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PROVISIONAL SPECIFICATION.

Improvements in Automatic or Mechanical Musical Instruments.

I, PAUL EHRLICH of Gohlis near Leipsic in the Empire of Germany Technical Director of the Company Fabrik Leipsiger Musikwerke do hereby declare the nature of this invention to be as follows:—

5 This invention relates to that class of automatic musical instruments in which the sound is produced by the passage of a perforated music sheet over levers which actuate valves controlling pipes or reeds and consists in a peculiar arrangement of the chambers and their valves and in the method of actuating the latter by means of the levers as hereinafter described.

10 The object of the invention is to enable the holes or their equivalents in the music sheet to be set closer together that is to say to effect a saving of space with regard to its width and also to obtain a better utilisation of its length that is to say to provide the greatest possible number of perforations or the like corresponding with the notes within a given area of surface.

15 The valves of a musical instrument of this description are preferably in the form of sliding valves but hinged valves may be employed if preferred. The sliding valve is connected by a wire with the corresponding actuating lever or the latter may be arranged to act upon the valve by the aid of a disconnected wire or rod capable of transmitting to it the requisite movements. When the lever drops into an opening or hole in the music sheet the valve is moved by the action of suitable intermediate parts or mechanism in such a manner as to open the passages through which the air from the bellows or other source has to pass in order to cause the instrument to produce the required sound.

20 The wire may act upon the valve at a point so near the centre upon which it rotates or is hinged that a very small movement of the lever is sufficient to open the passage that is to say to produce the sound. Consequently the holes or the like in the interchangeable sheets are enabled to be correspondingly diminished in size so that a larger number of them can be arranged within the limited length of the circular lines of a disc shaped music sheet for example.

25 The chambers or tubes upon which the valves are placed or have their seats are likewise arranged in an improved manner. They are constructed one above the other in steps so as to enable the valves to be placed near together in a horizontal direction so that less space is required between the levers. A further saving of space is also obtained by arranging the chambers side by side in such a manner that levers of double or unequal length for example are employed to work them. 30 The short levers being arranged to act upon the valves on one side and long levers to act upon the valves on the other side.

35 By means of this improved arrangement the divisions or lines in the music sheet are enabled to be placed very near together and moreover a much larger number of successive holes or the like are enabled to be placed within a given surface than 40 has heretofore been possible with a surface of the same area. Consequently the instrument is enabled to continue playing for a longer time and to play a greater variety of airs. The advantages of this invention are especially conspicuous in the case of instruments with circular music sheets.

Dated this 3rd day of November 1893.

J. H. JOHNSON & Co.,
47, Lincoln's Inn Fields, London, W.C., Agents.

[Price 8d.]

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COMPLETE SPECIFICATION.

Improvements in Automatic or Mechanical Musical Instruments.

I, PAUL EHRLICH of Gohlis near Leipsic in the Empire of Germany Technical Director of the Company Fabrik Leipsiger Musikwerke, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention relates to that class of automatic musical instruments in which the sound is produced by the passage of a perforated music sheet over levers which actuate valves controlling pipes or reeds and consists in a peculiar arrangement of the chambers and their valves and in the method of actuating the latter by means of the levers as hereinafter described.

The object of the invention is to enable the holes or their equivalents in the music sheet to be set closer together that is to say to effect a saving of space with regard to its width and also to obtain a better utilisation of its length that is to say to provide the greatest possible number of perforations or the like corresponding with the notes within a given area of surface.

The valves of a musical instrument of this description are preferably in the form of sliding pivotted valves but hinged or flap valves may be employed if preferred. The sliding valve is connected by a wire with the corresponding actuating lever or the latter may be arranged to act upon the valve by the aid of a disconnected wire or rod capable of transmitting to it the requisite movements. When the lever enters an opening or hole in the music sheet the valve is moved by the action of suitable intermediate parts or mechanism in such a manner as to open the passages through which the air from the bellows or other source has to pass in order to cause the instrument to produce the required sound.

The connecting wire may act upon the valve at a point so near the centre upon which it rotates or is hinged that a very small movement of the lever is sufficient to open the passage to produce the sound. Consequently the holes or the like in the interchangeable sheets are enabled to be correspondingly diminished in size so that a larger number of them can be arranged within the limited length of the circular lines of a disc shaped music sheet for example.

The chambers or tubes upon which the valves are placed or have their seats are arranged step like or one above another so as to enable the valves to be placed near together in a horizontal direction whereby less space is required between the levers. A further saving of space is also obtained by arranging the chambers side by side in such a manner that levers of double or unequal length for example may be employed to work them, short levers being arranged to act upon the valves on one side and long levers to act upon the valves on the other side.

And in order that my said invention may be fully understood I shall now proceed more particularly to describe the same and for that purpose shall refer to the several figures on the annexed sheet of drawings the same letters of reference indicating corresponding parts in all the figures.

Figure 1 shews in elevation an arrangement according to this invention for operating the sliding valves of automatic or mechanical musical instruments.

Figure 2 shews a modified arrangement of the valve operating wires and

Figure 3 shews a modification in the arrangement of the valve operating levers and of the valves so as to economise space.

Figure 4 shews in elevation the step like arrangement of the reed boxes or tubes.

Figure 5 is a perspective view of one end of a reed box.

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Figures 6, 7 and 8 represents parts of a mechanical musical instrument constructed according to my invention to be operated by means of circular music or tune sheets and

Figure 9 shews an arrangement for operating lifting valves.

5 Referring to Figure 1 *a* represents one of the valves of a mechanical musical instrument which valve in its normal position covers the three openings *e e e* in the wind chamber of the instrument. This valve is pivotted at *a*¹ and at as short distance as practicable from this pivot it is connected, by a rod *c*, to the valve operating lever *d* the point *d*² of which is shewn as having entered a hole in the music sheet *b* and consequently under the action of a spring *c*² the valve *a* has been
10 turned on its pivot *a*¹ so as to uncover the openings *e* and admit of air passing therethrough and so produce the required sound or note or notes governed by the said valve. By connecting the rod or wire *c* close to the pivot *a*¹ the valve is fully opened by a very slight movement of the lever *d* and consequently the fullest
15 possible advantage is obtained from the rows of perforations in the music sheet. The currents of air to produce the sounds on the reeds may be obtained either by pressure or suction by any known or convenient mechanism. When the air-currents are obtained by suction the connecting wire *c* of each valve is preferably arranged, as shewn in Figure 2, to slide in guides *h* and *i* the said
20 rod or wire being connected by a knob or button *k* to a rod or wire *l* sliding in a guide *m* and connected to the operating lever *d*. On the wire *c* is a stud or projection *o* which enters a slot *n* in the valve *a* so that when the end *d*² of the lever *d* enters a hole in the music sheet the wires or rods *c* and *l* will slide in their guides and the stud *o* by engaging with the slot *n* in the valve will cause the
25 said valve to turn on its pivot *a*¹ so as to open the passage *e* for the air. When the end *d*² of the lever is depressed by the unperforated portion of the music sheet the valve *a* will be moved in the reverse direction so as to close the passage *e*. The wires *c* are connected to the valves *a* so close to the pivots *a*¹ on which they turn that the slightest movement of any one of the operating levers *d* is sufficient to
30 cause the corresponding valve to uncover its air passage *e* to produce a sound consequently the perforations in the music sheet may be correspondingly reduced in size whereby a greater number of notes than heretofore may be comprised in a sheet of a given size. A further reduction of space is obtained by arranging the reeds in juxta position as indicated by the position of the valves *a* in Figure 3. In
35 this arrangement two sets of operating levers of different length are employed the set of short levers *d* being connected to the valves *a* on one side and the set of longer levers *d*¹ being connected to the valves on the other side. By thus employing levers of different lengths the said levers may be arranged closer together, than is the case when the said levers are all the same length and the connecting wires are
40 situated between the levers.

As a further means of economising space I arrange the reed boxes *z* one above another or step like as shewn in Figures 4, 5 and 7 whereby the operating levers *d* may be set very close together the notes in the music sheets being placed correspondingly close, and where pipes are employed for producing the notes or sounds
45 they are placed over the apertures *p* Figure 4 the space *g* being tightly closed and receiving air under pressure so that when the valves *a* are opened sounds are produced in the pipes.

Figures 6, 7 and 8 represent a musical instrument constructed for use with circular music sheets and in which the valves *a* although operated by the levers *d*
50 are not connected thereto. The wires or rods *l* interposed between the valve and the levers are each provided with a head *s* on which the levers *d* rest see Figure 6 whilst the valves are pressed against the opposite ends *l*¹ of the said rods or wires by springs *r*. These wires or rods *l* are guided in their movements in guides *m m*¹. Instead of employing sliding pivotted valves as described hinged or flap valves
55 may be employed as shewn for example in Figure 9 in which arrangement the rod or wire *l* on which the lever *d* rests acts at its opposite end on one arm *w*¹ of a

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bell crank lever w the other arm w^2 of the said bell crank being connected to a link or lever v provided at its outer end with a pin or projection at q^1 engaging in a slotted piece s^1 on the hinged flap valve a . The valve a which is hinged at n is held in its closed position by a spring n^1 but when the end d^2 of the lever d enters a perforation in the music sheet, a spring f^1 acting on the arm w^1 of the bell crank lever w causes the said bell crank to turn on its pivot and through the link v and pin and slot connection $q^1 s^1$ open the valve a . 5

By reason of the pin and slotted connection of the link v with the valve a any inequality in the size of the note perforations in the music sheet cannot interfere with or injuriously affect the proper operation of the instrument. 10

As shown in Figure 8 the bellows t for producing the necessary air currents for playing and also a reservoir u for air are enclosed in the casing of the instrument, and motion is imparted to the mechanism from the main spindle w^3 by a crank w^2 and worm and worm wheel w^1 in the usual manner.

By means of the improved arrangements hereinbefore described the divisions or lines in the music sheet are enabled to be placed very near together and a much larger number of successive holes or the like are enabled to be placed within a given surface than has heretofore been possible. Consequently the instrument is enabled to continue playing for a longer time and to play a greater variety of airs. The advantages of this invention are especially conspicuous in the case of instruments with circular music sheets. 15 20

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In automatic or mechanical musical instruments in which sounds are produced by the passage of a perforated music sheet over levers which actuate valves governing the passage of air through pipes or reeds, arranging the pipes or reed boxes with the governing valves step like or one in advance of another so that the levers and rods or wires which operate the valves for controlling the passage of air to the pipes or reeds can be placed close together and permit of the perforations in the music sheets being closer together than hitherto whereby a greater number of perforations or notes in a given area may be provided substantially as hereinbefore described with reference to Figures 4, 5 and 7 of the accompanying drawings. 25 30

2. In mechanical musical instruments of the kind hereinbefore referred to connecting the operating levers d to the valves a as near as practicable to the pivots on which the said valves turn so that a very slight movement of the levers will effect the opening of the valves substantially as and for the purpose hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings. 35

3. In mechanical musical instruments of the kind hereinbefore referred to, the employment of operating levers d d^1 of different lengths in combination with two sets of valves arranged in juxta position the short levers d being connected to one set of valves and the longer levers d^1 being connected to the other set of valves substantially as and for the purpose hereinbefore described with reference to Figure 3 of the accompanying drawings. 40 45

4. In mechanical musical instruments of the kind hereinbefore referred to the combination with the operating levers d and valves a of rods or wires l interposed between the operating ends of the levers d and the valves a near the pivots on which the said valves turn, so that by a slight movement of the levers the valves will be fully opened substantially as hereinbefore described and illustrated by Figure 6 of the accompanying drawings. 50

5. In mechanical musical instruments of the kind hereinbefore referred to the combination with the operating levers d and hinged valves a of rods or wires l operated by the said levers each rod or wire being caused to act on one arm of a bell crank the other arm of which is connected by a yielding connection to a 55

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valve *a* so as to open and close the valve substantially in the manner and for the purpose hereinbefore described with reference to Figure 9 of the accompanying drawings.

Dated this 31st day of July 1894.

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JOHNSONS & WILLCOX,
Agents.

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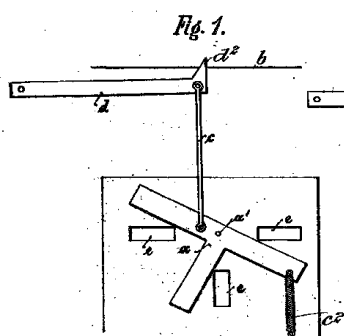


Fig. 1.

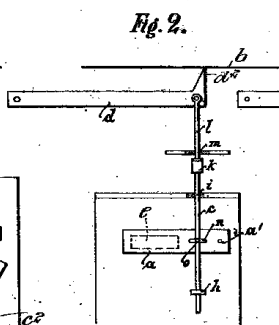


Fig. 2.

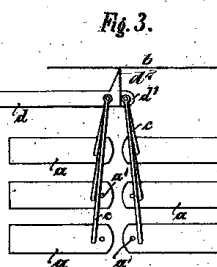


Fig. 3.

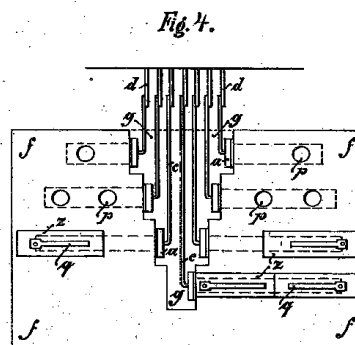


Fig. 4.

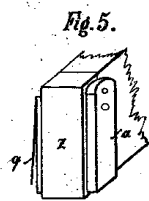


Fig. 5.

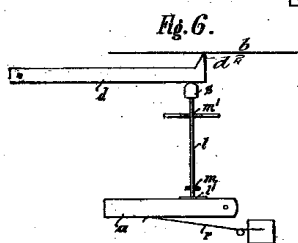


Fig. 6.

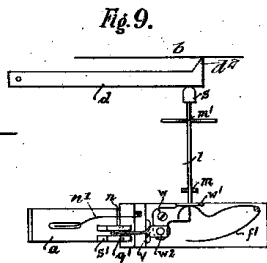


Fig. 9.

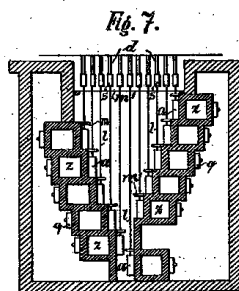


Fig. 7.

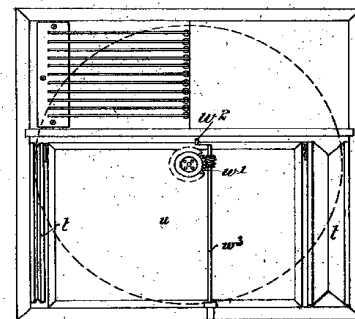


Fig. 8.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

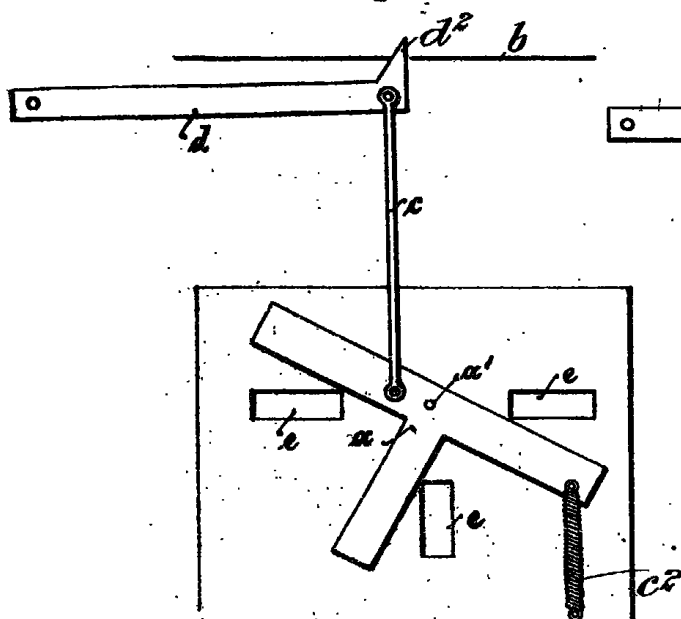


Fig. 2.

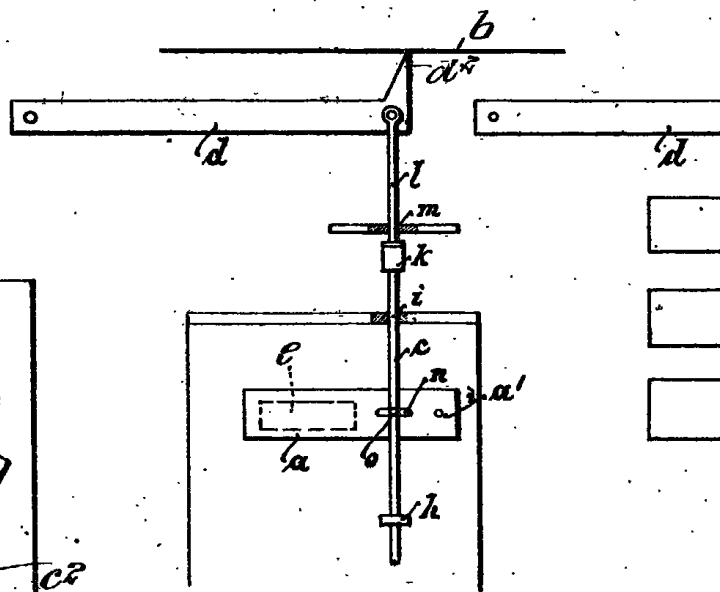


Fig. 5.

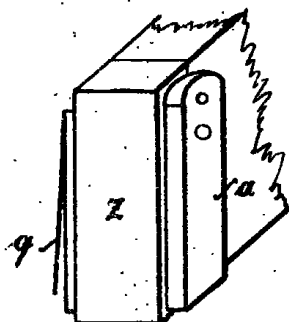


Fig. 6.

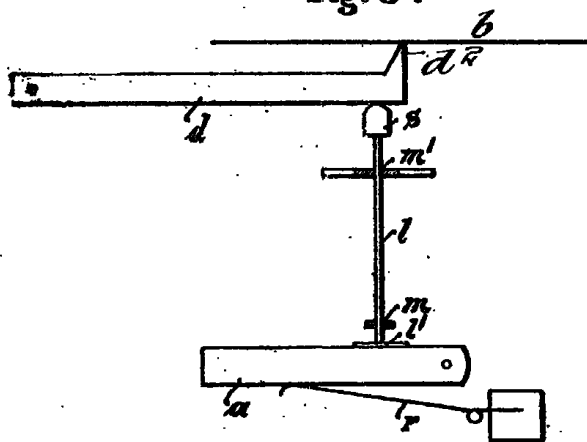


Fig. 9.

