

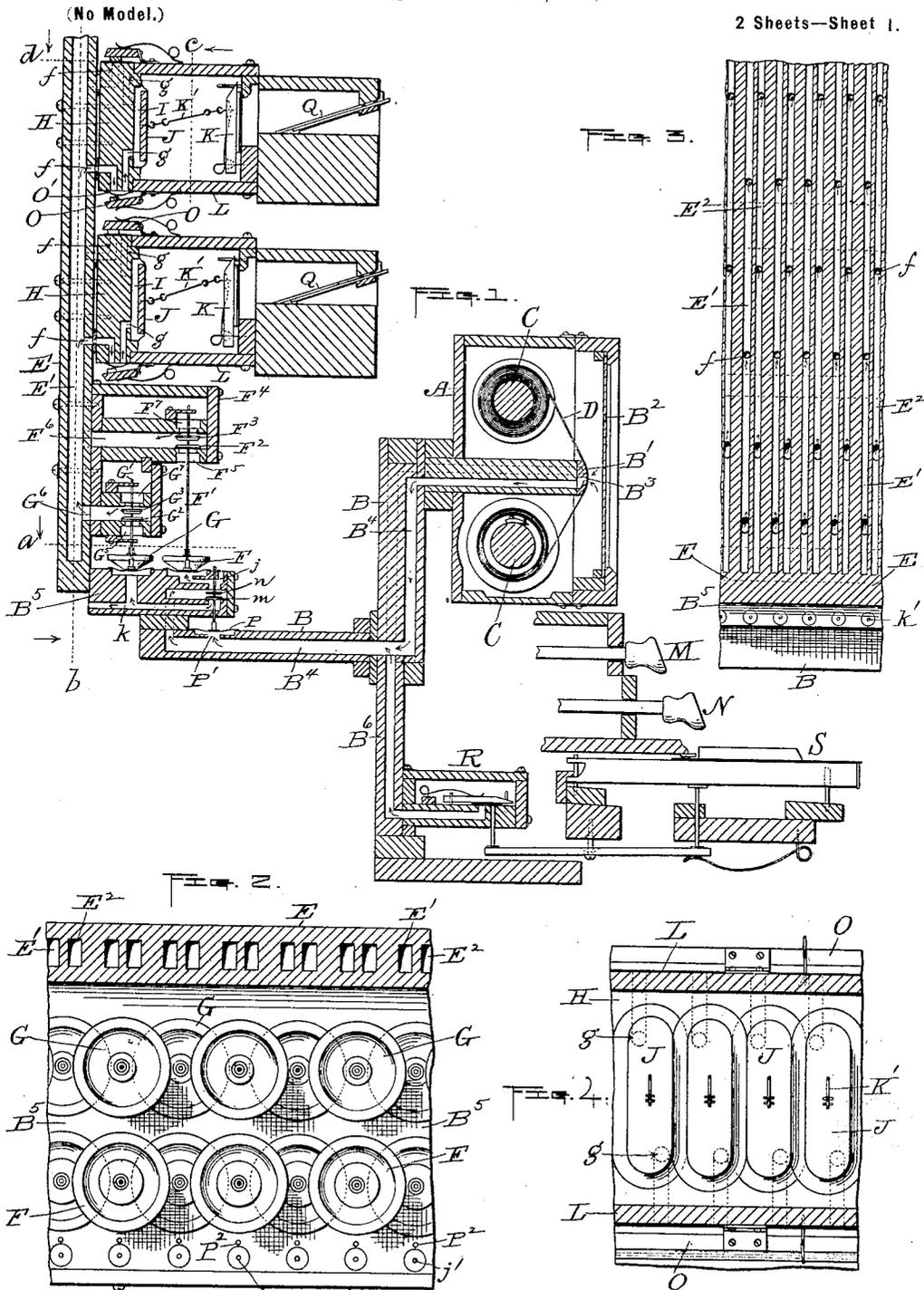
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Patented Oct. 10, 1899.

M. S. WRIGHT.
AUTOMATIC MUSICAL INSTRUMENT.

(Application filed Oct. 15, 1898.)

2 Sheets—Sheet 1.



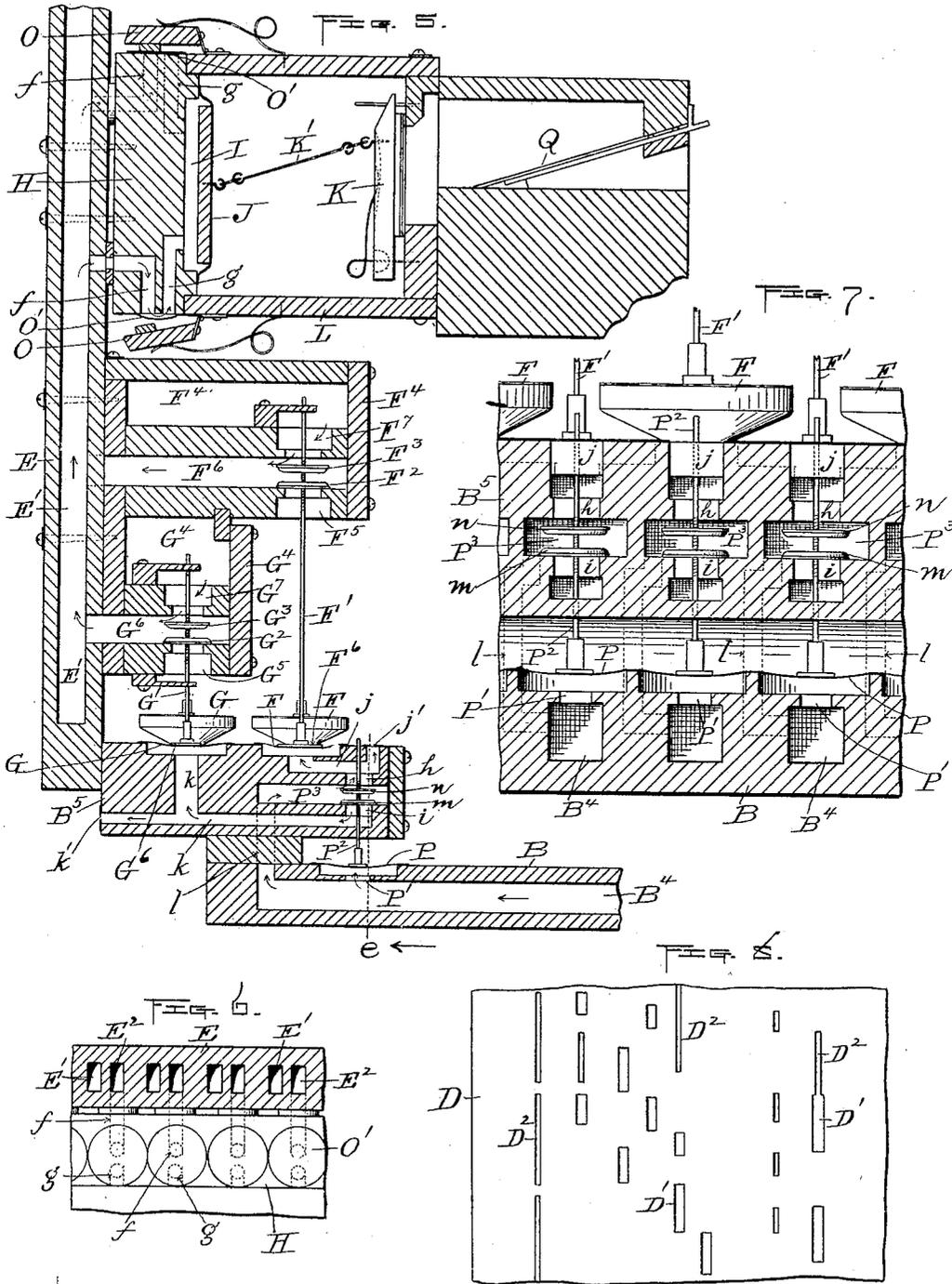
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UNITED STATES PATENT OFFICE.

MORRIS S. WRIGHT, OF WORCESTER, MASSACHUSETTS.

AUTOMATIC MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 634,601, dated October 10, 1899.

Application filed October 15, 1898. Serial No. 693,589. (No model.)

To all whom it may concern:

Be it known that I, MORRIS S. WRIGHT, of the city and county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Automatic Musical Instruments; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a vertical transverse section through so much of a reed instrument as is necessary to illustrate my invention. Fig. 2 represents upon an enlarged scale a horizontal section through part of the secondary channel-board, taken on line *a*, Fig. 1, also showing a plan of several pairs of the primary pneumatics hereinafter described. All the following figures are also upon an enlarged scale. Fig. 3 is a vertical longitudinal section through the secondary channel-board, taken on line *b*, Fig. 1, looking in the direction of the arrow. Fig. 4 is a vertical longitudinal section through part of one of the tone-chambers, taken on line *c*, Fig. 1, showing a front view of some of the secondary pneumatics in said tone-chamber. Fig. 5 is an enlarged view of part of the sectional view shown in Fig. 1. Fig. 6 is a horizontal section through part of the secondary channel-board, taken on line *d*, Fig. 1, showing a top view of part of one of the tone-chambers and some of the flexible pneumatic cut-off valves thereof. Fig. 7 is a vertical longitudinal section, upon a still larger scale than the previous figures, through part of the primary channel-board and mechanism for operating the primary pneumatics, taken on line *e*, Fig. 5, looking in the direction of the arrow; and Fig. 8 shows a piece of perforated sheet-music, such as is used in connection with my improved instrument.

This invention relates to reed instruments, and more particularly to automatic reed instruments in which a perforated sheet of music is used for producing the different tones of a tune played thereon. It may also have combined therewith the usual keys and connections for operating the instrument by hand, and may also, if desired, be connected by means of suitable mechanism with one or more key or string instruments combined

with the automatic part of the instrument; but as said connecting mechanism, with other instruments, is not covered by this invention the same is not shown or described.

Said invention consists of certain improvements in the construction and arrangement of the primary pneumatic system in connection with other parts of the instrument, whereby air admitted through different sizes and shapes of openings in the sheet-music and conducted through a single opening and channel in the primary channel-board to said pneumatics will operate two of them independently, one of each pair of said pneumatics being operated by the wide openings in said sheet-music to produce the solo or melody tones of a tune and the other by the narrow openings to produce the accompaniments thereto, each of said pairs of primary pneumatics also independently operating one and the same reed corresponding to said single opening and channel in said primary channel-board, all as will be hereinafter more fully set forth.

To enable those skilled in the art to which my invention appertains to better understand the nature and purpose thereof, I will now proceed to describe it more in detail.

My invention, as aforesaid, relating more particularly to automatic musical instruments, I will describe my improvements as applied thereto, and for convenience the sheet-music will be described as having two widths of openings; but I do not limit myself to this number or to the shape thereof in practice.

In the drawings, *A* represents the music-box, which is mounted on the outer end of the primary channel-board or "tracker-board" *B*, and is provided with the rolls *CC*, over which the perforated sheet-music *D* is placed, the same being drawn from one roll to the other over the mouthpiece *B'* of said primary channel-board by suitable mechanism, which is not shown, the same not constituting a part of my invention. Said music-box is also provided with the glass front *B²*, through which to view the sheet-music as it passes over the openings *B³* in the mouthpiece *B'*. The primary channel-board extends from near the glass front *B²* of the music-box to the secondary channel-board *E* and is provided with the channels *B⁴*, extending from

the openings B³ in the mouthpiece B' to under the primary pneumatics F G, which are arranged in this instance on an elevated part or block B⁵ of said primary channel-board.

5 The series of primary pneumatics F G are arranged in pairs, in this instance transversely, or crosswise of said raised part or block B⁵, and each pneumatic of each pair is connected, by means of the vertical wires F' G', with the cut-off or switch valves F² F³ and G² G³ of their respective wind-chests F⁴ and G⁴. When the pneumatics are lowered or are in their normal positions, as is shown in the drawings, the cut-off or switch valves F² G² close the air-outlets F⁵ and G⁵, respectively, of the channels F⁶ and G⁶ of said wind-chests which connect with the vertical channels E' E² in the secondary channel-board E, and when said pneumatics are lifted by the air admitted through the openings in the sheet-music, as hereinafter described, the cut-off valves F³ G³ close the air-outlets F⁷ G⁷, respectively, of said wind-chests. Each wind-chest passage F⁶ G⁶ and channel E' E² is respectively connected, by means of passages or channels *f g* in the tone channel-board H, with the space I back of each secondary pneumatic J. Therefore, as will be seen, each primary pneumatic of each pair is separately connected with one and the same secondary pneumatic J in the tone-chamber L, so that either one may operate the same independently, and thus independently operate the reed-valve K, which is connected by means of the wire K' with said secondary pneumatic J. The air-pressure between the wind-chests and tone-chambers may be cut off or opened as usual by the operation of the "stops" M N, which in practice are mechanically connected with the long cut-off valves O O, arranged to come over the openings of the channels *f g* at the top and bottom edges of the tone channel-board H, flexible pneumatic-valves O' O' also being used over said openings under the valves O O to form a connection between one channel *f* and the other *g* of each pair when said valves O are open. As said "stop" connections do not constitute a part of my invention, it will be unnecessary to illustrate or describe the same.

50 The mechanism whereby one or the other of the primary pneumatics F G is independently raised by air passed through two different widths of openings D' D² in the sheet-music and thence through a single opening and channel in the primary channel-board to each pair of said pneumatics, as previously stated, is constructed and arranged as follows: Just in front of the pneumatic F of each pair is arranged a pneumatic cut-off or switch device similar to those of the regular primary pneumatics and their cut-offs in the wind-chests. A pneumatic P is arranged under the top of the primary channel-board B under the front end of its raised portion B⁵, to which air is admitted from the single channel B⁴ through an opening P'. The vertical wire

stem P² of said pneumatic extends up through the front end of said raised part or block B⁵, and at about the center of the latter is formed a separate horizontal chamber P³ for each pair of pneumatics F G. (See Figs. 5 and 7.) In line with each pair of pneumatics F G and central with the stem P² are formed air outlets or openings *h i* from the top and bottom of said chamber P³, the top opening *h*, connecting with a channel *j*, communicating with the under side of pneumatic F, and the bottom opening *i*, with a channel *k*, extending to the under side of pneumatic G. The channel *j* is provided with a vent *j'* and the channel *k* with a vent *k'* for the purpose hereinafter described. Each opening B⁴ in the primary channel-board is also connected with each central chamber P³ in the block B⁵ by means of a channel *l*. (See dotted lines in said Figs. 5 and 7.) Upon the stem P² of pneumatic P are mounted two cut-off or switch valves *m n*, the valve *m* serving to cut off the escape of air from chamber P³ through the bottom opening *i* to the pneumatic G when the parts are in their normal positions, as is shown in the drawings, and the valve *n* to cut off the air to the other pneumatic F when the pneumatic P is raised, as hereinafter described.

In practice the foregoing parts are so constructed and arranged in relation to each other that when a small volume of air enters and passes through the channel B⁴ into the chamber P², the same being insufficient in power to raise pneumatic P to close valve *n*, it will pass up through opening *h* and lift the pneumatic F without operating the other pneumatic G; but when a larger volume of air and of greater power is admitted, sufficient to raise pneumatic P, the latter is quickly lifted, thereby closing the opening *h* and opening the air-outlet *i*. This permits said air to pass down through said outlet *i* and through channel *k* to operate the pneumatic G without operating the pneumatic F. In order to accomplish the above result, the vent-openings *j' k'* must be so proportioned to the narrow and wide openings in the sheet-music as to permit the air-pressure in the channels to lift its respective pneumatic without raising the other—as, for instance, the opening in the vent *k'* must be so proportioned to the narrow openings D² in the sheet-music that it never permits the pressure in channel *k* to lift pneumatic G. The pneumatic F, being the low-pressure pneumatic, or, in other words, the one operated by air admitted through the small openings D² in the sheet-music, is provided with a large disk F⁶, while the high-pressure pneumatic G, or the one operated by air admitted through the wide openings D' in said sheet-music, is provided with a smaller disk G⁶ for the purpose of conforming to said different degrees of air-pressure and obtain a proper operation of the parts, less pressure, it is obvious, being required in practice to lift a

pneumatic having a large disk than for one having a small disk.

It will be understood that in practice when the instrument is being played the music-box, wind-chests, and tone-chambers are supplied with air under equal pressure by the usual means. Therefore when any of the stops are drawn and the valves O are opened a free circulation of air existing between the wind-chests and the back of the secondary pneumatics in the tone-chambers connected with the stops that were drawn effects an equilibrium of the air forces on two sides of said secondary pneumatics, and they therefore remain stationary until one or the other of the primary pneumatics F G is operated to close its wind-chest valve and open one of the outlets F⁵ or G⁵. The pressure then being removed back of one of the pneumatics J, the air in the tone-chamber forces it back, thereby pulling open the reed-valve K and operating the reed Q.

The operation of the instrument may be briefly summed up as follows: Assuming that the air-pressure is applied and the perforated sheet-music is being drawn over the openings in the mouthpiece B' of the primary channel-board, also that the necessary stops have been drawn to open the cut-off valves O, when a wide opening D' in said sheet-music arrives over one of the openings in the mouth-piece, a large volume of air being admitted, the pneumatic P is lifted, thereby causing the high-pressure primary pneumatic G to be operated, as previously described, and a solo or melody tone of the tune to be played. Several of said wide openings may now come in succession over the same opening or both wide and narrow openings alternately, or in any other order, according to the tune to be played. When a narrow opening D² arrives over said opening, insufficient air being admitted to raise the pneumatic P it passes up through opening h and operates the low-pressure pneumatic F without operating pneumatic G, and so on for each different opening in the sheet-music and primary channel-board. By thus operating two pneumatics from one primary channel and opening and one and the same reed by two primary pneumatics, each independently, as previously described, it will at once be apparent that by the use of perforated sheet-music having two sizes of openings I am enabled to produce double the effect with sheet-music of only the ordinary width employed for this class of instruments of that usually obtained with sheet-music whose perforations are all the same width. To conform with said doubling in the capacity of the music within the usual width and to obviate the necessity of increasing the length of the instrument above its usual length, I arrange each pair of the primary pneumatics F G alternately one above the other, each alternate pair in this instance being on a level with the top of the primary channel-board block B⁵ and the others a little above the level thereof,

as is shown in Figs. 2 and 7. By this arrangement, as will be seen, they may be arranged very close together laterally, only sufficient distance between them being necessary to receive the vertical wires or stems F' G', as is shown in Fig. 2, thereby, as will also be seen, not materially increasing the length required for a double row of pneumatics over that required for the usual single row in instruments as heretofore constructed. The additional expense of thus constructing an instrument is but trifling, while that of making the sheet-music with two sets or widths of openings is practically the same as if only one width were made therein. On the other hand, the advantages derived by said improvements are of considerable importance in the manufacture of this class of instruments.

At the aforesaid trifling additional expense I am enabled to produce double the usual effect in tones over instruments using sheet-music of equal or about equal width to that which I employ, and the different variety of tones being confined to the usual width of sheet-music the person playing the instrument can more readily follow the music and manipulate the stops than if double the width is used, as in other patented devices, having one set of openings upon one sheet and another set upon another sheet, used side by side, or in one wide sheet double the usual width. Then, again, the objection of the openings in one sheet not properly traveling in unison with those in the other sheet, and thus not arriving over the openings in the primary channel-board at the proper time to properly play the different tones of the tune in unison, which is liable to occur when two sheets are used side by side, and also the objections to shrinkage and swelling where wide paper in one piece is used, are, as will be seen, wholly removed by my invention. By said invention if the paper is properly cut and the stops properly manipulated results may be produced wholly unattainable by the use of double or wide sheet-music in the expression or quality of tones in playing the instrument, which result I have fully demonstrated in practice in the construction of an instrument embodying my improvements.

I have described my invention as being operated by air under pressure; but I do not limit myself thereto, as the air-suction principle is equally applicable thereto. I prefer, however, the air-pressure principle, as described.

Although, as previously stated, my invention is designed principally for automatic musical instruments, it may also be combined with the keys of a reed or pipe organ, each bank of keys being separately connected to operate one or the other of the pneumatics of each transverse set—as, for instance, one key-manual may connect with the pneumatics F and another key-manual with the pneumatics G. In Fig. 1 of the drawings I have shown the instrument as being connected with one

key-manual for operating one of the sets of pneumatics, as aforesaid, as well as with a music-box, which is the way the instruments are made in practice. Said key attachment
5 is made by extending a branch B⁶ of the primary channel-board down and connecting its channel with an ordinary wind-chest and valve device R, operated from the keys S in the usual way. As said construction and oper-
10 ation are old and well understood, it will be unnecessary to enter into a detailed description thereof.

If desired, instead of arranging the primary pneumatics in pairs, as hereinbefore shown
15 and described, three or more may in practice be arranged in a row or set without departing from the principle of my invention, in which case the other parts would of course be like-
20 wise duplicated or modified in construction and the sheet-music made to conform there-with.

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

25 1. In a reed instrument, the primary channel-board, provided with one opening and channel for each pair of primary pneumatics and having mounted thereon the music-box
30 and its appliances for playing the instrument automatically, also the keys and connections for playing said instrument by hand; in combination with the series of primary pneumatics, arranged in pairs on said primary chan-
35 nel-board, a single pneumatic, also arranged on said primary channel-board and connected with one of its channels, a double cut-off or switch valve, arranged between said last-
40 named single pneumatic and the pair of primary pneumatics and connected with said single pneumatic, a double wind-chest, provided with separate channels and double cut-
45 off or switch valves, two of each for each pair of primary pneumatics, and said valves separately connected with said primary pneumatics; a secondary channel-board, provided
50 with two channels for each pair of wind-chest channels, each separately connected with said wind-chest channels, and a tone-chamber, containing a series of separate, secondary
55 pneumatics and reed-valves, one of each for each primary channel and reed, the channel-board of said tone-chamber being also provided with two, double channels and cut-off
valves for each secondary pneumatic, controlled by two "stops" for each tone-chamber,
substantially as and for the purpose set forth.

2. In a reed instrument, the primary channel-board, provided with one opening and
60 channel for each pair of primary pneumatics, and having mounted thereon the music-box and its appliances for playing the instrument automatically, in combination with the series of primary pneumatics, arranged in pairs on
65 said primary channel-board; a single pneumatic, also arranged on said primary chan-

nel-board and connected with one of its channels; a double cut-off or switch valve, arranged
between said last-named single pneumatic and the pair of primary pneumatics and con- 70
nected with said single pneumatic; a double wind-chest, provided with separate channels and double cut-off or switch valves, two of each
for each pair of primary pneumatics, and said valves separately connected with said pri- 75
mary pneumatics; a secondary channel-board, provided with two channels for each pair of wind-chest channels, each separately
connected with said wind-chest channels, and a tone-chamber, containing a series of sepa- 80
rate, secondary pneumatics and reed-valves, one of each for each primary channel and reed, the channel-board of said tone-chamber being also provided with two, double chan-
nels and cut-off valves for each secondary 85
pneumatic, controlled by two stops for each tone-chamber, substantially as and for the purpose set forth.

3. In a reed instrument, the primary channel-board, provided with one opening and
90 channel for each pair of primary pneumatics; the series of primary pneumatics, mounted on said channel-board and arranged in pairs thereon; a single pneumatic, also arranged on said primary channel-board and connect-
95 ed with one of its channels; a double cut-off or switch valve, arranged between said last-named single pneumatic and the pair of primary pneumatics, and connected with said single pneumatic; a double wind-chest, pro-
100 vided with separate channels and double cut-off or switch valves, two of each for each pair of primary pneumatics, and said valves separately connected with said primary pneumatics; a secondary channel-board, provided
105 with two channels for each pair of wind-chest channels, each separately connected with said wind-chest channels, and a tone-chamber, containing a series of separate, second-
110 ary pneumatics and reed-valves, one of each for each primary channel and reed, the channel-board of said tone-chamber being also provided with two, double channels and cut-off valves for each secondary pneumatic, controlled by two stops for each tone-chamber,
115 substantially as and for the purpose set forth.

4. In a reed instrument, the primary channel-board, provided with one opening and
120 channel for each pair of primary pneumatics; a secondary channel-board and a double wind-chest, each provided with double connecting-channels, and said wind-chest with two, double, cut-off or switch valves for each
125 pair of primary pneumatics, said valves being connected, one with each pneumatic of each pair; in combination with the series of primary pneumatics, arranged in pairs on said primary channel-board, a single pneumatic, also arranged on said primary chan-
130 nel-board and connected with one of its channels, and a double cut-off or switch valve, arranged between said last-named single pneu-

matic and the pair of primary pneumatics, and connected with said single pneumatic, substantially as and for the purpose set forth.

5 In a musical instrument, the combination of the primary channel-board, having one channel for each pair of primary pneumatics, with the series of primary pneumatics, arranged in pairs on said primary channel-board; a single pneumatic, also arranged
10 on said primary channel-board and connected

with one of its channels, and a double cut-off or switch valve, arranged between said last-named single pneumatic and the pair of primary pneumatics, and connected with said single pneumatic, substantially as and for 15 the purpose set forth.

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