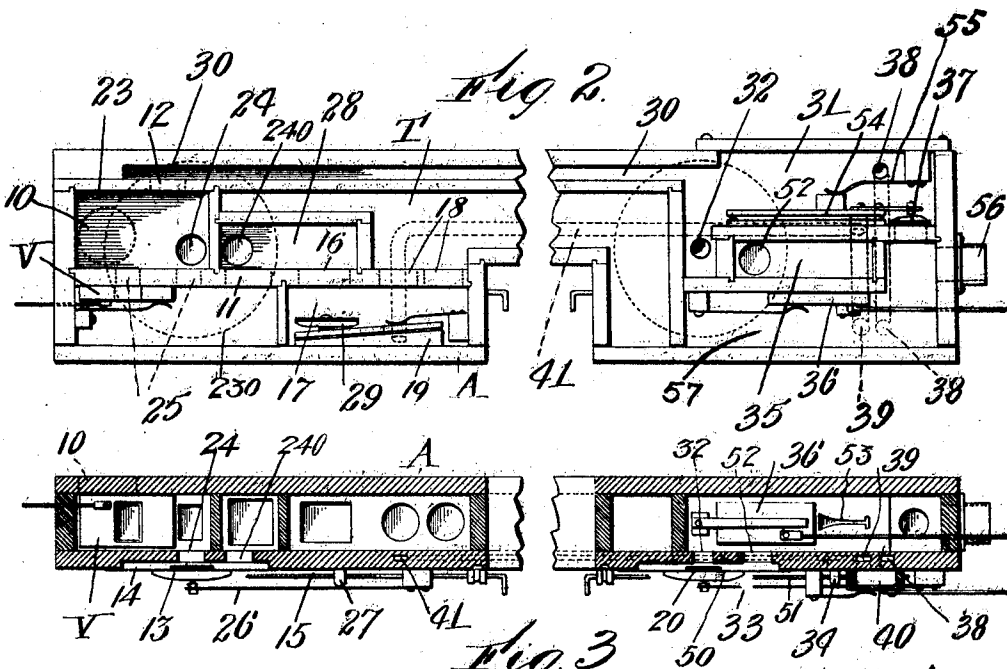
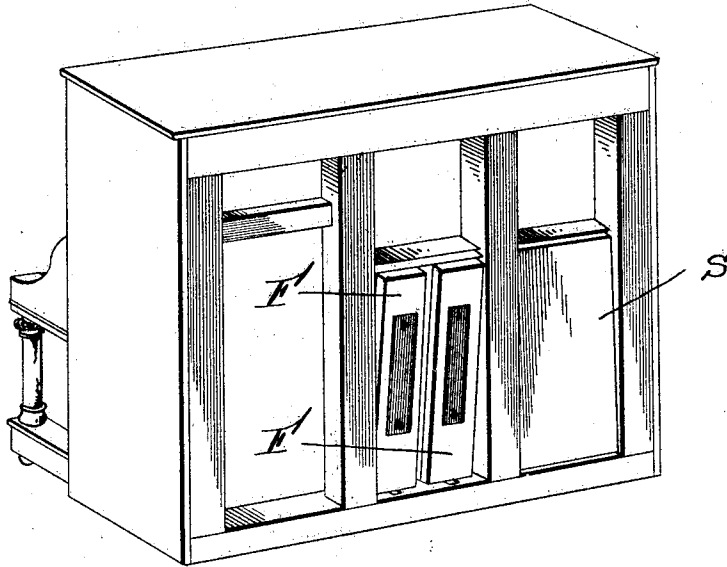


P. WELIN & H. UTTERBERG.
 REGULATING MECHANISM FOR AUTOMATIC MUSICAL INSTRUMENTS.
 APPLICATION FILED JAN. 14, 1905.

999,281.

Patented Aug. 1, 1911.

Fig. 1.



Witnesses:
 G. F. Mason
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UNITED STATES PATENT OFFICE.

PETER WELIN AND HJALMAR UTTERBERG, OF NEWCASTLE, INDIANA, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO THE KRELL AUTO-GRAND PIANO CO. OF AMERICA, OF CONNERSVILLE, INDIANA, A CORPORATION OF INDIANA.

REGULATING MECHANISM FOR AUTOMATIC MUSICAL INSTRUMENTS.

999,281.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed January 14, 1905. Serial No. 241,021.

To all whom it may concern:

Be it known that we, PETER WELIN and HJALMAR UTTERBERG, citizens of the United States, residing at Newcastle, in the county of Henry and State of Indiana, have invented a new and useful Regulating Mechanism for Automatic Musical Instruments, of which the following is a specification.

This invention relates to that class of playing attachments for musical instruments which are controlled by perforated paper.

The especial object of this invention is to provide a simple, compact and efficient means for regulating the air tensions to produce different operations in an instrument of the class referred to.

To this end, this invention consists of the governor mechanism and of the combinations of parts therein as hereinafter described and more particularly pointed out in the claims at the end of this specification.

In the accompanying drawing, Figure 1 is a rear perspective view of an automatic piano embodying this invention illustrating the bellows and storage reservoir for air tension which is to be controlled or regulated by the governor mechanism. Fig. 2 is a plan view of the governor-box with its cover removed, and Fig. 3 is a sectional view of the same.

In the accompanying drawing we have illustrated our invention as applied to an automatic piano in which the playing devices are inclosed within the piano casing, and a regulator constructed according to our invention is especially adapted for use in such a piano. It is to be understood, however, that our regulator may, if desired, be applied to different classes of instruments; for example, to what are known as "push-up" piano-players in which the pneumatic action is inclosed in a separate casing.

Referring to the accompanying drawing and in detail, in Fig. 1 we have illustrated the bellows and the storage reservoir for the exhaust, which is to be controlled by our governor. As shown in this figure, the exhaust is generated by upright bellows or feeders F—F which are located in one of the panels between the middle rear posts or uprights of the piano casing. The feeders or bellows F—F are connected to exhaust

the air from the usual storer or reservoir S, located in one of the outside panels between the posts or uprights of the piano casing. The governor box A is preferably located in the lower part of the piano casing, preferably below the key-board, and the storer or reservoir is connected to a chamber 23 formed in the governor box A by a passage 10. The partition forming one side of the chamber 23 is provided with two ports 25 for exhausting air from a second chamber 28 formed in the governor box, this communication being established through an intermediate chamber 230 and a port 11. The ports 25 and 11, and the chamber 230 constitute a passage-way. At the opposite side, the chamber 23 is provided with a port opening 12 which communicates with an air channel 30 which extends over to the other side of the governor box. The ports 25 are controlled by a double slide valve or choker V, when it is desired to modulate or automatically regulate the exhaust for the playing devices.

Formed in the wall of the governor box and bottom of the chamber 23 is a port 24 which extends into a recess which is connected by a port 240 to said chamber 28. These ports 24 and 240 constitute another passageway. The port 24 is controlled by a valve 13 which is carried by a circular diaphragm 14 which closes said recess, a spring arm 26 carrying said valve. The spring arm 26 is engaged at an intermediate point by an adjustable bearing piece 27 threaded into which is a thread-rod 15 which is journaled in brackets or bearing pieces secured to the side of the governor box. The end of the rod 15 is turned out, as shown, and by turning the rod the bearing piece 27 can be adjusted back and forth to vary the effective length of the spring 26. By moving the adjustable piece 27 toward the valve 13, the effective length of the spring will be shortened so that the same will act more stiffly and a higher degree of exhaustion will be attained in the action before the regulating valve 13 will automatically close.

The chamber 28 communicates by a passage 16 to a chamber 17, which latter connects by passages 18 to the main wind-trunk T, which leads to the action of the instrument. The port 16 is controlled by a shut-off valve 29 which is mounted on a pneu-

matic bellows 19, which valve 29 is arranged to close the port 16 to cut off the main wind trunk during rewinding, as hereinafter described. The valves and means for regulating the wind motor are located at the other end of the governor box, as shown in Fig. 2. The channel 30 connects to a chamber 31.

Opening through the bottom of the chamber 31 is a port 32 which is controlled by an automatic motor regulating valve 20. This valve is mounted on a diaphragm 50 and is normally held open by a spring 33, the effective length of which can be regulated by a bearing piece 34 mounted on a thread-rod 51 arranged similarly to the thread-rod 15. The adjustment of the motor regulating valve is similar to that of the modulating valve 13. Through the port 32 and a passage 52 air is exhausted from a third chamber 35 and opening through the side of the chamber 35 is a tapered port 53 which is controlled by a tempo valve 36 in a chamber 57. The controlling action of the tempo valve 36 will regulate the motor to wind the music-sheet at different speeds.

In the bottom part of the chamber 31 is a channel 38 which is normally connected through a slide valve 40 (see Fig. 3), to a channel 39 which channel 39 is connected to a pneumatic 54 carrying a shut-off valve 37 and said passage 39 is also connected by a channel 41 to a pneumatic 19 which carries the shut-off valve 29. When the slide valve is opened for the purpose of rewinding, atmospheric pressure will be admitted to the pneumatics which operate the valves 37 and 19. The valve 37 is normally held to its seat by a spring 55, as shown. When the pneumatics operate the valves, the valve 37 will open for direct connection between the storer S and the motor during rewinding, while the valve 29 closing will cut off the connection between the bellows and pneumatic action during rewinding. The motor is connected to the chamber 37 by a passage 56.

In the complete governor constructed according to this invention it will be seen that we have combined in an exceedingly compact manner an advantageous arrangement of choker V which can be manipulated to connect the playing devices directly with the exhaust reservoir or closed so that the air from the playing devices must pass through the automatically modulated air channels 24 and 240, an automatic regulating valve which controls said air channels when the choker is closed, an automatic valve 20 adapted to close when the exhaust is excessive and thereby cut the motor off from the reservoir, a tempo valve for throttling the motor supply to change the speed of the motor; and valves for admitting direct bellows tension to the motor during rewinding; and for cut-

ting off the pneumatic action during rewinding.

The construction herein illustrated is especially adapted to be housed in the lower part of the casing of an ordinary upright piano, although it is to be understood that our construction may be used in different classes of instruments as before explained.

We are aware that numerous changes may be made in the construction of our governor without departing from the scope of our invention as expressed in the claims.

We do not wish, therefore, to be limited to the construction we have herein shown and described, but—

What we do claim and desire to secure by Letters Patent of the United States is:—

1. In a valve mechanism for use in constructions of the class described, the combination of an air chamber having a port therefrom, a diaphragm, a valve carried by the diaphragm for closing the port, a spring-arm connected with the valve and mounted outside the chamber for holding the valve open, a bearing piece for the spring-arm, and means for adjusting the bearing piece to regulate the stiffness and resiliency of the spring arm.

2. In a valve mechanism for use in constructions of the class described, the combination of an air chamber having a port therefrom, a circular diaphragm, a valve carried by the diaphragm for closing the port, a spring arm connected with the valve and mounted outside the chamber for holding the valve open, a bearing piece engaging the spring arm between the valve and its point of support, and an adjusting rod threaded into the bearing piece, whereby by turning the rod the bearing piece will be shifted to change the stiffness and resiliency of the spring-arm.

3. In a governor mechanism for devices of the class described, the combination with pneumatic playing devices, of a motor, a main air channel, a main wind trunk for the pneumatic playing devices, a shut-off valve for the wind trunk, a spring normally holding the shut-off valve open, an air trunk for the motor, a shut-off valve, a spring normally closing the shut-off valve to cut off direct bellows connection with the motor, a pneumatic for each of the shut-off valves, and means for simultaneously admitting air pressure to both of said pneumatics to cut off the wind trunk of the pneumatic action, and to make direct bellows connection with the motor during rewinding.

4. In a construction of the class described, the combination of a motor, a main wind trunk, a normally closed valve for making direct bellows connections with the motor during rewinding, a normally opened valve for the main wind trunk, pneumatics for each of said valves, and a slide valve ad-

mitting air to operate said pneumatics to make direct connection between the bellows and motor, and to cut off the playing devices during rewinding.

5 5. In a pneumatic governor mechanism, the combination of the main wind trunk, a motor, a chamber from which air is exhausted, a second chamber, an intermediate channel communicating with both of said
10 chambers by means of ports, a recess connecting said chambers, a manually operated slide valve for controlling said ports, a valve for controlling said recess, a pneumatic controlled by the air tension in said chambers
15 for operating the valve controlling the recess, a third chamber having a port, a tempo valve for controlling said port, said port being adapted to be connected with the motor, a passage from the second chamber for communicating with the main wind-trunk, a
20 valve for closing said passage, a pneumatic for operating said last named valve, an air channel connecting the first named chamber to the third chamber through a port, a
25 valve for controlling the last named port, a pneumatic for controlling said valve controlled by the air tension in the channel, a valve for connecting said air channel directly with the motor, a pneumatic for operating said last named valve, and a slide
30 valve for controlling the last named pneumatic and the pneumatic operating the valve controlling the connection of the second chamber with the main wind-trunk.

35 6. As an article of manufacture, a pneumatic governor box having a partition therein and provided with an exhaust chamber having an exhaust passage connected therewith, said exhaust chamber being
40 located on one side of the partition, and a second exhaust chamber located on the same side of the partition, an intermediate chamber located on the opposite side of the partition, said partition having ports there-
45 through for connecting the intermediate chamber with both of the other chambers, a regulating connection between the first and second chambers, a valve for controlling the ports between the first chamber and the in-
50 termediate chamber, a main wind trunk, said partition having ports connecting said second chamber with the main wind trunk, and pneumatic means for controlling the connection between the second chamber and
55 main wind trunk.

7. As an article of manufacture a pneumatic governor box having a partition therein and provided with an exhaust chamber having an exhaust passage connected
60 therewith, and a second exhaust chamber, both of said chambers being located on the same side of the partition, an intermediate chamber located on the opposite side of the partition, said partition having ports there-
65 through for connecting the intermediate

chamber with both of the other chambers, a regulating connection between the first and second chambers, means for controlling the port opening between the first chamber and the intermediate chamber, a main wind
70 trunk, said partition having ports connecting said second chamber with the main wind trunk, an exhaust chamber at the other end of the governor box, and an unrestricted air channel from the first chamber to the
75 last named exhaust chamber.

8. As an article of manufacture, a pneumatic governor box having a partition therein and provided with an exhaust chamber, and a second exhaust chamber located on
80 the same side of the partition, an intermediate chamber located on the opposite side of the partition, said partition having ports therethrough for connecting the intermediate chamber with both of the other cham-
85 bers, a regulating connection between the first and second chambers, means for controlling the port opening between the first chamber and the intermediate chamber, a main wind trunk, said partition having
90 ports connecting said second chamber with the main wind trunk, a chamber at the other end of the governor box directly connected with the first chamber, a chamber located adjacent to said chamber at the other end
95 of the governor box, said governor box having partitions separating the last two mentioned chambers, a connection between the last two mentioned chambers, an automatic regulator for said connection, additional
100 partitions in the governor box separating the last chamber from the walls of the governor box, and having a port through one of said partitions, the part of the governor box outside of one of the last named parti-
105 tions having a motor connection, and a tempo valve for controlling the last named port.

9. In a pneumatic governor mechanism, the combination of a main wind trunk, a motor, an exhaust chamber, a second chamber,
110 an intermediate channel communicating with both of said chambers, means for controlling the connection between said exhaust chamber and intermediate channel, a third chamber having a port adapted to be connected
115 with the motor, a passage from the second chamber for communicating with the main wind-trunk, means for controlling the last named passage, an air channel connecting the first named chamber with said third
120 chamber, means for connecting said air channel directly with the motor, and means for controlling said last named connecting means and the means for controlling the connection of the second chamber with the
125 main wind-trunk.

10. A pneumatic governor box having fixed partitions forming an exhaust chamber having fixed walls and a second chamber adjacent thereto also having a constant
130

volume, said partitions having one port and the box having another port for conducting air directly from the second chamber to the first chamber, a valve within said box for
5 controlling the first of said ports, and a valve directly operated by the air in the chambers for automatically controlling the other port when the first valve is closed.

11. A pneumatic governor box having an
10 exhaust chamber having fixed walls, a second chamber adjacent thereto in the box, an intermediate channel in the box, ports connecting said intermediate channel with both of said chambers, a valve within said
15 intermediate channel for controlling the passage of air through said channel from one chamber to the other, additional ports by which said chambers are connected, and a valve controlled and operated by the air
20 in the chambers for automatically controlling said last named ports when the first named valve is closed.

12. A pneumatic governor box having formed within its walls an exhaust chamber,
25 a second chamber adjacent thereto, an intermediate channel, two sets of ports in the box connecting said chambers, one set of ports opening through the intermediate channel, a valve within said intermediate channel for
30 controlling one of said sets of ports, and a valve operated and controlled by the air in the chambers for automatically controlling the other set of ports when the first valve is closed, whereby the closing of the first valve
35 restricts the air between the two chambers and the same is automatically regulated.

13. A pneumatic governor box having two chambers from one of which air is exhausted, a partition separating said chambers,
40 the wall of the box having ports connecting said chambers, a second partition forming a wall of each of said chambers having ports through which air can pass from one chamber to the other, a manually operated valve
45 in said box for controlling the ports in the second partition which communicate with one of said chambers, a valve outside the box controlled directly by the air in the chambers for automatically controlling the
50 ports in the wall when the first valve is closed, a third valve chamber in the box having an inlet and a connection with the first

chamber, a tempo valve in said box adapted to control the inlet to the third valve chamber, a valve outside the box controlled directly by the air in the first chamber for automatically controlling the connection of the exhausted chamber with said third chamber, and means for adjusting each of said air controlled valves, whereby they may be regulated to operate under different conditions of exhaustion.

14. A pneumatic governor box having a partition therein separating two chambers, an exhaust chamber and a second chamber,
5 two passage-ways between said chambers, means for controlling one of said passage-ways, a valve mounted on the box and controlled by the air in the chambers for automatically controlling the other passage-way
70 when the first named means operates to close the first, a third chamber in the box, a connection within the box for connecting the third chamber with the first or exhaust chamber, and a valve mounted on the box
75 and controlled by the air in the first chamber for automatically controlling the connection of the first chamber with said third chamber.

15. A pneumatic governor box having
80 within its walls an exhaust chamber, a second exhaust chamber, a partition separating said chambers, said partition having a port, the wall of the box having a port communicating with the first exhaust chamber, and
85 a port for conducting air from the second chamber to said port in the wall, a valve within the box for controlling one of the first two of said ports, and a second valve operated by the air in the chambers for automatically controlling the other of the first
90 two ports when the first valve is closed, whereby the closing of the first valve restricts the flow of air between the two chambers, and the flow is automatically regulated
95 when so restricted by the second valve.

In testimony whereof we have hereunto set our hands, in the presence of two subscribing witnesses.

PETER WELIN.
HJALMAR UTTERBERG.

Witnesses:

ALBIN KRELL,
EDWIN B. PFAU.