L. B. DOMAN.

TEMPO GOVERNING DEVICE FOR SELF PLAYING MUSICAL INSTRUMENTS.

APPLICATION FILED JAN. 18, 1912.

1,039,660. Patented Sept. 24, 1912.

FIG. 1.

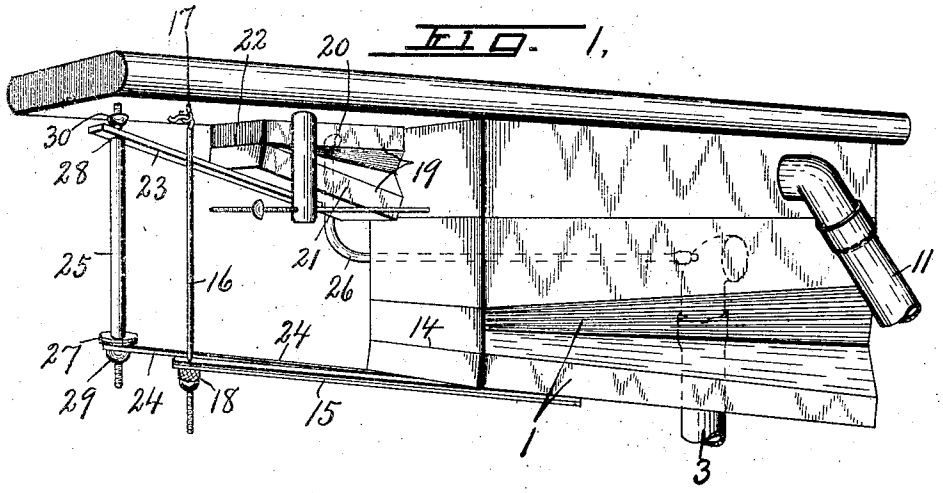


FIG. 2.

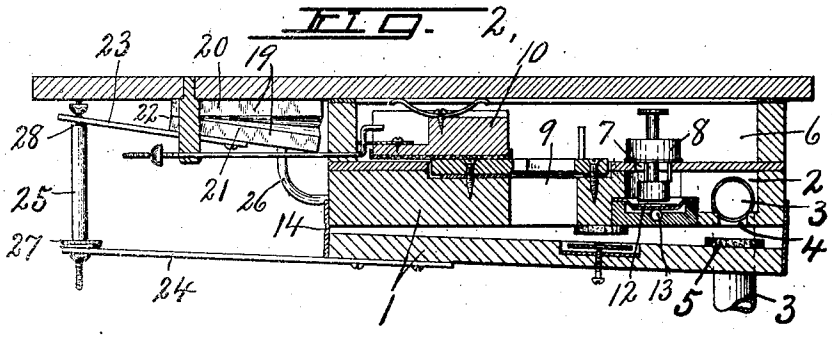
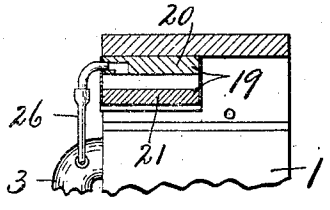


FIG. 3.



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TEMPO-GOVERNING DEVICE FOR SELF-PLAYING MUSICAL INSTRUMENTS.

1,039,660. Specification of Letters Patent. Patented Sept. 24, 1912.

Application filed January 18, 1912. Serial No. 671,872.

To all whom it may concern:

Be it known that I, LEWIS B. DOMAN, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Tempo-Governing Devices for Self-Playing Musical Instruments, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in tempo-governing devices for self-playing musical instruments for regulating the speed of action of a pneumatic motor under varying air tensions in the wind inducing device or intermediate connections between the wind inducing device and motor action. In apparatus of this character, a main tempo-governing pneumatic forms a part of the connection between the wind inducing device and motor action to operate automatically under varying air tensions against the action of a suitable retracting spring for regulating the speed of action of the motor, the tension of the spring being adjustable so as to harmonize as nearly as possible its resistance with the varying air tensions in the pneumatic. That is, the tension of the spring is adjusted to normally distend the pneumatic and to gradually increase the resistance to the collapse thereof as the air tension therein increases. I have discovered, however, that when this retracting spring is once adjusted with sufficient tension to open the pneumatic under low tension, the increased resistance of such spring produced by the closing action of the pneumatic under high tension is excessive and does not allow the pneumatic to respond with sufficient delicacy to produce the desired gradation of tempo control, and the primary object of my present invention is to produce simple means for automatically and gradually counteracting this increased tension of the spring so as to cause the tempo-governing pneumatic to respond more readily to the gradually increasing air tension therein, thereby producing a closer tempo-regulation than has heretofore been practised. In other words I have sought to provide auxiliary pneumatic means controlled by varying air tensions in the wind inducing device for assisting the operation of the main governing pneumatic when acting under the gradually increasing resistance of its retracting spring.

Other objects and uses will be brought out in the following description.

In the drawings—Figure 1 is a perspective view of my improved tempo-governing device including the primary and auxiliary pneumatics and their spring retracting means. Fig. 2 is a longitudinal sectional view through the main governing pneumatic showing the auxiliary pneumatic and its connection with the main governing pneumatic. Fig. 3 is a transverse sectional view through the auxiliary pneumatic showing the exhaust pipe leading therefrom.

In order that my invention may be clearly understood, I have shown a main governing pneumatic —1— similar to that set forth in my pending application #329,692, filed August 8, 1906, and forming a part of the connection between a suitable wind inducing device and motor action, neither of which are shown for the reason that the wind inducing device and motor action are well known elements in this class of instruments.

The stationary side of the pneumatic —1— is provided with an exhaust chamber —2— which is connected by a pipe —3— directly to the wind inducing device, not shown, and communicates through a passage —4— with the interior of the pneumatic —1—. The movable side of the pneumatic —1— is provided with a valve —5— coacting with the port —4— for normally controlling the passage of air therethrough to the motor and thereby regulating the tempo or speed of action of the motor which may be connected in any well known manner to the winding roller of the music sheet feeding mechanism not shown.

At one side, preferably the upper side, of the stationary part of the pneumatic —1— is a valve chamber —6— connected to the exhaust chamber by a port —7— which is normally closed by a valve —8—, said valve chamber being also connected by a passage —9— to the interior of the pneumatic —1—. Coacting with this passage —9— is a slide valve —10— adapted to be operated at will by any suitable mechanism for controlling the passage of air therethrough and thereby additionally controlling the tempo or speed of the motor. The valve chamber —6— is connected to the motor action, not shown, by means of a pipe —11— so that when the instrument is in action in playing a musical selection, the pneumatic —1— nor-

mally constitutes a part of the connection between the wind inducing device and motor action but after the selection is terminated, and it is desired to rewind the music sheet by the same motor, the valve —8— is opened by means of a primary pneumatic —12—, thereby connecting the motor action directly to the wind inducing device through the passage —7—, exhaust chamber —2— and conduit —3— to throw the full force of the wind inducing device into the motor action for rapidly rewinding the music sheet. The primary pneumatic is normally deflated by connection of a small bleed hole therein with the exhaust chamber —2— but is adapted to be operated by the admission of atmospheric air through a normally closed atmosphere port —13— in a manner set forth in my pending application referred to and not necessary to herein further illustrate or describe.

The movable side of the pneumatic —1— is hinged at one end at —14— to the stationary side thereof and is provided with a longitudinally extending retracting spring —15— having its free end operatively connected to a suitable anchorage —16— for distending the pneumatic —1—. One end of the anchoring rod —16— is connected to a supporting member —17— and its other or lower end is threaded for receiving an adjusting nut —18— against which the free end of the spring normally rests and is adapted to be adjusted to tension such spring sufficient to quickly distend the pneumatic —1— under relatively low air tension therein.

The parts thus far described are clearly shown in my pending application above referred to and I will now proceed to describe the means for assisting the operation of the main governing pneumatic under the increasing tension of the spring —15—. This means comprises essentially a relatively small pneumatic —19— preferably located at the same end of the main governing pneumatic as that from which the spring —15— is projected and consists of a fixed member —20— secured to the underside of the support —17— and a movable member —21— hinged to the fixed member at —22— and provided with an arm —23— extending in the same direction as the spring —15— but at one side of the vertical plane thereof. Secured to the movable side of the main governing pneumatic —1— is an additional spring —24— running substantially parallel with and at one side of the spring —15— and has its free end connected to the free end of the arm —23— by means of a connecting rod —25—. This smaller auxiliary pneumatic —19— is connected by a pipe —26— to the conduit —3— and is thereby connected directly to the wind inducing device so that the air tension in said pneumatic varies with that in the wind inducing device. The arm —23— projecting from the auxiliary pneumatic —19— is relatively short as compared with that of the spring —24— or —15— and by connecting them to the lower movable sides of the pneumatics and extending them in the same directions therefrom, it is evident that the movement of either side will tend to impart similar movement to the movable side of the other part through the medium of the connecting rod —25—. This connecting rod is provided with shoulders —27— and —28— for engaging adjacent faces of the arms —24— and —23—, the ends of said rod being threaded for receiving nuts —29— and —30— by which the arms —24— and —23— may be held to the shoulders —27— and —28—, said nuts also serving to adjust the arms in proper relation to each other.

It is now clear that when the instrument is in operation, the air tension in the pneumatics —1— and —19— will vary in accordance with the variation of air tension in the wind inducing device. For example, should the air tension in the pneumatic —1— be increased to its maximum degree, thereby tending to collapse the pneumatic, the tension of the spring —15— would also be correspondingly increased, thereby increasing the resistance to such collapse to such an extent as to prevent the desired closing movement of the valve —5— in which case the motor would be driven at too great a speed by the increasing air tension. This, however, is prevented by reason of the fact that as the tension increases in the pneumatic —1—, it also increases to the same extent in the auxiliary pneumatic —19—, thereby forcing the free end of its arm downwardly and causing a corresponding depression of the free end of the spring arm —24— through the medium of the connecting rod —25— which assists the air tension in the pneumatic —1— in properly cutting off the passage of air through the port —4— by means of the approach of the valve —5— toward said port. In other words, this action of the auxiliary pneumatic —19— assists to neutralize to some extent the resistance of the spring —15— and thereby permits a closer regulation of the tempo or speed of the motor.

What I claim is:

1. The combination with a tempo-governing pneumatic of a self-playing musical instrument and a spring resister opposing its collapse and operated thereby to increase its resistance as the pneumatic tends to such collapse, and a pneumatic assister aiding such collapse during the increasing resistance of the spring.

2. In combination with a tempo-governing pneumatic of a self-playing musical instrument and yielding means resisting the

collapse of said pneumatic, additional means including a pneumatic for assisting such collapse against the action of the resistance.

3. A tempo-governing device for self-playing musical instruments comprising a main governing pneumatic and a smaller auxiliary pneumatic, means including a spring resisting the collapse of the main pneumatic, and additional means operated by the auxiliary pneumatic for assisting the collapse of the main pneumatic against the action of the resistance spring.

In witness whereof I have hereunto set my hand on this 11th day of January, 1912.

LEWIS B. DOMAN.

Witnesses:
H. E. CHASE,
E. F. TUCKER.