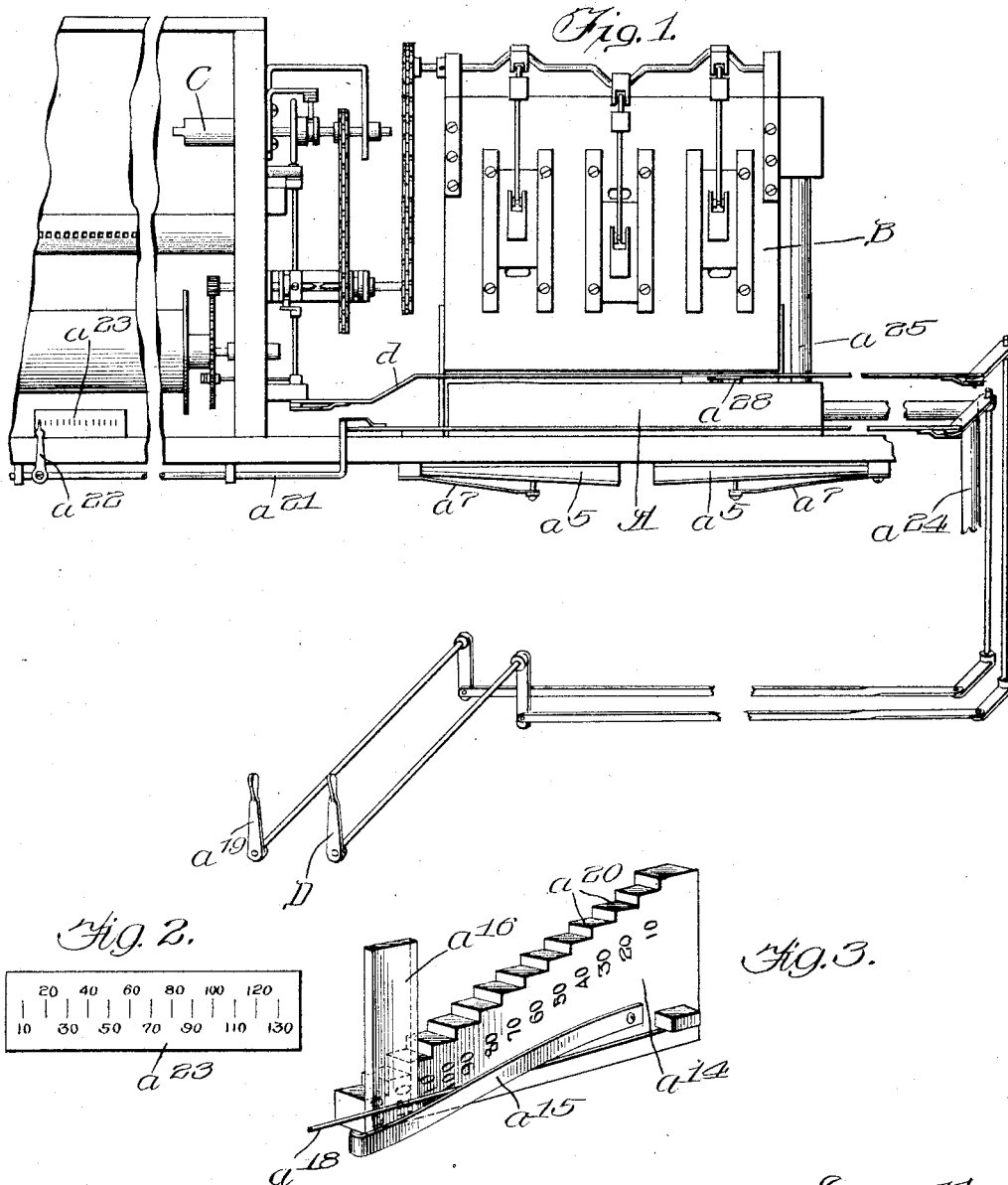


A. ANDERSON.
 PLAYER TEMPO REGULATOR.
 APPLICATION FILED JUNE 27, 1910.

1,011,553.

Patented Dec. 12, 1911.

3 SHEETS-SHEET 1.



Witnesses:
Edw. D. Perry
Geo. H. Nelson, Jr.

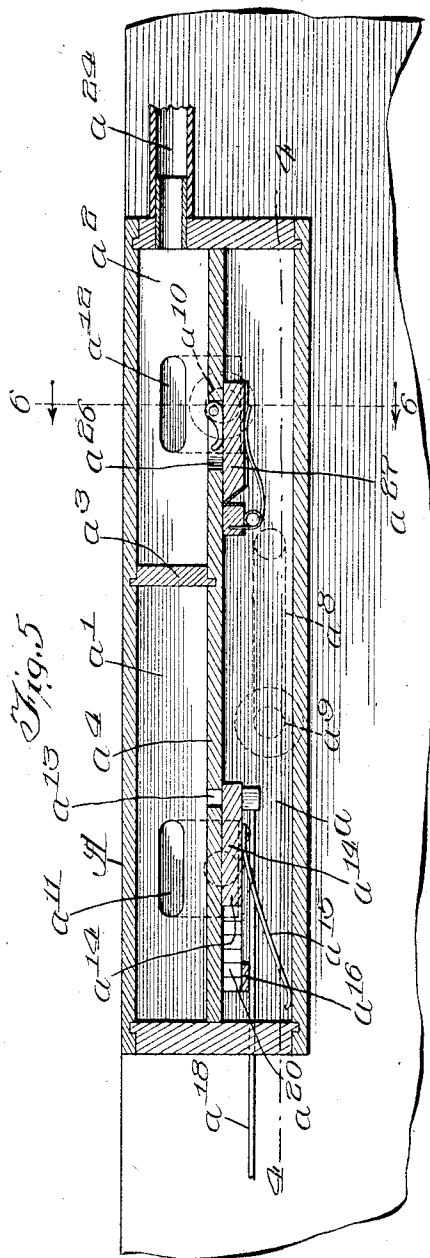
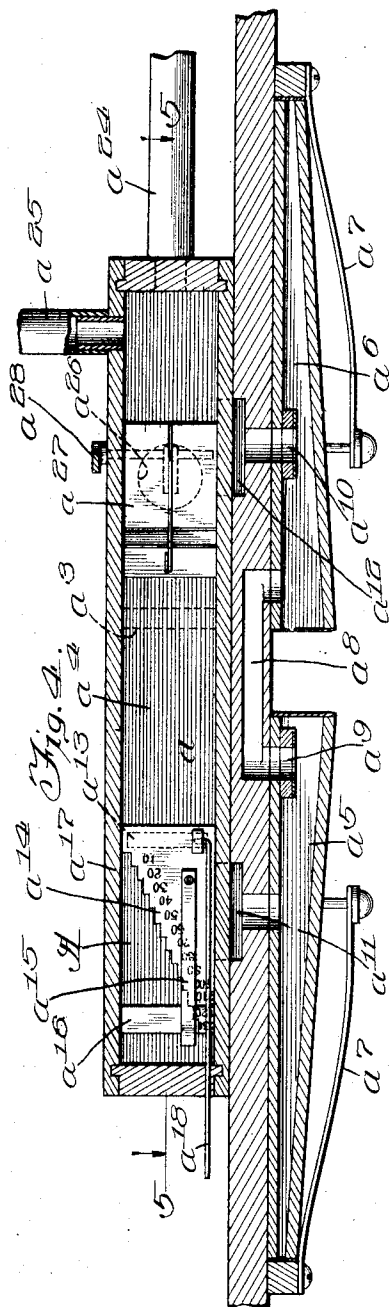
Inventor:
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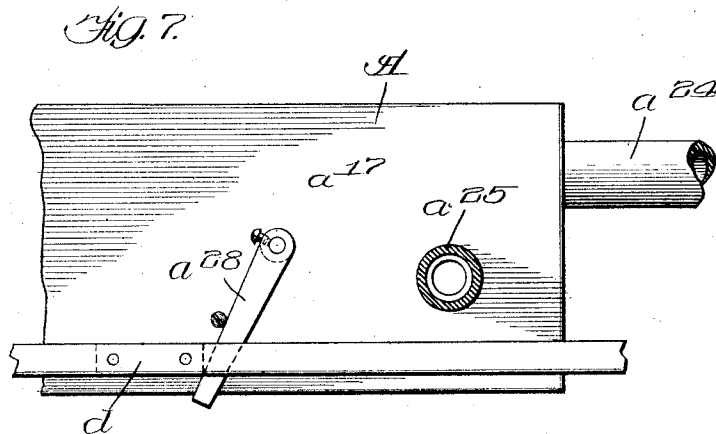
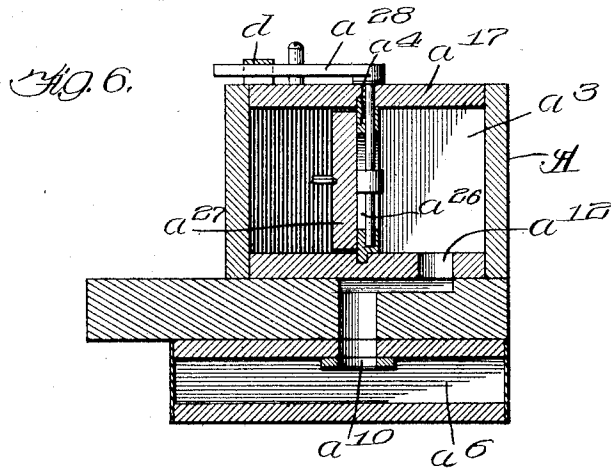
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 By Buckley & Durand
 Attys.

UNITED STATES PATENT OFFICE.

ALFRED ANDERSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO CONCORD COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF MAINE.

PLAYER TEMPO-REGULATOR.

1,011,553.

Specification of Letters Patent.

Patented Dec. 12, 1911.

Application filed June 27, 1910. Serial No. 569,022.

To all whom it may concern:

Be it known that I, ALFRED ANDERSON, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Player Tempo-Regulators, of which the following is a specification.

My invention relates to piano players or player pianos of the kind in which perforated sheet music is employed. In a player of this character it is necessary to provide some sort of mechanism for governing the time—that is to say, for regulating the tempo. This is ordinarily accomplished by providing a device for controlling the speed of the motor by which the perforated music is propelled or operated. In this way the time or tempo can be regulated or controlled at will to obtain the desired musical effect.

The object of my invention is to provide an improved and highly efficient mechanism for regulating or controlling the tempo in a piano player or player piano.

A special object is to provide a tempo regulator of such character that the speed of the motor by which the perforated music is propelled or operated may be more easily and responsively controlled than heretofore, to enable the player to interpret the music as indicated, or in any desired manner, with as little effort and inconvenience as possible, and with a greater degree of delicacy and accuracy than heretofore, as will hereinafter more fully appear.

Another object is to provide a tempo regulator of such simple and reliable construction that it will not easily get out of order.

Another object is the provision of a tempo regulator having one or more auxiliary reservoirs for preserving a continuous or more uniform action of the air on the motor by which the perforated music is propelled or driven.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings—Figure 1 is a front elevation, more or less in perspective, of a tempo regulator embodying the principles of my invention, showing the motor which is governed by the said regulator, as well as the spool mechanism and re-winding devices which are driven by the said motor. Fig. 2 is an enlarged front

elevation of the graduated indicator which shows the player the position necessary for the mechanism to preserve any particular time or tempo. Fig. 3 is a perspective of the stepped or graduated valve by which the air that operates the motor is controlled to regulate the speed at which the perforated music is made to travel. Fig. 4 is a vertical longitudinal section of said tempo regulator, being a section on line 4—4 in Fig. 5. Fig. 5 is a horizontal section on line 5—5 in Fig. 4. Fig. 6 is an enlarged cross section on line 6—6 in Fig. 5. Fig. 7 is a plan of the portion of the mechanism shown in Fig. 6.

As thus illustrated, the tempo regulator A is mounted below the motor B, which latter may be of any suitable, known or approved construction. The said motor drives the spindle C, through a suitable reversing mechanism controlled by the lever D through the medium of a rod connection d , whereby the motor may be used to either unwind or rewind the music, in the usual and well known manner. As the said motor and re-winding mechanism can be of any desired construction, no further description thereof is necessary. The said tempo regulator A comprises a rectangular box disposed horizontally and divided interiorly in compartments a , a' and a'' , the last two being separated by a transverse partition a'' , and these two compartments being separated from the compartment a by a longitudinal partition a' . Below the said box are a couple of bellows a^5 and a^6 that are kept normally distended or expanded by the spring a^7 . These bellows serve as auxiliary reservoirs for preserving a continuous or uniform action of the motor, notwithstanding the variations in the operation of the pumping apparatus, which latter may be of any suitable, known or approved character. The said bellows or auxiliary reservoirs are connected together by a passage-way a^8 . If the pumping becomes too violent, these bellows a^5 and a^6 will contact and approach the valve seats a^9 , a^{10} , thus more or less throttling the communication between the pumping apparatus and the motor; but as soon as the pumping apparatus is relaxed—that is to say, as soon as the exhaust is reduced, after a violent operation of the pumping apparatus, such as sometimes results from a sudden pressure on the pedals, the bellows a^5 and a^6 begin to

expand, and in so doing serve to draw the air from the motor. The bellows a^5 is connected with the chamber a' by an opening a^{11} , and the bellows a^6 is connected with the chamber a^2 by an opening a^{12} . The chamber a is connected with the chamber a' by an opening a^{13} , which latter opening is controlled by the stepped or graduated slide valve a^{14} . This slide valve is provided with a spring a^{15} that holds it flatwise against the partition a^4 , and has its smaller end provided with a vertical portion a^{16} that bears against the upper wall a^{17} of the box, whereby the valve is held against displacement. By means of a rod a^{18} the said valve is suitably connected with the tempo lever a^{19} , whereby it may be moved back and forth to open and close the opening a^{13} , which latter is in the nature of a vertical slot. The said valve a^{14} is provided on its upper edge with a series of steps a^{20} , thirteen in number, whereby thirteen variations in the volume of air passing through the opening a^{13} are made possible, ranging from a very slight volume for the slowest time or tempo to a considerable volume for the fastest time ever employed in the rendering of musical selections from the regulated tension in chamber a^4 . The rod a^{18} is connected by a rod a^{21} with the pointer a^{22} of the graduated indicator a^{23} , which latter is also provided with thirteen graduations or positions, which correspond to the thirteen steps on the valve. The pipe a^{24} connects the chamber a^2 with the exhaust or pumping apparatus and the pipe a^{25} connects the chamber a with the motor B, whereby the air in passing from the motor travels through the chamber a , through the opening a^{13} , through the opening a^{11} , and the interior of the bellows a^5 , then through the passage a^8 and the bellows a^6 , then through the opening a^{12} and the chamber a^2 and through the pipe a^{24} to the said exhaust or pumping apparatus. The air traveling in this manner is controlled by the stepped or graduated valve a^{14} to control the speed of the motor and thus regulate the time or tempo of the music. In other words, the said valve governs the size of the opening a^{13} , cutting off more or less thereof, and thereby controls the speed of the motor.

Some means, of course, must be provided for cutting out the tempo regulator when the music is re-wound. This is done automatically by means of a by-pass opening a^{26} that connects the chamber a to the chamber a^2 , and which is controlled by a valve a^{27} , of any suitable character, operated by an arm a^{28} , whereby the air passes directly from the chamber a to the chamber a^2 when it is desired to rewind the music. This arm a^{28} has, therefore, a connection, of any suitable character, with the rod d which controls the rewind of the player, whereby the throw of

the lever d controls both the rewind and the tempo cut-out. Thus when necessary the tempo regulator is entirely cut out and the motor is employed uncontrolled to quickly rewind the music.

From the foregoing, it will be seen that I provide a simple and exceedingly efficient form of tempo regulator for use in piano players or player pianos in which the perforated music is propelled or driven by a pneumatically-operated motor. The exhaust of pumping apparatus is not shown, but it will be readily understood that this may be of any suitable or desired character. The connection between the motor and the pumping apparatus, through which the air must pass after leaving the motor, is controlled by a stepped or graduated slide valve and the time or tempo is thus easily and responsively controlled in accordance with any desired interpretation of the music.

What I claim as my invention is:

1. A tempo regulator comprising a reciprocating slide valve, tapered longitudinally in the direction of its motion on one side only, and formed to provide as many distinct and defined steps as there are predetermined and corresponding divisions of the tempo, and a pneumatic motor governed by said regulator.

2. A tempo regulator comprising a wall having a slot therein, and a reciprocating slide valve controlling the passage of air through said slot by motion crosswise of the slot, said valve having one edge thereof provided with a series of steps for cutting off more or less of said slot to increase or decrease the length thereof and thereby vary the volume of air, and a pneumatic motor governed by said regulator.

3. A tempo regulator comprising a long chamber, two short chambers, passages for conducting the air from one short chamber to the other, a slot connecting the long chamber with the one short chamber, an exhaust connection leading from the other short chamber, a by-pass valve between the said long chamber and the said other short chamber, a stepped or graduated slide valve controlling the said slot, and means for moving the slide valve whereby the volume of air passing from the one long chamber to the one short chamber may be varied at will.

4. A tempo regulator comprising a box divided into three chambers, a pair of bellows associated with said box, a passage connecting said bellows, one end of said passage being adapted to be closed by the contraction of one bellows, a passage connecting the other bellows with one of said chambers, a passage from another chamber to the one bellows, a slot connecting said other chamber with the third chamber, a by-pass valve between the one chamber and

the third chamber, a stepped or graduated slide valve controlling said slot, means for admitting air to the third chamber, and an exhaust connection leading from the one chamber.

5. A tempo regulator comprising a long chamber, two short chambers, passages for conducting the air from one short chamber to the other, a slot connecting the long chamber with the one short chamber, an exhaust connection leading from the other short chamber, a by-pass valve between the said long chamber and the said other short chamber, a slide valve controlling the said slot, and means for moving the slide valve, said slot extending across the path of the slide valve, whereby the volume of air passing from the one long chamber to the one short chamber may be varied at will, the two valves being disposed at opposite end portions of the long chamber, and the slide valve being movable toward the by-pass valve to gradually open said slot.

6. A tempo regulator comprising a box divided into three chambers, a passage between one chamber and another chamber, a slot connecting said other chamber with the third chamber, a by-pass valve between the one chamber and the third chamber, a slide valve controlling said slot, means for admitting air to the third chamber, an exhaust connection leading from the one chamber, and means for moving the slide valve, said slot extending across the path of the slide valve, the two valves being both located in said third chamber, and the slide valve being movable toward the by-pass valve to gradually open said slot.

7. A tempo regulator comprising an end-wise reciprocating slide valve tapered longitudinally and notched to provide as many steps along one edge thereof as there are divisions of the tempo, said valve having means at its smaller end for keeping it mov-

ing straight, a spring which keeps it seated, and a casing engaged by said means and spring.

8. A tempo regulator comprising a collapsible chamber for the passage of air, a valve for varying the volume of air flowing to and through said collapsible chamber, and a pneumatic motor governed by said regulator, said valve having means at its smaller end for keeping it moving straight, a spring which keeps it seated, the said spring and means acting in directions at right angles to each other, and a casing engaged by said means and spring.

9. A tempo regulator comprising a wall having a slot therein, and a reciprocating slide valve controlling the passage of air through said slot, by motion crosswise of the slot, said valve having one edge thereof provided with a series of steps for cutting off more or less of said slot to increase or decrease the length thereof and thereby vary the volume of air, said valve having means for keeping it moving straight, a spring which keeps it seated, and a casing engaged by said means and spring.

10. A tempo regulator comprising a stationary wall with a slot therein, and a tapered slide valve having one edge thereof shaped to change or vary the length of said slot, by movement of the valve crosswise of said slot, to vary the volume of air passing through said slot, the said edge extending obliquely across said slot, said valve having means at its smaller end for keeping it seated to slide on its straight edge, a spring which keeps it seated, and a casing engaged by said means and spring.

Signed by me at Chicago, Illinois, this 23 day of June, 1910.

ALFRED ANDERSON.

Witnesses:

C. F. REEPS,
F. G. BARTELS.