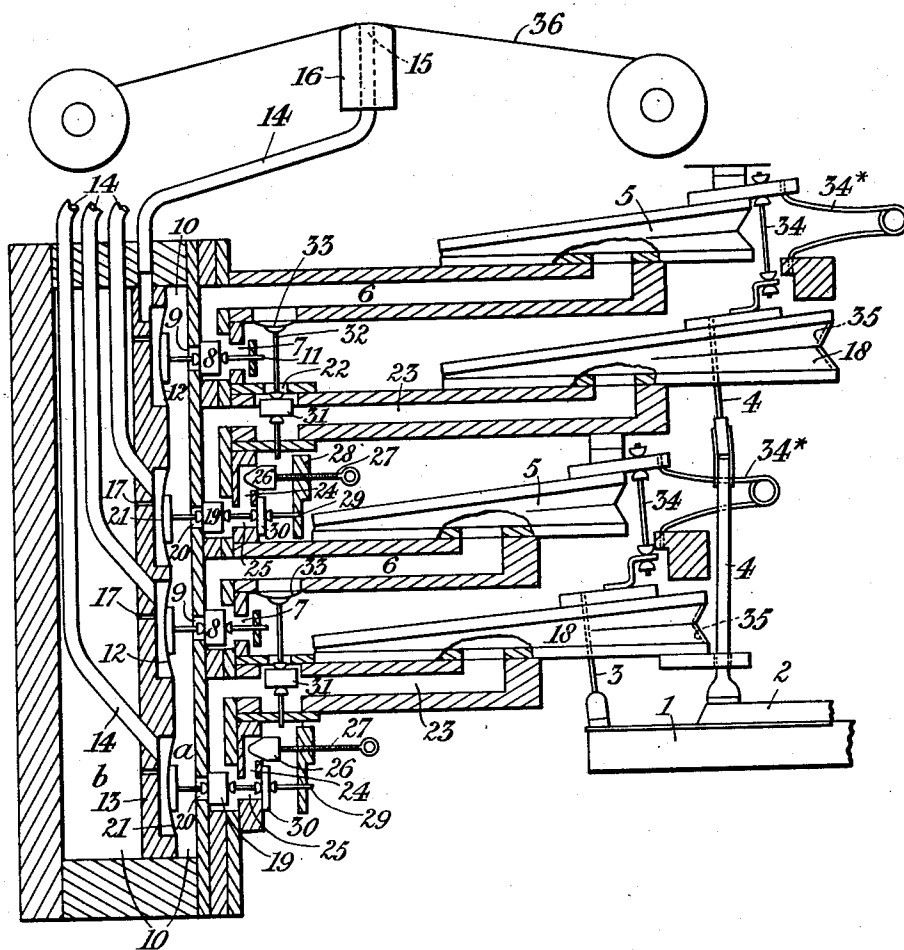


J. J. WALKER.
APPARATUS FOR AUTOMATICALLY PLAYING PIANOFORTES, CARILLONS, AND OTHER
MUSICAL INSTRUMENTS.

APPLICATION FILED JULY 12, 1909.

1,017,932.

Patented Feb. 20, 1912.



Witnesses.

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UNITED STATES PATENT OFFICE.

JAMES JOHN WALKER, OF LONDON, ENGLAND.

APPARATUS FOR AUTOMATICALLY PLAYING PIANOFORTES, CARILLONS, AND OTHER MUSICAL INSTRUMENTS.

1,017,932.

Specification of Letters Patent.

Patented Feb. 20, 1912.

Application filed July 12, 1909. Serial No. 507,160.

To all whom it may concern:

Be it known that I, JAMES JOHN WALKER, a subject of the King of the United Kingdom of Great Britain and Ireland, residing at 27 Francis street, Tottenham Court Road, London, England, have invented new and useful Improvements Connected with Apparatus for Automatically Playing Pianofortes, Carillons, and other Musical Instruments, of which the following is a specification.

This invention relates to apparatus for automatically playing pianofortes, carillons, and other musical instruments, especially apparatus such as that described in the specification of application for Letters Patent Serial Number 275611 filed August 24th 1905.

The invention will be best understood by reference to the accompanying drawing which is a vertical section of key-actuating mechanism according to the said invention.

According to the present invention there is provided, as in the apparatus described in the beforementioned patent, a plurality of pneumatics or motors for each key 1 or 2 to be operated, these motors being coupled together and caused to act upon the same key-depressing sticker 3 or 4. To simplify and facilitate the description of the invention, each set of motors for operating each of the keys 1, 2, is herein assumed, as a convenient example, to consist of two, and these are herein referred to as the "soft motor" and the "loud motor" respectively. Two such sets are represented in the drawing, one (the lower set) serving to actuate the white key 1 through the sticker 3, and the other (the upper set) serving to actuate the black key 2 through the sticker 4. These two sets of motors being practically identical the following description of one such set will serve for both.

The interior of the soft motor 5 is normally in open communication with the atmosphere through a passage 6 and port 7, the latter adapted to be closed by a valve 8 which normally, as shown, closes another port 9 through which the said motor may be placed in open communication with the interior of a suction chamber 10, the said port being formed in the front wall of the said chamber. The valve 8 is what may be regarded as a double-beat valve, opening the

two ports 7 and 9 in alternation, and it is carried on a stem 11 which is fast to a flexible diaphragm or primary pneumatic 12 mounted on a rigid partition 13 dividing the suction chamber 10 into two compartments *a* and *b*. The space behind the flexible diaphragm 12, and inclosed within the partition 13, is, through a tube 14, in open communication with the respective port 15 of the tracker board 16, and also, through a small passage 17 with the chamber *b*.

The interior of each of the loud motors 18, is normally closed to suction by a valve 19 coöperating with a port 20, the said valve being controlled by a flexible diaphragm 21 similar in construction and operation to the diaphragm 12 before described. The interior of each loud motor 18 is normally in free communication with the atmosphere through a port 22 opening directly out of its main passage 23, and a port 24 opening out of another port 25. The port 24 is controlled by a valve 26 which is manually adjustable by means of its stem 27 which is screw-threaded and capable of being screwed backward and forward in the stationary bar 28 which also serves to guide the outer end of the stem 29 of the before mentioned valve 19. The valve 19 is adapted to open and close the ports 20 and 25 in alternation, and its stem 29 also carries a valve 30 which normally closes the port 25 and is opened simultaneously with the opening of the port 20 by the valve 19. The port 22 is adapted to be opened and closed by a valve 31 fast to a spindle 32 whose upper end is fast to a flexible diaphragm or motor 33. The under side of the diaphragm 33 is always exposed to atmospheric pressure, while its upper side is always exposed to the condition prevailing within the passage 6 whether such condition be that of the atmosphere, as when the valve 8 closes the port 9, or that of suction as when the valve 8 closes the port 7.

The soft motor 5 is permanently coupled to the loud motor 18 by a coupling rod or sticker 34 and is acted upon by a spring 34^x which serves to return both of such motors to their respective normal positions. The flexible or collapsible walls of each loud motor are what is known as "ribbed," that is to say they are formed of, or reinforced with cardboard, as indicated by the dotted lines 35, to prevent them being forced outward

when the said loud motor acts as a retarder to the companion soft motor, as next described.

The tune sheet 36, is, as described in Letters Patent Serial Number 331,910, filed August 24th 1906, provided with two perforations for each key 1 or 2 to be operated, one slot for controlling the operation of the motor 5, and the other for controlling the operation of the motor 18. When the slot appertaining to the soft motor 5 registers with the respective tracker board port 15, atmospheric air is admitted through that port, and causes the flexible diaphragm 12 to move toward the right as viewed in the drawing and thereby to move the valve 8 so as to open the port 9 and close the port 7 with the result that the passage 6 and the interior of the motor 5 are placed in open communication with the suction chamber 10, and, as a consequence thereof the motor 5 is collapsed and the respective key 1 or 2 is depressed to sound the corresponding note. By the exhaustion or partial exhaustion of air from the passage 6, the diaphragm 33 is raised by the external atmospheric pressure and caused to close the port 22 by means of the valve 31, so that the interior of the loud motor 18,—which, during the collapsing of the soft motor 5, serves to retard such collapse,—is then open to atmosphere only through the valve-controlled port 24 the valve 26 of which may be adjusted to suit any desired "touch" required to be given by the automatic player. When the slot appertaining to the loud motor 18 registers with the respective tracker board port 15,—which it does practically simultaneously with, or more or less after—the just described registration, atmospheric air is thereby admitted through the respective tube 14 to the back of the diaphragm 21, the latter is moved by the air toward the right as viewed in the drawing, with the result that the valve 19 is moved so as to open the port 20 and close the port 25, to atmosphere, the valve 30 is caused to open the said port 25, the result being that the loud motor 18 is collapsed and caused to augment the power exerted on the key 1 or 2 by the motor 5. When the tune sheet perforations pass out of register with the tracker board ports 15—that appertaining to the loud motor 18 first, or practically simultaneously with that appertaining to the soft motor 5—the suction through the small passage 17 acting on the left hand side (as viewed in the drawing) of the respective diaphragm 21, assisted by the atmospheric pressure on the right hand face of the corresponding valve 19, moves the said valve from the port 25 to the port 20 opening the former and closing the latter thereby closing the interior of the loud motor to suction and leaving the said motor free to ex-

pand. At practically an instant later the perforation appertaining to the soft motor 5 passes out of register with the respective tracker board port 15, with the result that the corresponding valve 8 will be caused to close the port 9 and open the port 7 whereupon, atmospheric air being admitted to the passage 6, the valve 31 by gravity falls into its open position and thereby admits air freely into the motor 18 and the spring 34* immediately thereafter reexpands the motors 5 and 18.

The before described improvements are particularly applicable for use in connection with pianofortes and organs, but it is to be understood that they are also applicable for use in connection with other musical instruments, for example, very good results are obtained by their use in connection with carillons.

Although the before described apparatus has been described as operated by suction, it will be readily understood that, with suitable modifications, which will readily suggest themselves to those versed in the art, it may be worked by pressure.

I claim:—

1. An automatic musical instrument or player comprising a plurality of positively connected motors operative upon each key or actuating lever; separate sets of control valves to each motor adapted to be individually controlled by the music sheet, and additional controlling means in connection with one motor so arranged as to be operative coincidentally with energization of a second motor to check free action of the said one motor when the latter is deenergized and driven by the second motor.
2. An automatic musical instrument or player comprising a plurality of positively connected motors operative upon each key or actuating lever; separate sets of control valves to each motor adapted to be individually controlled by the music sheet, additional controlling means in connection with one motor so arranged as to be operative coincidentally with energization of a second motor to check free action of the said one motor when the latter is deenergized and driven by the second motor; and an adjustment operative in connection with the said one motor to vary the effective retardation offered by this motor to the driving influence of the said second motor.
3. An automatic musical instrument or player comprising a plurality of positively connected motors operative upon each key or actuating lever; separate sets of control valves to each motor adapted to be individually controlled by the music sheet, additional controlling means in connection with one motor so arranged as to be operative coincidentally with energization of a second motor to check free action of the said one motor

when the latter is deenergized and driven by the second motor; and a manually adjustable valve operative in connection with the said one motor the adjustment in one direction or the other being adapted to vary the effective retardation offered by the said one motor.

4. An automatic musical instrument or player comprising a plurality of positively connected motors operative upon each key or actuating lever; separate sets of control valves to each motor the set corresponding to one motor comprising a valve controlling the communication between the interior of this motor and the atmosphere; a motor-device adapted to be energized coincidentally with the other motor; and operative connection between said motor-device and said valve.

5. An automatic musical instrument or player comprising a plurality of positively connected motors operative upon each key or actuating lever one of such motors having two means of communication with the atmosphere; separate sets of control valves to each motor the set corresponding to one motor comprising a valve controlling one communication between the interior of this motor and the atmosphere; a motor-device adapted to be energized coincidentally with the other motor; operative connection between said motor device and said valve; and a manually adjustable valve controlling a second communication between the interior of said motor and the atmosphere.

6. An automatic musical instrument or player comprising a plurality of positively connected motors operative upon each key or actuating lever one of such motors having two means of communication with the atmosphere; a double beat valve to each motor, a tracker board, a music sheet in coöperative relation therewith, motor devices operative upon respective double beat valves and controlled by the passage of the music sheet over the tracker board to energize or deenergize respective motors; a valve controlling one communication between the interior of one of said motors and the atmosphere; a motor-device subject to the same power control as another of said motors; operative connection between said motor-device and said valve; and a manually adjustable

valve controlling a second communication between the interior of said motor and the atmosphere.

7. An automatic musical instrument or player comprising a plurality of positively connected motors operative upon each key or actuating lever one of such motors having two means of communication with the atmosphere; a double beat valve to each motor, a tracker board, a music sheet in coöperative relation therewith, motor devices operative upon respective double beat valves and controlled by the passage of the music sheet over the tracker board to energize or deenergize respective motors; a valve controlling one communication between the interior of one of said motors and the atmosphere; a motor device subject to the same power control as another of said motors; operative connection between said motor device and said valve; a manually adjusted valve controlling a second communication between the interior of said motor and the atmosphere; a by-pass to said valve; and a control valve on said by-pass operated simultaneously with the corresponding double-beat valve.

8. An automatic musical instrument or player comprising a plurality of positively connected motors operative upon each key or actuating lever one of such motors having two means of communication with the atmosphere; a double beat valve to each motor, a tracker board, a music sheet in coöperative relation therewith, motor devices operative upon respective double beat valves and controlled by the passage of the music sheet over the tracker board to energize or deenergize respective motors; a valve controlling one communication between the interior of one of said motors and the atmosphere; a motor device subject to the same power control as another of said motors; operative connection between said motor device and said valve; and a screw down valve controlling a second communication between the interior of said motor and the atmosphere.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JAMES JOHN WALKER.

Witnesses:

HENRY HART,
F. W. BELL.