J. A. WESER.

MECHANICAL MUSICAL INSTRUMENT.

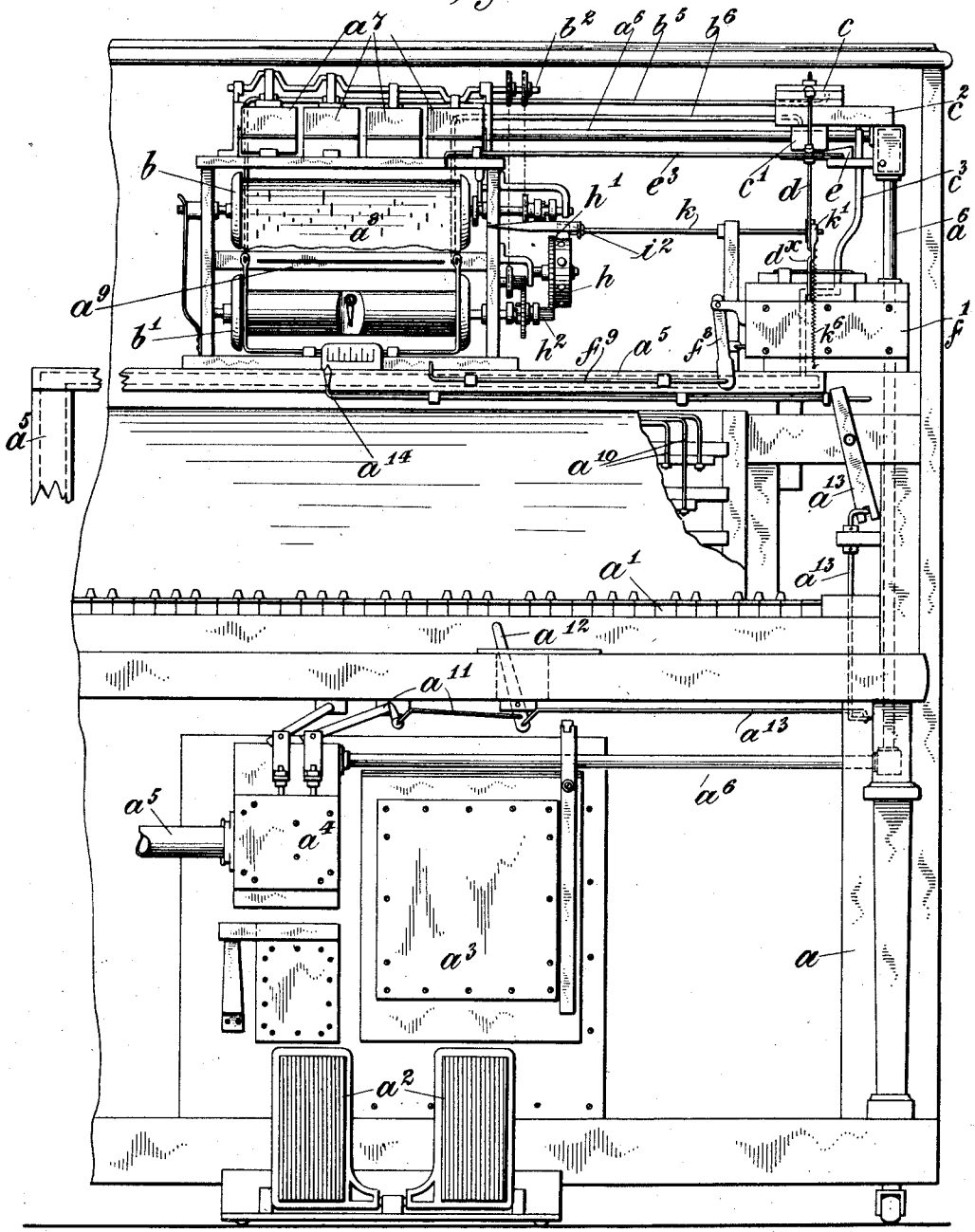
APPLICATION FILED MAY 22, 1909.

1,010,551.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 1.

Fig. 1.



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5 SHEETS—SHEET 2.

Fig. 3.

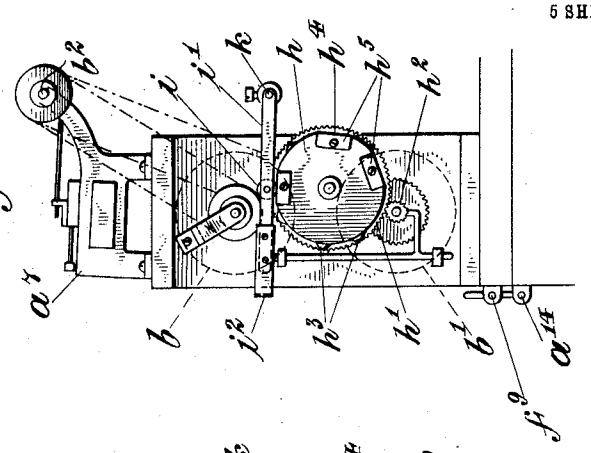
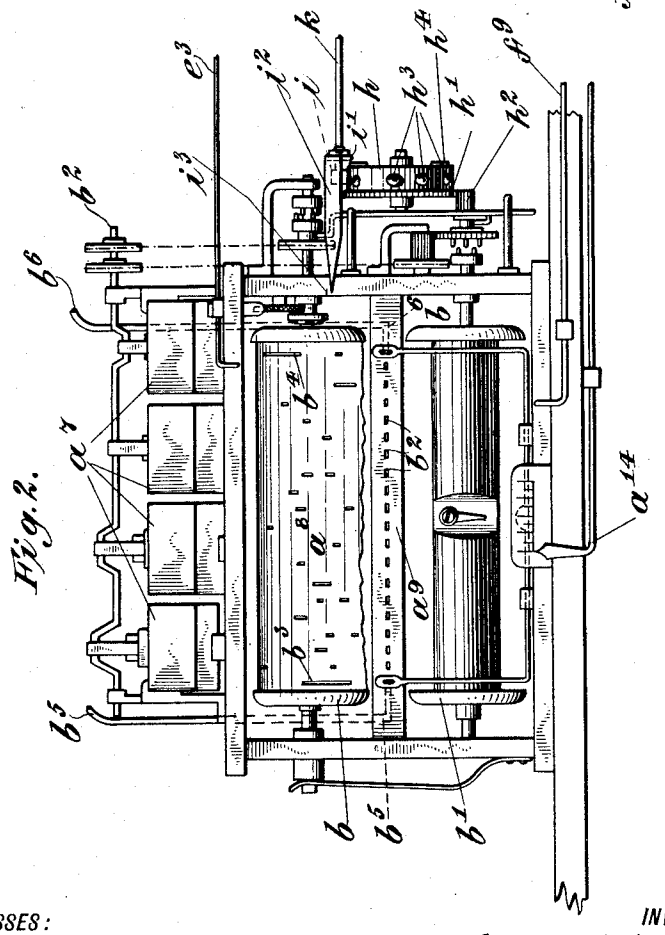


Fig. 2.



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5 SHEETS—SHEET 3.

Fig. 6.

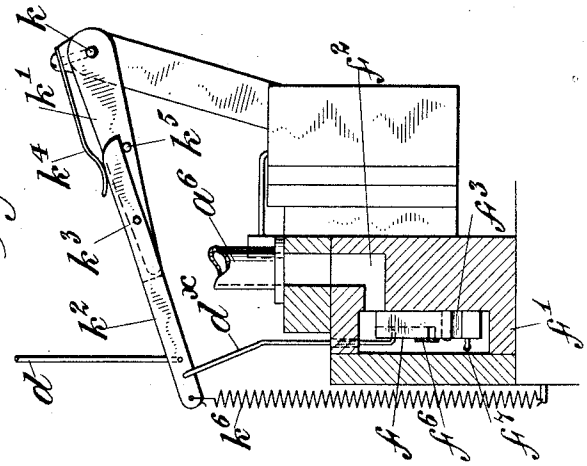


Fig. 5.

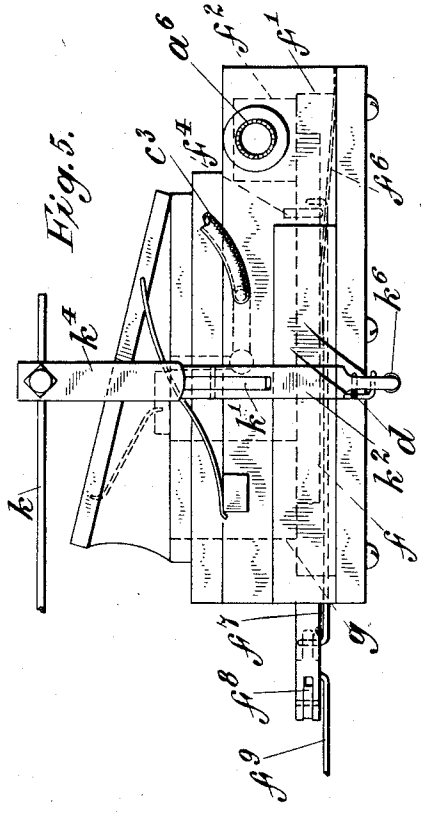
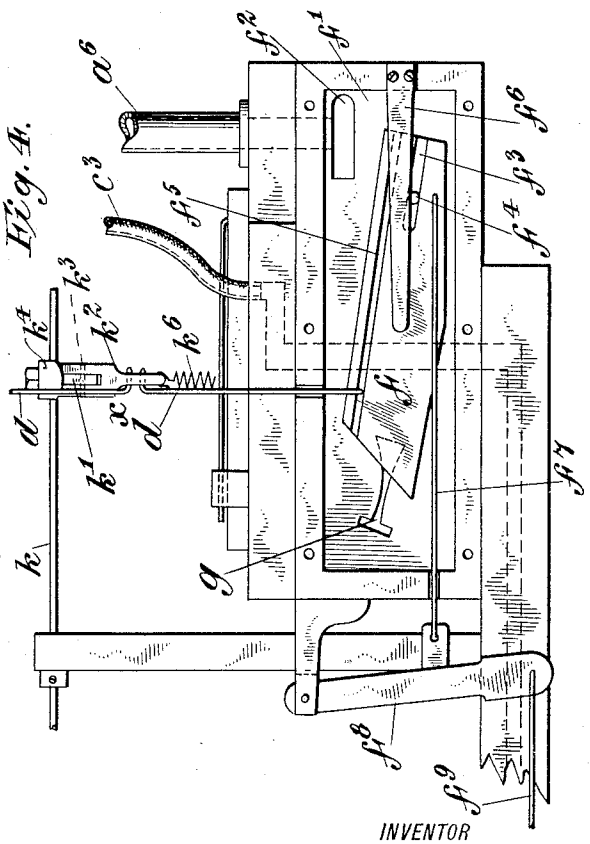


Fig. 4.



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1,010,551.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 4.

Fig. 9.

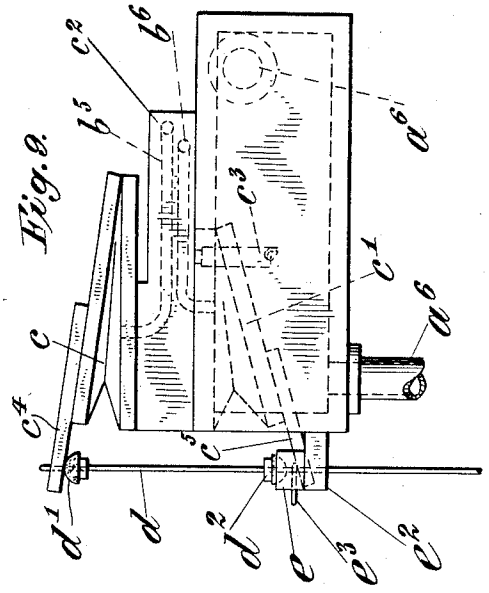


Fig. 8.

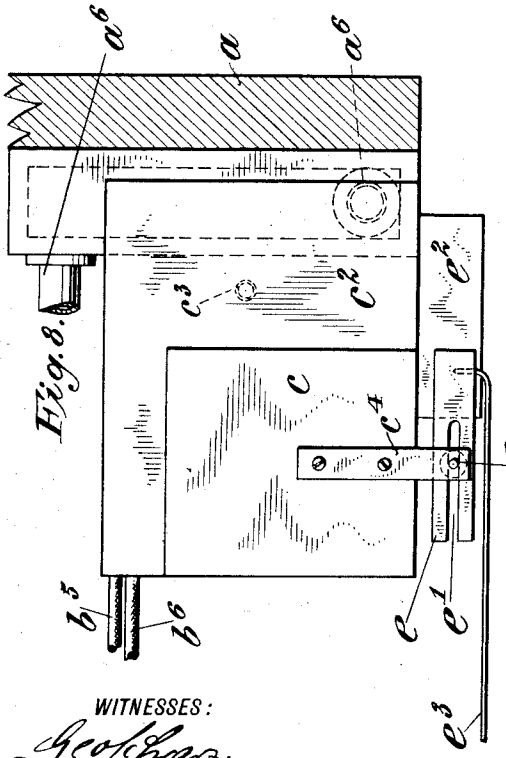
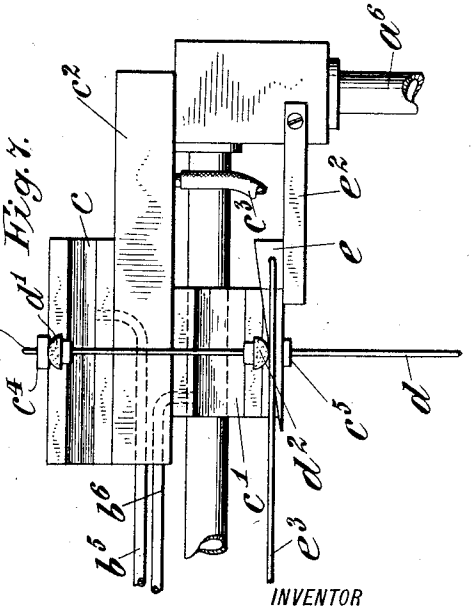


Fig. 7.



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MECHANICAL MUSICAL INSTRUMENT.

APPLICATION FILED MAY 22, 1909.

1,010,551.

Patented Dec. 5, 1911.

5 SHEETS—SHEET 5.

Fig. 9a

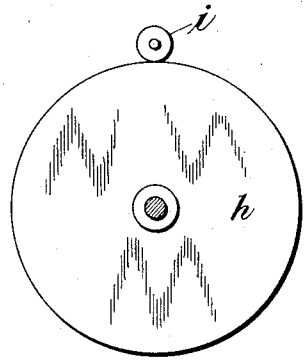


Fig. 10.

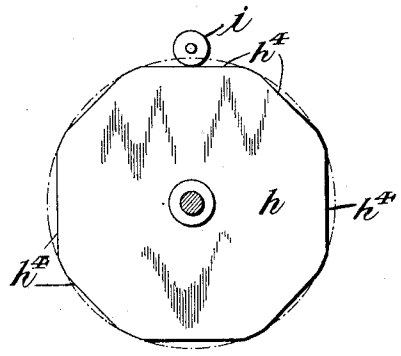


Fig. 11.

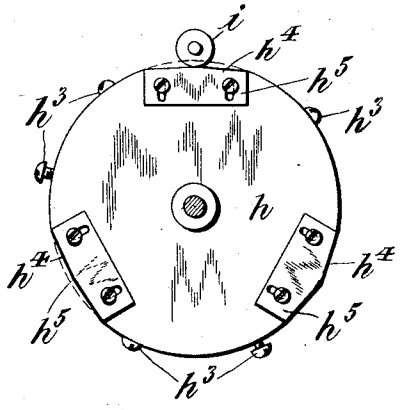
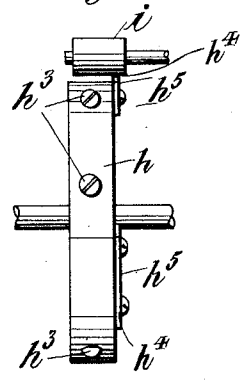


Fig. 12.



Witnesses
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S. Habert.

John A. Weser Inventor
By his Attorneys.
Redding, Purdy & Austin

UNITED STATES PATENT OFFICE.

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MECHANICAL MUSICAL INSTRUMENT.

1,010,551. Specification of Letters Patent. Patented Dec. 5, 1911.

Application filed May 22, 1909. Serial No. 497,584.

To all whom it may concern:

Be it known that I, JOHN A. WESER, a citizen of the United States, residing in the borough of Manhattan of the city of New York, in the State of New York, have invented certain new and useful Improvements in Mechanical Musical Instruments, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

In the operation of mechanical musical instruments of various kinds, including, for example, automatic pianos, organs and music boxes, it is usual to place the tempo under the control of the performer, except so far as variations in tempo are determined by variations in the spacing apart of the apertures or projections of the music sheet or disk.

It is the object of this invention to provide automatic improved means for the regulation of the tempo, independent of the spacing of the apertures or projections of the music sheet or disk and independent of any hand controlled devices for regulating the tempo, at least to such an extent that the automatic tempo regulating devices may be used either independently of or together with the hand operated devices, the operation of the automatic tempo regulating devices being controlled by a suitable selecting device, which may be perforations or projections of the music sheet or disk itself or independent thereof.

In the accompanying drawings, in which the invention is illustrated, automatic tempo regulating devices of both of the classes just referred to are shown as embodied in the same structure, the one set of regulating devices being capable of use in coöperation with or in supplement to the other set of devices.

The invention will be more fully explained hereinafter with reference to the accompanying drawings in which—

Figure 1 is a view in front elevation of so much of an automatic piano or player piano as is necessary to enable the application of the invention thereto to be understood, the casing of the piano being removed and some parts being broken out or broken away. Fig. 2 is a front elevation, on a larger scale, of the tracker board mechanism. Fig. 3 is a view in elevation of the parts shown in Fig. 2, as seen from the right hand. Fig. 4 is a detail view in front elevation of the valve mechanism which is controlled by the selecting devices, the front plate of the valve chest being removed. Fig. 5 is a top view and Fig. 6 is a view partly in transverse section and partly in end elevation of the parts shown in Fig. 4. Fig. 7 is a detail view in front elevation of a portion of one set of the devices which actuate the valve shown in Fig. 4. Fig. 8 is a top view and Fig. 9 is an end view, as seen from the right hand, of the parts shown in Fig. 7. Fig. 9^a is a detail view showing the tempo disk, hereinafter mentioned, having a uniform radius and adapted to act as a tempo retainer, with its coöperating roller in relation thereto. Fig. 10 is a similar view, but showing the tempo disk having depressions or parts of shorter radius and adapted to act as a tempo changer. Fig. 11 is a view similar to Fig. 10, but showing adjustable plates and projections on the disk for further varying the tempo. Fig. 12 is an edge view of the parts shown in Fig. 11.

The player piano which is chosen for illustration of the invention may be of any usual or suitable construction, comprising, so far as shown, the usual frame and supporting case a, key-board a', bellows pedals a^2, main bellows, indicated in part at a^3, and valve chest a^4, by which the connection between the main bellows a^3 and the main wind trunk a^5 is controlled, as well as the connection between the main bellows and the air-way a^6, which is in turn connected to the motor bellows a^7 by which the tracker box mechanism is driven and the music sheet a^8 is caused to travel over the tracker-board a^9, the ports in which are connected severally with the player pneumatics, as indicated at a^{10} in Fig. 1. As usual in mechanical musical instruments of the character represented in the drawings, the tempo is regulated by controlling the speed of the motor a^7 and this, in turn, is controlled through the operation of the valve in the valve box a^4, the position of the valve being shifted through suitable connections a^{11}, by the operation of the performer's tempo lever a^{12}. The latter is also connected, through a suitable system of rods and levers a^{13}, with the tempo indicator a^{14}. All of these parts are connected and arranged to operate as is usual in musical instruments of this character.

The automatic tempo regulating devices with which the present invention is concerned may regulate the speed of movement

of the music sheet or other selector through any suitable speed changing devices, such as a belt and cone pulleys, for example, but preferably regulate the speed of the motor a^7 through the variation, in the embodiment of the invention shown in the drawings, of the vacuum pressure which, created by the main bellows, acts upon the motor bellows a^7 of the tracker mechanism.

The music rolls b and b' are supported and operated from the motor shaft b^2, in the usual manner, through driving connections of usual construction and not necessary to be shown and described in detail. The music-rolls also carry, as usual, the music sheet a^8, which is provided with the usual perforations for coöperation with the ports in the tracker-board b^2. The music sheet is also preferably provided with perforations, as at b^3 and b^4, which coöperate with corresponding ports and conduits b^5 and b^6, for the purpose of controlling the action of one set of tempo regulating devices, as hereinafter described.

One of the ports and ducts b^5 and b^6, as for example, the port and duct b^5, is connected in the usual manner to a pneumatic c, while the other port or duct, as b^6, is connected to an oppositely placed pneumatic c', both of such pneumatics being connected to the main wind trunk so as to be collapsed by the vacuum pressure when atmospheric pressure is admitted to the primary valve of one or the other by the passage of a perforation in the music sheet over the corresponding port or duct b^5 or b^6, as the case may be, such connection being effected through a common air-way c^2 and pipe c^3 leading to the wind-way a^5. The pneumatics c and c' act oppositely, when collapsed, upon a rod d. The movable member of the pneumatic c has a projecting finger c^4 through which the rod d passes freely, the finger acting upon a nut d' on the rod. The pneumatic c' has a similar projecting finger c^5, through which the rod d also passes freely, the finger c^5 acting upon a nut d^2 on the rod d but in an opposite direction with respect to the action of the finger c^4 on the nut d'.

For the purpose of permitting the effective throw of the rod d to be varied at the will of the performer, a wedge e, slotted, as at e', to straddle the rod d, is supported movably in its lowest position upon a suitable support e^2 and has connected thereto a rod e^3 which terminates within the opening for the tracker-board mechanism, so that it may be shifted by the performer in one direction or the other, thereby causing a thinner or a thicker portion of the wedge e to be interposed between the finger c^5 and the nut d^2, so that when the pneumatic c' is collapsed, the rod d will be raised more or less. The purpose of this is to enable the performer to vary the normal or standard tempo through the devices hereinafter described without interfering with the automatic regulation of the tempo, the automatic accelerating of the tempo being effected by the collapsing of the pneumatic c, which is controlled by the perforations b^3 at the left hand margin of the music sheet or selector, while the retarding of the tempo is effected by the collapsing of the pneumatic c', which is controlled by the perforations b^4 at the right hand margin of the music sheet or selector.

The rod d is connected to a valve f shown in Fig. 4, which controls the effective area of a port g interposed in the wind-way between the main or power bellows and the motor bellows a^7, so as to vary the speed of the motor. It will be obvious that if the music sheet were relied upon alone as the selector to vary the tempo automatically, the rod d might be connected positively with the valve f, but in the construction shown the valve f is subject also to the control of another selector and the connection between the rod d and the valve f is impositive or yielding, as will be more fully explained hereinafter when the operation of the other selector is described. For the present, the rod d^x, shown in Figs. 4 and 6, may be regarded as a continuation of the rod d, the two being connected to a common intermediate part which is movable with both. The valve f is located in a valve casing or chamber f' which is connected through a port f^2 with the motor bellows a^7 through the upper part of the conduit a^6 and, through the port g and through a channel, not shown, through the lower part of the conduit a^6, with the valve chest a^4 and the main bellows a^3. The effective area of the port g, which is preferably elongated, as shown, is varied by the swinging of the valve f through the movements of the rod d or by the longitudinal movement of the valve at the will of the performer. The valve f is, therefore, so supported and operated that either of such movements may take place without interfering with the means for imparting the other movement. The valve f has a slot f^3 which straddles the fixed pivot pin f^4 and has also a longitudinal groove f^5 in which engages the bent extremity of the rod d^x. The valve is held upon its seat by a flat spring f^6 which bears upon the valve f. The longitudinal movement of the valve, at the will of the performer, is effected through a link f^7 which is connected through a lever or swinging arm f^8 with a rod f^9, shown in Figs. 1, 2, 4 and 5, the rod f^9 terminating in the tracker-board opening so that it can be shifted at will by the performer.

It will now be understood that when the tempo regulating devices are controllel from the music sheet itself as a selector, the occurrence of a perforation at the left hand margin of the music sheet will cause an

acceleration of the tempo during a period of time determined by the length of the perforation, while a perforation at the right hand margin of the music sheet similarly will cause a retardation of the tempo. Proper preparation of the music sheet will therefore effect automatically an acceleration or a retardation of the tempo as intended by the composer.

In conjunction with the tempo varying devices already described, it is desirable to provide a device for retaining the normal tempo, which has been fixed or determined by the performer, as by the longitudinal adjustment of the valve f through the movement of the rod f^9, that is, a device to restore such normal tempo after the variation of the same. The device which, in the embodiment of the invention illustrated in the drawings, is shown as adapted for this purpose, may, with certain additions, to be described, serve also as a tempo changer or selector. This tempo restorer or retainer acts, in the preferred embodiment of the invention, to retain the valve f in its normal position except as it is moved therefrom by the tempo changing devices. When it is provided with the additional features which enable it to act as a tempo changer, its action is mechanical, that is, it may act independently of the phrasing of the music, merely producing variations in the tempo without regard to the music. Furthermore, the operating connections between this device and the valve are so arranged that it may be used as a tempo changer in the same apparatus with such devices as have been described already, the operation of which is determined by perforations in the music sheet itself. It might have any of many different forms. As shown particularly in Figs. 1, 2 and 3, it comprises a disk h, which is suitably mounted adjacent to the tracker mechanism and is carried with a gear wheel h' which is engaged by a pinion h^2 on a continuously moving shaft of the tracker mechanism. If it is to serve as a tempo retainer only and not as a tempo changer, the periphery of the disk, which then serves merely as a stop, is continuous or of uniform radius as shown in Fig. 9ª, but if it is to serve as a tempo changer also, then the periphery of the disk h is varied, being provided with projections, such as screws h^3, which may be adjusted toward or from the axis of the disk and, it may also be provided with depressions or portions of shorter radius than the normal, as shown in Fig. 10, as at h^4, which may also be varied by adjustable plates h^5 applied to the side of the disk as shown in Figs. 11 and 12, upon which the roller i may rest. In contact with the periphery of the disk rests a roller i carried by a lever i'. The latter has an indicator i^2 which is intended to show to the performer, by its position relative to a normal mark i^3, the relation of the tempo at any particular time to the normal tempo. The arm or lever i' is fixed upon a shaft k, which is mounted in suitable bearings and, as shown particularly in Figs. 4, 5 and 6, has adjustably secured thereon a jointed arm comprising members k' and k^2, the latter being the part to which the rods d and $d^\times$ are connected in common. The member k^2 is pivoted upon the member k', as at k^3, and upon its end adjacent to the shaft k bears a flat spring k^4, the movement of the member k^2 with respect to the member k' being limited in one direction by a stop pin k^5. At the outer end of the member k^2 may be applied a spring k^6 which pulls the arm normally downward.

It will now be seen that when the valve f has been raised from its normal position by the action of the pneumatic or bellows c', to retard the tempo, and then has been released by the expansion of the bellows c', the valve will be moved downward to its normal position by the action of the spring k^6 on the jointed arm k', k^2 until the roller i, which was raised from the periphery of the disk h by the action of the bellows c', again rests upon the periphery of such disk. On the other hand, if the valve f has been moved downward by the action of the bellows c to increase the effective area of the port g and thereby increase the tempo, the jointed arm k', k^2 having yielded upon the pivot k^3 to permit such movement, the valve f, as soon as the bellows c has expanded, will be moved upward, to its normal position, through the action of the spring k^4 upon the member k^2 on the jointed arm, such spring k^4 being stronger than the spring k^6. Furthermore, if the disk h be intended to operate as a selector to vary the tempo and is provided with projections h^3 and depressions h^4 for this purpose, when one of the projections h^3 on the disk or selector h lifts the arm i' the valve f will be lifted to reduce the effective area of the port g and therefore to retard the tempo, while if the arm i' is permitted to move farther toward the axis of the disk, the valve f will be lowered to increase the effective area of the port g and therefore to accelerate the tempo. When the valve f is raised or lowered through the disk h, lever i' and shaft k, the rod d may be raised or lowered more or less, but no objectionable result will follow from such movement of the rod d, since lost motion is provided for between the buttons d', d^2 and the respective arms c^4, c^5, when the corresponding pneumatic bellows c, c' are fully expanded. If the pneumatic c should act in opposition to the disk, the arm k', k^2 will yield and the valve f will be operated by the pneumatic rather than by the disk. If the pneumatic c' should act, the roller i

will simply be lifted from the disk. In no case can there be any injury to the parts. It is intended that those portions of the periphery of the disk which are of normal radius shall correspond to the normal tempo, so that when the lever i' is resting upon such portions of the disk the point i^2 shall then stand at the normal mark i^3.

It will be understood that the normal tempo may be varied at the will of the performer by longitudinal movement of the valve f. Furthermore, while the disk-controlled devices will determine the tempo when the sheet-controlled devices are not in operation, that is, when the music sheet is not provided with tempo perforations, yet the music sheet, when provided with tempo perforations, will control the tempo for the reason that the arm or lever k', k^2, is jointed and provided with the spring k^4, which is not stiff enough to resist the action of the downwardly acting pneumatic, so that if a projection on the disk tends to lift the valve against the operation of the downwardly acting pneumatic, the arm k', k^2, will buckle on its joint and the outer end of the arm will not be shifted by the disk-controlled devices, and if a depression in the periphery of the disk passes under the roller i, the action of the upwardly acting pneumatic will hold the arm k', k^2 up against the tendency of the spring k^6 to pull it down. It will also be understood that either or both sets of automatic regulating devices may be used independently of or in conjunction with the usual hand operated devices for regulating the tempo at the will of the performer.

It will now be understood that the note selector, whether it is a perforated sheet, such as is indicated in the drawings, or any other of the various forms of note selectors such as are commonly employed in mechanical musical instruments of various types, may itself serve as a tempo selector or controller, through the proper provision of perforations or projections or contacts, as is well understood in the art, or that the tempo selector or controller may be independent of the note selector. It will also be understood that in other respects the invention might be embodied in many different forms and arrangements of parts and in automatic musical instruments of different types, and that it is, therefore, not to be limited to the particular construction and arrangement of parts or type of instrument shown and described herein.

I claim as my invention:

1. In a mechanical musical instrument, the combination of tracker box mechanism, comprising a tracker-board, a motor and means to move the music sheet, power bellows, a valve to control the connection between the power bellows and the motor, oppositely acting bellows controlled from the tracker-board and operatively connected with said valve to move the same in opposite directions to vary the speed of the music sheet, and a normal tempo restoring device and connections coöperating with the valve to return it to normal position after displacement by said last named bellows.

2. In a mechanical musical instrument, the combination of an air motor, power bellows, a valve to control the connection between the bellows and the motor, a note selector, means controlled by the selector to shift the valve and vary the speed of the selector, and a normal tempo restoring device and connections coöperating with the valve to return it to normal position after displacement by said last named bellows.

3. In a mechanical musical instrument, the combination of tracker box mechanism, comprising a tracker-board, a motor and means for moving the music sheet, power bellows, a valve to vary the connection between the power bellows and the motor, means controlled from the tracker-board to shift said valve and vary the speed of the music sheet and a normal tempo restoring device and connections coöperating with the valve to return it to normal position after displacement by said last named bellows.

4. In a mechanical musical instrument, the combination of a valve chest having a port, a valve to control said port and capable of movement in different directions, hand operated devices to shift said valve in one direction to determine the normal flow through the port, independent automatic means to shift said valve in the other direction of movement to vary the flow through the port, a normal tempo restoring device and connections coöperating with said valve to return it to normal position after displacement by said means, and an indicator operatively connected with said valve to indicate its normal position and its variations therefrom.

5. In a mechanical musical instrument, the combination of a note selector, variable driving means therefor, air connections to the driving means, a valve chest included in said air connections and having a port in communication therewith, a valve coöperating with said port and capable of movement in different directions, hand operated means to shift said valve in one direction to determine the normal flow through the port, independent automatic means to shift said valve in its other direction of movement to vary the flow through the port automatically and normal tempo restoring devices and connection coöperating with said valve to return it to normal position after displacement by said automatic means.

6. In a mechanical musical instrument, the combination of an air motor, power bellows, a valve chest interposed between

the power bellows and the motor and having a port through which connection from the power bellows to the motor is established, a valve to control said port, a note selector, means controlled by the selector to shift the valve, a normal tempo restoring device and connections to restore the valve to normal position, and a yielding common connection between the selector controlled means, said last named means and the valve, whereby said valve may be operated by either the note selector or the normal tempo restoring device without disturbing the other.

7. In a mechanical musical instrument, the combination of a motor, power bellows, a valve to control the connection between the power bellows and the motor, a tempo selector, a rock shaft actuated thereby, a yielding jointed arm mounted on said shaft, a connection from the outer member of said arm to the valve, an independent selector and means controlled thereby and connected with said outer member of the arm.

8. In a mechanical musical instrument, the combination of a motor, power bellows, a valve to control the connection between the power bellows and the motor, a rock shaft having a jointed arm free to yield in one direction and having means for holding it from yielding in the opposite direction, a connection from the outer member of said arm to the valve, means to oscillate said shaft, oppositely acting bellows, means to control said bellows and a rod connected to the outer member of said arm and adapted to be moved in opposite directions by said bellows respectively.

9. In a mechanical musical instrument, the combination of an air motor, power bellows, a valve to control the connection between the bellows and the motor, a note selector, means controlled by the selector to shift the valve and vary the speed of the selector, and a normal tempo retaining device operatively connected with the valve to maintain the normal tempo.

10. In a mechanical musical instrument, the combination of an air motor, power bellows, a valve to control the connection between the bellows and the motor, a note selector, means controlled by the selector to shift the valve and vary the speed of the selector, an arm yieldingly connected with the valve to move therewith and a stop to limit the movement of the arm.

11. In a mechanical musical instrument, the combination of an air motor, power bellows, a connection between the bellows and the motor, a valve included in said connection to control the same, a continuously rotating disk having a periphery of varying radius and means controlled by said disk to shift the valve and vary the speed of the motor.

12. In a mechanical musical instrument, the combination of an air motor, power bellows, a connection between the bellows and the motor, a valve included in said connection to control the same, a continuously rotating disk, means to vary the radius of the periphery of the disk and means controlled by said disk to shift the valve and vary the speed of the motor.

This specification signed and witnessed this 21st day of May A. D. 1909.

JOHN A. WESER.

Signed in the presence of—

W. H. KEATING,

MAX LEVIAN.