

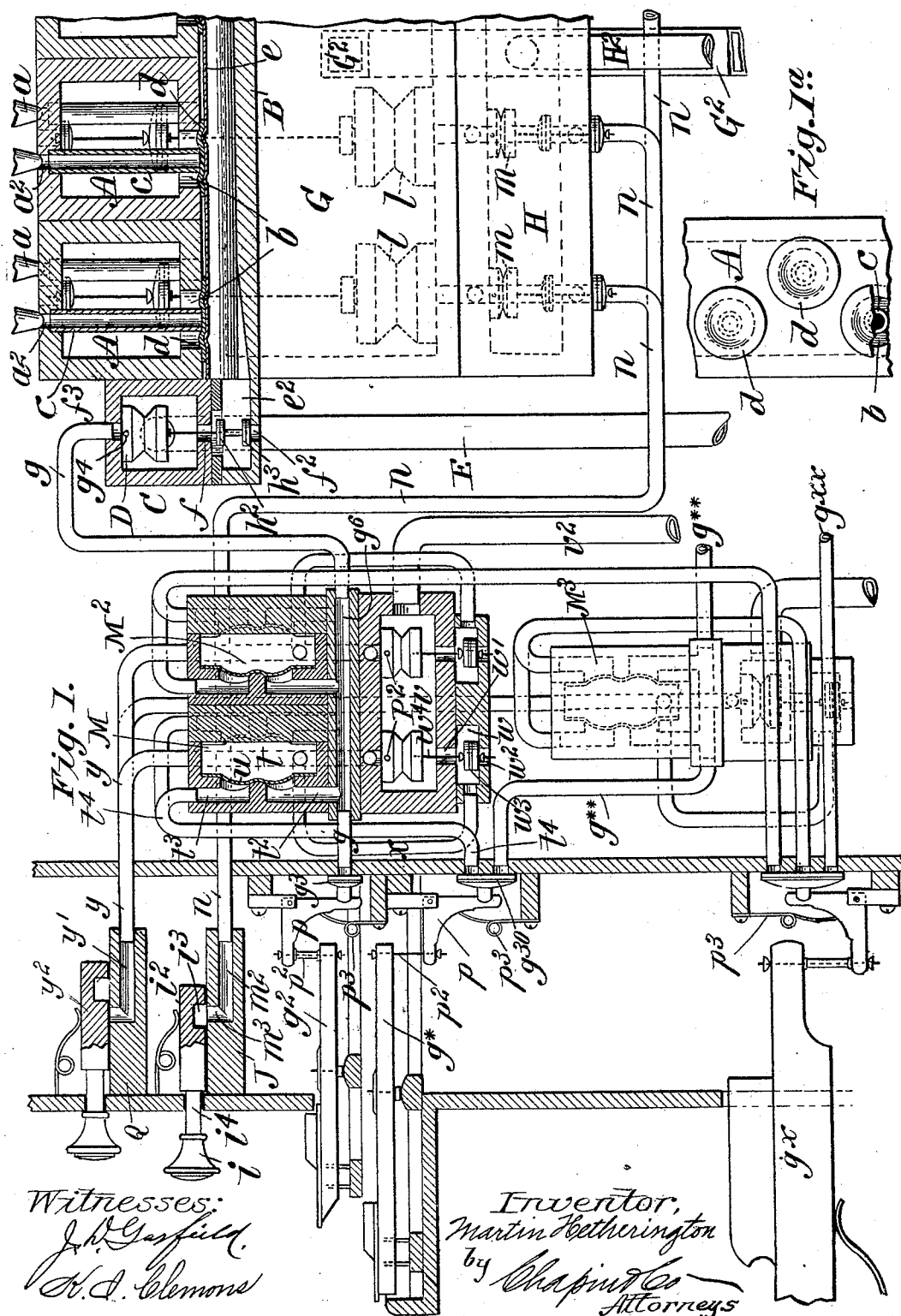
(No Model.)

3 Sheets—Sheet 1.

M. HETHERINGTON.
ORGAN.

No. 528,478..

Patented Oct. 30, 1894.



M. HETHERINGTON.
ORGAN.

No. 528,478.

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Fig. 2.

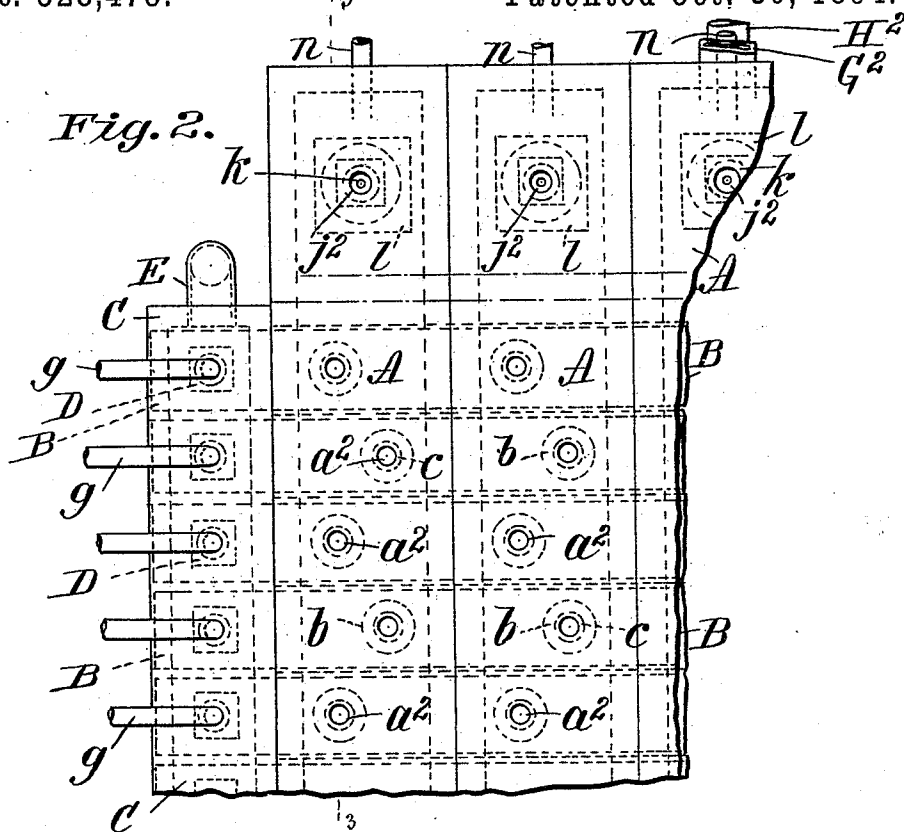


Fig. 3.

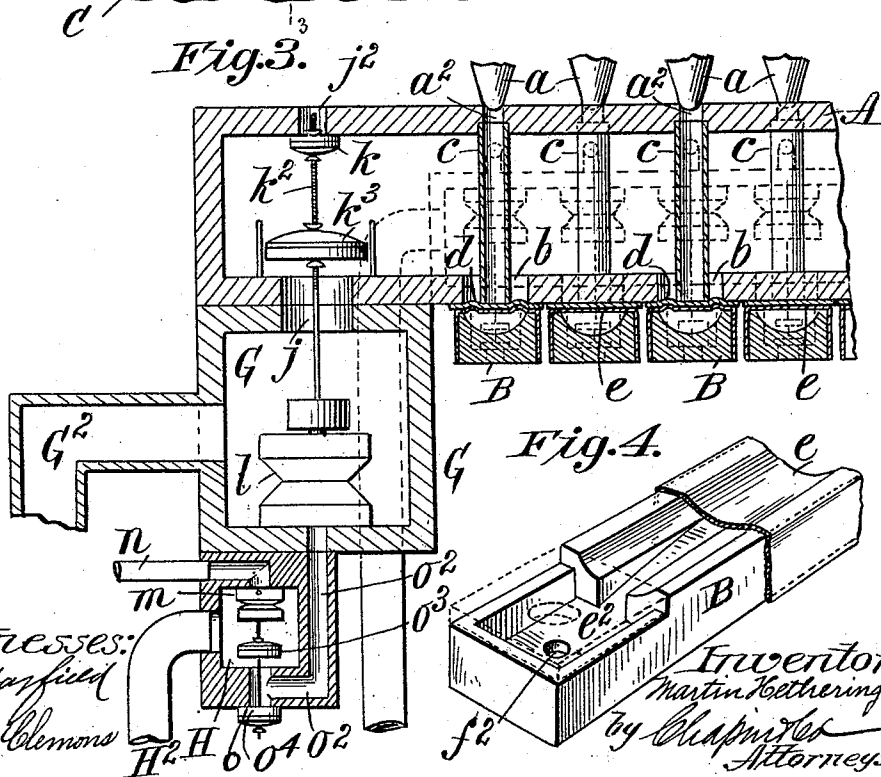
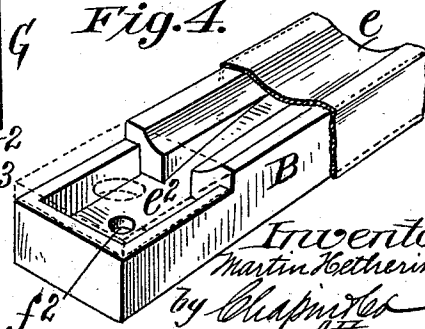


Fig. 4.



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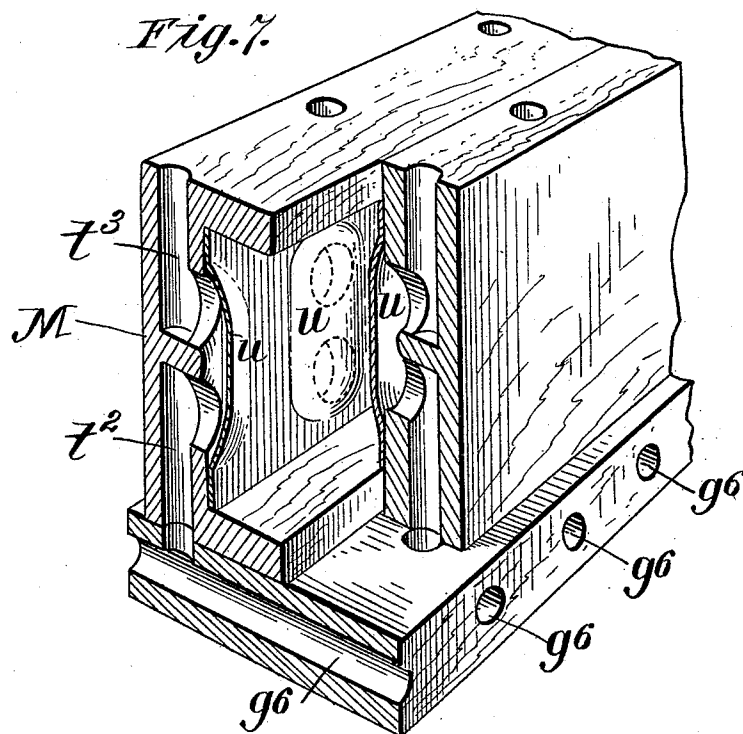
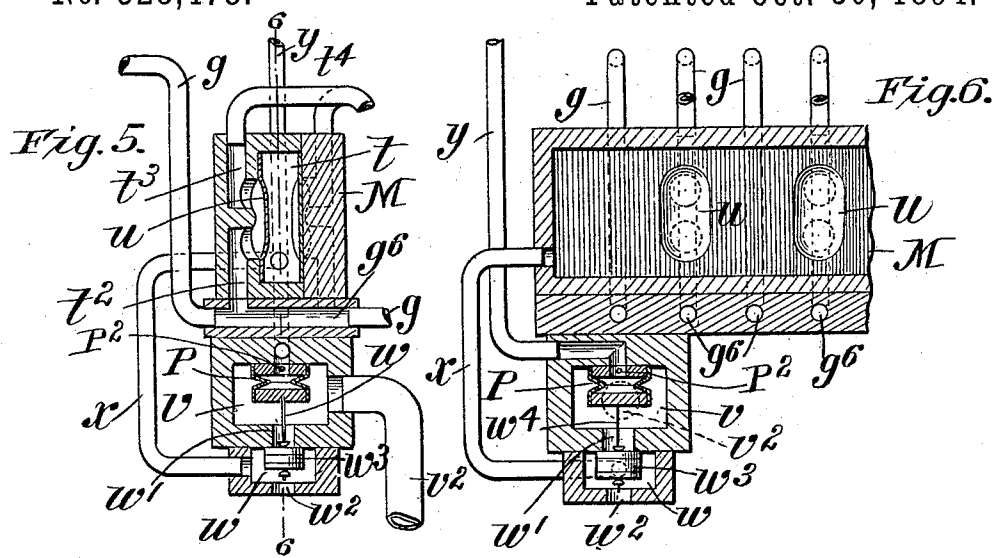
(No Model.)

3 Sheets—Sheet 3.

M. HETHERINGTON.
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No. 528,478.

Patented Oct. 30, 1894.



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UNITED STATES PATENT OFFICE.

MARTIN HETHERINGTON, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO
J. W. STEERE & SON, OF SAME PLACE.

ORGAN.

SPECIFICATION forming part of Letters Patent No. 528,478, dated October 30, 1894.

Application filed January 5, 1894. Serial No. 495,781. (No model.)

To all whom it may concern:

Be it known that I, MARTIN HETHERINGTON, a subject of the Queen of Great Britain, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Organs, of which the following is a specification.

This invention, pertaining to improvements in pipe organs, more particularly relates to improvements in the construction of the sound board in conjunction with which are provided the organ pipes and the mechanism comprised in, or coacting with, the sound board for pneumatically operating the organ pipe-valves on the depression of the keys; to improvements in the stop mechanism, or apparatus for establishing, at pleasure, the wind pressure in one, or more, or all of the several wind compartments comprised in the various stops of keys; and to improvements in the coupler mechanism whereby, in the organ having several banks, or sets, of keys or keys and pedals, the depression of a given key, or pedal, of one set may cause, in addition to the sounding of the pipe, or pipes, controlled by the depressed key, also the sounding of a pipe, or pipes, controlled by some other key, or pedal, usually of some other set or bank, but possibly of the same set or bank; and to these ends the invention consists in certain constructions and combinations, or arrangements of parts for operation, all substantially as will hereinafter fully appear and be covered in, and by, the claims.

In the drawings, Figure 1 is a sectional elevation showing the swell key, great key, and pedal key mechanism, together with the stop-pull and coupler stop at the front, a portion of the sound board and comprised mechanism for the "swell organ" (the substantially duplicated "great organ" and "pedal organ" being omitted) and the coupler mechanism for coupling the swell with the great organ, great with pedal organ, or the swell and great organs with the pedal organ. Fig. 1^a is a bottom plan view showing a preferred arrangement of the pipes and valves of a "stop of pipes." Fig. 2 is a plan view of a portion of one of the sound boards. Fig. 3 is a section on line 3—3, Fig. 2. Fig. 4 is a perspective view showing a device comprising an air

conductor and valve for pipes of several stops. Fig. 5 is a vertical sectional view of one of the couplers, the same showing the parts as in their positions when the coupler is open or operating. Fig. 6 is a vertical sectional view of the same as taken at right angles to Fig. 5,—the plane of section being indicated by the line 6—6. Fig. 7 is a perspective and sectional view of a portion of the bored and chambered block of the coupler having the valves therein.

Similar characters of reference indicate corresponding parts in all the views.

The sound board mechanism for one of the organs (here the swell organ) will be now described, it being remembered that the sound board mechanism for the "great organ" and for the "pedal organ" may be substantially the same.

The sound board comprises a series of parallel, long, narrow compartments, A, A, as constituted by a suitable number of wooden tubes which are rectangular in cross section (as seen in Fig. 1) with their opposite vertical sides united by gluing, or otherwise. The ends of these compartments are closed. Each compartment, A, comprises a "stop of pipes," the pipes being of greater or lesser number according to the character and scope or capacity of the organ, the pipes being indicated by *a*, and the openings through the top of the compartment for the lower ends of the pipes are shown at *a*¹, *a*². Directly under each pipe the bottom of the tubular compartment has a hole, *b*, bored through it, which is of a diameter considerably larger than that of the top opening. Round, wooden tubes, *c*, open from end to end, are for each pipe set in counter sunk sockets concentric with the pipe holes, *a*¹, in the under side of the upper wall of the compartments, they forming practically downward continuations of the pipes, their lower ends terminating, concentrically within the holes, *b*, at about the level of the under side of the bottom wall, whereat the pipe valves, *d*, are individually applied.

Each pipe valve consists of a disk of leather, rubber-cloth, or other suitable flexible material, having its marginal portions securely glued to the under borders of the valve-hole, *b*.

It will be here stated that all the pipes of each compartment will speak when its respective valve is opened, when, also, the draw stop corresponding to that compartment, or

stop of pipes, is pulled out, there being in each compartment, when its corresponding draw-stop is pulled out, an adequate air pressure, as will hereinafter fully appear in the description of the stop mechanism.

Secured to, and under the sound-board, through suitable means, is a series of air receptacles in the form of wooden, trough-like strips, B, B, arranged closely side by side, transversely of the lengths of the sound board compartments, A; each of these troughs intersecting, or crossing under, one of the openings of the several compartments. The upwardly opening trough, (which is closed at the ends of the strip or bar within which it is formed) has the upper flexible wall, e , of leather, &c., which, however, does not extend over the front deepened end, e^2 , of the trough. Every trough, B, at its deepened end, opens upwardly to a common wooden tubular compartment, C, supported at the front edge of the sound board,—holes, f , through the bottom of the compartment at proper intervals forming communication between each trough and the compartment. A hole, f^2 , is also provided through the base of the trough under the hole, f , while above both of said holes is another hole, f^3 , in the top of the compartment leading to which is a pipe, or tube, g , which, primarily considered, runs to proximity to a key, g^2 , corresponding to one of the troughs, at which is the key-operated valve, g^3 , closing the end of this said tube. This tube, g , has free communication with the interior of a little square bellows, or pneumatic, D, which has no valve. This little pneumatic has, through some part of its inclosing wall, a minute opening, seen at g^4 , while the movable bottom board of the pneumatic has connected thereto the depending valve-stem, h , which supports, when the pneumatic is inflated, a valve-disk, h^2 , below and free from opening, f , and a valve-disk, h^3 , which rests on the orifices of, and closes opening, f^2 .

E represents a conduit understood as connected with a bellows (not shown) and entering the said common compartment, C, for establishing therein, at all times during the operation of the organ, a constant bellows pressure.

Now, describing the operation of the sound board on the playing of the keys corresponding thereto, it being assumed that air pressures are established in some, or all, of the wind-chest compartments by the stop mechanism, when a key, g^2 , is depressed and the valve, g^3 , is opened, the bellows pressure in the compartment, C, containing the pneumatics, D, causes the pneumatic, corresponding to the depressed key to collapse,—this because the opening of the key-valve, g^3 , abolishes the bellows pressure within the pneu-

matic, D, which will not be replaced in time to prevent its collapse, because of the smallness of the said opening, g^4 . The collapse of this pneumatic draws the valves, h^2 and h^3 , upwardly, the upper one shutting off the communication for bellows-pressure from the compartment, C, to the trough, B, (whereby all the pipe valves corresponding to such trough were forced closed,) while the lower one opens the trough to terminate the bellows pressure which had been therein, whereupon all the pipe-valves controlled, or held raised, by the trough-leather, by reason of the wind pressure in A, fall or sag centrally within the holes, b , allowing the bellows-pressure within the one or several wind compartments to enter the now uncovered lower ends of the pipes resulting in the sounding thereof.

As seen in Fig. 1, each pipe, or tube, g , which may be of lead, rubber, or other material, and which leads forwardly from its pneumatic, ultimately to the key, g^2 , corresponding to a trough, B, and to the pneumatically operated valves, h^2 , h^3 therefor, is in two parts or sections intermediate between the ends of which is the bored block forming the body of a coupler mechanism to be hereinafter described. When the coupler is not specially put into operation by opening its valves, as will appear, the air exit from the pneumatic through the valve, g^3 , is direct, as above explained.

The sound board described and the keys, g^2 , corresponding thereto may be understood, for instance, as the "swell organ." Another bank of keys is indicated at g^* , which may be understood as of the "great organ," there being correspondingly provided, in conjunction therewith, as has been described for the "swell organ," the sound board compartments, A, with pipes, troughs, B, pneumatics in compartments, C, with the various valves, and pressure conduits; and in Fig. 1 the pipe g^* is indicated as for each great organ key, it having its connection with a pneumatic, D, in a compartment comprised in the sound board mechanism, substantially such as described, and the pedals, g^x ; also through the pipes, g^{xx} , respectively connected therewith, operate another similar sound board mechanism, substantially like the one illustrated and in detail described.

Describing the stop-action, whereby on drawing a stop-knob, a sound board compartment, A, comprised in a "stop of pipes," may receive a constant bellows pressure, it will be noted that under one end of all of the sound board compartments, A, is a long chamber, or end-closed tube, G, having through its top the series of openings, j , leading respectively into the compartments, A. Above each opening, j , is another opening j^2 through the top of compartment, A,—the valve, k , normally opening the latter, while upon the same axial valve stem, k^2 , is another valve-disk, k^3 , normally closing the said opening, j . In the bottom of the said common compartment, or trunk, G,

under each two valves, k , k^3 , is a separate pneumatic, l . Now, next below the common trunk, G , is another tube-like inclosure, H , of wooden construction, and of smaller cross-sectional dimension, it running along the length of the trunk, G . Suspended within, and at the top of this tube is a series of small pneumatics, m , each with the minute opening, as in the before described one D . A lead, or other tube, or conduit, n , has communication through its top with the interior of each pneumatic, m , this running to connection with the board, J , at the front of the organ which has the series of horizontal holes, m^3 , bored therein, each of which has the upwardly directed continuation, m^3 , opening to the top of the board. Each draw-stop consists of the block, or bar, i^2 , sliding on and covering a suitable part of the upper face of the said bored board, having the recess, i^3 , extending through from its one lateral edge to the other, and the longitudinal forwardly extended stem, i^4 , with the knob, i . This stop normally covers and closes the opening, m^3 .

Through the base wall of the under tubular compartment, H , is a vertical hole, o , directly under the pneumatic, m , while within the said base wall is a horizontally bored hole, o^2 , leading laterally from said vertical hole and then upwardly continued within the side wall and extended through the bottom of the wind trunk, G , to communication only with the interior of the motor, or pneumatic, l .

The little pneumatic, m , in the tubular compartment, H , has the depending valve-stem carrying the valve o^3 , which is normally in closing relation to the top of hole, o , and the valve, o^4 , which is normally in open relation to the lower end of the said hole, o . A conduit, G^2 , leads into the wind-trunk, G , for supplying it with a comparatively light bellows pressure, but a pressure which, however, is sufficient to supply the sound board, A , A , while another conduit, H^2 , leads into the tube, H , for supplying it with a comparatively heavy bellows pressure so as normally to hold the pneumatic, l , which is weighted as indicated in Fig. 3, inflated.

The operation of the stop mechanism will be now described whereby the parts are brought from their normal positions, as above specified, to their relative positions which are shown in the illustration, as necessary for insuring the sounding of the pipes of the sound board compartments. Therefore, the opening of the stop, i , insures the exhaust of the little pneumatic, m , corresponding thereto, through conduit, n , opening valve, o^3 , and closing valve, o^4 , whereupon the heavy pressure from tube, H^2 , through passage, o^2 , expands and holds up the pneumatic, l , lifting valve, k^3 , open, and closing the valve k . Now, the wind supplied into trunk, G , passes into the properly opened compartments, A , and is there held, its only exit being now through the organ pipes as the valves, d , thereof are opened in the manner before explained.

In the illustrations here given there are shown three coupler devices, M , M^2 , M^3 , one of which insures, on the playing of a great-organ key, in addition to the sound effects from the great organ corresponding to such key, also sound effects from the swell organ corresponding to some key thereof, in conjunction with which the particular great organ key is paired, or coupled. The second coupler device, M^2 , insures, on the depression of the pedal for the pedal organ effect, also a sounding of a pipe, or pipes, of the swell organ, as controlled by a key, or keys, of the swell organ which is paired, or rendered operative, in conjunction with the so depressed pedal, and the third coupler, M^3 , insures also on the depression of any pedal for the corresponding pedal organ effect also a sounding of a pipe, or pipes, of the great organ which would be controlled by a key, or keys, of the great organ which is paired, or rendered operative in conjunction with the so depressed pedal. I will, therefore, first describe the coupler for bringing in swell organ effects in addition to great organ effects upon the playing of a great organ key,—it being borne in mind that the duplication of the coupler and its connection and arrangement for the other coupler effects being merely an extension of the present described idea of means in a manner obvious to intelligent and skillful persons.

I will first point out that the conduit, g^{**} , which leads from a pneumatic in the wind compartment of the sound board of the great organ (not shown) but which corresponds to the one, D , described as comprised in and relative to the swell organ sound board,—extends to the front of the organ and has its end covered by the valve g^{20} , which, like valve g^3 is on one member of a pivotally mounted elbow lever, p , to the other arm of which, through stickler or connecting stem, p^2 , the key is connected. The spring, p^3 , holds each of these valves normally closed. The coupler, M , for bringing in the swell with great force, comprises a body with a suitably long valve chamber t , therein. Through the body is the passage, g^6 , (duplicated for the various swell keys) which constitutes, in substance, an intermediate part of each pipe conduit, g , leading from one of the pneumatics, D , of swell sound board to the corresponding key-operated valve, g^3 , of the swell organ. A duct, t^2 , leads from each passage, g^6 , upwardly, within the coupler block and terminates in a flue open into valve chamber t . Corresponding with, and near each of these passages, or flues, t^2 , is another opening, t^3 , which is upwardly continued in the passage through the block and has the conduit continuations, t^4 , which also leads to proximity to one of the great organ keys, g^* and has its end covered by the same valve which covers the open terminal of conduit, g^{**} . A valve, u , normally closes both of the orifices of passages, t^2 , t^3 , next to the valve chamber. Now, it will be plain that if a force be established to hold open the valve from the

ducts, t^2 , t^3 , so that they may be in communication the one to the other, the valve preventing their communication with the valve chamber and a key of the great organ is depressed, moving open the valve, g^{30} , while the air passing through conduit, g^* , is exhausting a pneumatic,—like D,—but contained in conjunction with the sound board of the great organ, an exit is also created for the exhaust of a pneumatic, D, (shown) and which is provided as a part of the swell organ sound board mechanism; and which exit for exhaust is created without the depression of a swell-key, that is to say this pneumatic is opened to communication with the atmospheric air by the right-hand pipe section, g , connecting with passage, g^6 , thence through ducts, t^2 and t^3 , rendered continuous, the one with the other, by the opening deflection of the valve, u , and thence through the pipe, t^1 , to its end which is now uncovered by the great organ key-controlled valve, g^{30} . The valves are held normally closed by the continuance of a wind pressure in the valve-chamber, and are opened to establish the coupling results by exhausting such wind pressure; and the apparatus for these effects will be now described. Beneath the coupler valve chamber, t , and the series of passages, g^6 , is a wind compartment, v , which through a pipe, v^2 , is supplied with a constant bellows pressure. Below compartment, v , is another compartment, w , with the opening, w' , establishing communication the one with the other, it also having through its bottom, under opening, w' , the opening, w^2 . A valve, w^3 , rests about, and upon, the upper margin of this opening, w^2 , and has the stem, w^4 , extending up through the other opening to connection with the little pneumatic, P, in compartment, v , which is normally inflated and has the minute opening, P², leading thereinto, as described, for the other similar pneumatics employed in various other situations, as explained. When the pneumatic is collapsed, as will be shortly explained, the valve, w^3 , opens hole, w^2 , and closes the opening, w' , thereabove.

The conduit, x , connects the compartment, w , with the valve chamber, t , so that there is free air communication or wind pressure, as supplied by pipe, v^2 , through chambers, v , w , and t , for holding the valves, u , closed.

The collapse of the pneumatic, P, for insuring the opening of the valves and the establishment of the coupler effects is by this means:—The pipe, y , leads from communication with the interior of the pneumatic, P, to the front of the organ, connecting with the passage, y' , in the board, Q, which upwardly opens and is normally covered by the sliding stop, y^2 . On sliding the stop, the passage, y' , pipe, y , and pneumatic, are instantly opened to atmospheric air, the pneumatic collapsing, and remaining so, while such opened relations are continued. While the pneumatic remains collapsed the valve, w^3 , shuts off pressure from compartment, v , into compart-

ment, w , consequently relieving valve-chamber, t , from pressure, and the said valve, w^3 , also opening the hole, w^2 , opens the valve chamber, t , to atmospheric air,—through the conduit.

The parts are shown as opened, or in their positions for establishing the coupling results, in Figs. 5 and 6. In Fig. 7 a portion of the block, or body for a coupler, is shown, illustrating the plurality of passages, g^6 , the common valve-chamber, t , the ducts, t^2 , t^3 , within the walls at both sides of the chamber, t , and the valves, u . The valve is of sheepskin and is glued to the inner walls of chamber, t , it being left slack at the openings of ducts, t^2 and t^3 , as plain.

Having now fully and sufficiently in detail described the construction and relative combination, or arrangement, of the coupler, M, for coupling swell with great organ, it will be readily understood by the provision of the couplers, M² and M³, of substantially the same composition, and their respective pipes, how the similar coupling of swell organ with pedal organ and the great organ with the pedal organ may be attained on operating the respective stops, like the one, y , for such results; and of course it will be manifest to a skilled organ builder in what manner the couplers, substantially such as described, may be rendered available in other situations than those here indicated.

The principal advantages derived from the exercise of these improvements are, that the organ, as a whole, may be produced at a greatly decreased cost of construction. The possibility of construction of the swell, great and pedal organizations, may be without special reference to each other, and the arrangement thereof may be widely variable as may be found most expedient when the organ is to be set up. The avoidance of the numerous angle levers, "trackers," and "stickers," or connecting-rods heretofore largely employed, as well also as of the slide-stops and valves, and, furthermore, the organ pipes and their wind controlling devices are most efficient for instantaneous and sharp responses and very rapid repetitions.

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

1. In combination, a wind-board comprising separated wind compartments, each for a stop of pipe, pipes and pipe extensions opening through holes in the bottom of the compartments, and having the valves, the trough, B, crossing under pluralities of the compartments and having the flexible tops, e , and having the extended hollow end portions, e^2 , which stand beyond the edge of the wind chest, each having the hole, f^2 , through its wall, the wind-box, C, set next above the trough projections, e^2 , and having the series of passages, f , through its bottom leading into said hollow trough extensions, a series of small pneumatics supported within said wind-

box, C, carrying the valves, h^2 , h^3 , in respectively open and closed relations to said holes, f , f^2 , and key-controlled means for operating the pneumatics, substantially as described.

2. In combination, a sound-board comprising parallel separated wind compartments each for a stop of pipes, pipes and pipe extensions which terminate within holes, b , which are formed in the bottoms of the compartments of larger diameter than the pipe extensions and having the downwardly opening flexible valve, d , attached by their margins to the lower boundaries of the hole, b , the series of troughs, B, ranging alongside each other under and across pluralities of the pipe extension valves and having flexible valve-operating tops, e , and having the extended hollow end portions, e^2 , projected beyond the end of the first compartment of the sound-board and each having the hole, f^2 , through its bottom opening to the atmospheric air, the wind-box, C, set against the edge of the sound-board and resting upon the projected portions of said troughs and having the air-feeding conduit, E, and the series of passages, f , through its bottom leading into said trough extensions, a series of small pneumatics, D, supported within said wind-box, C, each having the minute openings leading from its chamber to the pressure chamber within the wind-box, C, and each pneumatic carrying valves, h^2 , and h^3 , the former normally standing open at the passages, f , and the latter normally closing the openings, f^2 , a tube communicating with the interior of each of said pneumatics, and a key-operated valve for closing each tube and adapted to open it to atmospheric air, substantially as described.

3. In a pipe organ, the sound-board compartments, trunk, G, and its feed pipe, G^2 , pneumatics, l , which are imperforate and weighted, the second or sub wind-box, H, with pneumatic, m , having minute perforations and controlling the valves, o^3 and o^4 , for openings, respectively leading from box, H, to interior of weighted pneumatic, l , and the opening leading through bottom of box, H, together with a feed-pipe, H^2 , for giving into box, H, wind at greater pressure than that supplied into trunk, G, by feed pipe, G^2 , substantially as described.

4. The combination with the series of compartments for stops of pipes, of the wind-trunk, G, ranging transversely under the ends of said compartments, and having the valved communicating passages, j , and the inflatable pneumatics, l , in said trunk, G, for holding the valves, j , open so that the pressure from the trunk may feed the aforesaid compartments, the wind-box, H, set below the trunk and having at its upper wall the pneumatic, m , with minute openings and the pipe, n , leading to the interior of said pneumatic, the passages leading through the bottom of box, H, under each pneumatic and having the transverse branch within the bottom wall, and the vertical branch through the side wall

which enters the pneumatic, l , the valves, o^3 , and o^4 , hung from said pneumatics, m , and the pipe, H^2 , for supplying a heavy wind pressure into said box, H, substantially as described.

5. A coupler comprising a suitable block, or part, with a passage through it, with the terminals of which an air conduit may be connected, and having therein a chamber, a duct leading from said passage and opening into said chamber, another duct opening at said chamber and adapted to have a connection with another air-conduit, a valve, or valves, for closing and simultaneously opening both of said openings, and means for opening said valve, substantially as described.

6. A coupler comprising a suitable block, or part, with a passage through it, with the terminals of which an air-conduit may be connected, and having therein a chamber, a duct leading from said passage and opening into said chamber, another duct communicating with said chamber and thence continued in another air-conduit, a valve of flexible material for covering each of said chamber communicating openings, means for supplying an air pressure within said chamber for maintaining said valves closed, and means for terminating said air pressure within the chamber for permitting the valves to open, substantially as described.

7. A coupler comprising a body, or part, having several passages with the terminals of which air-conduits are connected, and having therein a common chamber, ducts leading from each of said passages and opening to said chambers, another corresponding series of ducts opening at said common chamber and adapted to have connection with another series of air conduits, valves for closing and simultaneously opening both sets of said openings, and means for causing the opening of said valve, substantially as described.

8. A coupler comprising a body, or part, with a passage through it with the terminals of which air conduits may have connection, and having therein a transfer chamber and a wind chamber, a duct leading from said passage and opening into the transfer chamber, and another duct opening at said chamber and adapted to have connection with another air conduit, a pneumatic in said wind chamber with a minute opening, a conduit for normally establishing communication for air pressure from the wind chamber to the transfer chamber, a valve device controlled by said pneumatic for shutting off the said pressure-communication between the chambers, and permitting the exhaust of the transfer chamber (for opening the valves therein) and a valved conduit for opening the interior of the pneumatic to the atmospheric air, substantially as described.

9. A coupler comprising a body, or part, with a passage through it, a transfer chamber, a separate wind chamber, and another compartment below the wind chamber with

an opening leading thereto, and an outlet opening, a valve normally closing the latter opening and leaving the former open, and a pneumatic in the wind chamber for controlling the said valves, a conduit connecting said compartment with the transfer chamber, a valved conduit communicating with the pneumatic for causing a valve controlling movement thereof, and said coupler further comprising a passage therethrough with a duct leading therefrom and opening to the transfer chamber, and another duct opening at said chamber and having connection with an air conduit, and the valve in said transfer chamber adapted to be air-pressed to close the said communicating ducts, substantially as described.

10. In an organ, the combination with a pneumatic motor for controlling organ valve mechanism, and coupler comprising a body with a transfer chamber therein, and a passage therethrough, and a pipe connected to the said motor and to said passage and another conduit, or pipe extension, leading from said passage to a proximity with a key and having a key-operated valve, said coupler having a duct leading from said passage to said transfer chamber and another duct opening at said chamber and leading thence to proximity with another key whereat it is provided

with a key-operated valve, in said transfer chamber, for normally closing said ducts, and means for causing at pleasure the opening of said valve, substantially as described.

11. In an organ, the combination with pneumatic motors for controlling different organ valve mechanisms, and a conduit leading from one of the motors into proximity to a key and having a key-operated valve for closing it, and a coupler body with a transfer chamber therein, and a passage therethrough, and a pipe leading from the other of said motors to said passage and another pipe leading from said passage and having another key-operated valve for closing it, and said coupler having a duct leading from said passage into the transfer chamber, and a second duct leading from said chamber and having a conduit extending therefrom to proximity with said first-named key-operated valve whereby it may also be closed thereby, and the valve in the transfer chamber for normally closing said ducts which communicate therewith, and means for causing them to open, substantially as described.

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Witnesses:

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