No. 844,984. PATENTED FEB. 19. 1907

P. WUEST, JR.

MECHANICAL MUSICAL INSTRUMENT.

APPLICATION FILED JAN. 25, 1904.

3 SHEETS—SHEET 1.

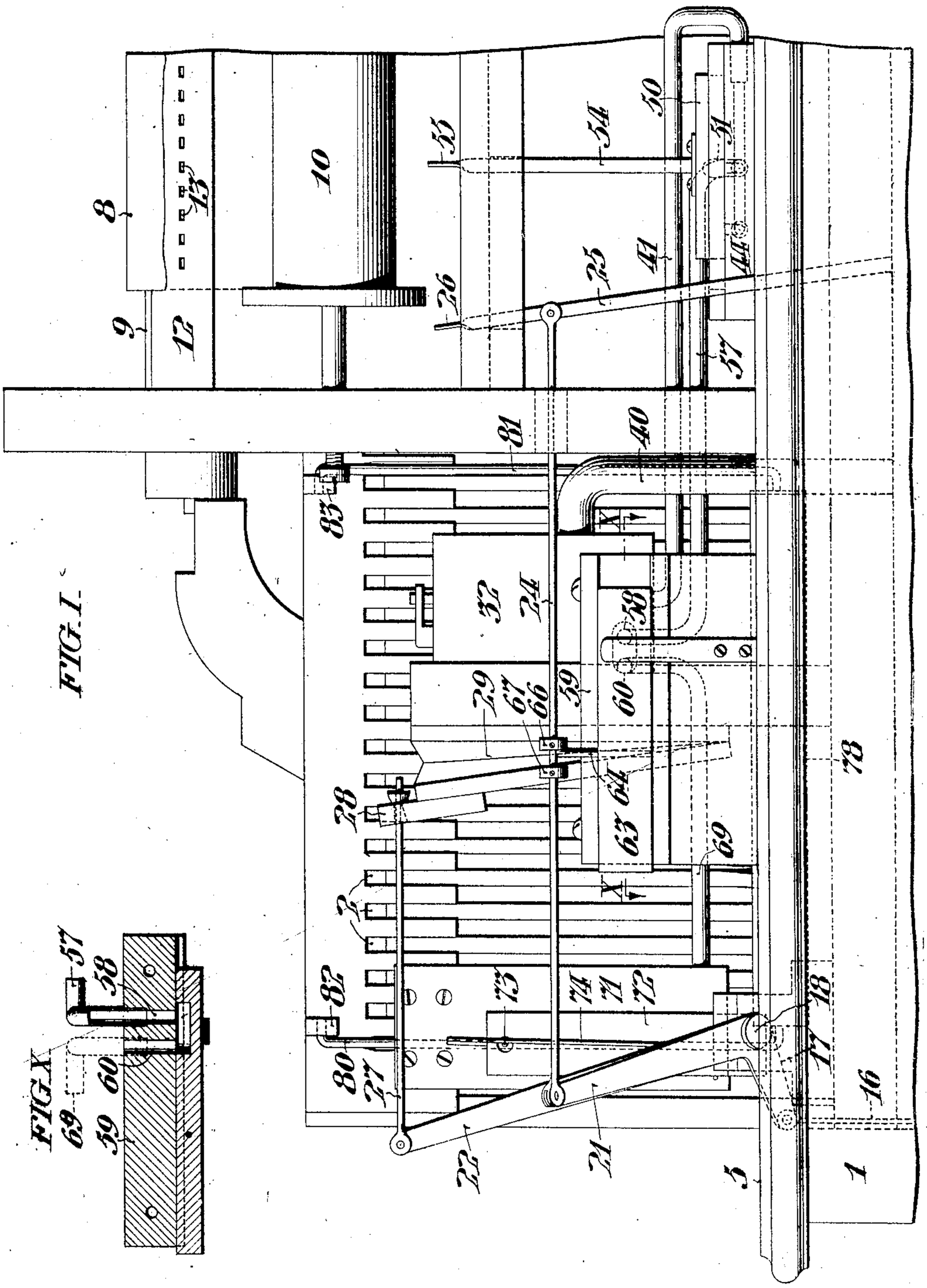

FIG. 1.

FIG. X.

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John C. Bugner.

INVENTOR:

PHILIP WUEST JR.,

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Attys.

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3 SHEETS—SHEET 2.

FIG. III.

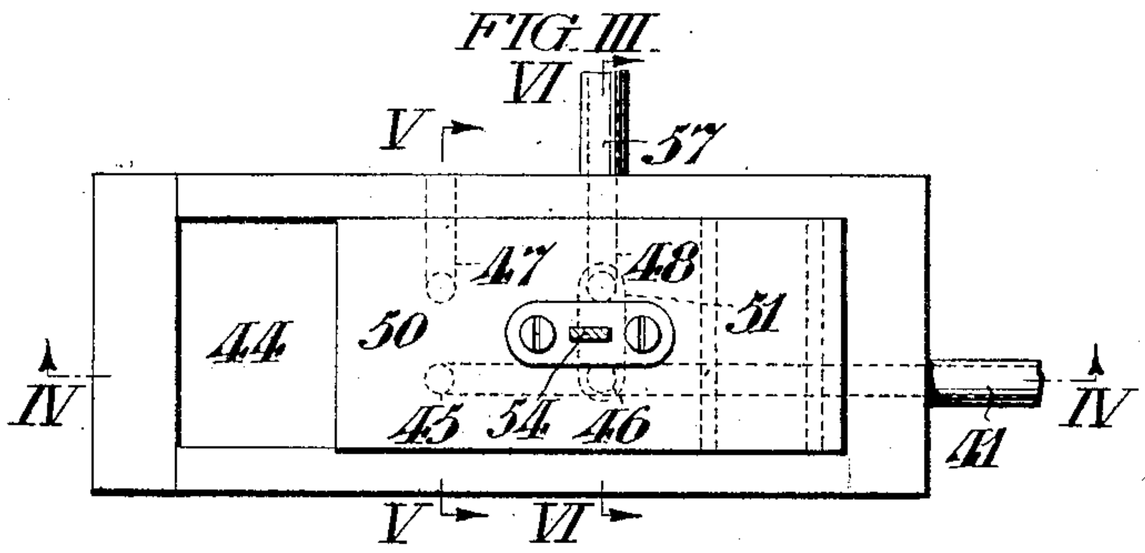


FIG. IV.

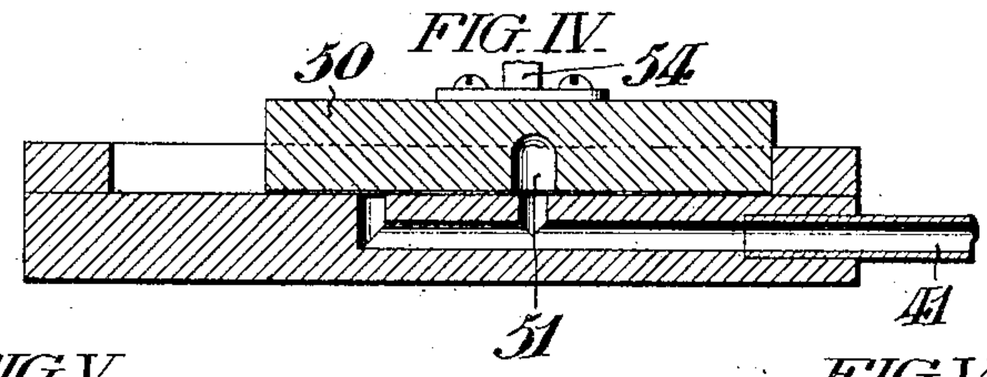


FIG. V.

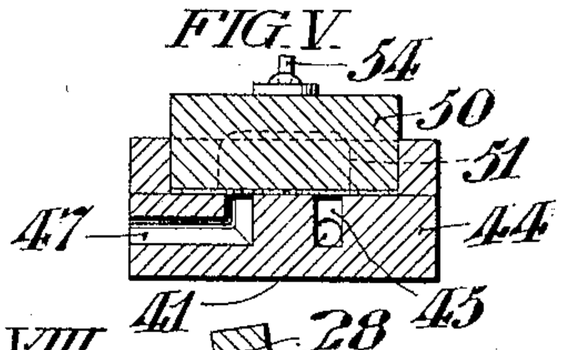


FIG. VI.

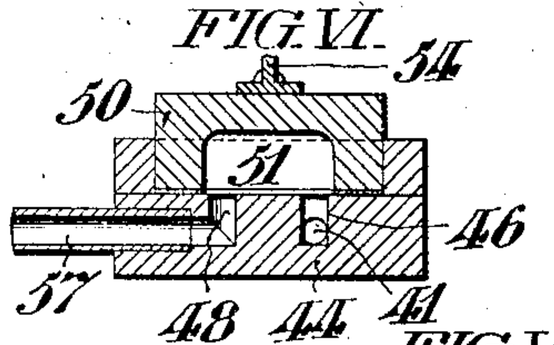


FIG. VIII.

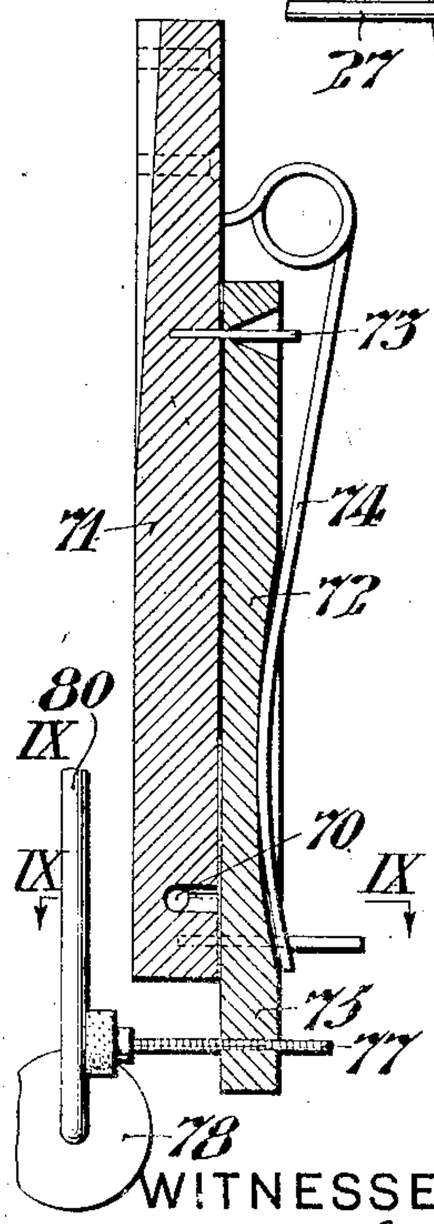


FIG. II.

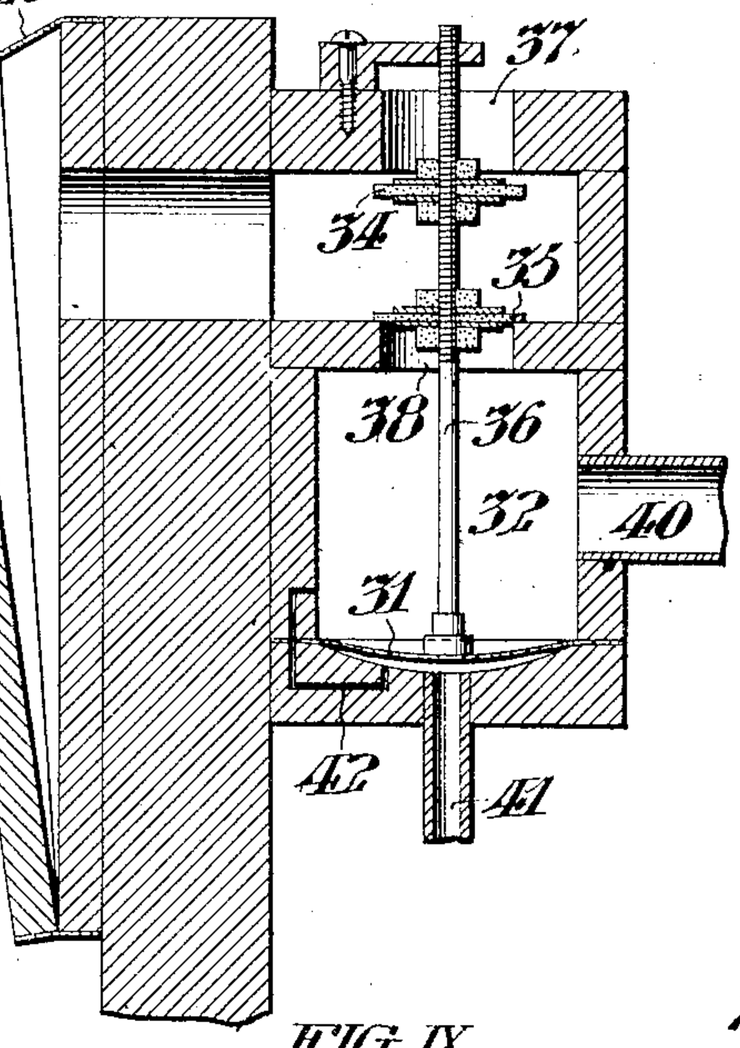


FIG. VII.

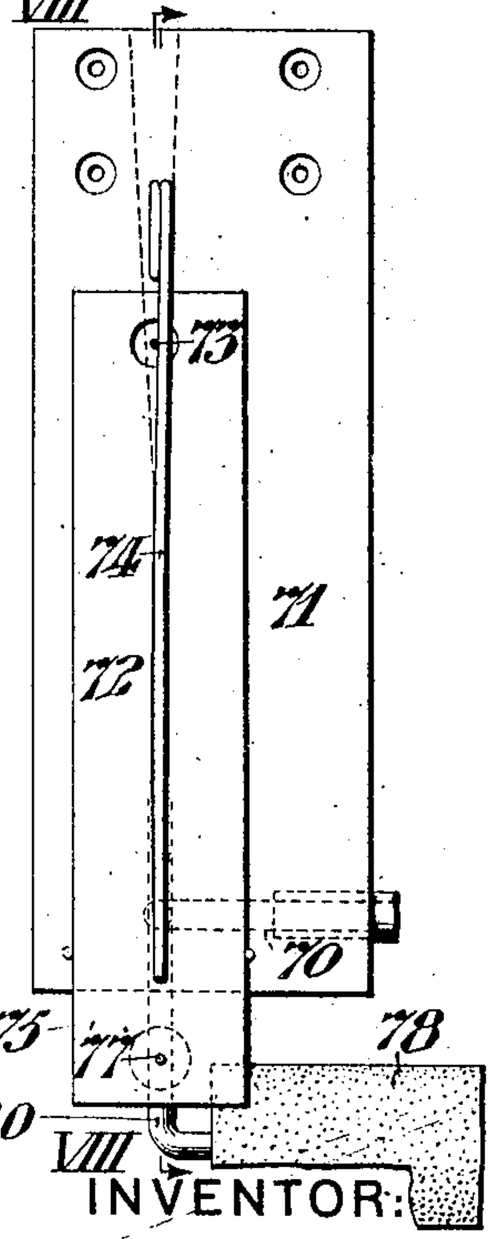
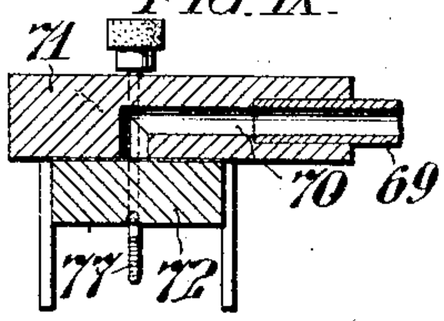


FIG. IX.



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No. 844,984. PATENTED FEB. 19, 1907.

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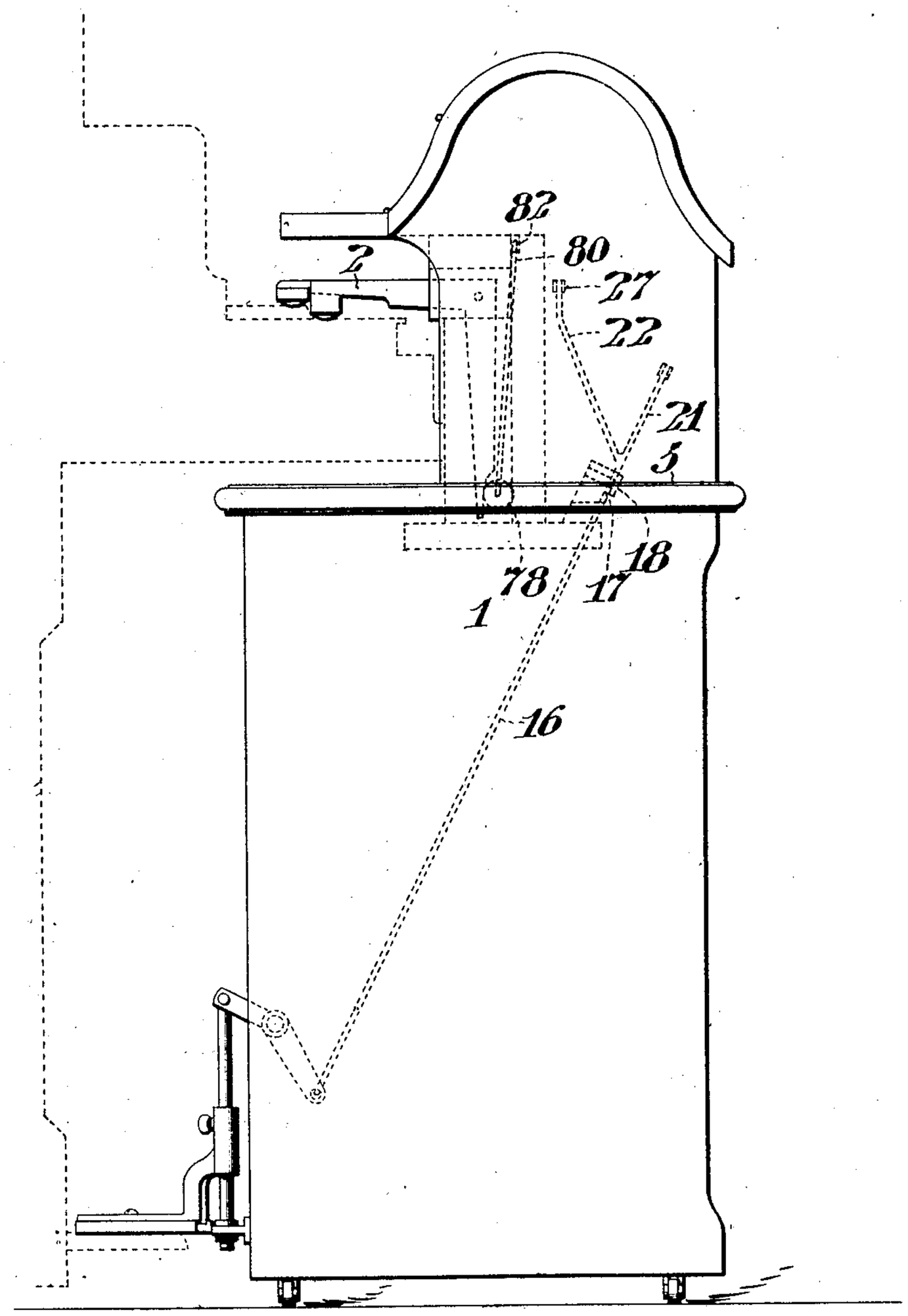
MECHANICAL MUSICAL INSTRUMENT.

APPLICATION FILED JAN. 26, 1904.

3 SHEETS—SHEET 3.

FIG. XI.



WITNESSES:

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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. 844,984. Specification of Letters Patent. Patented Feb. 19, 1907.

Application filed January 25, 1904. Serial No. 190,446.

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 invention relates particularly to that class of instruments known as "piano-players." Such an instrument comprises a series of finger-levers arranged to impinge upon the digitals of a piano or similar instrument and actuated in any predetermined sequence by means of respective pneumatic mechanisms controlled by a web of perforated paper, which is progressed over a pneumatic tracker-bar provided with a series of apertures corresponding with said series of finger-levers.

Broadly considered, it is the object of my invention to provide means to operate the pedals of a piano or similar instrument, particularly the loud pedal, in proper accord with the music being played and without the interposition of the operator, although in the form of my invention hereinafter described the pedal mechanism is so arranged as to be manually controlled by the operator, if desired.

In Letters Patent of the United States No. 744,990, granted to me November 24, 1903, I disclosed a device for the purpose above described of which it is characteristic that a selected series of levers operatively related to the strings of a piano or similar instrument have common control of the mechanism for operating the pedal, so that the latter is depressed automatically and is not released so long as any one of said controlling-levers is maintained in operation.

Inasmuch as some musical compositions contain legato runs and similar passages involving such sequence of operation of the levers in the controlling series as to continuously maintain the pedal in operation when constructed as above described, it is one object of my present invention to provide means for automatically releasing the pedal during the operation of the levers of the controlling series, so as to avoid discords which are rendered possible by the prolonged freedom of the strings incident to the continued depression of the loud pedal.

As hereinafter described, my invention contemplates such a construction and arrangement that the pedal-operating mechanism may be operated as the result of the initial movement of any one of the levers selected to control it and may be released as a consequence of its own movement. For instance, as hereinafter described, my present invention contemplates a pedal-operating device which may be controlled by a selected series of finger-levers and which when set in motion by the control of any one of said levers effects its own release by moving a pneumatic valve and returns to normal position automatically, to be again set in operation automatically by the operation of any lever of said series.

Moreover, as hereinafter described, my invention also contemplates the automatic operation of the pedal-applying device independently of the control of the series of levers aforesaid. In the latter form of my invention the pedal is operated and released by the rhythmic movement of said device in accordance with the rhythm or tempo of the composition being played, means being provided to adjust said device to any given rhythm, so that variations in the rhythmic movement of said device may be automatically effected by and in accordance with variations in the pneumatic pressure incident to variations in the rhythm of any composition.

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

In the drawings, Figure I is a fragmentary front elevation of a musical instrument comprising a convenient embodiment of my invention. Fig. II is a sectional view of the pneumatic motor of the automatic pedal-operating device. Fig. III is a plan view of the manually-operated slide-valve by which the automatic pedal-operating device may be rendered idle, if desired. Fig. IV is a longitudinal sectional view of said slide-valve, taken on the line IV IV in Fig. III. Fig. V is a transverse sectional view of said slide-valve, taken on the line V V in Fig. III. Fig. VI is a transverse sectional view of said slide-valve taken on the line VI VI in Fig. III. Fig. VII is a front elevation of the oscillatory valve, which is controlled by the selected series of finger-levers. Fig. VIII is a vertical

sectional view of said oscillatory valve, taken on the line VIII VIII in Fig. VII. Fig. IX is a transverse sectional view of said oscillatory valve, taken on the line IX IX in Fig. VIII. Fig. X is a longitudinal sectional view of the automatic pedal-releasing valve, taken on the line X X in Fig. I. Fig. XI is an end elevation of said musical instrument shown in Fig. I.

In said figures, 1 is the casing of the instrument, in which is mounted the series of finger-levers 2, arranged to impinge upon the digitals of a piano or similar instrument. Said finger-levers 2 are operated by respectively independent pneumatic mechanisms, which are located within the casing 1 below the table 5 thereof and controlled by a perforated paper web 8, which is initially wound upon the roller 9 and unwound from said roller and wound upon the roller 10 by the operation of the instrument. Said web 8 being thus progressed with respect to the pneumatic tracker-bar 12 opens and closes its apertures 13, which are arranged in a series corresponding with the series of finger-levers 2, and thus effects the operation of said levers 2 in any sequence predetermined by the arrangement of the perforations in said web 8. The vertical rod 16, (shown at the left-hand side of Fig. I,) which is pivotally connected to the bell-crank lever 17, whose fulcrum 18 is in stationary relation with the casing 1, is provided at its lower end with means to depress the pedal of the piano when said rod is raised. Said lever 17 is provided with two upwardly-extending arms 21 and 22. The arm 21 is connected by the link 24 with the lever 25, which being pivoted at its lower extremity is conveniently flattened at its upper extremity 26, as indicated in Fig. I, to be readily fingered by the operator, who may thereby manually depress the loud pedal. The other arm 22 of said lever 17 is connected with a pneumatic motor, by which it may be operated to depress the loud pedal automatically, as follows: Said arm 22 is connected by the link 27 with the lever 28 of the pneumatic-motor bellows 29, which latter by collapsing, as hereinafter described, shifts the lever 17, and thereby depresses said loud pedal. The operation of said bellows 29 is controlled by the pneumatic diaphragm 31, (shown in Fig. II,) which is mounted in the primary valve-box 32 and provided with a vent-valve 34 and the exhaust-valve 35, coupled by the rod 36. The valves 34 and 35 respectively register with the vent-port 37 and the exhaust-port 38, and said valves normally occupy the position shown in Fig. II, wherein the bellows 29 is in communication with the atmosphere through the port 37 and may be rocked idly back and forth when the loud pedal is manually depressed by the operator employing the lever 25. Said valve-box 32 is in constant communication with the main exhaust-bellows of the instrument through the conduit 40, and the arrangement is such that when the conduit 41, beneath the diaphragm 31, is closed said diaphragm is depressed and the valves 34 and 35 maintained in the position shown by the external atmosphere opposed to the partial vacuum within said box 32. When, however, the conduit 41 is open to the atmosphere, the difference in area between the exhaust-conduit 40 and the by-pass duct 42 is such that the diaphragm 31 is instantly uplifted, the vent-port 37 closed, and the exhaust-port 38 opened. Communication being thus established between the bellows 29 and the exhaust-conduit 40, said bellows is collapsed, and by the link 27, lever-arm 22, lever 17, &c., the loud pedal of the piano is automatically depressed against the stress of a spring, which tends to restore the mechanism aforesaid to its normal position. The pedal may be released and the motor-bellows 29 restored to its normal position by closing said conduit 41, for thereby the pressure above and below the diaphragm 31 is equalized through the by-pass duct 42. The port 38 is closed by the valve 35, the port 37 simultaneously opened, and the bellows 29 inflated by atmospheric pressure through the port 37. As hereinafter described, the loud pedal may be depressed and released by said motor-bellows 29 by respectively opening and closing said conduit 41 in either of three ways: first, by manually shifting a valve 50 both to open and close it; second, by manually shifting said valve 50 to open it and automatically shifting a releasing-valve 63 to close it; third, by automatically shifting a valve 72 to open it under control of any one of a selected series of said finger-levers 2 and automatically shifting said releasing-valve 63 to close it.

Referring to Figs. I and III to IX, inclusive, said conduit 41, above described with reference to Fig. II, extends to the slide-valve casing 44, wherein it terminates in the ports 45 and 46, respectively adjoining the ports 47 and 48. All of said ports are normally closed by the slide-valve 50 when it is shifted to a position wherein its recess 51 is intermediate of the ports 45 and 46. Said valve 50 is provided with a rod 54, whose upper extremity 55 extends adjacent to the upper extremity of the lever 25 and is likewise flattened to be readily fingered by the operator. The motor-bellows 29 may be collapsed and the pedal thereby depressed by manually shifting said valve 50 until its recess 51 establishes communication between the port 45 and the port 47, which latter opens directly to the outer atmosphere. In such case the pedal remains depressed by the motor 29 until the valve 50 is manually shifted to cut off communication between the conduit 41 and the atmosphere through said valve-ports 45

and 47. When it is desired to manually initiate the operation of said pedal by said motor 29 and then effect its release automatically, the valve 50 is manually shifted to the position shown in Figs. I, III, and IV, wherein its recess 51 establishes communication between the ports 46 and 48 in the casing 44. Said port 48 opens into the conduit 57, and the latter terminates in the port 58 in the valve-casing 59, adjoining the port 60, which latter, as shown in full lines in Fig. X, opens to the atmosphere through the valve-casing 59. Said ports 58 and 60 are normally in communication through the recess 62 in the slide-valve 63, whose upwardly-projecting tappet 64 is encountered and shifted by the collar 66 on the link 24 as the mechanism moves to the position shown in Fig. I, corresponding with the release of the pedal. Said tappet 64 is encountered by the collar 67 on said link 24 during the movement of said mechanism to depress the pedal, so that the tappet 64 then shifts said slide-valve 63 toward the right-hand side of Fig. I, closing communication between said ports 58 and 60 in the valve-casing 59, thus closing communication between the conduit 41 and the atmosphere, restoring the motor-valves 34 and 35 to the position shown in Fig. II, and thus permitting the distention of the bellows 29 and the release of the pedal as a consequence of the initial movement of the mechanism to depress the pedal. Upon being released, as above described, the mechanism, including the link 24 and lever-arms 21 and 22, is returned toward the left-hand side of Fig. I by the spring before referred to as tending to restore the pedal to its normal position. During such return movement the collar 66, carried by the link 24, encounters the tappet 64 and returns the slide-valve 63 to the position shown in Figs. I and X, wherein the ports 58 and 60 are in communication, and if said port 60 is open to the atmosphere, as above contemplated, another impulse of the motor-bellows 29 results and the mechanism continues to operate to automatically depress and automatically release the pedal by the rhythmic reciprocation of the parts above described, determined by the pneumatic pressure incident to the rhythm of the musical composition being played. It is to be understood that proper rhythmic movement of said mechanism may be attained by adjustment of said collars 66 and 67 on said link 24. When it is desired to initiate the operation of the pedal by said motor 29 under the control of any one of a selected series of said finger-levers 2, said port 60 is connected by the conduit 69 with the port 70 in the valve-casing 71. Said port 70 is normally closed by the valve 72, which is mounted to oscillate upon the pin 73 under stress of the spring 74, which tends to close it and whose upper extremity is fixed in said casing 71. The free lower extremity 75 of said valve 72 is provided with the adjustable stud 77 for operative contact with the swing or bail-shaped lever comprising the horizontal member 78 and the vertical arms 80 and 81 at its opposite ends, which arms, as shown in Fig. I, are respectively mounted for oscillation in the stationary bearings 82 and 83. As shown in Fig. I, said swing-lever member 78 is common to and arranged to be actuated by the vertical arms of the first sixteen of the series of finger-levers 2, counting from the left-hand end of said series, as shown in Fig. I. The respective finger-levers 2 in said selected group of sixteen correspond with the first sixteen tones of the lower register of the piano or similar instrument which my invention is arranged to play, and it is designed that any chord of tones produced by the automatic progression of the perforated web 8 shall include at least one of the selected group, with the result that the operation of the finger-lever corresponding with the bass tone of any chord shall not only produce that tone by encounter with its corresponding digital, but shall also simultaneously oscillate the swing-lever 78, operate the valve 72 to open the port 70 to the atmosphere, thereby effecting the collapse of the pneumatic bellows 29, and through the links and levers connected with the latter depress the loud pedal and maintain it in depressed position until the conduit 41 is again closed to the atmosphere—for instance, by the automatic movement of the releasing-valve 63, as above described.

Although in the embodiment of my invention chosen for illustration the releasing-valve 63 is operatively connected with the link 24, it is to be understood that it may be connected with any other moving element of the mechanism by which the pedal is depressed, the only relation essential to the operation described being that such motion shall be imparted to said valve consequent upon the movement of the mechanism to depress the pedal as to effect the release of the latter.

It may be noted that my invention may be advantageously employed in connection with an ordinary commercial perforated web without any alteration or addition to said web to thereby secure the correct operation of the pedal of the instrument played upon without the attention of the operator, who may be entirely ignorant of the proper operation of said pedal. It may be also noted that when the releasing-valve 63 and the parts connected therewith are properly adjusted, as above described, the maximum efficiency of the loud pedal may be secured by the rhythmic depression and release of said pedal automatically without the attention of the operator and independently of the control of the finger-levers simply by the pneumatic pressure present in the instrument at any instant, which pressure varies with the rhythmic

character of the composition being played. That is to say, the operating connections of said valve 63 may be so adjusted that the pedal is automatically depressed and released with every pulse or every accented pulse of the music played, so as to afford the greatest possible freedom of the strings and volume of tone without discord, the vibration of the strings being automatically checked by each release of the pedal consequent upon each operative movement thereof. Moreover, the operating connections of said releasing-valve 63 may be so adjusted as to maintain communication between the conduit 41 and the atmosphere through the ports 58 and 60 under normal pneumatic pressure within the instrument, so that a decrease in such pressure is required to effect the release of the pedal by closure of said valve, which may be attained by the operator through manipulation of the pumping mechanism alone. In other words, with the arrangement last contemplated the loud pedal may be controlled both as to its depression and as to its release by variations in the pneumatic pressure in the instrument occasioned at the will of the operator and without direct manipulation of any element of the pedal-operating mechanism above described.

Although I have shown my invention embodied in the particular form of piano-player known commercially as the "pianola," I do not desire to limit myself to such embodiment or to such construction of my invention as is adapted thereto, as it is obvious that various modifications may be made without departing from the essential features of my invention.

I claim—

1. In a musical instrument, the combination with a series of levers adapted to operate sounding devices; of a pedal whose operation affects said sounding devices; a motor adapted to operate said pedal; and, pneumatic means arranged to release said pedal automatically as a consequence of the operation of said motor, substantially as set forth.

2. In a musical instrument, the combination with a series of levers adapted to operate sounding devices; of a pedal whose operation affects said sounding devices; a pneumatic motor adapted to operate said pedal; a pneumatic valve controlling the operation of said motor; and, means arranged to control said valve automatically as a consequence of the movement of said motor, substantially as set forth.

3. In a musical instrument, the combination with a series of levers adapted to operate sounding devices; of a motor; means arranged to operatively connect said motor with a pedal whose operation affects said sounding devices; pneumatic means arranged to initiate the operation of said motor; and, releasing means connected with said motor to check the movement of the latter and release the pedal as a consequence of its operative movement, substantially as set forth.

4. In a musical instrument, the combination with a series of levers adapted to operate sounding devices; of a pneumatic motor; means arranged to operatively connect said motor with a pedal whose operation affects said sounding devices; a pneumatic valve arranged to initiate the operation of said motor; and, a pneumatic releasing-valve operatively connected with said motor to effect the reverse movement of the latter and the release of said pedal as a consequence of its operative movement, substantially as set forth.

5. In a musical instrument, the combination with a series of levers adapted to operate sounding devices; of a pedal whose operation affects said sounding devices; a motor arranged to operate said pedal; a pneumatic tracker-bar; mechanism arranged to operate the respective levers in any sequence predetermined by perforations in a web traversing said bar; a pneumatic valve connecting said motor with the mechanism actuating said levers and arranged to initiate the operation of said motor; and, a pneumatic valve arranged to release said pedal automatically as a consequence of the operation of said motor, substantially as set forth.

6. In a musical instrument, the combination with a series of levers adapted to operate sounding devices; of a pedal whose operation affects said sounding devices; a motor adapted to operate said pedal; means arranged to initiate the operation of said motor by a selected one of said levers; and, means independent of said levers arranged to release said pedal automatically as a consequence of the operation of said motor, substantially as set forth.

7. In a musical instrument, the combination with a series of levers operatively related to the strings of a piano or similar instrument; of a pneumatic tracker-bar; mechanism to operate said levers in any sequence predetermined by perforations in a web traversing said tracker-bar; mechanism comprising a motor operatively connected to operate the pedal of a piano or similar instrument; a pneumatic valve arranged to render said motor operative; a pneumatic valve arranged to release or render said motor inoperative; and, an adjustable operative connection between said pedal-operating mechanism and said releasing-valve, substantially as set forth.

8. In a musical instrument, the combination with a series of levers adapted to operate sounding devices; of a pedal whose operation affects said sounding devices; a motor adapted to operate said pedal; means arranged to release said pedal automatically as a conse-

quence of the operation of said motor; and, means to adjustably vary the actuating element of said releasing means, substantially as set forth.

9. In a musical instrument, the combination with a series of finger-levers arranged to impinge upon the digitals of a piano or similar instrument; of mechanism arranged to operate the pedal of a piano or similar instrument; means arranged to automatically effect the operation of said mechanism, contemporaneously with the operation of a selected finger-lever; means to render said mechanism independent of said finger-lever at the will of the operator; and, means arranged to automatically release said pedal independently of said finger-lever, substantially as set forth.

10. In a musical instrument, the combination with a series of finger-levers arranged to impinge upon the digitals of a piano or similar instrument; of mechanism adapted to engage the pedal of a piano or similar instrument; means arranged to automatically effect the operation of said mechanism contemporaneously with the operation of a selected finger-lever; means to automatically release said pedal independently of said finger-lever; and, means arranged to place said mechanism under the control of said finger-lever and remove it therefrom at the will of the operator, substantially as set forth.

11. In a musical instrument, the combination with a series of levers operatively related to sounding devices; of a pneumatic tracker-bar; mechanism arranged to operate the respective levers in any sequence predetermined by perforations in a web traversing said bar; a member adapted to engage a pedal affecting said sounding devices; means adapted to operate said member under control of a selected lever of said series; and, means arranged to release said member, after its operation, independently of said controlling finger-lever, substantially as set forth.

12. In a musical instrument, the combination with a series of levers operatively related to the strings of a piano or similar instrument; of a pneumatic tracker-bar; mechanism arranged to operate the respective levers in any sequence predetermined by perforations in a web traversing said tracker-bar; a member adapted to engage the pedal of a piano or similar instrument; a motor arranged to operate said member; a pneumatic valve arranged to render said member operative; and, means independent of said levers arranged to release said member as a consequence of the movement of operation of said member, substantially as set forth.

13. In a musical instrument, the combination with a series of levers operatively related to the strings of a piano or similar instrument; of a pneumatic tracker-bar; mechanism arranged to operate the respective levers in any sequence predetermined by perforations in a web traversing said tracker-bar; a member adapted to engage the pedal of a piano or similar instrument; a motor arranged to operate said member; a pneumatic valve arranged to render said member operative; and, a pneumatic valve arranged to release said member as a consequence of the movement of operation of said member, substantially as set forth.

In testimony whereof I have hereunto signed my name, at Philadelphia, Pennsylvania, this 23d day of January, 1904.

PHILIP WUEST, Jr.

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