No. 884,094.

PATENTED APR. 7, 1908.

E. DE KLEIST.

ORGAN.

APPLICATION FILED DEC. 9. 1904. RENEWED SEPT. 25, 1907.

2 SHEETS—SHEET 1.

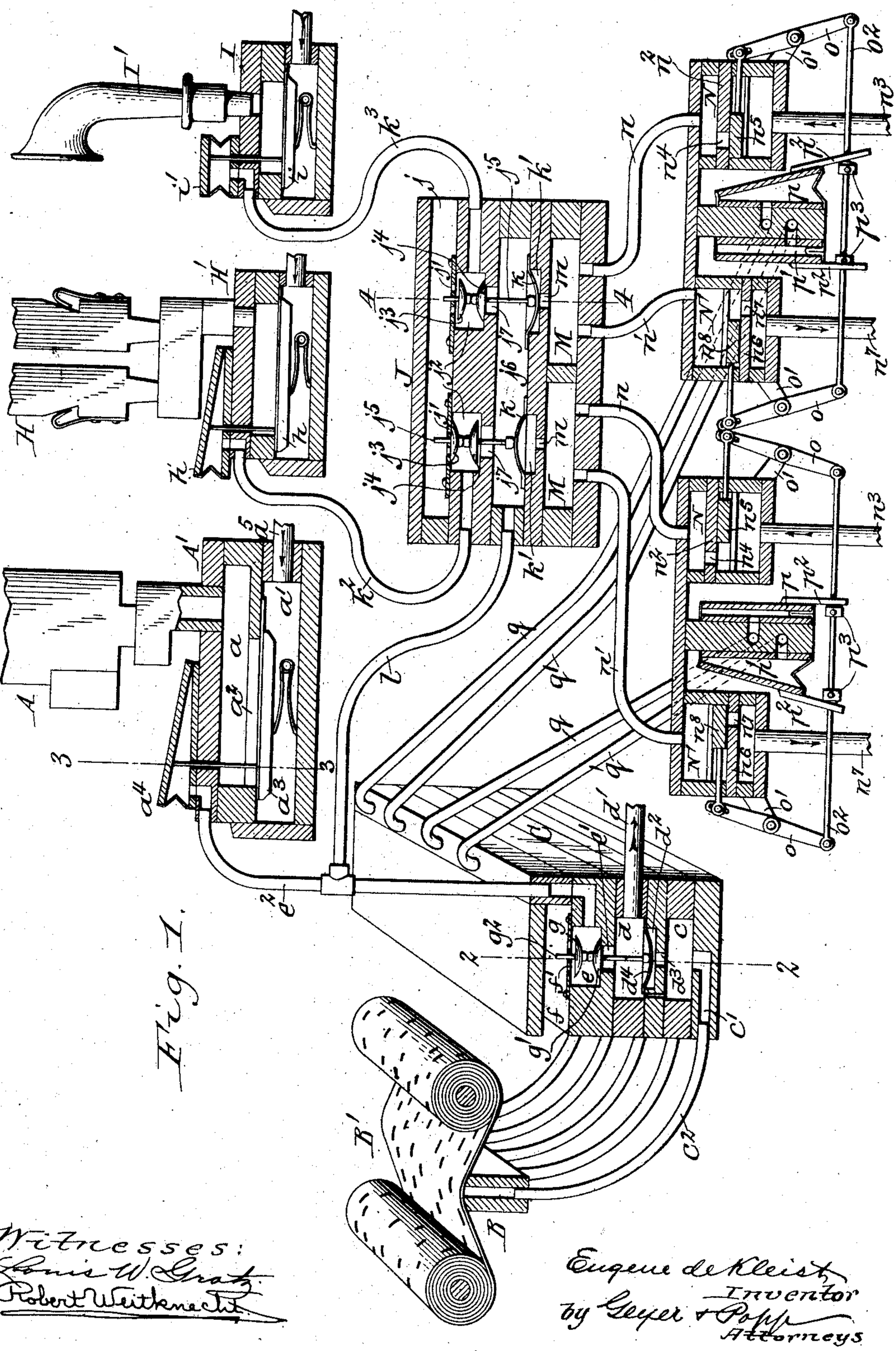

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

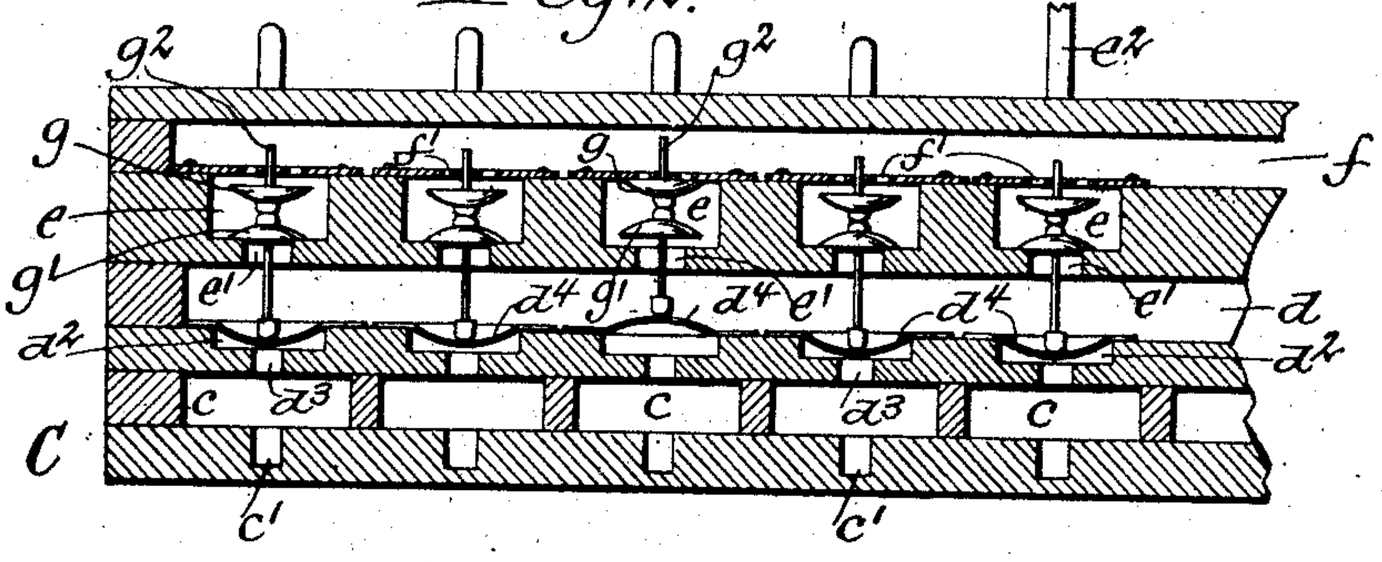


Fig. 3.

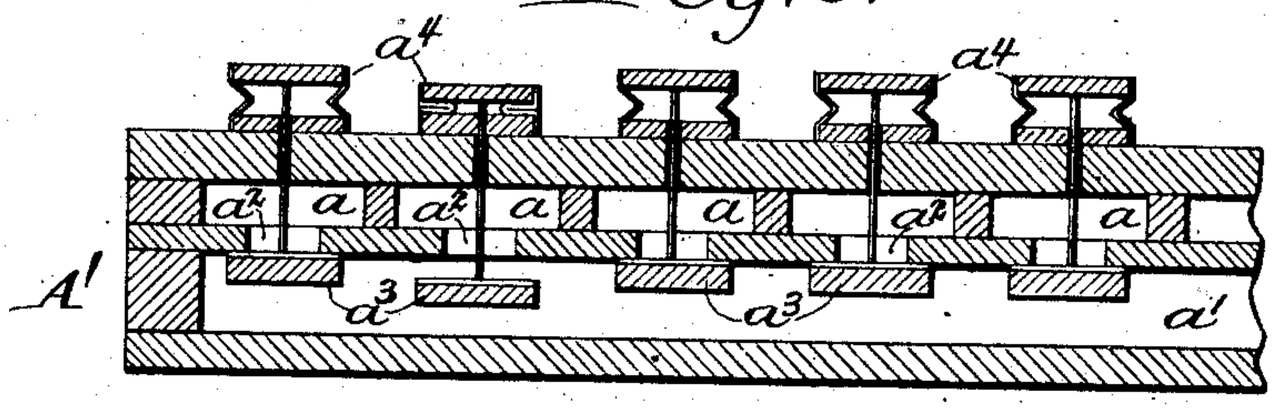
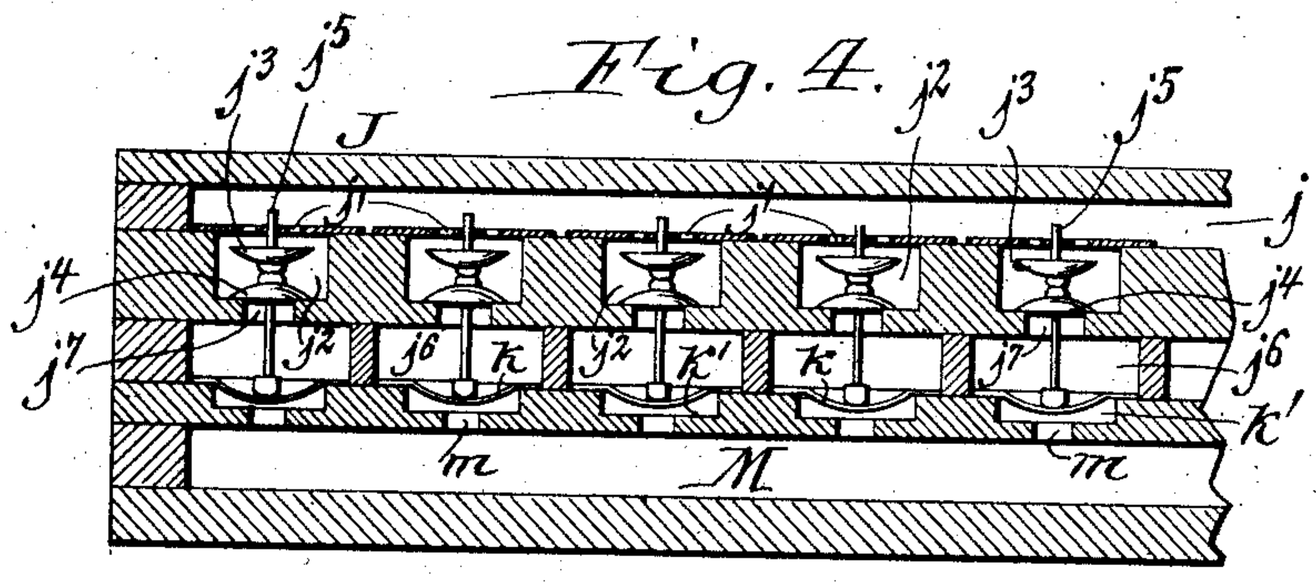


Fig. 4.



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UNITED STATES PATENT OFFICE.

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No. 884,094. Specification of Letters Patent. Patented April 7, 1908.

Application filed December 9, 1904, Serial No. 236,150. Renewed September 25, 1907. Serial No. 394,578.

To all whom it may concern:

Be it known that I, EUGENE DE KLEIST, a citizen of the United States, residing at North Tonawanda, in the county of Niagara and State of New York, have invented new and useful Improvements in Organs, of which the following is a specification.

This invention relates to the stops or stop-mechanism of pipe organs and similar musical instruments.

Heretofore long strips or so-called "sliders" have been employed for controlling the admission of the air to the various groups of pipes commonly called stops. Such sliders are unsatisfactory, however, because they are liable to warp and bind in their ways in which case they open only partly and admit an insufficient quantity of air to the pipes.

The object of my invention is the provision of a pneumatic stop mechanism which is positive and reliable in action.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a fragmentary transverse section of a pipe organ embodying my invention, non-essential parts being omitted for the sake of clearness. Figs. 2, 3 and 4 are longitudinal sections of different wind chests, in the correspondingly-numbered lines in Fig. 1.

Similar letters of reference indicate corresponding parts throughout the several views.

The organ shown in the drawings has two auxiliary stops or groups of pipes, such as clarinets and trumpets, in addition to the main group of pipes, but a greater or less number of stops may obviously be employed.

A indicates the main stop or group of organ pipes and A^1 the corresponding wind chest having the usual row of individual air ducts a with which the respective pipes communicate, and the lower longitudinal compressed air chamber a^1 common to all of the ducts a and with which the latter communicate by ports a^2. These ports are controlled by the usual valves or pallets a^3 which are opened by the customary motor pneumatics a^4. a^5 is the compressed air inlet of the chamber a^1.

The action of the motor pneumatics is controlled by suitable valve mechanism which in turn may be controlled by a tracker board B and a traveling perforated music sheet B^1 or any other suitable means. The means shown in the drawings for this purpose, consist of a horizontal wind chest C hereafter termed the "action chest", which is provided in its bottom with a row of transverse individual air chambers c each of which is connected with one of the ducts of the tracker board by a passage c^1 and a flexible tube or conduit c^2. Above the chamber c is arranged a longitudinal exhaust channel d which is connected by a trunk d^1 with an exhaust bellows or similar device, not shown in the drawings. In the bottom of this channel are formed a series of diaphragm chambers d^2 corresponding to the air chambers c and connected therewith by ports d^3 and between each of these diaphragm chambers and the exhaust channel a flexible diaphragm or pneumatic d^4 is interposed. Above this exhaust channel is a series of valve chambers e which communicate with said channel by exhaust ports e^1 and with the corresponding motor pneumatic a^4 by a tube or conduit e^2, and above said valve chamber is an air channel f which is open to the atmosphere and with which said valve chambers communicate by air ports f^1. Each of these valve chambers contains two oppositely-acting valves g, g^1 both secured to a stem g^2. The upper valve g controls the air-ports f^1 of the valve chamber and the lower valve g^1 its exhaust port e^1, and the two valves are so arranged that when one is opened the other is closed, in a manner common to this class of pneumatic actions. The stem g^2 of each pair of valves rests upon, or is attached to, the companion diaphragm d^4, so that when the diaphragm is depressed, as shown in Fig. 1, the corresponding valves are allowed to descend for cutting off the companion valve-chamber e from the exhaust channel d and placing the same in communication with the air channel f; while when the diaphragm is elevated, it raises the stem g^2 and reverses the valves, closing the air ports of said valve chamber and connecting the latter with the exhaust channel, as shown in connection with the central set of valves in Fig. 2. When the valves are shifted to the last-named position, the air is exhausted from the corresponding motor pneumatic a^4, collapsing the same and opening the air inlet valve a^3 and causing the corresponding pipe to speak, while when the valves assume the first-named position, the atmosphere is admitted to said pneumatic and the air valve is allowed to close. As is common in such

pneumatic actions, the diaphragm d^4 is allowed to collapse or descend when the corresponding tracker duct is closed by an imperforate portion of the music sheet, and is expanded or reversed when a perforation of the sheet registers with said duct.

The particular construction of the pneumatic action thus far described forms no part of my present improvement and the same may be widely varied without departing from the scope of the invention.

H indicates the pipes of one of the auxiliary stops, say clarinets, and H^1 the wind chest thereof, and I is the wind chest of another stop, say the trumpets I^1, as shown. These wind chests are constructed substantially like the chest A^1 of the main stop, the valves h of the chest H^1 being opened by motor pneumatic h^1 and the valves i of the chest I by similar pneumatics i^1.

J is a stop wind chest containing pneumatic valve mechanism which takes the place of the sliders ordinarily employed in organs and which controls the action of the motor pneumatics of the auxiliary stops H, I^1. As shown in Figs. 1 and 4, this wind chest is provided in its top with an air channel j which communicates by ports j^1 with valve-chambers j^2 arranged below said channel and each containing an air valve j^3 and an exhaust valve j^4 both mounted on a stem j^5. Below each of these valve chambers is arranged a transverse channel j^6 which communicates with said chamber by a port j^7. Each pair of valves j^3, j^4 is actuated by a diaphragm k interposed between the corresponding channel j^6 and a diaphragm chamber k^1 similar to the corresponding parts of the action wind chest C. The stop wind chest J has a row of such air and exhaust valves for each stop or group of pipes, two rows being shown in the drawings. The motor pneumatics of the clarinet stop are connected with one row of the valve chambers j^2 by tubes or conduits k^2, while the motor pneumatics of the trumpet stop are connected with the other row of said valve chambers by similar tubes k^3. The two valve chambers which represent corresponding pipes of the stops communicate with the same channel j^6 of the stop wind chest J, as shown in Fig. 1, and each of said channels is connected by a tube or conduit l with the tube e^2 corresponding to the same duct of the tracker board. It will now be understood that when an exhaust valve g^1 of the action wind chest C is opened, the air will not only be exhausted from the corresponding motor pneumatic a^4 of the main wind chest A^1, but also from the corresponding channel j^6 of the stop wind chest J, and hence if one or both exhaust valves j^4 of the last-named chest are opened, the air will be exhausted from the corresponding motor pneumatics h^1, i^1 of the stops H and I^1, thus causing the corresponding pipes of the main pipes or stop and the auxiliary stops to speak simultaneously.

The stop valves j^3, j^4 of each row are simultaneously opened and closed by the following mechanism: Under each series of diaphragm-chambers k^1 of the stop wind-chest J is arranged a continuous air channel M with which said chambers are connected by individual ports m and which are alternately exhausted and flushed or supplied with compressed air to cause all of the diaphragms k^1 of the corresponding stop to fall or rise for closing the exhaust valves j^4 and opening the air valves j^3, or vice versa. For this purpose, each of the air channels M is provided with a pneumatic controlling mechanism consisting, preferably, of flushing and exhaust chambers N, N^1 which are connected therewith by tubes or conduits n, n^1. The flushing chamber N is divided by a horizontal partition n^2 into an upper chamber with which the tube n connects and a lower chamber with which a main flushing or compressed air supply trunk n^3 is connected. This partition contains a port n^4 controlled by a cut off valve n^5, preferably of the sliding type, as shown, so that said upper chamber may be placed in communication with or cut off from the trunk n^3. The exhaust chamber N^1 is likewise divided by a partition n^6 into an upper chamber with which the tube n^1 is connected and a lower chamber with which an exhaust trunk n^7 is connected, the latter leading to an exhaust bellows or similar device, not shown in the drawings. The partition n^6 has a port n^7 controlled by a cut off valve n^8 similar to the valve n^5. These two cut off valves are coupled to move simultaneously in such manner that one valve is closed when the other is opened, so as to cause the channel M to be alternately flushed and exhausted. The preferred coupling devices consist of levers o pivoted to brackets o^1 and each having one of its arms connected with the adjacent cut off valve, while the other arms of the levers are connected by a rod o^2. These levers are alternately swung in opposite directions by oppositely-disposed bellows or motor pneumatics p, p^1, the movable boards of which carry arms p^2 which act alternately against collars p^3 secured to the connecting rod o^2. Each pair of these pneumatics is connected with the action wind chest C by tubes q, q^1 and their operation is controlled automatically by suitably disposed perforations of the music sheet in the same way as the motor pneumatics a^4 of the main stop A.

The operation of the instrument is as follows: For example, when by the action of the tracker board and the traveling music sheet the cut off valves n^5, n^8 of the right hand controller N, N^1 are shifted to the position shown in the right-hand portion of Fig. 1, the compressed air supply is shut off

from the corresponding air channel M, and this channel is placed in communication with the exhaust trunk n^7, thus exhausting the air therefrom, allowing the right-hand series of diaphragms k to descend and closing the corresponding exhaust valves j^4 and opening the air valves j^3. The motor pneumatics of the trumpet-stop are now cut off from the channels j^6 and the pipes of that stop therefore remain silent. When the cut off valves n^5, n^8 are reversed, as shown in connection with the left-hand controller N, N^1 in Fig. 1, the air channel M is cut off from the exhaust trunk n^7 and connected with the compressed air trunk n^3. The compressed air entering said channel now expands the diaphragms k to their elevated position, as shown in the left-hand portion of the stop wind chest J, thereby opening all of the exhaust valves j^4 of that stop or series and closing the corresponding air valves j^3 and holding them in that position so long as the valves n^5, n^8 of the controller remain in the last-named position. The motor pneumatics of the corresponding auxiliary stop say the clarinet stop, now communicate with the corresponding valve chambers e of the action wind-chest C through the tube k^2, valve chamber j^2, port j^7, channel j^6, and tubes l, e^2, and whenever a motor pneumatic a^4 of the main stop A is collapsed, the corresponding motor pneumatic h^1 of said auxiliary stop is also collapsed, causing the corresponding pipes of the active stops to speak in unison in an obvious manner.

In my improved stop mechanism, the series of ports or passages which connect the motor pneumatics of the stops with the action wind-chest C are controlled by individual pneumatically-operated valves instead of by a single slider, as heretofore. These individual valves are positive and reliable in action and always open fully, thus insuring an ample supply of air to the pipes of the stops and overcoming the objections of warping, binding and incomplete opening incident to the use of such sliders.

In the construction shown in the drawings, the two series of stop valves j^3, j^4 are arranged in the same wind chest for simplifying the instrument, but a separate wind-chest could obviously be employed for the valve mechanism of each stop. It is also obvious that the controller-levers o could be operated by mechanical or other means, or they could be operated manually, if desired, without departing from the spirit of the invention.

The relative arrangement and location of the several wind-chests and the connections between the same, as well as the construction and arrangement of the main action and the pneumatic controlling means N, N^1 may be widely changed and modified as the fancy of the manufacturer may dictate or circumstances may require, and I do not therefore wish to be limited to the particular construction and arrangement of the parts herein shown and described.

I claim as my invention:

1. In an organ, the combination with a pneumatic action, of a stop or group of pipes, valves controlling the passage of the air to said pipes, motor pneumatics for said valves controlled by said action, a stop wind-chest having passages leading to said motor pneumatics, individual stop-valves controlling said passages, pneumatics for operating said stop-valves, air inlet and exhaust chambers, and means for alternately connecting said chambers with the last-named pneumatics, substantially as set forth.

2. In an organ, the combination with a pneumatic action, of a stop or group of pipes, valves controlling the passage of the air to said pipes, motor pneumatics for said valves controlled by said action, a stop wind-chest having passages leading to said motor pneumatics, individual stop-valves controlling said passages, an air chamber adapted to be alternately exhausted and flushed and having air inlet and exhaust conduits, actuating pneumatics for said stop-valves connected with said chamber, and cut-off devices controlling said conduits, substantially as set forth.

3. In an organ, the combination with a stop or group of pipes, valves controlling the passage of the air to said pipes and motor pneumatics for operating said valves, of a stop wind-chest having passages leading to said motor pneumatics, individual stop-valves controlling said passages, pneumatics, for operating said stop valves, air inlet and exhaust chambers both connected with said pneumatics, a cut-off valve arranged in each of said chambers, oppositely-acting motor pneumatics operating to open said cut-off valves alternately, and pneumatic operating means for alternately collapsing the last-mentioned motor pneumatics, substantially as set forth.

4. In an organ, the combination with a stop or group of pipes, valves controlling the passage of the air to said pipes and motor pneumatics for operating said valves, of a stop wind-chest having passages leading to said motor pneumatics, individual stop-valves controlling said passages, pneumatics for operating said stop-valves, air-inlet and exhaust chambers both connected with the last-mentioned pneumatics, a cut off valve arranged in each of said chambers, a connection between said cut-off valves for causing one of the same to open when the other closes and motor pneumatics arranged to shift said connection in opposite directions, substantially as set forth.

5. In an organ, the combination with a stop or group of pipes, valves controlling the passage of the air to said pipes and motor

pneumatics for operating said valves, of a stop wind-chest having passages leading to said motor pneumatics, individual stop-valves controlling said passages, pneumatics for operating said stop-valves, air-inlet and exhaust chambers both connected with the last-mentioned pneumatics, a cut off valve arranged in each of said chambers, operating levers for said cut off valves, a connection between said levers, and oppositely-acting motor pneumatics engaging with said connection, substantially as set forth.

6. In an organ, the combination with a pneumatic action, of a stop or group of pipes, valves controlling the passage of the air to said pipes, motor pneumatics for said valves controlled by said action, a stop wind chest comprising a channel, valve chambers having air ports and connected with said channel by exhaust ports, and a pair of alternately-opening valves arranged in each of said chambers and controlling the air and exhaust ports thereof, said valve-chambers being connected with said motor pneumatics, an operating pneumatic for each pair of said air and exhaust valves, and pneumatic means for operating the last-mentioned pneumatics, substantially as set forth.

7. In an organ, the combination with a main stop or group of pipes, valves controlling the admission of the air to the pipes, and motor pneumatics for operating said valves, of a pneumatic action controlling said motor pneumatics and including a wind-chest and suitable valve mechanism, an auxiliary stop or group of pipes having similar controlling valves and motor pneumatics for operating the same, an auxiliary wind-chest for the last-mentioned stop having passages connected with the last-named motor pneumatic and the corresponding channels or passages of said pneumatic action, stop valves controlling the passages of said auxiliary wind-chest, pneumatics for operating said stop-valves, air inlet and exhaust chambers both connected with the last-mentioned pneumatics, a cut-off arranged in each of said chambers, and oppositely-acting motor pneumatics operating said cut-offs and controlled by said pneumatic action, substantially as set forth.

8. In an organ, the combination with a pneumatic action, of a stop or group of pipes, valves controlling the passage of the air to said pipes, motor pneumatics for said valves controlled by said action, a stop wind-chest having passages leading to said motor pneumatics, individual stop-valves controlling said passages, pneumatics for operating said stop valves, air inlet and exhaust conduits connected with the last-mentioned pneumatics, controlling means for said conduits, and motor pneumatics operating said controlling means and governed by said pneumatic action, substantially as set forth.

9. In an organ, the combination with a stop or group of pipes, valves controlling the passage of the air to said pipes and motor pneumatics for operating said valves, of a stop wind-chest having passages leading to said motor pneumatics, individual stop-valves controlling said passages, pneumatics for operating said stop valves, air inlet and exhaust conduits connected with the last-mentioned pneumatics, controlling means for said conduits, motor pneumatics operating said controlling means, a wind-chest with which the last-mentioned pneumatics are connected, valve-mechanism in said wind-chest for controlling the passage of the air to and from said pneumatics, and a tracker board and perforated music sheet controlling said valve-mechanism, substantially as set forth.

Witness my hand this 11th day of November, 1904.

EUGENE DE KLEIST.

Witnesses:
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E. M. GRAHAM.