

P. WIRSCHING.

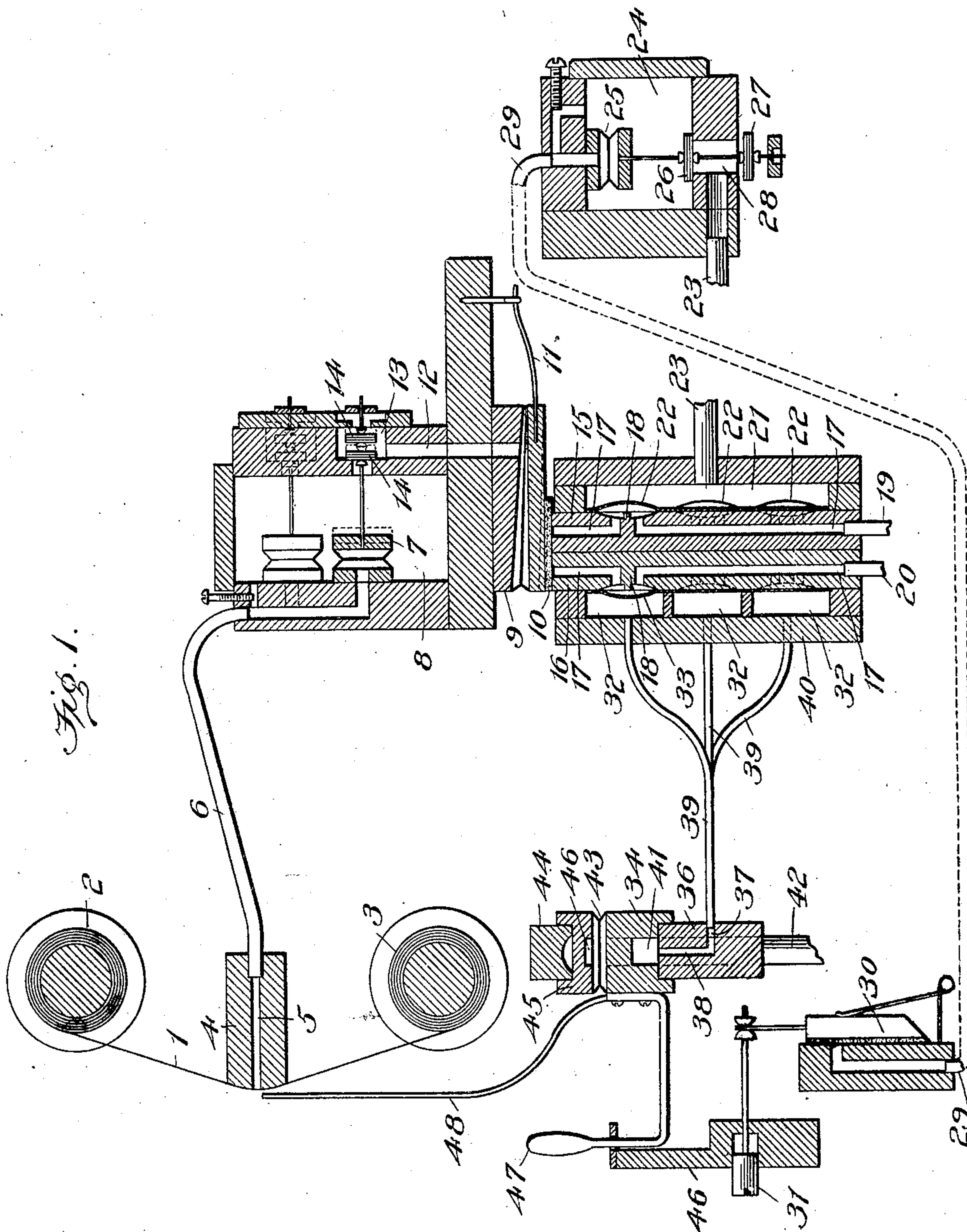
SELF PLAYING MUSICAL INSTRUMENT.

APPLICATION FILED MAR. 15, 1906. RENEWED FEB. 11, 1909.

988,612.

Patented Apr. 4, 1911.

2 SHEETS—SHEET 1.



Witnesses

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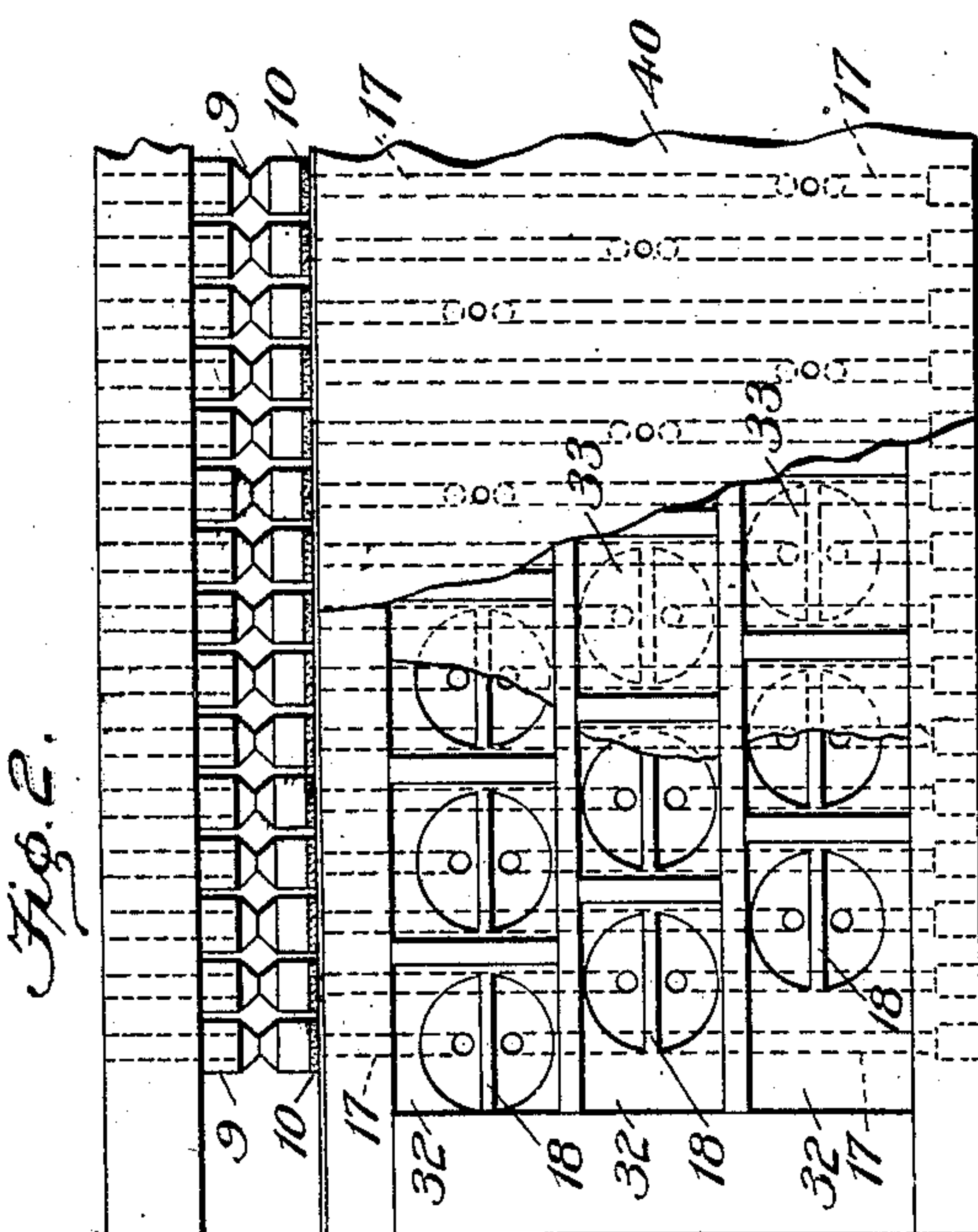
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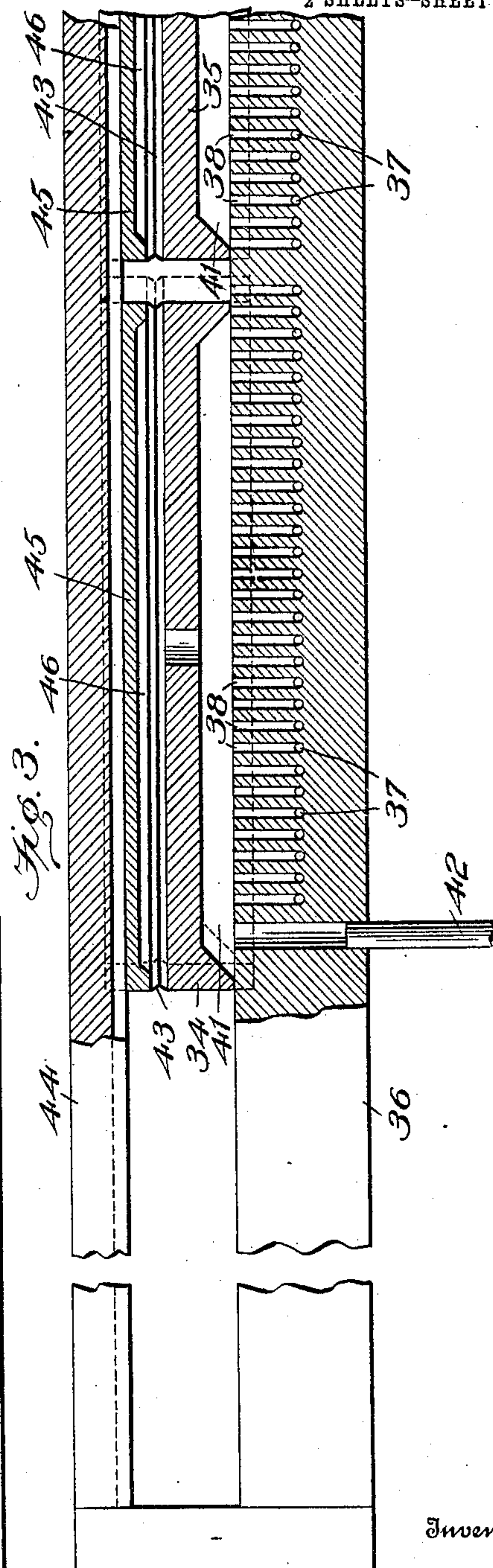
2 SHEETS—SHEET 2.



Witnesses

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UNITED STATES PATENT OFFICE.

PHILIPP WIRSCHING, OF SALEM, OHIO, ASSIGNOR TO THE WIRSCHING ORGAN COMPANY, OF SALEM, OHIO.

SELF-PLAYING MUSICAL INSTRUMENT.

988,612.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed March 15, 1906, Serial No. 306,256. Renewed February 11, 1909. Serial No. 477,465.

To all whom it may concern:

Be it known that I, PHILIPP WIRSCHING, a citizen of the United States, residing at Salem, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Self-Playing Musical Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to auto-pneumatic or self-playing mechanisms for musical instruments and is adapted more particularly for use in connection with pipe organs having several organ divisions, as for example, a first or great organ and a second or swell organ equipped with suitable stop and coupler devices. It may, however, be extended, by mere multiplication of parts, to a greater number of organ divisions, or on the contrary limited to a one manual instrument.

More particularly stated the invention contemplates means whereby the performer, although unskilled as a musician, may pick out certain notes for producing obligato or solo effects upon one of the organ divisions, silence all other notes in that particular organ, and at the same time allow the accompaniment to be played upon another organ division; or, at his option, silence all parts except the notes of a solo. He may cause the accompaniment to be played upon the first organ, and the melody or obligato to be played upon the second organ as is ordinarily the case; or, when the present invention is applied to organs employing duplex wind-chests constructed in conformity with the teachings of my pending application for Letters-Patent Serial No. 280,701, the performer may reverse the tonal effects of the instrument, playing the accompaniment upon the second organ and the melody upon the first.

As is well understood all of the better class of automatic players constructed and operated upon the perforated sheet-music principle are provided with means under control of the operator for governing and regulating the speed or rate of movement of the music and consequently the tempo of the rendition. The present invention presupposes this mechanical feature, although such is not herein shown and described.

In the accompanying drawings which form part of this application: Figure 1 is a transverse vertical section of my invention taken through the music rolls, tracker board, motor-chamber, action bars, and controller devices. Fig. 2 is a view partly in section of the venting motor-pneumatics or bellows valves, individual valve chambers adjacent to the second or melody organ action-bar, and the membrane valves within said chambers. Fig. 3 is an enlarged detail view partly in section of the reciprocating controller and its supporting frame, and Fig. 4 is a front elevation on a reduced scale of the music bearing rolls surmounting the oppositely arranged controller slide valves.

Reference being had to the drawings and numerals thereon, 1 indicates a perforated music sheet, 2 the music spool, and 3 the take-up roll all of ordinary and well known construction.

The numeral 4 indicates the tracker board perforated as usual by parallel ports 5 over the outer end whereof the sheet 1 is adapted to pass, and to the opposite or inner end whereof are affixed motor tubes 6 one for each note embraced in the tracker range. Each of the tubes 6 communicates directly with the interior of its particular motor pneumatic 7 contained within a common motor box or exhaust chamber 8. Beneath said box or exhaust chamber 8 is affixed a parallel series of bellows valves 9 each fitted with a pallet 10 on the underside of its movable member, and normally maintained in an inflated position by action of a spring 11 as shown. By means of individual ports 12 these bellows-valves are placed in direct communication with their respective ported valve pockets 13, formed in one wall of the chamber 8, and are thus adapted to communicate either with the interior of said chamber or with the outside atmosphere according to the position of valves 14 under control of the motor pneumatics 7. Obviously when communication is established with the exhaust chamber 8 the valves 9 collapse, unseating their pallets 10 for purposes that will later appear. Arranged transversely beneath the said bellows-valves 9 are action bars 15 and 16 of which there may be one for each organ division of the instrument, in the present illustrations there being but two shown corresponding with or relating to the first and second organs.

These bars 15, 16 are broken by parallel borings or wind ways 17 each obstructed in the course of its length by a partition 18 and adapted to be opened in pairs to the atmosphere above upon the removal of their respective pallets 10, as hereinbefore described. At their opposite or lowermost ends the borings or wind ways 17 are fitted with action tubes 19 and 20 leading to intermediate stations of the first and second organs respectively. The construction and operation of said intermediate stations is well understood, and for this reason they are not herein shown or described.

Adjacent to the action bar 15 is a universal valve-chamber 21 containing membrane valves 22, or a sheet of flexible impervious material constituting in effect individual membrane valves, arranged to bridge each of the partitions 18 of the wind ways 17, which latter would otherwise open directly into said chamber 21. Leading from the interior of this chamber 21 is an air duct 23 serving normally to exhaust the same to the atmosphere or on the contrary to charge it with wind pressure according to circumstances. The numeral 24 indicates a unison or universal release box containing air under pressure, and also containing a small pneumatic motor 25, the latter controlling a double valve 26—27 alternately guarding opposite ends of a through port 28 intersected by duct 23 from the chamber 21 as aforesaid. Leading from the interior of the last named motor 25 is an exhaust tube 29 the end whereof is normally closed by a spring-pressed pallet 30 adapted to be unseated at will of the performer by a thrust of the piston 31 located adjacent to the organ key-boards. Obviously this operation results in charging the chamber 21 with pressure from box 24 and closing all valves 22 for the purpose of silencing all accompaniment notes, as will later appear. Similarly upon the opposite side of, and adjacent to the action bar 16 are arranged valve chambers 32 but, differing from the chamber 21, these are individual chambers one for each note embraced in the tracker range. Within the individual valve chambers 32 are located membrane valves 33 similar to the valves 22, and in like manner adapted to establish communication between the two sections of each wind-way 17 around the partition 18 therein, but only when one or more of said chambers 32 are vented to the atmosphere in the manner which will now be described.

In convenient proximity to the key board of the instrument are located sliding controller valves 34 and 35 which are identical in construction and are adapted to reciprocate upon a continuous valve seat or distributing bar 36. This seat or bar 36 is penetrated upon its rear side by a series of

horizontal borings 37 each intersected by a vertical boring 38 corresponding in number to ports 5 of the tracker board, and all opening to the atmosphere except at such times as they may be covered by the said sliding controller valves 34—35. Leading from each of said borings 37 is an air duct 39, which, passing through the face board 40 enters its particular individual valve chamber 32 for the purpose of venting the same and releasing its valve 33 when occasion arises. The reciprocating valves 34—35 are hollow in cross section as shown at 41, and this space constitutes a pressure channel which is at all times charged by way of inlet ports 42 from any convenient wind trunk (not shown) in the organ. Accordingly, when all borings 38 are thus covered by the controller valves 34—35 there is pressure in all valve chambers 32, all valves 33 are seated and this organ silenced.

Secured to the controller valves 34—35 by an air tight flexible connection 43, and interposed between said controllers and a guide-rail or resistance rail 44, are runners 45 indented upon their inner surfaces by an air space 46 and partially embracing said guiding rail. The under surface of rail 44 is also grooved throughout its length for purposes of lightness and to reduce its frictional bearing upon said runners, while the space between each controller and its respective runner 45 directly communicates with the pressure chamber 41, thus automatically seating the controller valves, and at the same time serving to retard their too ready reciprocation. By preference these controller valves 34 and 35 together with their supporting frame and correlative reciprocating parts are made of hard rubber, but they may if desired be satisfactorily constructed of wood or of metal.

Projected forward from each controller valve 34—35 in a convenient position at the front of the key board 46 are exposed finger levers 47 whereby said controller valves and dependent parts may be reciprocated at will of the performer; while carried by each controller valve is an upwardly projecting tracers 48, 48 crossing the music sheet in front of the tracker board 4 for a purpose which will now appear in connection with a statement of operation.

Presuming all ports 5 of the tracker board 4 to be closed by an imperforate portion of the music sheet 1, also that a line *a* upon the face of such music sheet intersects the notes of a solo part as expressed by perforations in said music sheet; furthermore presuming 8 to be an exhaust chamber, 24 a pressure chamber, and likewise channels 41 normally charged with action wind from a wind trunk of the instrument. Obviously, as the perforations of sheet 1 come into register with ports 5 of the tracker board there is an

inflow of atmospheric pressure there-through to those of the motor pneumatics 7 with which such ports are directly connected causing these motors to be inflated as indicated by dotted lines in Fig. 1. This inflation of said motors, induced by the suction or exhaust from chamber 8 serves to alter the relative position of valves 14, and collapses the corresponding bellows valves 9 by exhausting the same through the aforesaid chamber 8. Certain of the valves 9 being thus lifted, open to the outside atmosphere the uppermost end of their corresponding borings or wind-ways 17, each of said valves thus guarding two of said ways, one in the first organ action bar 15 and one in the second organ action bar 16.

Normally the chamber 21 is open to the atmosphere, as shown by Fig. 1, with its diaphragm valves 22 also open to permit passage of the column of air contained in the first organ wind-way 17, so that in this manner the action tubes 19 leading from the first organ intermediate station (not shown) are vented and the corresponding musical pipes caused to speak producing the accompaniment as arranged upon the perforated sheet 1. If, however, it is desired to silence the first organ or accompaniment notes, the performer merely depresses piston 31, with the obvious result that the position of valves 26—27 is reversed and the pressure from unison release box 24 instantly employed to close all valves 22 in chamber 21. Similarly, wind ways 17 of the second organ action bar 16 are vented by passage of the music sheet and by agency of the interposed bellows valves 9 before described. Here, however, the membrane valves 33 are inclosed in independent pressure chambers 32 in order that they may be individually controlled, and are utilized to govern the release of action wind from action tubes 20 leading from the intermediate station (not shown) of the second or melody organ. Obviously this venting of the wind ways 17 in the action bar 16 depends upon two conditions, firstly, the bellows valves 9 must have been lifted, and secondly, the diaphragm valves 33 must have been released or opened. When, therefore, all vent borings 37 in the distributing bar 36 are spanned by pressure channels 41 of the controller valves 34 and 35 there is pressure in all ducts 39 and in all valve chambers 32, the valves 33 thus being held closed; but in the event that one or more of said borings 37 are uncovered by a partial reciprocation of either or both of the controller valves 34 or 35, conditions are immediately reversed. The corresponding valve chambers 32 are thereupon vented through ducts 39, borings 37 and 38 to the atmosphere, the valves 33 in such vented chambers are released or opened, and the action wind escapes thence from such of the wind

ways 17 as may be uncovered, with the results before stated. The action last described is illustrated by the combined Figs. 3 and 1 of the drawings, the former showing a single vent 38 between the partially separated controller valves 34—35 uncovered and opened to the atmosphere, and the latter, Fig. 1, illustrating the effect upon its corresponding membrane valve 33 in the uppermost of the three individual valve chambers 32 shown. The same operation and results apply to any and all of the individual valves of the second organ action bar 16 and correlative parts,—so that it is possible thus to silence all notes of the second organ, or, on the contrary to pick out, and render available any particular notes for producing obligato or solo effects such as indicated by the zig zag line *a* in Fig. 4. Thus all notes of the accompaniment are ordinarily played upon the first organ precisely as they are presented by the perforations of the music sheet to the tracker board, the melody being simultaneously played by agency of the same perforations but upon the second organ. When, however, occasion requires, all notes either of the accompaniment or the melody may be silenced at will of the operator as heretofore stated, and if desired the notes of the first organ may be silenced in octaves, provided the pressure chamber 21 is divided into independent compartments all connected with the unison release box 24 precisely as shown in the present arrangement of the common chamber 21. Likewise, all notes of the second organ may be played when the valves 33 are released as aforesaid, or any number of such notes may be momentarily brought into action by agency of the controller valves 34—35 for purposes of emphasis.

When, in the course of a written piece of music or perforated record sheet, solo parts occur, these, as indicated by line *a* Fig. 4, are traced out by the pointers 48 with the result that only the appropriate vents 37 are opened to the atmosphere one at a time in proper succession. In other words, the controller valves 34—35 slightly separated as shown by Fig. 3, are moved simultaneously one way or the other as indicated by the guiding line *a*. In like manner the controller valve 34 may be left in a position to silence upon the second organ all bass notes of the music by subjecting the corresponding diaphragm valves 33 to pressure as before described; while with the other controller valve 35 the operator may trace out and render available all treble notes as indicated upon the music sheet.

This being a general description of my present invention it should be understood that I do not limit myself to the precise arrangement and combination of parts herein shown and described, on the contrary

various changes and modifications thereof will readily suggest themselves to those skilled in the art of organ construction. For example, in the present illustrations two
 5 reciprocating controller valves are shown for governing the treble and bass parts of the tracker range, respectively, but obviously these may be doubled in length so that either will control the entire range of the tracker
 10 board. And, again, the present illustrations provide for operating upon a combined suction or exhaust and pressure principle; but the same operation and results may also be obtained by either suction or pressure alone.

15 Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a pneumatic action for musical instruments, the combination with a plurality
 20 of action bars, of suitable windways through each of said bars arranged in series one for each division of the instrument, individual valve chambers and valves for each of the windways in one of said bars, means for
 25 reversing the position of said valves by venting their respective valve chambers to the atmosphere, valves for simultaneously opening and closing one of said windways in each series, and pneumatic motors under control
 30 of a perforated music sheet for controlling in turn the last mentioned valves, substantially as described.

2. In a pneumatic action for musical instruments, the combination with suitable
 35 wind ways and individual valves and valve-chambers therefor, of an action controller comprising a slide valve provided with a pressure chamber, a distributing bar upon which the slide valve is mounted, a guide rail above
 40 the slide valve, a pneumatic bellows interposed between said valve and rail, and pneumatic connections whereby the aforesaid valve-chambers may be charged from the slide valve pressure chamber or exhausted to
 45 the atmosphere, substantially as described.

3. In a pneumatic action for musical instruments, the combination with suitable
 50 wind ways and individual valves and valve-chambers therefor, of an action controller comprising a plurality of slide valves each provided with a pressure chamber, a distributing bar upon which said valves are
 55 mounted, and pneumatic connections whereby said valve-chambers may be charged from the pressure chambers of said reciprocating valves or exhausted to the atmosphere, substantially as described.

4. In a pneumatic action for musical instruments, the combination with suitable
 60 wind ways and individual valves and valve chambers therefor, of an action controller comprising a distributing bar communicating with said valve-chambers by independent ducts, a slide valve seated upon said bar
 65 for uncovering one or more of said ducts, a guide rail above, and an air cushion inter-

posed between said rail and slide valve to maintain the latter in a seated position whereby the valve-chambers aforesaid are
 70 charged or exhausted to close or open their respective valves, substantially as described.

5. In a pneumatic action for musical instruments, the combination with suitable
 75 windways, of individual valve chambers and valves normally closing their respective windways, of individual valve chambers and ing a distributing bar communicating with
 80 said valve chambers by independent ducts, a slide valve mounted upon said bar for uncovering one or more of said ducts, a resistance rail, an air cushion interposed between
 85 said rail and slide valve, and means for constantly charging both the valve and cushion with pressure, substantially as described.

6. In a pneumatic action for self playing
 90 musical instruments the combination with an intermediate station, of an action bar, suitable wind ways in said bar for communicating with said intermediate station, valves
 95 wholly at one side of said windways for governing the passage of action wind through said ways, individual valve chambers inclosing the valves having no communication with the windways aforesaid, and a
 100 controller for operating said valves individually or collectively, substantially as described.

7. In a pneumatic action for self playing
 105 musical instruments the combination with an intermediate station, of an action bar, suitable wind ways through said bar for communicating with said intermediate station, valves wholly at one side of said windways
 110 for governing the passage of action wind through said ways, air tight individual valve chambers inclosing the valves having no communication with the windways aforesaid, and a sliding controller for operating
 115 said valves individually or collectively, substantially as described.

8. In a pneumatic action for self playing
 120 musical instruments the combination with an intermediate station, of a melody action bar, suitable wind ways in said bar for communicating with said intermediate station, a perforated music sheet, valves wholly at
 125 one side of said windways for governing the passage of action wind through said ways, means for controlling said valves, and an additional valve under control of the music sheet for guarding the outlet of the wind
 130 ways aforesaid, substantially as described.

9. In a pneumatic action for self playing
 135 musical instruments the combination with an intermediate station, of an action bar, suitable wind ways through said bar for communicating with an intermediate station, a perforated music sheet, pneumatic motors
 140 under control of said sheet, and valves operatively controlled by said motors for guard-

ing the outlet of the wind ways aforesaid, substantially as described.

10. In a pneumatic action for self playing musical instruments the combination with
5 intermediate stations, of a plurality of independent action bars, a series of wind ways through each of said bars for communicating in series with the intermediate stations of their respective organ divisions, and
10 valves under control of the music sheet each guarding one of said wind ways in all of said action bars, substantially as described.

11. In a pneumatic action for self playing musical instruments the combination with
15 intermediate stations, of melody and accompaniment action bars, suitable wind ways through each of said bars for communicating with the intermediate station of their respective organ divisions, internal valves for
20 governing the passage of action wind through said ways, means for closing all internal valves of the accompaniment series, means for closing one or more internal
25 valves of the melody series, and a series of external valves under control of the music sheet each guarding the outlet of a wind way in both action bars, substantially as described.

12. A pneumatic action for musical instruments including an intermediate station, suitable wind ways, and a valve in each of said wind ways, in combination with
30 a controller common to all of said valves comprising a distributing bar, independent ducts operatively connecting said bar with
35 each of the valves aforesaid, and an interior controller valve slidably seated upon said bar for uncovering and venting one or more of said ducts, substantially as described.

13. A pneumatic action for musical instruments including an intermediate station, suitable wind ways, and a valve in each of said wind ways, in combination with a controller, common to all of said valves comprising a distributing bar, independent ducts
45 operatively connecting said bar with each of the valves aforesaid, and a hollow controller-valve constantly charged with wind pressure and slidably seated upon said bar for uncovering and venting one or more of said
50 ducts, substantially as described.

14. A pneumatic action for musical instruments including an intermediate station, suitable wind ways, and a valve in each of said wind ways, in combination with a controller common to all of said valves comprising a distributing bar, independent ducts operatively connecting said bar with each of the valves aforesaid, an interior controller valve slidably seated upon said bar for uncovering and venting one or more of said
55 ducts, and a tracer carried by the controller-valve to indicate the extent of its reciprocation, substantially as described.

65 15. A pneumatic action for musical in-

struments including an intermediate station, suitable wind ways, and a valve in each of said wind ways, in combination with a controller common to all of said valves comprising a distributing bar, independent ducts
70 operatively connecting said bar with each of the valves aforesaid, a controller-valve slidably seated upon said bar, a guide rail above, and an air cushion interposed between said rail and valve to maintain the latter in a
75 seated position, substantially as described.

16. A pneumatic action for musical instruments including an intermediate station, suitable wind ways, and a valve in each of said wind ways, in combination with a controller common to all of said valves comprising a distributing bar, independent ducts operatively connecting said bars with each of the valves aforesaid, a controller-valve slidably seated upon said bar, a guide rail,
80 a self-packing air cushion interposed between said rail and valve, and ports for constantly charging both the valve and cushion from a common source of wind pressure, substantially as described. 90

17. A pneumatic action for musical instruments including an intermediate station, suitable wind ways, and a valve in each of said wind ways, in combination with a controller common to all of said valves comprising a distributing bar, independent ducts operatively connecting said bar with each of the valves aforesaid, a controller-valve slidably seated upon said bar, a superposed guide rail, a runner beneath said rail, an airtight flexible connection between said runner and controller valve, and ports for supplying air pressure to said controller-valve and runner, substantially as described. 100

18. A pneumatic action for musical instruments including an intermediate station, suitable wind ways, and a valve in each of said wind ways, in combination with a controller common to all of said valves comprising a perforated distributing bar, independent ducts operatively connecting each perforation of said bar with one of the valves aforesaid, and an interior controller-valve slidably seated upon said bar for normally covering the perforations aforesaid, substantially as described. 105 110 115

19. A pneumatic action for musical instruments including an intermediate station, suitable wind ways and a valve in each of said wind ways, in combination with a controller common to all of said valves comprising a distributing bar, independent ducts operatively connecting said bar with each of the valves aforesaid, a controller-valve slidably seated upon said bar, a superposed guide rail having a grooved under surface, a runner beneath said rail also having a depressed under surface, a flexible bellows connection between said runner and controller-valve, and ports for supplying air
120 125 130

pressure to the interior of said controller-valve and runner, substantially as described.

20. In a pneumatic action for self-playing musical instruments the combination with
5 intermediate stations, a perforated music sheet, and a tracker board, of melody and accompaniment action bars, suitable wind ways through each of said bars communicating with their respective intermediate sta-
10 tions, a valve wholly at one side of each of said wind-ways, individual valve chambers inclosing the valves having no communication with the windways aforesaid, a controller common to all valves of said melody
15 action bar comprising a distributing bar, independent ducts operatively connecting the last named bar with each of the valves in said melody action bar, independent controller-valves seated upon the exterior of
20 said distributing bar, and means whereby said controller-valves may be reciprocated in opposite directions, substantially as described.

21. In a pneumatic action for self-playing
25 musical instruments, the combination with a perforated music sheet, a tracker board and an intermediate station, of first and second organ action bars provided with suit-

able exhaust wind ways, arranged in coacting series, pneumatic bellows valves for
30 closing both series of wind ways, pneumatic motors under control of said music sheet for controlling in turn said bellows valves, a universal release chamber coacting with said first organ action bar, and individual
35 pressure chambers coacting with said second organ action bar, substantially as described.

22. In a pneumatic action for musical instruments, the combination with a perforated music sheet, a tracker board and an
40 intermediate station, of suitable wind ways communicating with said station, valve chambers and valves normally closing their respective wind ways, means for reversing the position of said valves by venting their
45 chambers to the atmosphere, and additional bellows valves under control of the music sheet for guarding the outlet of the wind ways aforesaid, substantially as described.

In testimony whereof I affix my signature, 50
in presence of two subscribing witnesses.

PHILIPP WIRSCHING.

Witnesses:

GEO. J. TAYLOR,

C. A. RICHARDSON.