

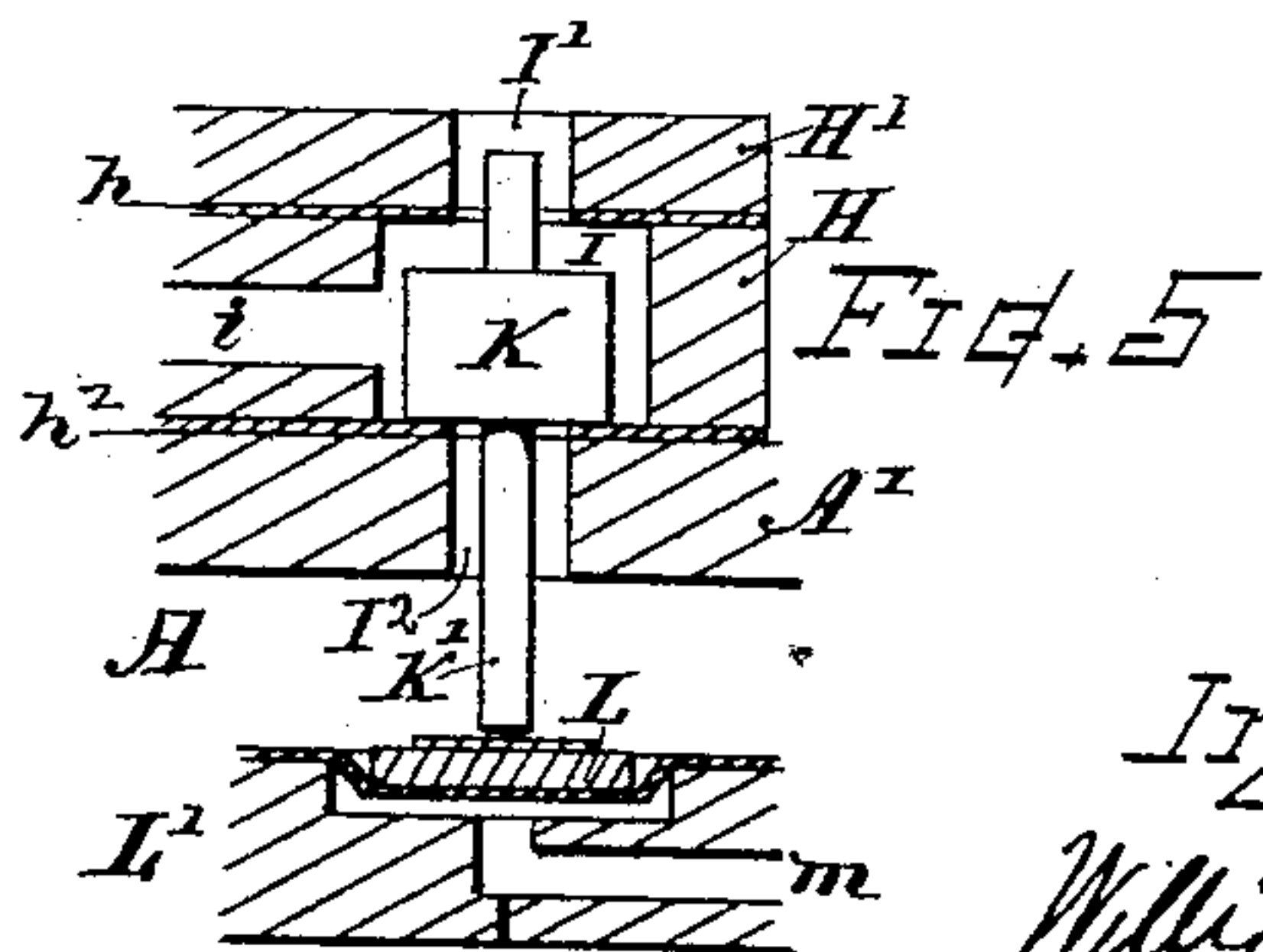
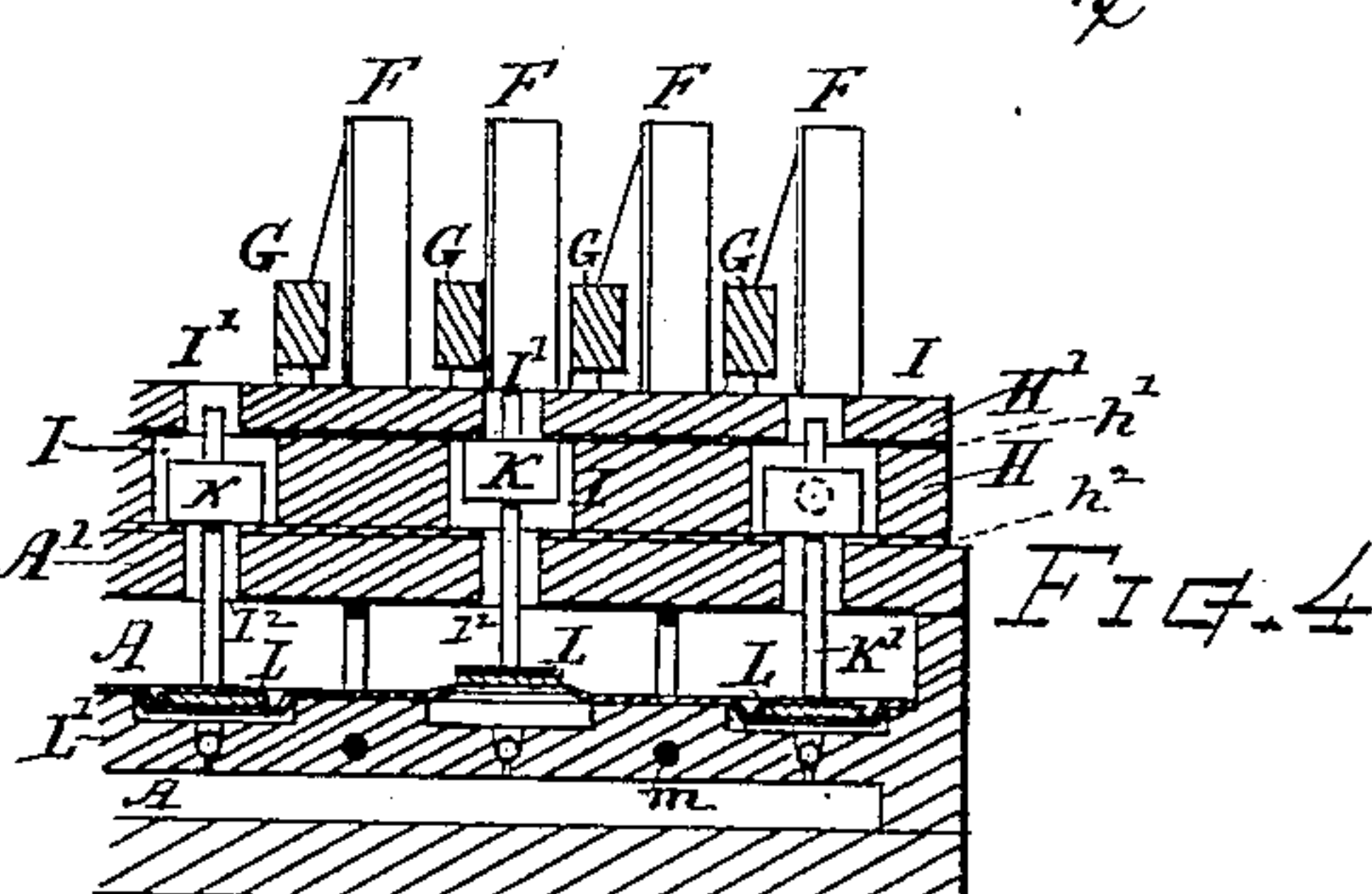
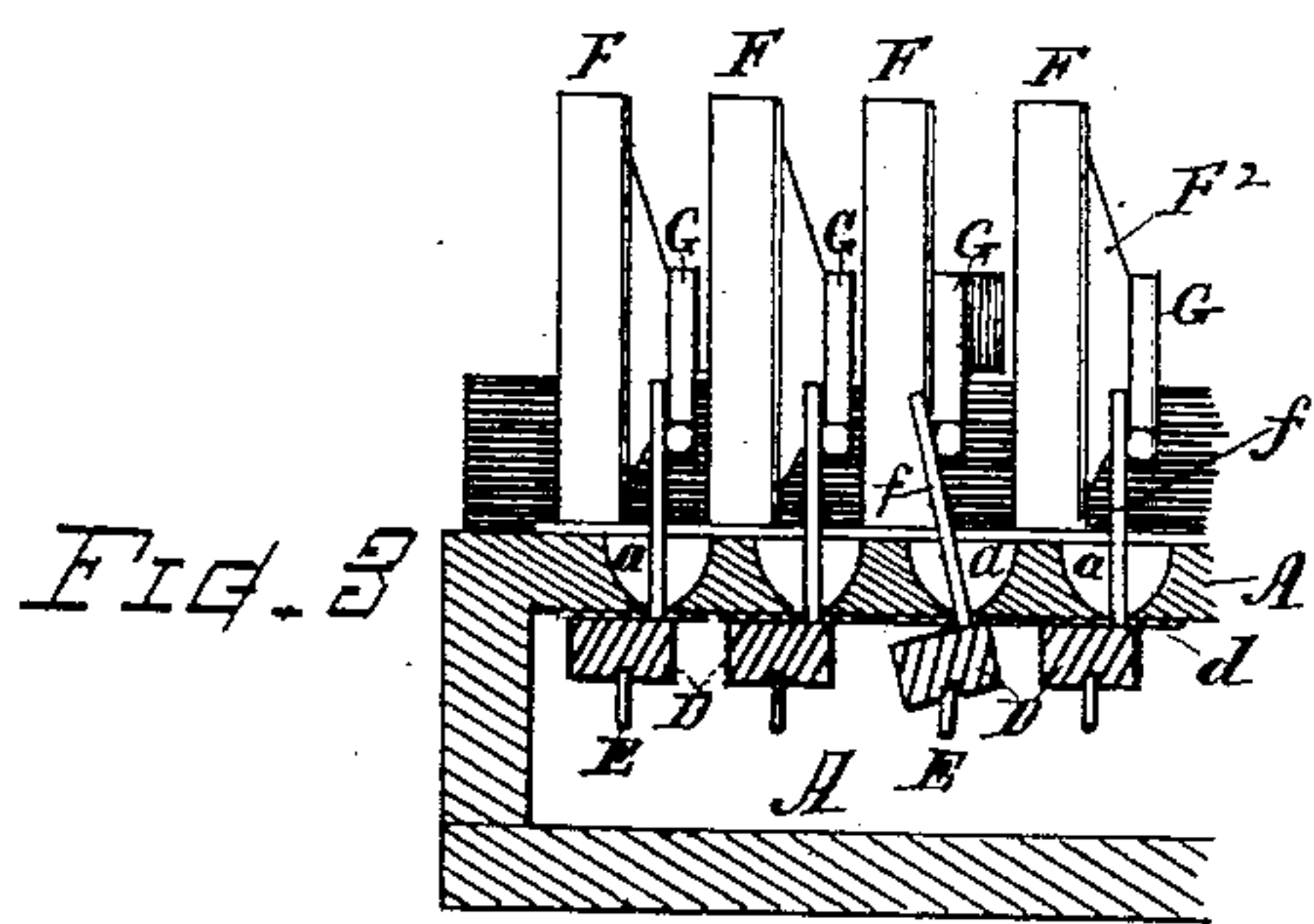
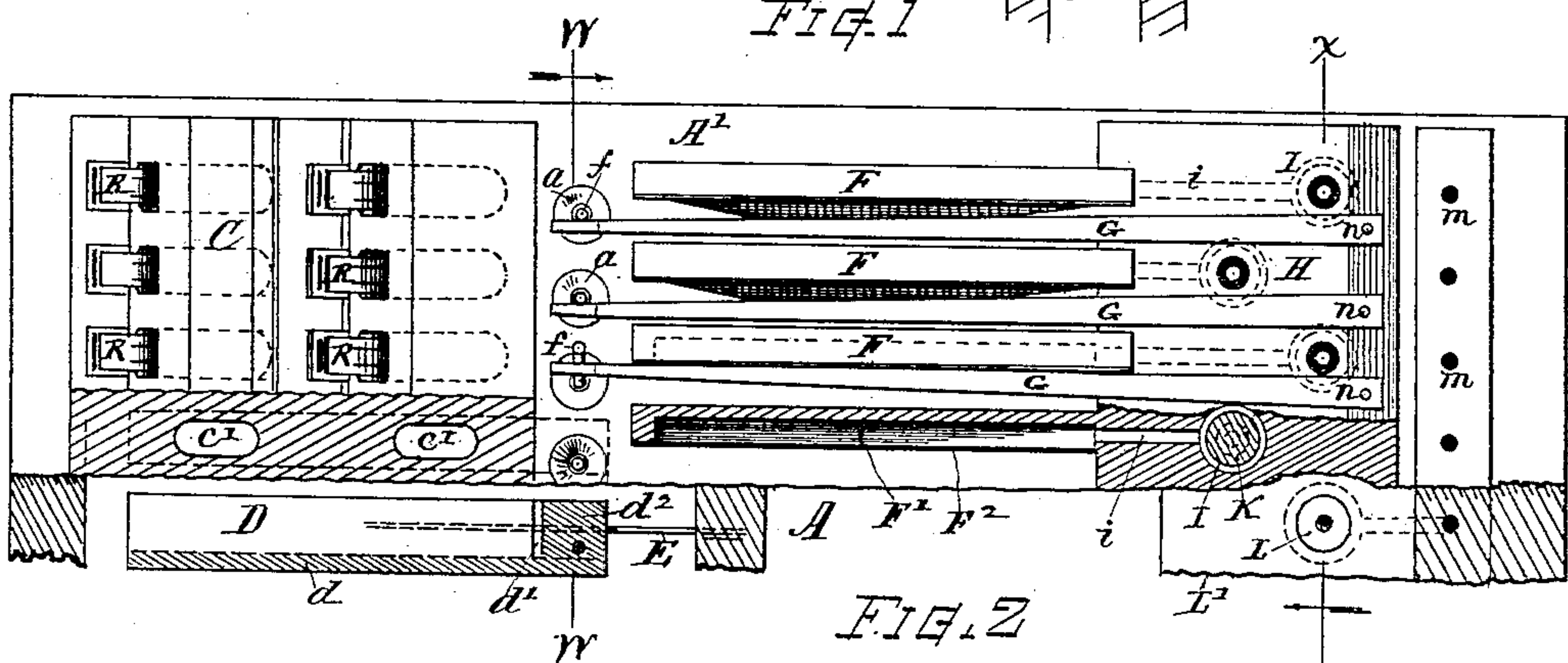
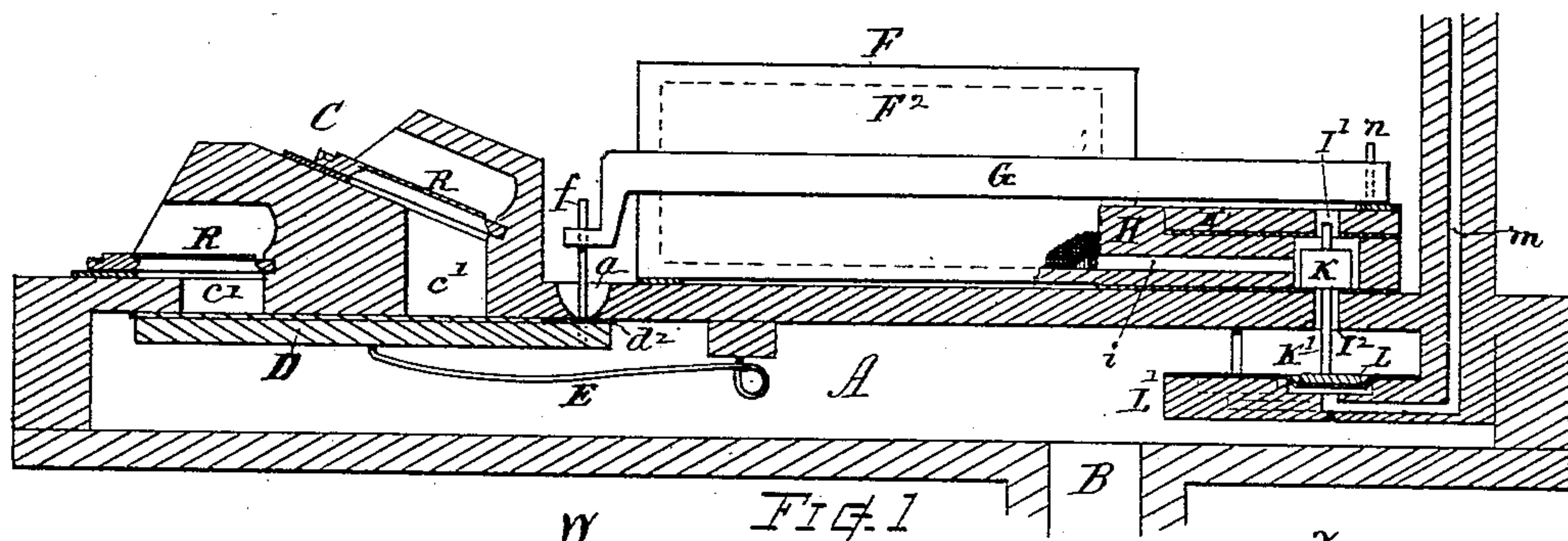
(No Model.)

W. D. PARKER.

PNEUMATIC ACTION FOR MUSICAL INSTRUMENTS.

No. 394,005.

Patented Dec. 4, 1888.



Witnesses.

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# UNITED STATES PATENT OFFICE.

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## PNEUMATIC ACTION FOR MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 394,005, dated December 4, 1888.

Application filed April 12, 1888. Serial No. 270,439. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM D. PARKER, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic Actions for Musical Instruments, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

In my previous Letters Patent, No. 368,164, of August 9, 1887, I have described an action for pneumatic organs having a system of sound-controlling pneumatics or valve-movers disposed within the wind-chest and ranging in lateral spacing to correspond with that of the reeds, and combined with a system of regulating-valves actuated by primary pneumatics that work in response to the playing mechanism. This mechanism, while it is of great practical utility and advantage, does not meet the requirements of instruments in which an externally-disposed action is desired.

My present invention therefore relates to an improved pneumatic action based upon principles of similar utility embodied and organized in mechanism that is adapted for external arrangement.

The object of my present invention is to provide an action for pneumatically-operated musical instruments which can be constructed with practical facility and economy, and in which the pneumatics that control the sound-producing devices or actuate the valves thereof are disposed at spacing or intervals corresponding to the reed-scale on the exterior of the wind-chest, to be collapsed by atmospheric pressure when exerting their operative force, and provided with a system of operating-levers, by which their power and movement are transmitted to the sound devices or to the reed-duct valves that are located within the wind-chest; also, to provide, in combination with the principal pneumatics, a windway-plate and system of governing valves or puppets of peculiar construction which are actuated by the small primary pneumatics in response to the playing mechanism. These ob-

jects I attain by means such as hereinafter described, the particular subject-matter claimed being definitely specified.

In the drawings, Figure 1 is a vertical sectional view of a pneumatic organ-action, illustrating the nature of my improvements. Fig. 2 is a plan view of the same, portions being shown in section to illustrate underlying parts. Fig. 3 is a vertical section at line *u u*. Fig. 4 is a vertical section at line *x x*; and Fig. 5 is a detail view of the governing-valve, showing its arrangement in the windway-plate and its actuating pneumatic.

In referring to parts, A denotes the wind-chest from which in practice the air is exhausted, any suitable bellows or wind-inducing apparatus being combined therewith at B for the purpose, which apparatus, being common and well known, need not be herein shown and described.

C denotes the sounding devices—in the present instance a double tube-board provided with the usual cells containing reeds R, and having wind ducts or passages *c'* leading from the respective cells to the interior of the wind-chest, which ducts are in their order controlled by valves D, disposed within the wind-chest and hinged along one of their sides, as at *d*, to close against the under side of its seat-board A' and to open by a rolling or rocking action. Each valve is provided with an arm, finger, or pin, *f*, rigidly fixed thereto, which extends through a conical or funnel-shaped space or opening, *a*, to the exterior of the wind-chest. The face-packing of the valve D is cut laterally, as at *d'*, and the portion *d''* is glued to the board A', forming a close packing for the pin *f* and stopping any leakage of air through the space *a*. The funnel shape of the space *a* allows the pin *f* to swing freely for rocking the valve D. Suitable springs, E, are provided for closing the valves D to their seats when the pressure of the opening mechanism is relieved.

F indicates the pneumatics, by which the valves D or sound-controlling devices are operated. Said operating-pneumatics are arranged on the outside of the wind-chest at intervals corresponding with the lateral spacing of the reeds, and consists of a series of thin boards or plates having upon one of their



sides a recess or chamber,  $F'$ , which is covered by a flexible diaphragm,  $F^2$ , the edges of which are tightly secured to the board or frame around the edges of the chamber. These pneumatics  $F$  are arranged to stand on edge, or perpendicular to the action-board  $H'$ , and are in their order connected with a windway-plate,  $H$ , also attached to the outside of the wind-chest, and which contains a series of valve-chambers,  $I$ , corresponding in number to the number of pneumatics  $F$ , while windways  $i$  lead from the respective pneumatics into the respective valve-chambers  $I$ . The valve-chambers  $I$  are formed by simply boring holes through the board or plate  $H$ , and the windways  $i$  by boring holes from the edge of the plate to intersect the chambers  $I$ .

Air-passages  $I'$  extend through the cap  $H'$  of the windway-plate  $H$ , and air-passages  $I^2$  connect the valve-chamber  $I$  with the interior of the wind-chest  $A$ . A packing,  $h'$ , of soft leather, is placed between the windway-plate and the top of the wind-chest  $A'$ , and a similar packing,  $h^2$ , is arranged on the under side of the cap-piece  $H'$ . These serve as packings for the boards or plates and as seats for the several valves.

The governing-valves  $K$  are arranged within the chambers  $I$ . Said valves are of the form indicated, each provided with a puppet or head to work up and down in the chamber  $I$ , and a depending stem,  $K'$ , that passes downward through the openings  $I^2$  to a position where it can be engaged by the primary pneumatics  $L$  when the latter are inflated. The primary pneumatics are constructed to operate substantially similar to those described in my former patent, above named, the pneumatic-supporting bed  $L'$  being arranged within the wind-chest, and the several pneumatics each being provided with a windway or air-inlet duct,  $m$ , that leads to a tracker or key-range, where the ducts are opened or closed, and the pneumatic action thus controlled by the playing mechanism, (not shown,) which can be a perforated music-sheet, a system of valves operated by a music-sheet, or by manual-keys, or any arrangement of well-known devices whereby the ducts  $m$  can be opened and closed in accordance with the notes of the music to be executed.

The governing-valve  $K$  is of somewhat less diameter and of less height than the chamber  $I$ , in which it is confined. This allows it to move freely. When the primary pneumatic is inflated, the valve is forced upward against the cap  $H'$  and closes the upper opening,  $I'$ , and when the primary pneumatic is collapsed the valve  $K$  drops and closes the lower opening,  $I^2$ .

Combined with the pneumatics  $F$  are series of laterally-swinging levers  $G$ , that have one of their ends fulcrumed, as at  $n$ , their centers respectively attached to the diaphragms of the respective pneumatics, and their opposite ends at positions for engaging with the pins  $f$  of the valves  $D$ , so that the action of the

pneumatic diaphragm, when collapsed, will, by drawing back the lever  $G$ , press back the pin  $f$  and effect the opening of the valve, while the action of the spring  $E$ , which closes the valve, will return the parts to normal position and expand the pneumatic when the collapsing force is relieved from the pneumatic diaphragm.

The levers  $G$  are disposed, as indicated, to swing in the spaces between the respective pneumatics, which latter are disposed parallel to each other, the lever-movement and pneumatic frame occupying a range or space corresponding to the range or scale of the reeds.

In my present drawings I have shown only a few of the series of sound devices, valves, and pneumatic-operating mechanisms; but it will be understood that in practice the instruments may contain any desired number of these pneumatics, sound devices, and operating mechanisms, the parts being arranged in similar order to that shown throughout the full length of the organ compass, or any desired portion thereof, to afford a greater or less number of tones in the range or scale, according to the required scope or size of the instrument.

The operation of my improved action is as follows: Under normal condition the series of ducts  $m$  are closed; hence the primary pneumatics are collapsed, and the governing-valves are in depressed position, stopping the passage  $I^2$  and maintaining the passage  $I'$  open. Under these conditions the operating-pneumatics are held inflated by the force exerted by the springs  $E$  acting through the pins  $f$  and levers  $F^3$ , which are attached to the pneumatic diaphragms. Now, when the player opens one of the windways or ducts  $m$ , the primary pneumatic corresponding therewith is instantly inflated by atmospheric pressure attempting to supply the exhaust of the wind-chest. This forces upward the governing-valve  $K$  to the top of its chamber  $I$ , closing the passage  $I'$ , and opening the passage  $I^2$ , which gives communication between the operating pneumatic  $F$  and wind-chest, and said latter pneumatic is consequently instantly collapsed, vibrating the lever  $G$  against the valve-pin  $f$ , and overcoming the force of the spring  $E$ , and rocking the valve  $D$  so as to open the duct of the reed or sounding device, allowing the same to sound. When the duct  $m$  is again closed the primary pneumatic is collapsed and the governing-valve drops, closing the passage  $I^2$  and opening the passage  $I'$ . Equality of pressure being thus restored to the diaphragm of the operating-pneumatic it loses its power, and the valve  $D$  and lever  $F^3$  are moved back to normal position by the force of the spring  $E$ . Each of the respective sets of devices for the different tones of the scale or series operate in similar manner as their respective ducts  $m$  are opened in accordance to the notes of any piece of music to be played, the opening and closing of said ducts being accomplished in any suitable or well-



known manner by manual keys by a perforated traveling music sheet or tablet, or by other means, such as employed for playing music in instruments of similar class.

5 Pneumatics arranged as herein shown with the intermediate levers, G, may be employed for controlling sound-producing devices other than reeds, such as pipes, strings, bells, or vibrating rods.

10 It will be understood that I do not claim novelty in the feature of controlling a valve-operating pneumatic by means of a small primary pneumatic and valve devices that open and close outlet and inlet passages leading to  
15 said operating-pneumatic from the external air to the wind-chest.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. A pneumatic action for musical instruments, having, in combination, an inside sound-controlling valve (or valves) hinged along its longitudinal edge to open and close by rocking movement and provided with an arm projecting through the action-board in  
25 radial relation to the hinging axis, an outside collapsible pneumatic (or pneumatics) provided with a connection that engages said arm and moves it laterally for operating said valve, and a governing valve (or valves) disposed within the air-passage of said pneumatic, having a stem that depends into the  
30 wind-chest, and a primary pneumatic (or pneumatics) for lifting said governing-valve disposed on a support or bed inside of the  
35 wind-chest, the windways of which are controlled by the player or music-sheet.

2. In a musical-instrument action, a series of pneumatics composed of chambered boards provided with flexible diaphragms arranged  
40 in upright position externally of the wind-chest, in connection with a windway-board having a series of valve-chambers containing governing-valves with windways leading therefrom into said pneumatic chambers beneath their diaphragms in said pneumatics,  
45 and a series of levers attached to the diaphragms and fulcrumed to vibrate laterally between the adjacent pneumatics, substantially as and for the purpose set forth.

50 3. In a musical instrument, the series of collapsible operating-pneumatics disposed outside the wind-chest at intervals corresponding to the reeds and provided with intermediately-located levers that are moved by the  
55 action of the respective pneumatic diaphragms, in combination with rocking sound-controlling valves disposed inside the wind-chest and provided with arms or pins that extend to the exterior and are respectively en-

gaged by the levers of the operating-pneumatic, substantially as set forth.

4. A musical-instrument action provided with the inside rocking sound-controlling valves having pins extending through the action-board, the outside collapsible operating-pneumatics provided with levers that en-  
65 gage said pins for opening the valve, and springs that close the valves and expand the operating-pneumatics, in combination with a system of governing-valves and primary pneu-  
70 matics that are controlled by the player for bringing said outside pneumatics into action.

5. The combination of the sound devices, the valves D, provided with pins *f*, the springs E, the collapsible operating-pneumatics F, the levers G, intermediate thereto, ful-  
75 crumed at *n* and actuated by the pneumatic diaphragms, the windway-board H, having passages *i* and chambers I, the governing-valves K, arranged within said chamber with  
80 depending stems K', and the primary pneumatics within the wind-chest, having ducts that lead to the tracker or key-board range for control by the player, substantially as set forth.

85 6. The windway plate or board H, having the windways *i* and the chambers I, with the inlet and outlet air-passages I' I'', and the governing-valves K, located within said chambers with its stem depending to the interior  
90 of the wind-chest, in combination with the outside operating-pneumatics and the inside primary pneumatics, substantially as and for the purposes set forth.

7. The action-board A', supporting the reed  
95 or sound device having the duct *c'*, and provided with the tapered aperture *a*, in combination with the inside reed-duct valve hinged on said board and provided with the pin *f*,  
100 that projects through said aperture and engages the valve-operating mechanism at the exterior of the wind-chest, substantially as set forth.

8. The sound-controlling valve hinged on the action-board at the interior of the wind-  
105 chest, as at *d*, with its operating arm or pin *f* projecting from the valve through an opening, *a*, to the exterior of the wind-chest, and having a portion of the valve-facing *d'* attached to the action-board to close said open-  
110 ing and form a packing about said pin, substantially as set forth.

Witness my hand this 7th day of April, A. D. 1888.

WILLIAM D. PARKER.

Witnesses:

CHAS. H. BURLEIGH,  
ELLA P. BLENUS.