by the wall 39. The upper division is further divided into two chambers 13 and 14 by the vertical wall 15. The lower division is divided into three chambers 16, 17, and 18 by the walls 19 and 20. The chamber 13 communicates with the chamber 16 by the opening 21 and also with the chamber 17 by the ports 22. The chamber 14 communicates with the chamber 18 by the port 23. In the bottom wall of the box a port 24 connects the chamber 17 with the wind-chest 7. The chamber 18 is also connected with the wind-chest by the opening 25. A similar opening 38 connects the chamber 16 with the passage 12. At one end of the expression-box an air-passage 26 leads through the same and opens into the wind-chest. The ports 22 and 23 are provided with and controlled by slide-valves 27 and 28, both attached to and operated by the same valve-rod 29 and provided with means by which the ports 22 and 23 are closed simultaneously. The port 24 is controlled by a slide-valve 30, operated by the valve-wire 31, which by suitable connections is placed under the control of the operator.

The governor 11, consisting of an inflatable and collapsible bellows, is attached to the upper surface of the expression-box over the chambers 13 and 14 and connected with said chambers by the opening 32, leading to the chamber 13, and the gate-valve 33, connecting the bellows 11 with the chamber 14, said gate-valve being controlled by the movable member of the bellows 11.

In order that the governor-bellows 11 may be maintained in an expanded condition, an auxiliary presser-pneumatic 34 of a predetermined size, communicating with the exhaust

of the wind-chest through the passage 26, is connected with the governor-bellows in such a manner that the suction of the exhaust in closing the presser-pneumatic 34 performs this function. In the drawings I show a lever 35, carried by the fulcrum 36, the ends of said lever engaging the movable members of the bellows 34 and 11 at the point where the lever engages with the bellows 11. I use a regulating-screw 37 for the proper relative adjustment of the two bellows. By this arrangement I place the governor under the control of the presser-pneumatic, as described.

The function of my expression device is to regulate the degree of vacuum-pressure exerted upon the striking-pneumatics, by which a maximum, minimum, or intermediate force is brought into operation selectively by the operator, also to cut off entirely the passage of air through the governing mechanism during the process of rerolling the music-sheet. When in action, the air in the chambers 14 and 18 is constantly under the full vacuum-pressure of the bellows. The chambers 13, 16, and 17 are under a modified pressure, depending upon the position of the valve 30 over the port 24, which controls the circulation of air beyond the limited amount passing through the governor-passage 32 and valve 33.

The operation of my expression-box and governor is as follows: For the purpose of illustration let it be supposed that a perforated music-sheet indicates that some particular part thereof be played pianissimo. The performer being guided by the marks on the sheet or by personal knowledge of the music closes the port 24 by the valve 30 with the proper means provided therefor, and immediately the governor-bellows, because of its area being greater than that of the pneumatic 34, collapses under the action of the exhaust through the chambers 14 and 18, and the gate-valve 33 is closed. As air from the striking-pneumatics enters the chambers 16 and 13 through the passage 12 and opening 38 the partial vacuum therein is relieved. The movable member of the governor-bellows is slightly raised, and the air is allowed to pass through the valve 33. An equilibrium of low vacuum-pressure is thus maintained in the chambers 13 and 16 and the channel 12, leading to the striking-pneumatics, with the result that the softest piano effects are realized. When the music calls for fortissimo or brilliant effects, the operator opens the port 24, which restores the vacuum-pressure of the chambers 13 and 16 to the normal pressure of the bellows, under which the striking-pneumatics act with the greatest force. It will be seen that when the port 24 is partially opened or closed intermediate effects may be obtained, thus offering the greatest facility for musical expression. In the process of rerolling the music-sheet the ports 22 and 23 are closed by the valves 27 and 28. This cuts off all passage of air through the expression-box, thus cutting off the action of the striking-pneumatics.

It is a customary practice in instruments of this class to distend the governor-bellows 11 with a spring, the pressure of which is always fixed and remains constant. With my improved method of maintaining the governor-bellows in an open position with a presser-pneumatic under the constant vacuum-pressure of the exhaust-bellows it is apparent that as the pressure of the exhaust-bellows varies the resisting pressure of the governor-bellows also varies, and a better and more uniform equilibrium of vacuum in the instrument is maintained.

My improved governor is not limited in its application to the particular form of expression-box as herein described, but is equally well adapted to any other form or arrangement embodying the same or similar principles of construction.

Having described my invention, what I desire to secure by Letters Patent is—

1. In a pneumatic musical-instrument player the combination of a governor-pneumatic with an auxiliary presser-pneumatic, said auxiliary pneumatic being connected with and operated by the exhaust of the bellows, and connected also with the governor-pneumatic, and provided with means whereby the latter is maintained in an expanded condition by the action of the exhaust upon the former, substantially as described.

2. In a pneumatic musical-instrument player the combination of a governor-pneumatic with an auxiliary presser-pneumatic, said auxiliary pneumatic being connected with the exhaust of the bellows by an air-passage leading thereto, and with the governor-pneumatic by a lever, the ends of which engage the movable members of both pneumatics and through the action of which the governor-pneumatic is maintained in an expanded condition through the action of the exhaust on the auxiliary pneumatic, substantially as described.

3. In a pneumatic musical-instrument player the combination of a governor-pneumatic with an auxiliary presser-pneumatic, said auxiliary pneumatic being connected with the exhaust of the bellows by an air-passage leading thereto, and with the governor-pneumatic by a lever, the ends of which engage the movable members of both pneumatics and through the action of which the governor-pneumatic is maintained in an expanded condition through the action of the exhaust on the auxiliary pneumatic; one end of said lever being provided with means for regulating the action of the auxiliary pneumatic upon the governor-pneumatic, substantially as described.

4. In a pneumatic musical-instrument player the combination with the windway leading from the striking-pneumatics to the

bellows, of a main cut-off valve, a governor-pneumatic, a regulating-valve controlled thereby, an auxiliary presser-pneumatic and connections for maintaining the governor-pneumatic in an expanded condition and an independent regulating-valve, substantially as described.

5. In a pneumatic musical-instrument player the combination with a windway from the striking-pneumatics to the bellows, of a main cut-off valve, a governor-pneumatic, a regulating-valve controlled thereby, an auxiliary presser-pneumatic and connections for maintaining the governor-pneumatic in an expanded position, and an independent regulating-valve; said auxiliary pneumatic being directly connected with the exhaust of said windway, substantially as described.

6. In a pneumatic musical-instrument player a cut-off expression-box divided horizontally into two sections; the upper division being further divided into two chambers 13 and 14; and the lower division into three chambers 16, 17 and 18; the chambers 13 and 16 being connected by the passage 21, the chambers 13 and 17 by the ports 22, and the chambers 14 and 18 by the port 23; said box being provided with valves and means for controlling said ports 22 and 23, substantially as described.

7. In a pneumatic musical-instrument player, a cut-off expression-box divided horizontally into two sections, the upper division being further divided into two chambers 13 and 14, and the lower division into three chambers 16, 17 and 18; the chambers 13 and 16 being connected by the passage 21; the chambers 13 and 17 by the ports 22; and the chambers 14 and 18 by the port 23; the chamber 16 being connected with the windway from the striking-pneumatics by the passage 38; the chamber 18 with the wind-chest by the passage 25 and the chamber 17 with the wind-chest by the port 24; said port being controlled by the regulating-valve 30, substantially as described.

8. In a pneumatic musical-instrument player, the combination of a cut-off expression-box with a governor-pneumatic; an auxiliary presser-pneumatic; a striking-pneumatic passage, and a wind-chest; said auxiliary pneumatic having connections maintaining the governor-pneumatic in an expanded position; said expression-box having chambers 13, 16, 14 and 18 and a main air-passage leading from the striking-pneumatic passage 12 to the wind-chest through said chambers; through the governor-pneumatic 11 and through the passages 38, 21, 32 and 25; the gate-valve 33 and the main port 23; said port being controlled by a cut-off valve 28, substantially as described.

9. In a pneumatic musical-instrument player the combination of a cut-off expression-box with a governor-pneumatic and an auxiliary presser-pneumatic, a striking-pneumatic passage and a wind-chest; said auxiliary pneumatic maintaining the governor-pneumatic in an expanded position; said expression-box having chambers 16, 13, 14, 17 and 18 and a main air-passage leading from the striking-pneumatic passage 12 to said wind-chest through the chambers 16, 13, 14 and 18, the governor-pneumatic 11, the passages 38, 21, 32 and 25, the gate-valve 33 and the main port 23; said port being controlled by the valve 28; and a secondary air-passage leading from said striking-pneumatic passage to said wind-chest independent of the governor-pneumatic through the chambers 16, 13 and 17, the passages 38 and 21, and the ports 22 and 24; said ports being controlled by the valves 27 and 30, substantially as described.

10. In a pneumatic musical-instrument player the combination of a cut-off expression-box with a governor-pneumatic and an auxiliary presser-pneumatic, a striking-pneumatic passage and a wind-chest; said auxiliary pneumatic maintaining the governor-pneumatic in an expanded position; said expression-box having chambers 16, 13, 14, 17 and 18 and a main air-passage leading from the striking-pneumatic passage 12 to the wind-chest 7 through the chambers 16, 13, 14 and 18, the governor-pneumatic 11, the passages 38, 21, 32 and 25, the gate-valve 33, and the main port 23; also a secondary air-passage leading from the striking-pneumatic passage 12 to the wind-chest, independent of said governor-pneumatic, through the chambers 16, 13 and 17, the passages 38 and 21 and the ports 22 and 24; the valve 30 controlling the port 24 and regulating the amount of air passing through the secondary passage; and the valves 27 and 28 controlling the ports 22 and 23 and cutting off the circulation of air through both the main and secondary passages, substantially as described.

11. In a pneumatic musical-instrument player the combination of a cut-off expression-box with a governor-pneumatic and an auxiliary presser-pneumatic, the striking-pneumatic passage and the wind-chest; said auxiliary pneumatic having connections maintaining the governor-pneumatic in an expanded position; said expression-box having a passage therethrough connecting said auxiliary pneumatic with said wind-chest; also a main air-passage leading from the striking-pneumatic passage to the wind-chest, controlled by a main valve and said governor-pneumatic; and a secondary air-passage leading from the striking-pneumatic passage to the wind-chest, independent of said governor-pneumatic; said secondary passage being controlled by a regulating-valve, substantially as described.

LAWRENCE U. JOBES.

Witnesses:
J. W. MACY,
H. K. BLINN.