No. 820,080. PATENTED MAY 8, 1906.

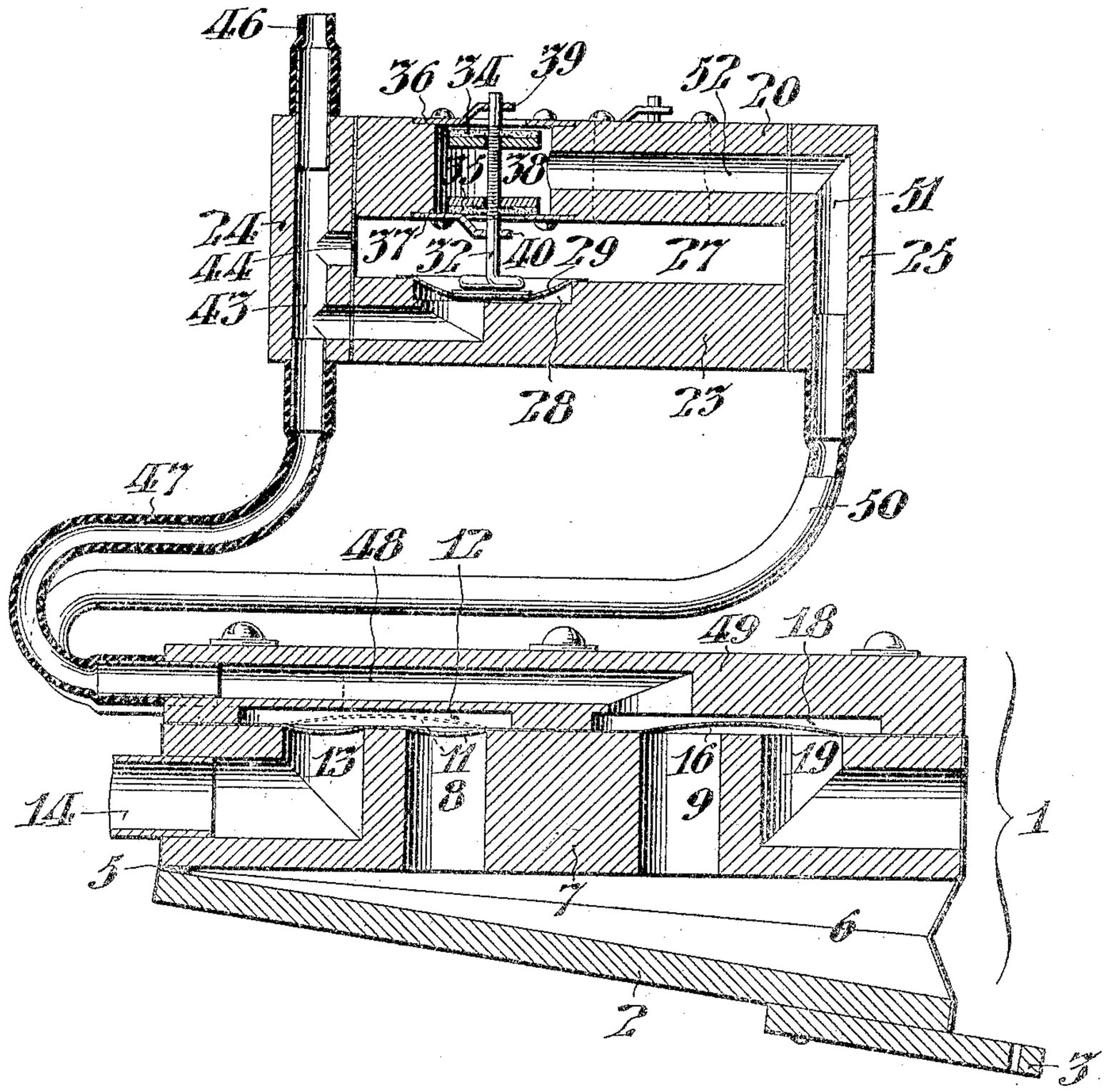
P. WUEST, JR.

MECHANICAL MUSICAL INSTRUMENT.

APPLICATION FILED SEPT. 13, 1904.

3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

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3 SHEETS—SHEET 2.

FIG. II.

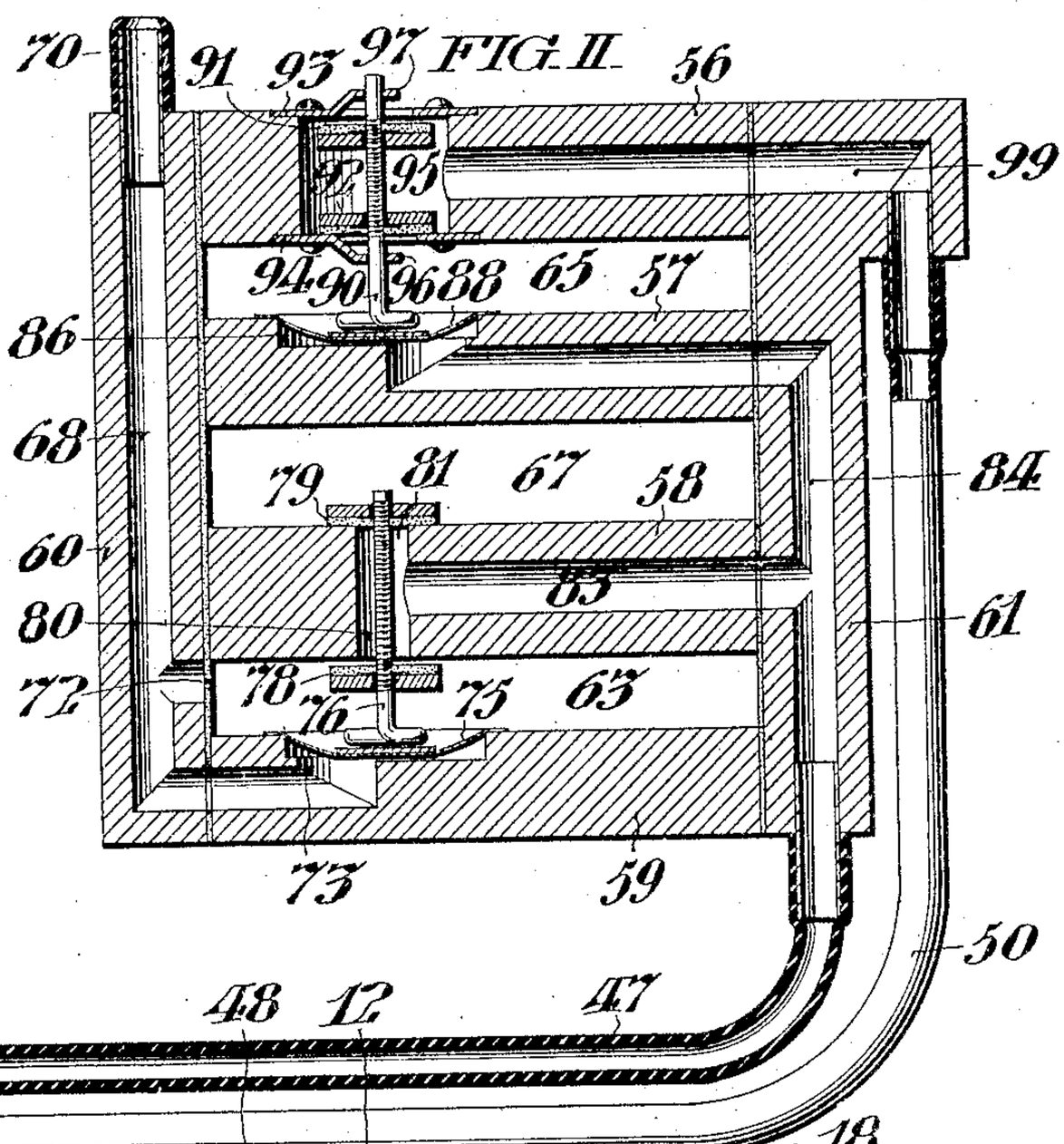
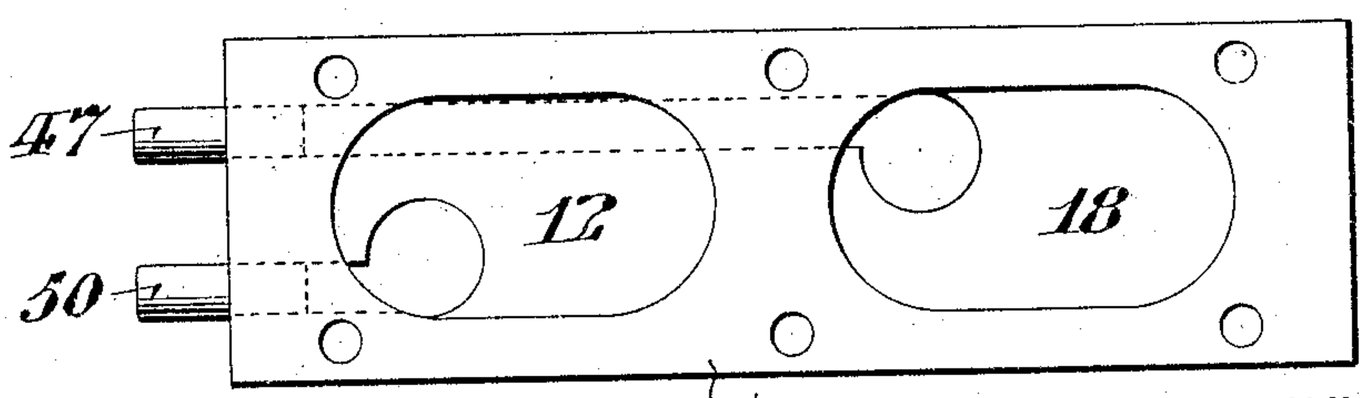


FIG. III.



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3 SHEETS—SHEET 3.

FIG. IV.

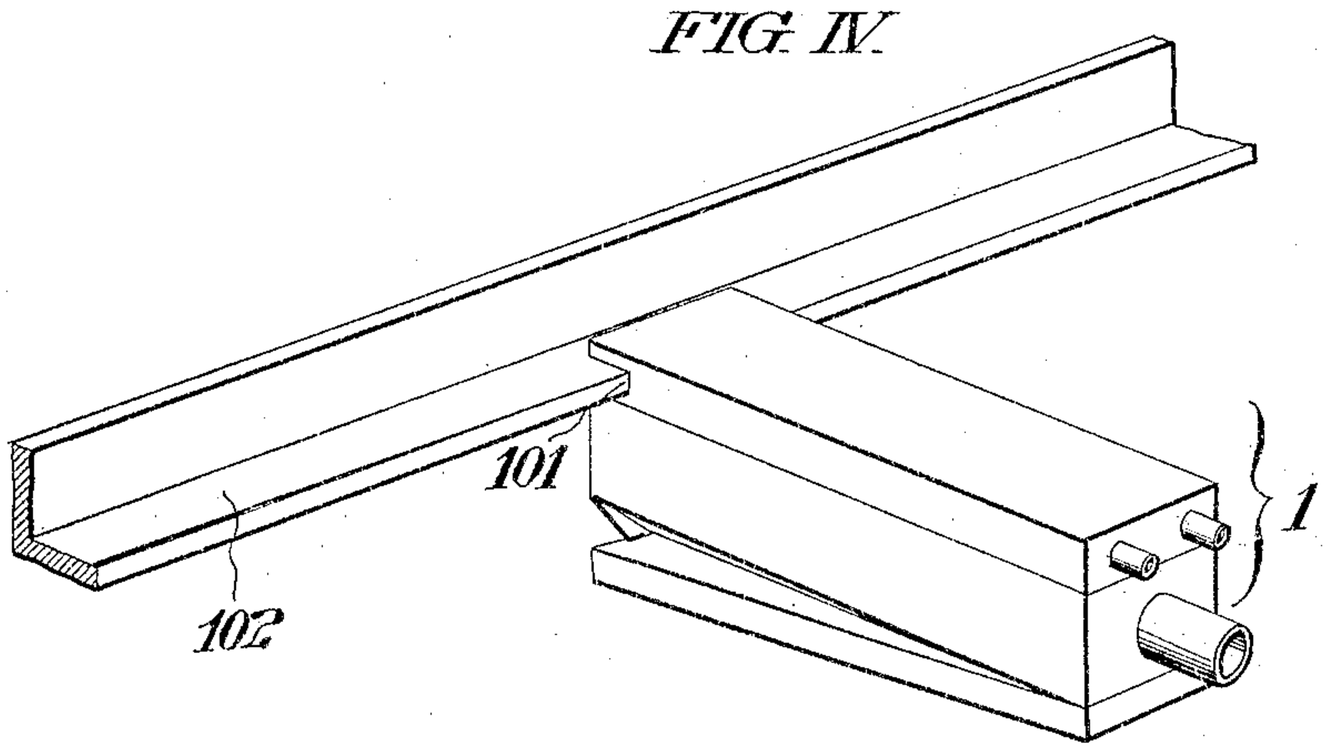


FIG. V.

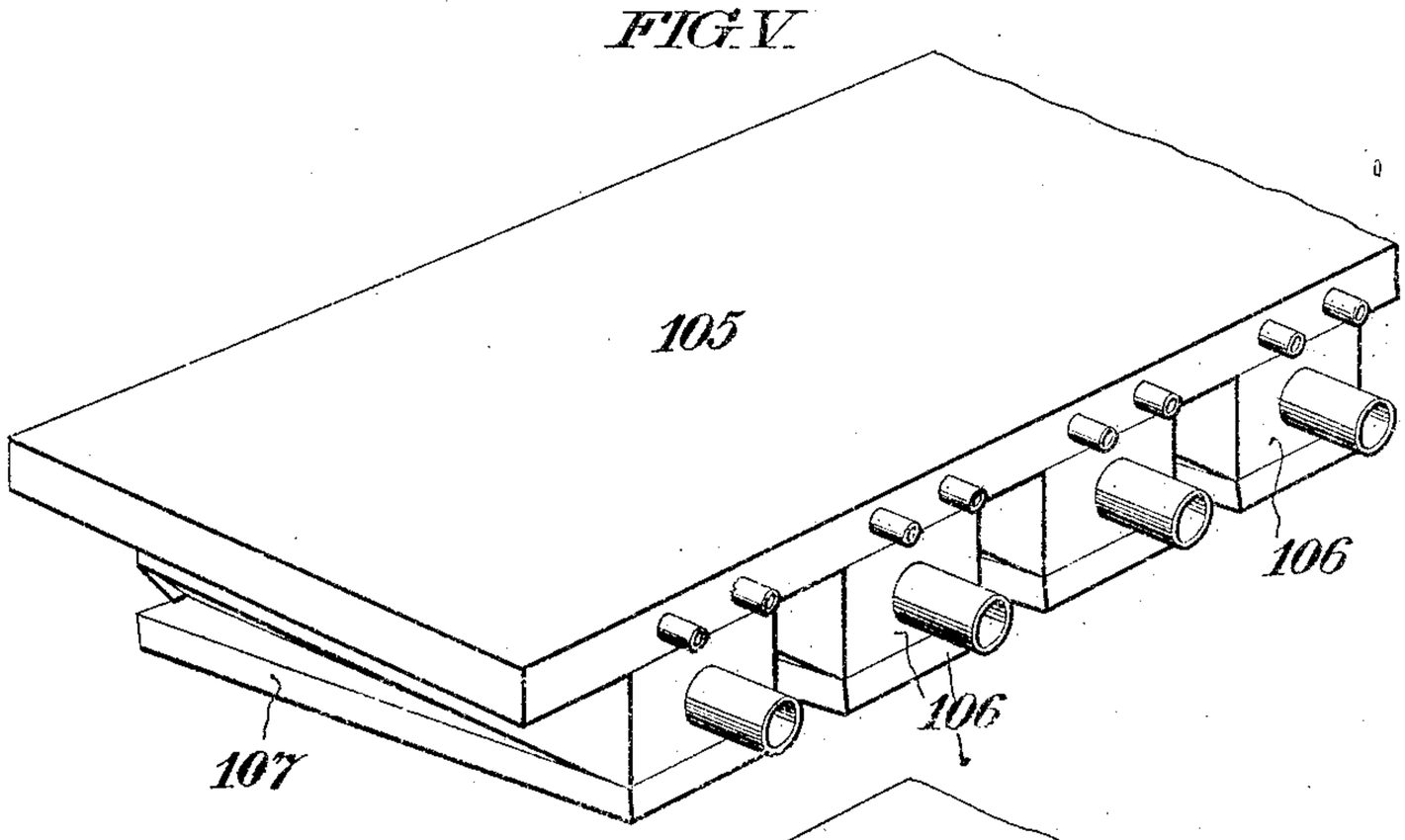
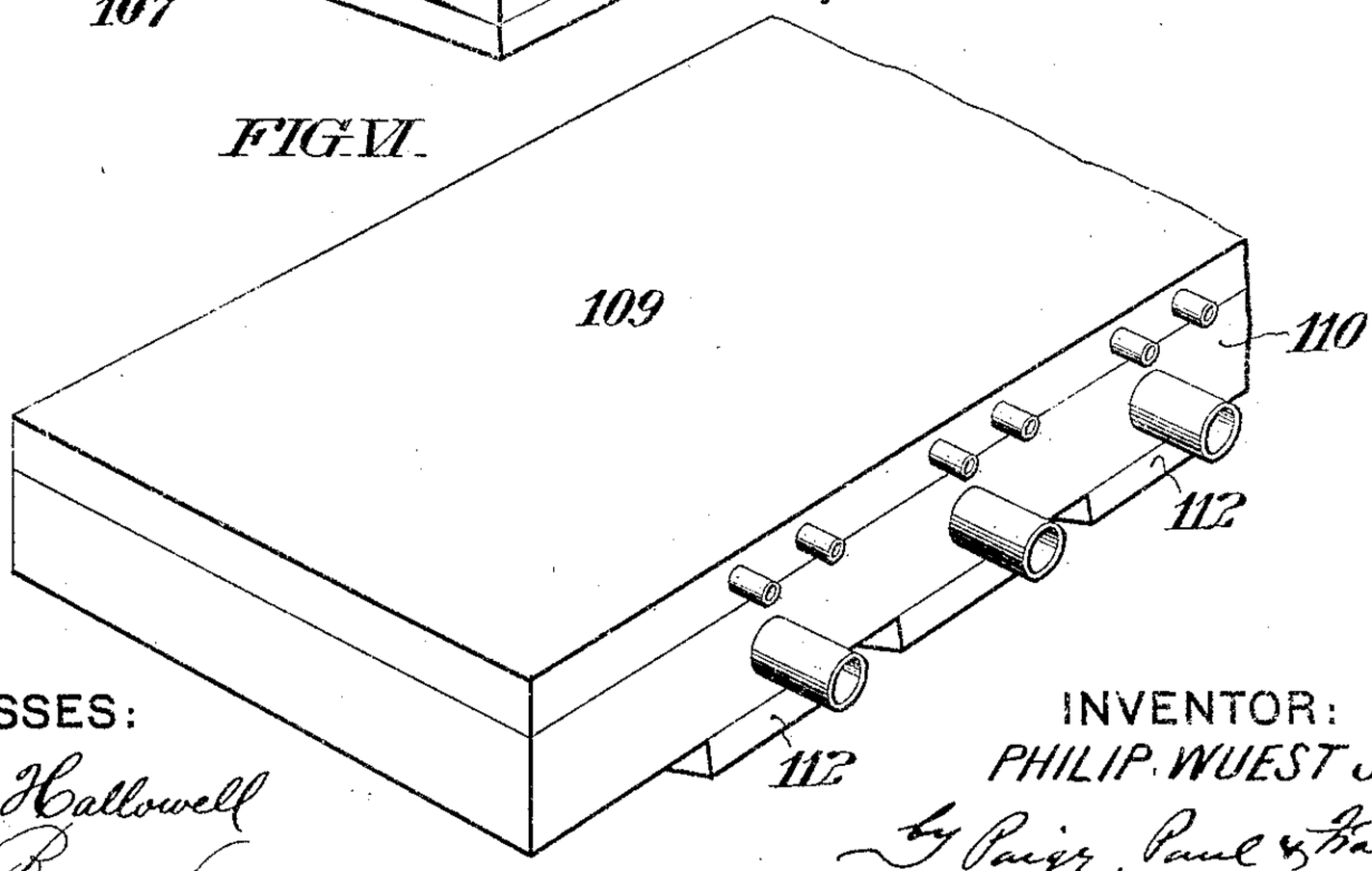


FIG. VI.



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UNITED STATES PATENT OFFICE.

PHILIP WUEST, JR., OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE AUTO-MANUAL PIANO ACTION COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

MECHANICAL MUSICAL INSTRUMENT.

No. 820,080. Specification of Letters Patent. Patented May 8, 1906.

Application filed September 13, 1904. Serial No. 224,265.

To all whom it may concern:

Be it known that I, PHILIP WUEST, Jr., of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Mechanical Musical Instruments, whereof the following is a specification, reference being had to the accompanying drawings.

My improvements relate particularly to pneumatic-actions for instruments of the class including piano-players and self-playing pianos comprising automatic playing mechanism arranged to operate sounding devices—for instance, mechanism controlled by a web of perforated paper which is progressed with respect to a pneumatic tracker-bar provided with a series of apertures corresponding with the series of sounding devices.

It is an object of my invention to avoid the waste of power due to leakage of air into the exhaust system by providing closed diaphragms instead of the ordinary puppet-valves heretofore employed to control the strike-pneumatics or pneumatic-lever motors for the operation of the sounding devices. As hereinafter described, my improvements comprise such a motor provided with a port for communication with the exhaust-reservoir and a port for communication with the atmosphere independently controlled by closed diaphragms of flexible material, such as rubber-coated cloth, arranged to alternately open and close said ports. As hereinafter described, said motors may be made entirely separate from each other and be assembled in separable relation, or the diaphragms for a plurality of said motors may be located in a board or panel common to them, so that the only separately-movable elements are the bellows leaves or levers which actuate the sounding devices.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawings, Figure I is a transverse sectional view of a primary valve mechanism connected with a strike-pneumatic motor conveniently embodying my improvements. Fig. II is a transverse sectional view similar to Fig. I, but showing a modified form of primary valve mechanism. Fig. III is an inverted plan view of the cover-board comprising the diaphragm-seats shown in section in Figs. I and II. Fig. IV is a perspective view of a single strike-pneumatic motor such as is shown in Figs. I and II, and means for supporting a series of the same. Fig. V is a perspective view showing a cover-board or panel common to a series of individual port-boards and strike-pneumatics. Fig. VI is a perspective view showing a cover-board and a port-board common to a series of strike-pneumatic bellows.

Referring to the form of my invention shown in Fig. I, the strike-pneumatic 1 comprises the movable leaf or lever 2, whose end 3 is operatively related to a sounding device. Said leaf is hinged at its end 5 and provided with the bellows 6, which when exhausted rises and when inflated drops to the position shown in Fig. I. Said bellows 6 is secured on the port-board 7 comprising the ports 8 and 9, through which said bellows 6 may be respectively and alternately placed in communication with an exhaust pump or reservoir and with the atmosphere. Said port 8 communicates with the exhaust-reservoir when the diaphragm 11 is uplifted, as indicated in dotted lines in Fig. 1, within its recess 12, in which position said diaphragm uncovers the adjoining port 13, having the conduit 14 leading to the exhauster. Said port 9 communicates with the atmosphere when the diaphragm 16 is uplifted to the position shown in Fig. I in its recess 18, in which position it uncovers the port 19, opening to the atmosphere through the right-hand edge of said port-board 7. Said diaphragms 11 and 16 are alternately uplifted to respectively collapse and distend said bellows 6 by the primary valve mechanism shown in Fig. I. Said mechanism is conveniently mounted in a chest or shelf comprising the top board 20, the bottom board 23, the front cover-board 24, and the back cover-board 25. Said boards inclose the exhaust-chamber 27, in which a partial vacuum is maintained by any convenient means. Said board 23 is provided with the seat 28, covered by the diaphragm 29, which is in operative relation with the valve-stem 32 common to the two valves 34 and 35, respectively arranged to close against the seat-plates 36 and 37, respectively, at the top and bottom of the valve-chamber 38, said stem 32 being supported in the respective bearings 39 and 40

local to said disks. The board 24 is provided with the duct 43, which communicates with the exhaust-chamber 27 through the perforation 44. Said duct 43 is connected by the flexible conduit 46 with an aperture in an ordinary tracker-bar and by the flexible conduit 47 with the duct 48 in the cover-board 49 of the strike-pneumatic 1. As indicated in Fig. III, said recesses 12 and 18 are respectively in communication with the conduits 50 and 47, leading, respectively, to the valve-chamber 38 (by the ducts 51 and 52) and to the duct 43, the latter being in communication with the exhaust-chamber 27 through the perforation 44.

Said apparatus operates as follows: In the normal idle condition of the instrument the strike-pneumatic 1 has its leaf 2 lowered, as shown in Fig. I. The tracker-bar aperture connected with the duct 43 being uncovered, atmospheric air is admitted to the latter, (which was previously exhausted through the perforation 44, communicating with the exhaust-chamber 27,) and the diaphragm 16 is thus released from its uplifted position shown in Fig. I, so that it may fall and close both of the ports 9 and 19. Contemporaneously the atmospheric pressure beneath the diaphragm 29 at the bottom of said exhaust-chamber 27 uplifts the diaphragm into contact with the valve-stem 32, so as to simultaneously open the valve 35 and close the valve 34, thus exhausting the valve-chamber 38, ducts 52 and 51, conduit 50, and the recess 12 above the diaphragm 11, so as to raise the latter to the position indicated in dotted lines in Fig. I, thus establishing communication beneath said diaphragm 11 and between the ports 8 and 13, exhausting and collapsing the bellows 6 and uplifting the bellows-leaf 2 to operate the sounding device connected therewith, the air-inlet port 9 being of course tightly closed by the diaphragm 16, pressed down thereon by the atmosphere admitted through the duct 43, conduit 47, and duct 48, as above described. When the aperture in the tracker-bar is again covered, the duct 43, conduit 47, and duct 48 are again exhausted through the perforation 44 leading to the exhaust-chamber 27, and contemporaneously the valves 34 and 35 fall to the position shown in Fig. I and the other parts are restored to the position shown therein.

Although I have shown in Fig. I a convenient form of primary valve mechanism, it is to be understood that strike-pneumatics constructed in accordance with my invention may be controlled by other means. For instance, in the form of my invention shown in Fig. II the conduits 47 and 50 lead to the primary valve mechanism conveniently mounted in the chest or shelf comprising the duct-boards 56, 57, 58, and 59, provided with the front board 60 and back board 61. Said boards inclose the chambers 63 and 65 in communication with the exhauster and the chamber 67 in communication with the atmosphere. Said front board 60 is provided with the duct 68, connected with the tracker-bar aperture by the conduit 70. Said duct 68 communicates with the exhaust-chamber 63 through the perforation 72 and leads to the recess 73 in the board 59 beneath the diaphragm 75. Said diaphragm is in operative relation with the valve-stem 76, which carries the two valves 78 and 79, arranged to alternately close the ports 80 and 81, leading, respectively, from said exhaust-chamber 63 and to the atmosphere in the chamber 67. Said ports are connected by the duct 83 with the conduit 47, leading to the strike-pneumatic, and also in communication by the branch duct 84 with the recess 86 in the board 57 beneath the diaphragm 88. Said diaphragm 88 is in operative relation with the valve-stem 90, which carries the two valves 91 and 92, arranged to be alternately closed upon the seat-plates 93 and 94, respectively at the top and bottom of the valve-chamber 95, said stem 90 being provided with bearings 96 and 97, extending from said plates. Said valve-chamber 95 is connected by the duct 99 with the other conduit 50, leading to the strike-pneumatic.

The apparatus last described operates as follows: In the normal idle condition of the instrument the strike-pneumatic 1 has its leaf 2 lowered, as shown in Fig. II. The tracker-bar aperture connected with the duct 68 being uncovered, atmospheric air is admitted to the latter (which was previously exhausted through the perforation 72, leading to the exhaust-chamber 63) and the diaphragm 75 is uplifted into contact with the valve-stem 76 by the atmospheric pressure admitted beneath it through the duct 68, so as to simultaneously open the valve 79 and close the valve 78, thus admitting atmospheric pressure from the chamber 67 through the ducts 83 and 84 beneath the diaphragm 88, uplifting the latter into contact with the valve-stem 90, so as to simultaneously open the valve 92 and close the valve 91. The exhaust-chamber 65 is thus connected with the duct 99, conduit 50, and recess 12 above the diaphragm 11, so as to raise the latter to the position indicated in dotted lines in Fig. II and establish communication beneath said diaphragm 11 between the ports 8 and 13, thus exhausting and collapsing the bellows 6 and uplifting the bellows-leaf 2 to operate the sounding device connected therewith, the air-inlet port 9 being of course tightly closed by the diaphragm 16 pressing down thereon by the atmosphere admitted through the duct 48, conduit 47, and duct 83 from the chamber 68, as above described. When the aperture in the tracker-bar is again covered, the duct 68 is again exhausted through the perforation 72, leading to the exhaust-cham-

ber 63, so that the valves 78 and 79 fall to the position shown in Fig. II and the ducts 83, 84, and 99 are again exhausted to restore the other parts to the position shown in Fig. II.

As indicated in Fig. IV, each strike-pneumatic 1 may be conveniently provided with a recess 101 in its cover-board fitted to the horizontal flange of a supporting-rail 102, upon which a series of such pneumatics may be independently mounted in proper assembled relation. Such an arrangement is advantageous in that the individual pneumatics may be separately removed and replaced.

Fig. V shows an arrangement wherein a single cover-board or panel 105 is common to a series of separate individual port-boards 106 and strike-pneumatic bellows 107.

Fig. VI shows a single cover-board 109 and a single port-board 110 common to a plurality of individual strike-pneumatic bellows 112.

Although but one valve-chamber 38 is shown in Fig. I, it is to be understood that the board 20 comprises a plurality of such chambers, and for compactness of arrangement they are disposed in two series in staggered relation to each other, as indicated by the dotted lines in said figure.

I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention.

I claim—

1. In a mechanical musical instrument, the combination with a pneumatic-motor comprising a bellows provided with an exhaust-port and an air-inlet port; of a port adjoining said exhaust-port and leading to the exhauster; a port adjoining said air-inlet port and leading to the atmosphere; and, diaphragms respectively common to said pairs of ports, arranged to alternately open and close them, substantially as set forth.

2. In a mechanical musical instrument, the combination with a pneumatic-motor comprising a bellows provided with an exhaust-port and an air-inlet port; of diaphragms respectively local to said ports; and, means arranged to alternately raise and lower said diaphragms, substantially as set forth.

3. In a mechanical musical instrument, the combination with a pneumatic-motor comprising a bellows provided with an exhaust-port and an air-inlet port; of a cover-board provided with diaphragms respectively local to said ports; and, means arranged to alternately open and close said ports by said diaphragms, substantially as set forth.

4. In a mechanical musical instrument, the combination with a pneumatic-motor comprising a bellows; of a port-board forming one leaf of said bellows, provided with an exhaust-port and an air-inlet port leading to the interior of said bellows; a port in said port-board adjoining said exhaust-port and leading to the exhauster; a port in said port-board adjoining said air-inlet port and leading to the atmosphere; two diaphragms respectively local to said pairs of exhaust and inlet ports; and, pneumatically-controlled means arranged to alternately operate said diaphragms and alternately collapse and inflate said bellows, substantially as set forth.

5. In a mechanical musical instrument, the combination with a pneumatic-motor comprising a bellows; of a port-board forming one leaf of said bellows, provided with an exhaust-port and an air-inlet port leading to the interior of said bellows; a port in said port-board adjoining said exhaust-port and leading to the exhauster; a port in said port-board adjoining said air-inlet port and leading to the atmosphere; two diaphragms respectively local to said pairs of exhaust and inlet ports; and, valve mechanism pneumatically controlled by a tracker-bar, arranged to alternately operate said diaphragms and alternately collapse and inflate said bellows, substantially as set forth.

6. In a mechanical musical instrument, the combination with a pneumatic-motor comprising a bellows provided with an inlet-port and an exhaust-port; of diaphragms respectively local to said ports; and, means whereby the diaphragms open and close their respective ports in alternation, substantially as set forth.

7. In a mechanical musical instrument, the combination with a pneumatic-motor comprising a bellows provided with a plurality of separate ports; of flexible diaphragms respectively local to said ports; and, means whereby the diaphragms open and close their respective ports in alternation, substantially as set forth.

In testimony whereof I have hereunto signed my name, at Philadelphia, Pennsylvania, this 12th day of September, 1904.

PHILIP WUEST, Jr.

Witnesses:
ARTHUR E. PAIGE,
ANNA F. GETZFREAD.