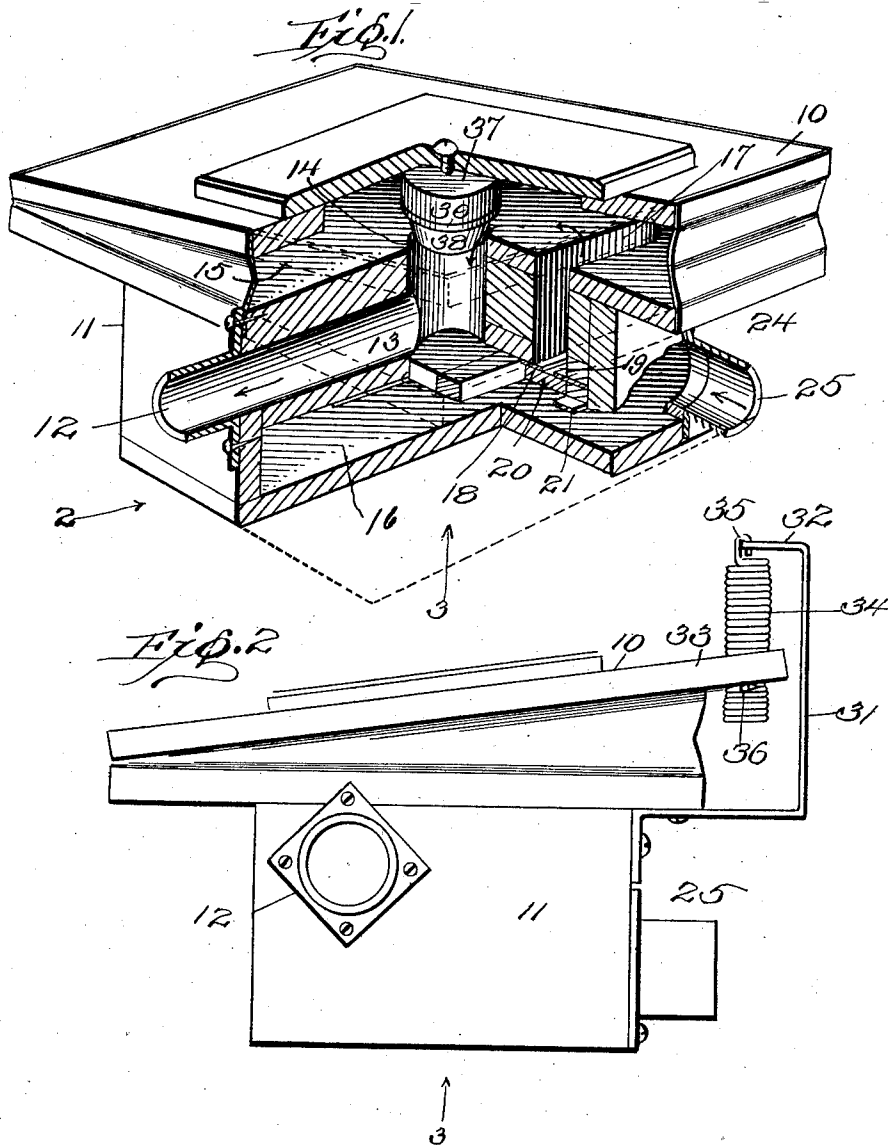


E. LUNDBERG.
 TEMPO REGULATOR.
 APPLICATION FILED MAY 2, 1908.

1,016,839.

Patented Feb. 6, 1912.

2 SHEETS—SHEET 1.



Witnesses

J. M. Fowler Jr.
 L. Morrell.

Inventor,
 E. Lundberg.

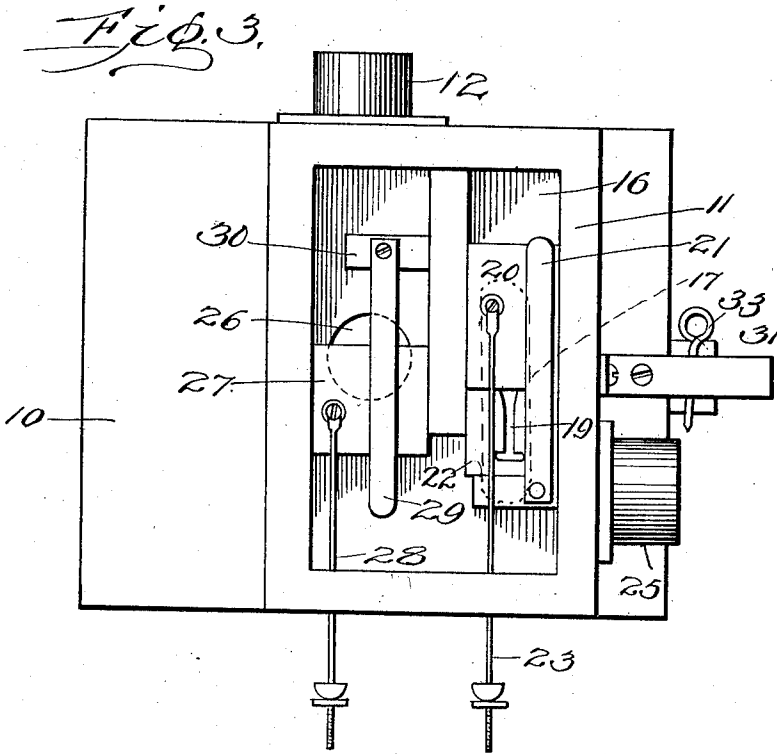
By Mason F. Lawrence
 Attorneys

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Witnesses
J. M. Fowler
L. Norrell

Inventor,
Erik Fred Lundberg
 By *Mason F. Lawrence*
 Attorneys

UNITED STATES PATENT OFFICE.

ENDFRED LUNDBERG, OF WESTFIELD, NEW JERSEY, ASSIGNOR TO HARDMAN, PECK & COMPANY, OF NEW YORK, N. Y., A CORPORATION.

TEMPO-REGULATOR.

1,016,839.

Specification of Letters Patent.

Patented Feb. 6, 1912.

Application filed May 2, 1908. Serial No. 430,610.

To all whom it may concern:

Be it known that I, ENDFRED LUNDBERG, a citizen of the United States, residing at Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Tempo-Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to automatic regulators for self-playing musical instruments and musical instrument players whereby a regular movement of the tempo is secured irrespective of the degree of rarefaction in the exhaust chamber.

An object of the invention is to provide a regulator of improved form in communication with the exhaust chamber and the motor whereby an increase of rarefaction tends to automatically close a portion of the communication between the exhaust chamber and the motor.

A further object of the invention is to provide in a regulator of the class means for throwing the exhaust chamber into direct communication with the motor when desired for the purpose of re-winding and the like.

With these and other objects in view the invention comprises certain novel constructions, combinations and arrangements of parts as will be hereinafter fully described and claimed.

In the drawings:—Figure 1 is a view in perspective of the improved regulator with one corner broken away to show the operating parts. Fig. 2 is a view of the regulator in side elevation as seen along arrow 2 in Fig. 1. Fig. 3 is a view of the slide valve chest with the cover removed, seen along arrow 3 of Figs. 1 and 2.

Like characters of reference designate corresponding parts throughout the several views.

The regulator forming the subject-matter of this application comprises a pneumatic connected with a block 11 through and in which the several passages, chambers and communicating openings are provided. At one side of the block 11 a nipple or other connection 12 is secured designed to be connected by means of a flexible pipe or otherwise with the exhaust chamber of the instrument and also communicating by a

passage 13 and an opening 14 with the chamber 15 within the pneumatic so that as air is drawn through the nipple 12 it passes from the chamber 15 through the opening 14 and duct 13 outwardly through the nipple 12.

Within the block 11 a chamber 16 is provided communicating by means of a port 17 with the chamber 15 within the pneumatic. Closing the side of the port 17 adjacent the chamber 16 is a plate 18 having a slot 19 tapered and formed as the usual and ordinary slot employed for manual control of the tempo and as shown in Fig. 3 partly in dotted lines. Within the chamber 16 a slide valve 20 is mounted adapted to slide over the plate 18 and cover the slot 19 and held yieldingly in operative position by a spring 21 secured to a block 22 and bearing upon the upper surface of the slide valve 20. The valve 20 is operated by means of a rod 23 extending outwardly through the casing of the chamber 16 and provided with means for connection with the usual and ordinary manual control of the tempo. The chamber 16 is in communication by means of the passage 24 and nipple 25 with the motor by any approved means as by the employment of flexible tubing therefor. Within the chamber 16 the opening 26 is provided communicating with the passage 13 and controlled by means of a slide valve 27 operated by a rod 28 connected with the manual control device and held yieldingly in position by a spring 29 secured to a block 30 and bearing upon the upper surface of the valve 27 in similar manner to the spring 21.

For the purpose of holding the pneumatic normally expanded a bracket 31 is employed extending upwardly with an arm 32 extending outwardly above a block 33 carried by the movable member of the pneumatic and a spring 34 is secured to the arm 32 as by the hook 35 and a pin 36 is inserted through between any two coils of the spring 34 to secure the desired opening tension upon the movable member of the pneumatic 10.

The movable member of the pneumatic 10 is provided with a valve member 37 having a conical end as at 38 inserted within the passage 14 and a shoulder 39 provided with an elastic gasket adapted to bear and be seated upon the wall provided with the valve opening 14. It will thus be seen that

as the movable member of the pneumatic 10 is closed downwardly the conical end 38 of the valve is inserted farther and farther into the opening 14 and owing to its conical formation closes more and more of such opening 14 until the shoulder 39 is finally in contact with the wall thereby closing the passage entirely.

The valve 27 is normally in position to close the passage 26 so that the only communication between the nipple 25 and the nipple 12 is by way first of the chamber 16 in the block 11, thence upwardly through the slot 19 of the plate 18, thence through the opening 17 into the chamber 15, thence downwardly through the opening 14 into the passage 13 and so outwardly through the nipple 12. The passage of the air through the passages as just described is produced by the exhaust in the exhaust chamber and the chamber 15 of the pneumatic is, therefore, constantly under atmospheric pressure from without varying as the degree of rarefaction within the exhaust chamber varies. As the degree of rarefaction at the motors controls the tempo it will be seen that the amount of air passed through the motor will be controlled by the opening or closing of the valve 37 in the opening 14. As, therefore, the rarefaction within the exhaust chamber increases the atmospheric pressure upon the movable member of the pneumatic 10 will close such pneumatic and tend to seat the valve 37 within the opening 14, such movement and seating being resisted by the spring 34, which increases in tension as the pneumatic closes. By regulating the tension of the spring 34 the pneumatic may be so regulated as to produce an almost unvarying passage of air through the motor except as the same may be varied by the manual operation of the valve 20 to cover or uncover a greater or less portion of the slot 19 as the passage 26 may manually open during the re-wind to provide the greatest possible speed of the motor.

The nipples 12 and 25 have been illustrated in the positions shown in the drawings simply for convenience of illustration it being understood that the said nipples may be located at any approved point so that the passages communicating with such nipples communicate in turn respectively with the passage 14 and with the chamber 16, the position of such nipples in practice being determined by the position of the exhaust chamber and the motor with which the regulator is in communication. As shown also in the drawings the valve 37 is carried by a cover member removably secured to the movable member of the pneumatic 10, such

arrangement being provided simply for convenience in attaching and detaching the valve 37 and associate parts and not being essential to the operation of the device. The employment of the bracket 31 for engaging the spring 34 and also the employment of the block 33 are simple mechanical expedients found convenient for carrying into effect the present invention. The specific arrangement and mechanism of the valves 20 and 27 and their associate and coöperative parts are also not essential to the present invention in the specific form in which they are disclosed, any mechanical equivalents or elements performing the functions being interchangeably employed when desired.

What I claim is:—

1. A tempo regulator comprising a chamber with rigid walls, a chamber formed upon one of the side walls of the first mentioned chamber having a collapsible wall, said side wall being provided with two openings communicating directly with both of said chambers, slide valves positioned to cover both of said openings, a duct leading into the first mentioned chamber, a duct communicating with one of said openings leading out of said second mentioned chamber and a valve carried by the collapsible wall proportioned to increasingly restrict the opening communicating with said second mentioned duct as the collapsible wall moves toward said side wall.

2. A tempo regulator comprising a housing formed with rigid walls, a plurality of openings arranged in one of the walls of said chamber, a bellows construction connected with said housing and defining a chamber in free communication with said openings, an outlet duct communicating with one of said openings, an inlet duct communicating with said first mentioned chamber, means for normally maintaining closed the opening between said chambers to which said outlet duct is connected, means for adjustably closing the other of said openings for regulating the air passing from said first mentioned chamber to said second mentioned chamber, and a valve structure connected with the movable part of said bellows construction arranged to fit into the opening communicating with said outlet duct for permitting a rarefaction of the air in said outlet duct according to the degree of closure of the bellows construction.

In testimony whereof I affix my signature in presence of two witnesses.

ENDFRED LUNDBERG.

Witnesses:

E. A. SCHMITT,
JOHN E. CAPLEAS.