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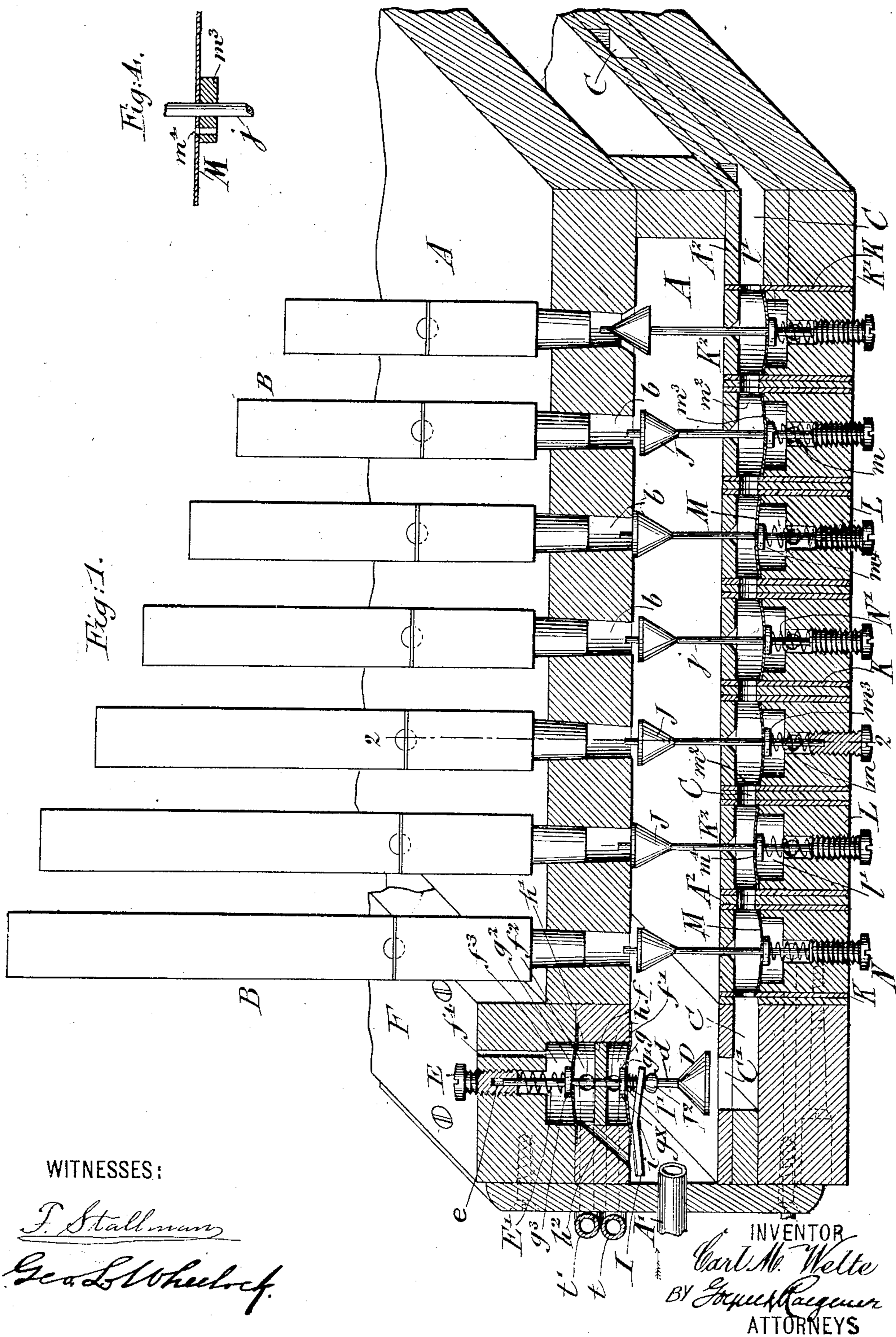
Patented Nov. 27, 1900.

C. M. WELTE.  
PNEUMATIC VALVE ACTION.

(Application filed Apr. 12, 1900.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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No. 662 705.

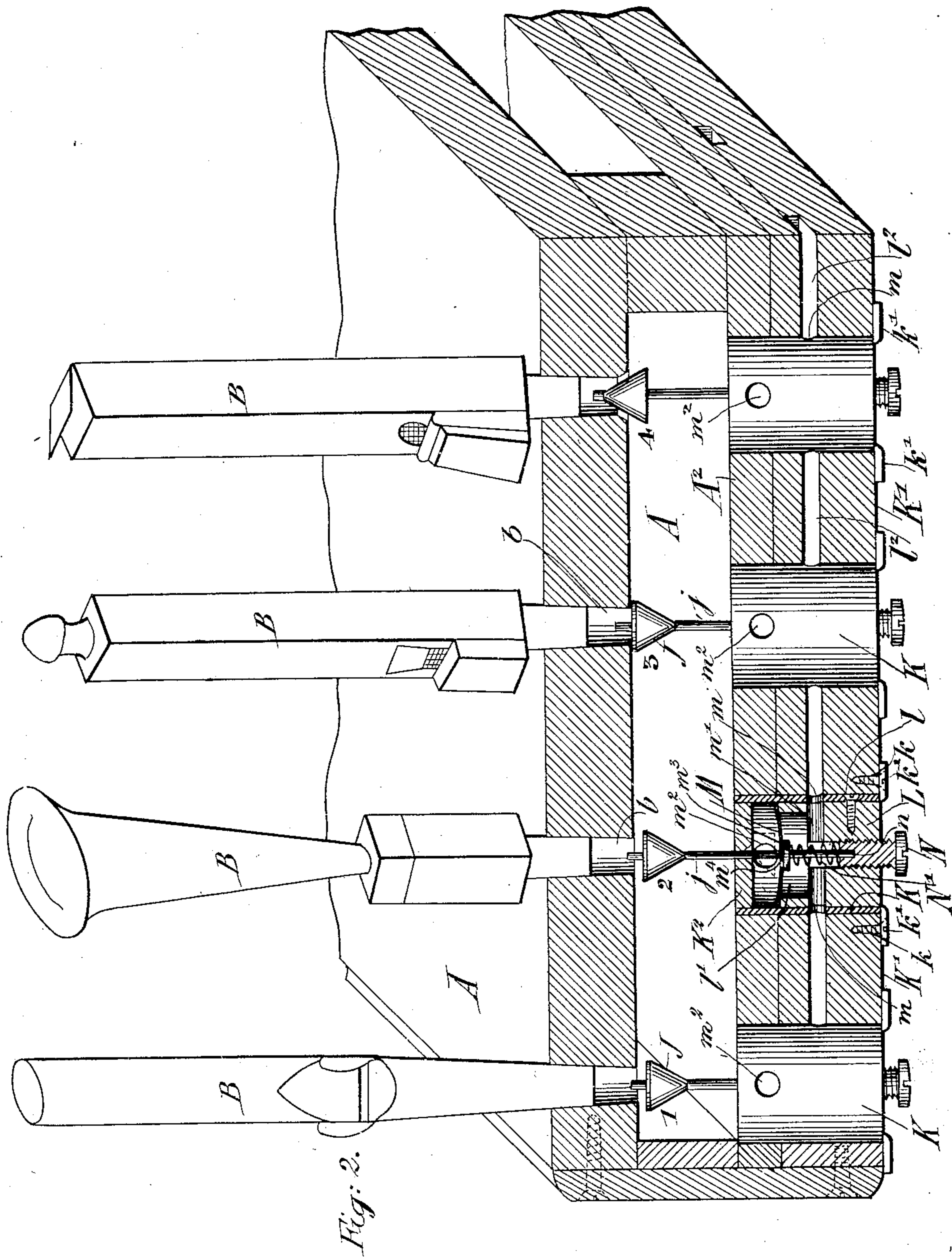
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3 Sheets—Sheet 2.



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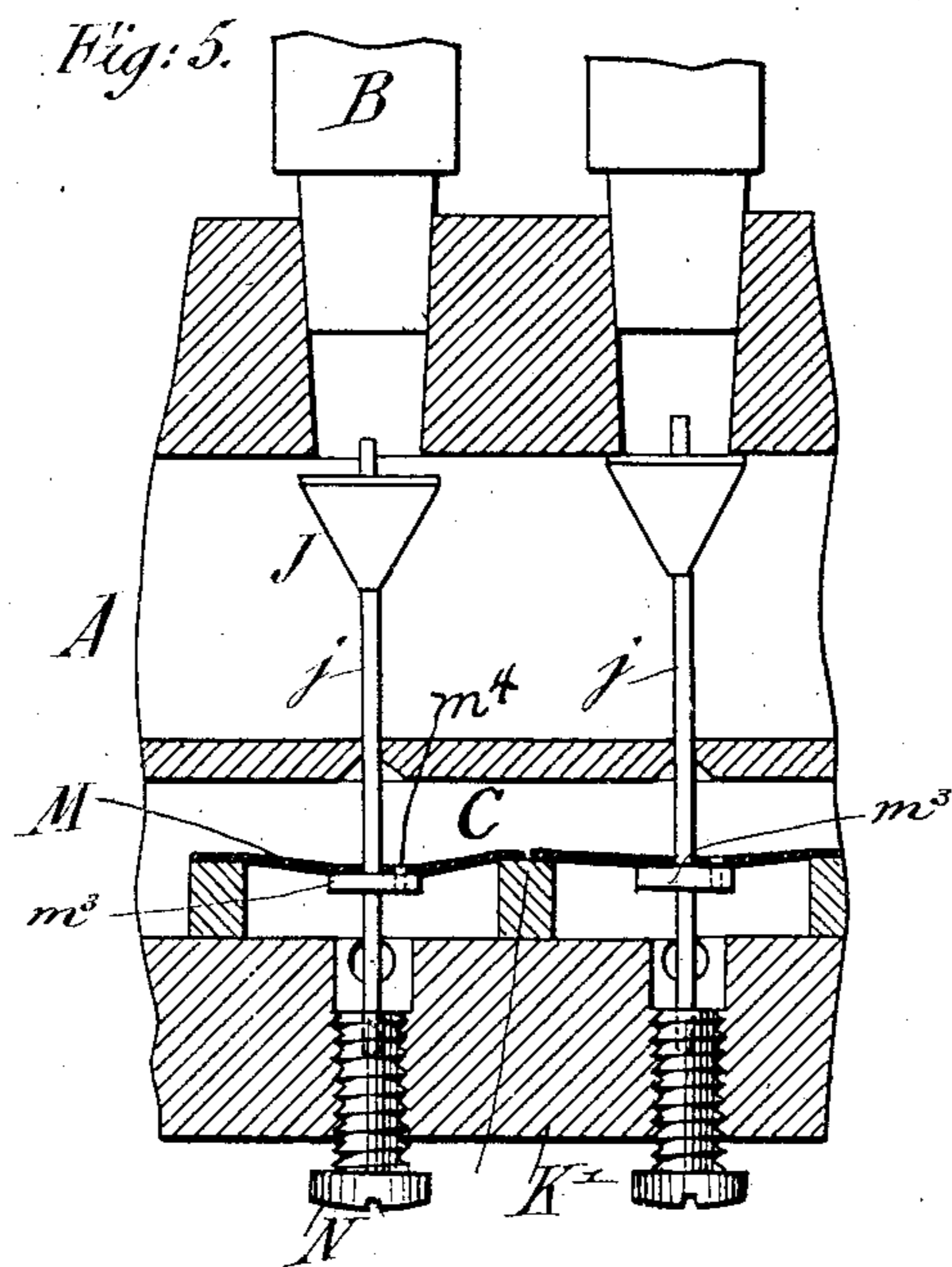
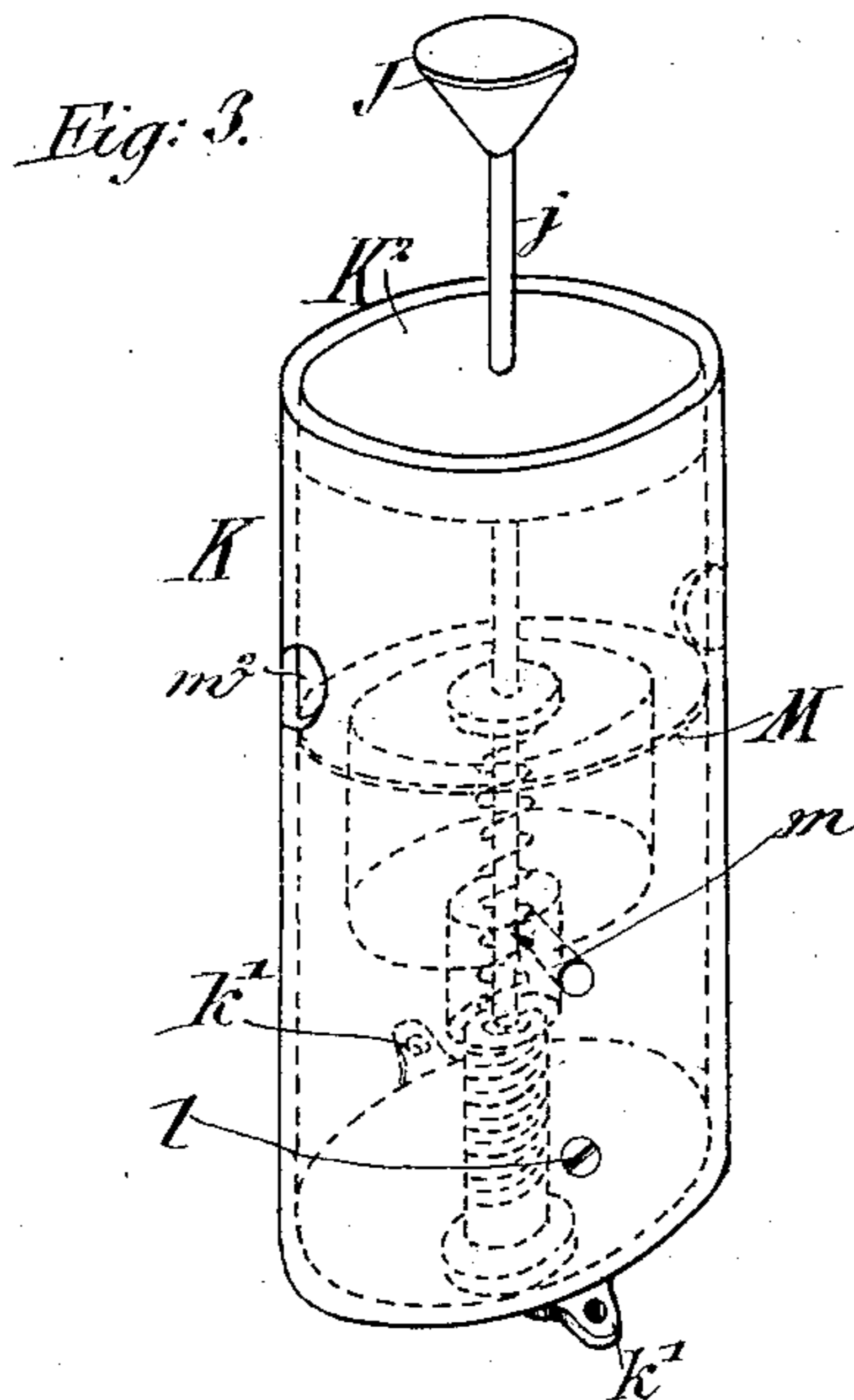
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(No Model.)

3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

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## PNEUMATIC VALVE-ACTION.

SPECIFICATION forming part of Letters Patent No. 662,705, dated November 27, 1900.

Application filed April 12, 1900. Serial No. 12,558. (No model.)

*To all whom it may concern:*

Be it known that I, CARL M. WELTE, a citizen of the United States, residing in the city of New York, borough of Manhattan, State of New York, have invented certain new and useful Improvements in Pneumatic Valve-Actions, of which the following is a specification.

This invention relates to pneumatic valve-actions for mechanical musical instruments, such as orchestrions, organs, and the like; and one object of the same is to render the valves more quickly responsive and effective than heretofore, so that the pipes and auxiliaries will have a greater promptitude of speech, whereby more perfect orchestration can be effectuated.

A further object is to so mount the valves which directly control the sounding devices as that they can be removed from the wind-chest for repair or renewal, this being done without disturbing any of the other valves or necessitating that the playing of the instrument be interrupted.

The invention consists of certain features of construction and combinations of parts to be hereinafter described and then claimed.

In the accompanying drawings, Figure 1 is a sectional perspective view taken through a wind-chest, showing the valves and other accessories and the sounding devices. Fig. 2 is a section through the same on line 2 2. Fig. 3 is a detail perspective view of a diaphragm-chamber and its supported valve removed from the wind-chest. Fig. 4 is a detail view of one of the diaphragms, and Fig. 5 is a modification.

Similar letters of reference indicate corresponding parts throughout the drawings.

Referring to the drawings, A indicates the wind-chest of an orchestrion, organ, or similar mechanical musical instrument in which air is kept under pressure in the well-known manner, the air being led from the pressure-bellows by a tube, such as A', and upon which wind-chests are arranged the necessary sounding devices, such as B, according to the kind and scope of the instrument. Extending transversely of the wind-chest are a series of register-ducts C, independent one of the other and communicating with the interior of the wind-chest by ports C'. The sounding de-

vices or pipes B communicate with the wind-chest by ports b.

Each register-duct C is closed by one valve D, the stem  $d$  of which is guided in a central guide-hole  $e$  in a set-screw E, which is screwed into a case F, fixed to the wind-chest. Said valve-stem  $d$  is also guided through a partition  $f$ , separating the case F into two chambers  $f'$  and  $f^2 f^3$ . One side of the chamber  $f'$  is formed by a flexible diaphragm  $g$ , which is secured to the valve-stem  $d$  by means of a button  $g'$ . The other chamber is composed of two subchambers  $f^2 f^3$ , formed by a partition-diaphragm  $g^2$ , attached to the valve-stem  $d$  by a button  $g^3$ . Between the button  $g^3$  and the screw E is confined a helical compression-spring E', which is coiled around the valve-stem  $d$ . Leading through one wall of the subchamber  $f^3$  is a vent-orifice  $f^4$ , while a vent-orifice  $g^x$  is formed in the button  $g'$  and adjacent diaphragm.

A duct  $h$  connects each chamber  $f'$  by means of a tube  $t$  with the well-known tracker, over which a note-sheet passes, or with the keyboard, and a duct  $h'$  connects each subchamber  $f^2$  with the tracker by a separate tube  $t'$ , while a short duct  $h^2$  connects each subchamber  $f^2$  with the wind-chest A. Said duct  $h^2$  is closed by a flap-valve I, which is hinged or pivoted at  $i$ , its heel end being perforated to receive the valve-stem  $d$ , around which is coiled a helical spring I', arranged between the heel end of the valve I and the diaphragm  $g$ . A button I<sup>2</sup>, fixed on the valve-stem  $d$ , holds the heel end of the valve against the said spring I'.

The described valve-action of the register operates as follows: When air is to be let into one of the register-ducts C, the corresponding opening of the note-sheet registers with the duct  $h$  and the diaphragm  $g$  is pressed into the chamber  $f'$ , because as said chamber is open to the outer air there will be no counter-pressure therein, some of the air from the wind-chest passing off through the vent  $g^x$  to the outer air. Instantly this takes place the valve D is opened and the flap-valve I also opened, so as to admit air from the wind-chest into the subchamber  $f^2$ , and inasmuch as the duct  $h'$  is closed the said subchamber  $f^2$  will contain a pressure equal to that in the wind-

chest, which assists in raising the valve and in holding it raised against the tendency of spring  $E'$ , some of the air in subchamber  $f^3$  escaping through vent  $f^4$ . When the register is to be closed, by shutting the air off from the said register-duct  $C$  the proper perforation of the note-sheet registers with the duct  $h'$ , and the duct  $h$  is closed by the stock or imperforate portion of the note-sheet, whereupon the valve  $D$  is instantly closed, due to the action of the spring  $E'$ . The closing of the valve  $D$  is permitted by the closing of the flap-valve  $I$ , by the open communication of the subchamber  $f^2$  with the outer air, and by the equilibrium of pressure in the wind-chest and the chamber  $f'$ , caused by air from the wind-chest which passes through the vent  $g^x$  into the chamber  $f'$  being there confined. In this way a quick opening and closing action of the register-valves  $D$  is obtained.

Each register-duct  $C$ , before referred to, is in common with a number of sounding devices  $B$  or rather with a set of valves  $J$ , which control the ports of the sounding devices. The sets of valves are designated 1, 2, 3, and 4, (see Fig. 2;) but their number depends upon the scope of the orchestrion or other similar wind instrument.

In facilitating repairs or renewing the operative parts it is preferable to mount the valves and the parts related thereto removably. To this end, as shown in Figs. 1 to 3, tubular metallic casings or holders  $K$  are fitted into corresponding openings in the lower part of the wind-chest and are secured therein by means of screws  $k$ , which screw into ears  $k'$  of the holder and into the bottom board  $k'$  of the wind-chest. The upper ends of the diaphragm-holders  $k$  terminate in the partition-board  $A^2$  of the wind-chest, which board separates the pressure-chamber from the register-ducts. Wooden or other suitable cylinders or plugs  $L$  are secured in the lower portions of the diaphragm-holders  $K$  by means of screws  $l$  passing through the holders and screwing into said plugs, the upper portions of said plugs being hollowed out at  $l'$  to form chambers, over which are glued, or otherwise fastened air-tight, thin flexible diaphragms  $M$ . Registering openings  $m m'$ , respectively, in the holders or casings  $K$  and in the walls of said chambers  $l'$ , lead to the tracker or keyboard by means of ducts  $l^2$  and of tubes (not shown) in the well-known manner, while large diametrical openings  $m^2$  in the upper parts of the holders or casings  $K$  establish a through-and-through communication with the register-ducts  $C$ . The valves  $J$  are arranged in the pressure-chamber of the wind-chest and are provided with valve-stems  $j$ , which are guided axially in the said holders or casings  $K$  through holes in closing-disks  $K^2$ , glued in the upper ends of the same, and axial guide-holes  $n$  in the set-screws  $N$ , screwed axially into the lower ends of the wooden plugs or cylinders  $L$ . The said valve-stems are secured, by means of buttons  $m^3$  or the

equivalent, to the diaphragms  $M$ , through which they pass, and said diaphragms and buttons are provided with vents  $m^4$ . Coiled around the valve-stems  $j$ , between the buttons  $m^3$  and the ends of the set-screws  $N$ , are helical actuating-springs  $N'$ , which tend to close the valves.

In Fig. 4 a modification is shown in which the diaphragms  $M$  in the register-channels  $C$  are not removable, nor are the valves  $J$ , the said diaphragms being, on the contrary, glued down tight to the woodwork. Also the set-screws  $N$  are screwed directly into the bottom board  $K'$ . The valves  $J$  of the sounding devices are controlled from the note-sheet and will operate only when the corresponding register-valve is open to permit air under pressure to enter the register-duct. When the register-valve  $D$  is open, as shown; and one or more of the sounding devices in common with the duct  $C$ , controlled by that valve, are to be sounded, the perforated note-sheet opens communication between the ducts  $l^2$  and the outer air, so that the diaphragms  $M$  are pressed down and the valves  $J$  are opened, as shown. When the note-sheet closes the ducts  $m$ , the air from the register-duct  $C$  establishes an equilibrium in the chambers  $l'$  by the air passing through the vent  $m^4$ , and the springs  $N'$  close the valves. All the vents communicating with the keyboard or tracker are made very minute, the size of a pin-hole being sufficient, so that there will be no tendency of the confined air to raise the note-sheet from the keyboard or tracker.

The described valve-actions for the sounding devices and registers are thoroughly reliable and practical and respond quickly when they are called into action. By arranging the direct valves  $J$  of the sounding devices, their diaphragms and allied parts removable, a great advantage is gained, inasmuch as the parts can be more readily and conveniently adjusted, repaired, or renewed without having to stop playing and the tracker-tubes do not have to be disconnected.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a pneumatic valve-action, the combination, with the wind-chest and a register-duct communicating with the same by means of a port, of a spring-actuated register-valve for controlling said port, two chambers, a vented flexible diaphragm closing one of said chambers and a second flexible diaphragm subdividing the other of said chambers, one of which subchambers is vented, and the other of which communicates with the wind-chest by means of a duct, a second valve, controlled by the valve-stem of the register-valve, and in turn controlling said duct, and ducts leading from the subchamber connected with the wind-chest and from the diaphragm-closed chamber to the tracker, substantially as set forth.

2. In a pneumatic valve-action, the combination, with the wind-chest having a pres-

sure-chamber provided with ducts leading to the tracker or keyboard, and sounding devices mounted on the wind-chest, of valves arranged in the pressure-chamber of the wind-  
5 chest and directly controlling the sounding devices, and removable holders in which said valves are supported, said holders being provided with side openings which communicate with said ducts, substantially as set forth.  
10 3. In a pneumatic valve-action, the combination, with the wind-chest provided with a pressure-chamber, ducts leading from the wind-chest to the tracker or keyboard, register-ducts, valves in the pressure-chamber for  
15 closing the inlet-ports of said register-ducts, means for operating said valves, and sounding devices on the wind-chest, provided with

ports opening into the pressure-chamber, of valves in the pressure-chamber for directly closing the ports of the sounding devices, 20 and removable holders for the last-named valves, fixed in the wind-chest directly opposite the sounding devices, said holders being provided with side openings which communicate with the tracker or keyboard duct, 25 substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

CARL M. WELTE.

Witnesses:

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M. H. WURTZEL.