SELF PLAYING ATTACHMENT FOR KEY MUSICAL INSTRUMENTS.

INVENTOR

ATTORNEY
SELF-PLAYING ATTACHMENT FOR KEY MUSICAL INSTRUMENTS.


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To all whom it may concern:

Be it known that I, Harry M. Salyer, a citizen of the United States, and a resident of the city of New York, borough of Bronx, in the county of New York and State of New York, have invented certain new and useful Improvements in Self-Playing Attachments for Key Musical Instruments, of which the following is a specification.

10. The object of my invention is to provide a new and improved self-playing attachment for key instruments—such as pianos, organs, and the like—which attachment is simple in construction, strong and durable, can easily be applied on any key instrument, and plays any desired melody, according to the tune-sheet inserted, and produces all the various effects in music, such as forte and piano, which the pedals, vary the speed at which the music is to be produced, and which attachment can easily be adjusted to repeat the same melody any number of times automatically or can be adjusted to stop at the end of a tune, and which attachment also rapidly rewinds the music-sheet upon its original roller to permit removing it from the attachment, so that another music-roller can be inserted.

In the accompanying drawings, forming a part of this specification, and in which like letters of reference indicate like parts in all the views, Figure 1 is a general plan view of my improved self-playing attachment for key instruments, the attachment being shown as applied to the keyboard of a piano and the air-compressor used for working the attachment being shown in diagram. Figure 2 is a side view of the clamping-bracket on the under side of the attachment for holding the attachment over the keyboard. Figure 3 is a vertical longitudinal sectional view of one of the key-operating plungers and the valve mechanism for the same. Figure 4 is a detail plan view, enlarged, of the pedal-operating mechanism. Figures 5 and 6 are enlarged vertical transverse sectional views on the lines 5 5 and 6 6 of Figure 1, respectively, both in the direction toward the right of Figure 1. Figure 7 is an enlarged sectional view of the key-levers, taken on the line 5 5 of Figure 1. Figure 8 is an enlarged plan view of the music-sheet rollers and the mechanism for operating the same, parts being broken away. Figures 9 to 12 are sectional views of the controlling-cock. Figure 13 is a sectional plan view of the automatically-adjustable pressure-regulating valve. Figure 14 is a side view of the brake-pulley.

The entire mechanism is contained in a casing A, provided with a bottom A 1, which rests on suitable rabbits A 2, Figure 1, of the keyboard-support, and from the underside of said bottom A 1 bracket pieces A 3 extend downward and below the keyboard-support A 4 of the pianoforte, the brackets A 3 being provided with a screw A 5, by means of which the casing A can be clamped on the pianoforte-casing.

The casing A is provided with a hinged cover A 6 and with an intermediate horizontal partition or floor A 7. On the intermediate floor or partition A 8 a bridge-piece B 1 is secured, near the longitudinal center line of the intermediate partition or floor A 7 and in the direction of the length of the keyboard, which bridge-piece is preferably shaped concave in cross-section and is provided with a flat top B 2, Figure 7, in which a series of ducts or channels b terminate. Directly above the upper end of each channel b a valve B 3 for closing the channel is located, each attached to a 80 spring-strip B 4, which spring-strips are all secured on a rail B 5 attached to standards B 6 at the ends of the bridge-piece B 1. A shaft B 7 is secured in the upper ends of the standards B 6, and on said shaft a key-lever C is mounted for each duct or channel b in the bridge-piece B 1, and the downwardly-extending free end C 1 of each key-lever rests upon the free end of the corresponding spring-strip B 4, carrying on its under side the valve B 3 for the corresponding duct or channel b.

Each key-lever C is provided at its free end with a beveled upwardly-extending lug C 1, which several lugs C 2 each pass through a corresponding transverse slot c in a top plate C 3, secured to the standards B 6, the said key-levers C being held in such positions that their lugs C 2 project through these slots c under the action of their corresponding springs B 5. A retaining-bar C 4, grooved longitudinally on its under side for receiving the several lugs C 2 of the key-levers C, is hinged to
a standard $b'$ and at its opposite end is provided with a latch $b''$ for engaging another standard $b''$ for the purpose of locking said retaining-bar in place.

5 The downwardly-extended front end $C$ of each key-lever $C$ is provided with an arm $C'$ extending toward the rear, and over the said several arms $C'$ a half-round bar $C''$ extends in such a manner that when the several key-levers are raised and the half-round bar $C''$ is in such a position that its flat side is in a horizontal plane the upper edges of the several arms $C'$ will rest against the said flat side of the half-round bar, as shown in Fig. 2.

10 A note-sheet of paper or other suitable material and provided with slots $a'$, suitably spaced and arranged according to the music to be produced, rests upon the slotted plate $C''$, on which it is held by the retaining-bar $C''$. The perforations $a'$ being arranged in parallel rows extending in the direction of the length of the note-sheet, the rows being an equal distance from each other and separated a distance equal to the distance between the lugs $C''$.

15 Each music-sheet is secured to a roller $D'$, which is mounted removably between the standard $D'$ and the hub of a cog-wheel $D''$, mounted in a suitable standard $D''$ on the intermediate floor or partition $A'$, and that end of the roller $D'$ engaging the hub of the cog-wheel $D''$ is squared or in any other manner so shaped as to turn with the cog-wheel $D''$. The standard $D'$ is provided with a longitudinally-movable spring-bearing $D''$, of any well-known construction, for holding the left-hand end of the roller $D'$ in such a manner that it may turn freely, at the same time permitting the ready removal of the roller, with the note-sheet thereon, when said spring-bearing $D''$ is pulled out to the left. I do not show the details of the construction of this spring-bearing, nor of the ends of the pivots of roller $D'$, as such constructions are all well-known and not of my invention. The other end of the note-sheet is secured in any suitable manner on the playing-roller $D''$, which is mounted in suitable bearings $D'$, Fig. 8, and is provided with means for attaching the end of the note-sheet to it, such means being shown in Fig. 1 and consisting of a pin $a$, projecting into a slot $d'$ in the note-sheet $a'$; but any other well-known contrivance may be used for securing the end of the note-sheet $a'$ in the playing-roller $D''$. The playing-roller $D''$ carries a cog-wheel $D''$, secured to the shaft of said playing-roller $D''$, which cog-wheel $D''$ can be engaged by a small cog-wheel $D'$ mounted in a free end of a swinging arm $D'$, mounted to rock on a shaft of the pinion $D'$, which pinion engages the wheel $D''$. The shaft $E$, on which said pinion $D''$ is secured, is a driven shaft of a compressed-air motor $E'$ of any suitable construction. A cog-wheel $D''$, mounted on a suitable standard, engages the cog-wheel $D''$, so that when the arm $D'$, Fig. 6, is pushed to the right the cog-wheel $D''$ engages the cog-wheel $D''$, and as the latter engages the cog-wheel $D''$ on the roller $D''$ the latter will be rotated and the sheet that has been wound upon the playing-roller $D''$ during the playing of the instrument can be rewound back upon the original roller $D''$ by means of the said motor. All that is necessary is to shift the cog-wheel $D''$ out of engagement with the cog-wheel $D''$ and into engagement with the rewinding cog-wheel $E''$. A centrifugal governor $F$, of any well-known construction, is provided upon its central shaft with a pinion $F'$, engaged by the cog-wheel $F''$ on the shaft $E$, driven directly by the motor, and said governor $F$ is provided with a friction disk $F''$, which rotates with the weights and moves lengthwise on the governor-shaft when said weights swing toward or away from each other. A spring-brake lever $F''$, attached to the horizontal partition $A''$, extends upward at the side of the friction or brake disk $F''$ and the friction-lever $F''$ can be pressed against the friction-disk $F''$ by two wedges $F''$ and $F''$, which can press laterally on the lever $F''$, the wedge $F''$ resting against the beveled inner end part $F''$ of an elbow-lever $F'$, pivoted on a standard $F''$, its outer end resting against an adjustable screw $F$ in the standard $F''$ on the partition $A''$, which screw can be turned by means of a handle $F''$, provided with a pointer $F''$.

The plungers for operating the keys and other parts of the mechanism, and which are all of one and the same construction and clearly shown in section in Fig. 3, will now be described. Compressed air is conducted into a chamber $G$, with which one or more of said plungers may be connected. The piston in the cylinder $H''$ is provided with a suitable packing $H'$, and a piston-rod $H''$, secured to the piston, extends through a hole in the outer head of the cylinder, whereby the piston-rod is guided. Said piston-rod may operate any suitable mechanism or it may carry a head $H''$ for striking a key, and which head is provided with a rubber, felt, or other pad $H''$. The outer head of the cylinder is provided with a vent-aperture $I'$, and a helical spring $I''$, surrounding the piston-rod $I''$ serves for pressing the piston inward. At the inner end of the cylinder $I''$ and between the same and the chamber $G$ a cylinder $J$ is located, the axis of which is at right angles to the axis of the cylinder $H''$, and this cylinder $J$ contains a piston $J'$, provided with a suitable packing $J''$, a helical spring $J''$ being interposed between the cylinder-head $J'$ and the piston $J'$ and bearing on each. An aperture $J''$ in the cylinder-head $J'$ connected by a fine air-tube with one of the channels $b$ in the bridge-piece $D$ for a purpose that will appear hereinafter. The piston-rod $K$ of the piston $J'$ is made hollow and is adapted to work freely through the central axial bore $K'$ of a hub $K''$, fixed in the cylinder $J$, which hub is provided with a duct $K''$, extending from the center bore $K'$ to the inner...
end of the cylinder II', and with a duct K', extending from the neck K' in the chamber G to one end of the hub. The piston J' is provided below its packing-ring J' with a metallic plate L, secured to the piston-rod K below the packing-ring J', and this plate L is provided with a duct L', extending from the box of the piston-rod K to the edge of the plate L. A screw-stem L' is screwed into the tubular piston-rod K and in its end serves to regulate the size of the opening of the inner end of the duct L', said screw projecting from the opposite end of the piston-rod K, as is clearly shown in Fig. 3. The size of the opening at the inner end of the duct L', can thus easily be adjusted by screwing the screw-stem L' inward or outward more or less. A leather valve M is secured to the under side of the plate L on the piston-rod K and is adapted to seat on that end of the hub K' in which the duct K' terminates, so as to interrupt the communication between the duct K' and the central bore K' of the hub K'. At the opposite end of the hub a disk N' is secured on the piston-rod K and carries on its inner side a valve N, adapted to seat on the hub K' and to close that end of the central bore K' opposite the one which can be closed by the valve M. Normally the parts are in the positions shown in Fig. 3, and the compressed air from the chamber G cannot escape, and the communication between the duct K' and the central bore K' of the hub K' is closed by the valve M. As soon as the valve L is lifted off the end of the corresponding channel L in the bridge piece L the pressure on the outer side of the piston J' is reduced to much less than the pressure on the inner side, which internal pressure is about six to eight pounds to the square inch more than atmospheric pressure, more or less, and in consequence the piston J' is moved in the direction toward the head J' of the cylinder J, the tension of the spring J' being overcome. At the same time the valve N has been lifted against and closed that end of the central bore K' of the hub K' opposite the one from which the valve M has just been lifted. Compressed air from the chamber G can now pass from the duct K' into the bore K' of the hub K' and as it cannot escape from the end of the said bore passes through the duct K' in the inverse direction of the arrow shown and, acting on the piston II in the cylinder II', drives the piston-rod outward. The parts remain in these positions until the valve H' of Fig. 7 closes the end of the corresponding channel H', and thereupon the pressure is equalized at both sides of the piston J' in the cylinder J, for the reason that some of the compressed air passes through the duct L' and the hollow piston-rod into the closed end of the cylinder J and the tube n, connected therewith, thereby equalizing the pressure. The compressed air now acts on the valve N and readily moves the same from the end of the hub, for the reason that the pressure on both sides of the piston J' is equalized and the pressure on the outer side of the disk N' is less than the internal pressure, and this movement is also assisted by the spring 70 J'. The result is that the valve M shuts off communication between the duct K' and the bore K', and communication is established between the inner end of the cylinder II' and the outer air by means of the duct K' and the bore K', and the spring I' can now force the piston H toward the inner end of the cylinder II'. The parts remain in this position until the end of the corresponding channel L is again opened in the manner described or in any other manner, and so on.

By means of a water-motor O of any approved construction, supplied with water by the pipe O', air-compressors Q, which are connected with each other, are operated and serve to compress air to the desired pressure in a tank O, which, for example, may be located in the cellar, or the compressors may be operated by any other power. The air-tank O' is connected, by means of a pipe O', with the casing A, and one branch O' of this pipe extends to the main valve P of the entire mechanism, which valve is located within the casing A and has its stem provided with a cross-arm the ends of which rest against the heads of the piston-rods I' and I' of two cylinders h and h', constructed and operating like the mechanism shown in Fig. 3, and which two cylinders serve for opening and closing the main supply-valve P. Compressed air passes from the main valve P through the pipe m to the two pressure-regulators Q and R, and from the pressure-regulator Q compressed air passes through the pipe m' and its branches to the two compressed-air chambers G G, with which the several key-operating plungers are connected, and from the pressure-regulator R the compressed air passes through the pipes m' to various other air-operated mechanism, which will be described later on. The pipe O' conducts compressed air to the valve mechanism of the plungers h and h'. The regulator Q consists of a cylindrical casing provided with a neck Q', through which the compressed air enters, and with a neck Q', through which air escapes, the neck Q' extending some distance into the regulator Q and being closed at its inner end, which closed inner end has a hole Q', which can be closed by a valve Q' on the end of an arm Q, secured to a diaphragm Q', which diaphragm has a stem Q', the opposite end of which is secured to a sliding piece Q', mounted to slide in a neck Q' of the casing of the pressure-regulator, Fig. 13. The diaphragm Q' has such spring tension as to hold the valve Q' normally such a distance from the hole Q' as to permit a certain predetermined quantity of compressed air to pass. The sliding piece Q' terminates in a stem Q', which rests on a rim of a ratchet-wheel S, made integral with a larger ratchet-wheel S', engaged by a pawl S', pivoted on a pawl-lever S', mounted
to rock on the shaft of the ratchet-wheels S S', which rocking lever S can be actuated by a rod P of a cylinder R like the one shown in Fig. 3, and whenever said ratchet-wheel is turned to the proper extent the stem Q 2 is forced inward, as is also the diaphragm Q 1, and the valve Q 1 is opened to a greater extent, thus permitting a greater quantity of compressed air to pass through the neck Q 1, and from the same through the connecting-tube w into two chambers G, connected with the several plungers like those shown in Fig. 3 for operating the keys. As will be seen from Fig. 1, one stroke of the pawl-lever S 2 opens the valve Q 1 to its greatest extent, and the next stroke permits it to close as far as the diaphragm Q 1 permits. The cylinder h 2 is connected by a fine tube w' with one of the ducts b in the bridge-piece B, and whenever such a greater quantity of compressed air is to be admitted into the chambers G for the key-strikers a hole a' must be provided in the note-sheet a. For example, when the keys for a chord are to be struck with a heavier force such greater pressure of compressed air must be admitted in the manner just described. The other pressure-regulator R is constructed in a similar manner, with the exception that the diaphragm in the same is adjustable by means of a screw R', according to the desired pressure to be maintained. As stated, the air that has passed from the regulator R is conducted to a series of mechanisms. A branch pipe w 2 extends to a cylinder h 3, and the branch pipe w 3 extends to a cylinder h 4, the piston-rods of which two cylinders bear against the opposite sides of the arm T 3 on the lower part of a vertical rock-shaft T 4, provided at its upper end with a crank-arm T 5, which is connected by a connecting-rod T 6 with the swinging arm D 5, carrying a cog-wheel D 7. Accordingly as the compressed air is admitted into one of the two cylinders h 3 or h 4 the rock-shaft T is turned in one direction or the other, and by means of the connecting-rods T 6 the cog-wheel D 7 is engaged in engagement with the cog-wheel D 1 for playing or into engagement with the cog-wheel E 1 for rewinding the sheet back upon the original roller D. It is necessary that the lugs C of the several key-levers C shall be depressed while rewinding the note-sheet, so as to be cut of the way of the same, and for this purpose the half-round shaft C 5 is provided at one end with a crank-arm T 7, which is connected by a connecting-rod T 8 with a crank-arm T 9 of the shaft T, so that when said shaft T is turned as to shift the cog-wheel D 9 from the cog-wheel D 2 to the cog-wheel D 7 for rotating the winding mechanism the half-round shaft C 5 is turned such an extent as to press down the lugs C of the key-levers C, so that they will be below the slotted plate C 6, and thus cannot tear the note-sheet during rewinding. It is very essential that the motor shall run at a high speed when rewinding, so as not to occupy much time in rewinding, and for that purpose the wedge F 3, which bears on the brake-lever F 1 of the governor, is connected by a rod T 1 with the crank T 2 by a pivot T 3, as shown in Fig. 4, so that the wedge F 3 is moved toward the front of the mechanism during rewinding, whereby the pressure is taken off the spring brake-lever F 1 to such an extent as to permit the governor to rotate freely. As the note-sheet a is wound on the playing-roller D 3 the speed with which the note-sheet travels over the lugs C increases, and therefore it is necessary to gradually decrease the speed of the motor as the diameter of the note-sheet roll on the roller D 3 increases. An arm I of a spring-pressed shaft C, Fig. 5, carries at its end a roller F, and the arm h 6 of this shaft is connected with a rod P, to the front end of which the wedge F 3 is attached. As the diameter of the note-sheet on the roller D 3 increases it pushes the roller F to the rear of the casing, and thereby the wedge F 3 is forced to the front and increases the pressure of the spring brake-lever F 1 on the brake-disc F 4. When the wedge F 3 acts in the manner just described, the wedge F 3 is in its normal position, and the wedge F 3 bears against the wedge F 1, and the latter against the brake-lever F 1. The cylinders h 3 and h 6 are connected with the compressed-air-supply pipe w 1, and the piston-rod of the cylinder h 6 acts on a pawl-lever V 1, carrying a pawl V 1, engaging a ratchet-wheel V 3, with which a toothed wheel V 4 is made integral or mounted on the said shaft. The toothed wheel V 4 has half as many teeth as the wheel V 3, the teeth each having a shoulder W. A lever V 1 pivoted at V 2 has one end in the path of the teeth of the wheel V 3, so that as this wheel is rotated the said lever V 4 is actuated and the other end of the lever V 4 rests against an arm V 5 of the rock-shaft V 4, provided with an arm V 5, connected with a bar V 5, extending down to the soft pedal or piano-pedal. When one of the ends of a tooth of the wheel V 3 bears on the end of the lever V 4, the soft pedal will be depressed to a greater extent than when the shoulder V 5 bears on it, thus producing different effects. The position of the rest of the lever V 4 is when its end rests at the inner end of a tooth. When it rests at the inner end of a tooth and the soft pedal is to be depressed to its greatest extent, the ratchet-wheel V 4 moves the distance of two teeth; but if the pedal is only to be depressed to the intermediate position the ratchet-wheel V 4 must be turned one tooth, and so on. To throw off the soft pedal, the ratchet-wheel must be turned the distance of one tooth from extreme depression and two teeth from intermediate depression. The note-sheet must be provided with holes a', arranged in position and number accordingly as the soft pedal is to be operated. The forte pedal is operated
in the same manner by means of the cylinder \( h' \); but the wheel \( V' \), corresponding to the wheel \( V \), has teeth of uniform length.

The cylinder \( h' \), which throws the arm \( D' \) in such a way as to throw the cog-wheel \( D \) into engagement to the rewinding cog-wheel \( E' \), is connected by an air-tube \( n' \) and \( n \) with a push-button \( W' \) on the board \( W \) on the front of the casing, so that at any time by pushing this button the air is permitted to escape from the valve mechanism of the cylinder \( h' \) and the shaft \( T \) rotated in such a manner as to set the gear to rewinding. The push-button \( W' \) on the board \( W \) is connected by an air-tube \( n' \) with the cylinder \( h' \), so that by pressing on said button the air is permitted to escape from the valve mechanism of the cylinder \( h' \) and as the piston of the latter moves outward it throws the arm \( P' \) of the main valve \( P \) into such a position as to open this main valve and start the mechanism. The valve mechanism of the cylinder \( h' \) of the starting- and stopping device is connected by a tube \( n' \) with one of the ducts \( b \) in the bridge-piece, and in this tube \( n' \) a cock \( I \) is located, which cock is provided with a tapering bore \( I' \) for a plug \( I' \), having a handle \( P' \) which handle projects from the board \( W \). The body of this cock has a channel \( I' \), extending across the bore \( I' \) at right angles, and also has a hole \( P' \), extending from the bore \( I' \) to the bottom of the cock. The plug \( I' \) has a transverse hole \( P' \), which can be brought to register with the channel \( I' \) of the body, and in addition thereto has a hole \( P' \), extending from the hole \( P' \) through the plug to the surface, but only at one side. When this cock is adjusted as shown in Fig. 11, the hole \( I' \) in the plug registers with the channel \( I' \) and the small hole \( I' \) in the plug registers with the hole \( I' \) in the body of the cock, so that the air can escape from the valve mechanism of the cylinder \( h' \), said air passing from the pipe \( n' \) through the bore \( I' \) into the hole \( I' \) and through the hole \( I' \) and \( P' \). The result of this is that the lever \( P' \) of the main valve \( P \) is turned in such a manner so as to shut off all air-supply from the supply-pipe \( O' \). When the plug \( I' \) is reversed as shown in Fig. 12, so that the small hole \( I' \) in the plug \( I' \) does not register with the hole \( I' \) of the body, the air cannot escape, but the tube \( n' \) is not closed. The cylinder \( h' \) is brought into communication by the tube \( n' \) with the corresponding duct \( b \) in the bridge-piece \( B' \), and the instrument continues to play until it arrives at the end of a tune, when a suitable hole \( a' \), provided in the tune-sheet, registers with this duct, permitting the air to escape from the valve mechanism of the cylinder \( h' \), whereupon the piston-rod of the cylinder \( h' \) turns the valve-lever \( P' \) in such a manner as to shut the main valve \( P' \). If the cock \( I \) is adjusted as shown in Fig. 10, the communication with the cylinder \( h' \) is shut off entirely, and as there is no escape for the air in the valve mechanism of the cylinder \( h' \) the instrument continues to play continuously, and every time at the end of the tune the tune-sheet is automatically wound, a suitable hole in the sheet permitting the air to escape from the valve mechanism of the corresponding cylinder \( h' \), and then when the sheet has been rewound entirely another hole registers with the duct \( b \), connected with the valve mechanism of the cylinder \( h' \) and so on for an indefinite time. So as to prevent the note-sheet from unwinding too readily from the roller \( D \), the shaft of this roller carries loosely a disk \( r \), against which a brake-lever \( r' \) rests. While the sheet is being unwound, the shaft of the roller \( D \) turns in the direction of the arrow, Fig. 14, and the two clutch-levers \( r' \) of the disk \( r' \) on the shaft of the roller \( D \) engage by friction the inner surface of the rim of the pulley \( r \) and turn the same in the direction of the arrow, Fig. 14, and as the brake-lever \( r' \) rests against this disk a too-rapid unwinding is avoided; but while the sheet is being rewound upon the roller \( D \) the said roller turns in the inverse direction of the arrow, Fig. 14, and the clutch-levers \( r' \) slide within the pulley \( r \) without turning it. In place of the clutch mechanism shown any other well-known friction-clutch mechanism may be used.

In the drawings the large tubes are compressed-air-supply tubes, and the small tubes are air-escape tubes for the valve mechanisms. The tube \( m' \) supplies compressed air to the motor \( E' \). As the pivoted arm \( D' \) requires but a slight movement for throwing the wheel \( E' \) from the wheel \( D' \) to the wheel \( E' \) or, vice versa, from the wheel \( E' \) to the wheel \( D' \), but a comparatively-large throw of the crank-arm \( T' \) is required for turning the half-round shaft \( C' \). The connecting-rod \( T' \) is provided with a longitudinal slot \( l' \), so as to insure the proper turning of the half-round shaft \( C' \) before the wheel \( D' \) is engaged with the wheel \( E' \).

The operation of the playing attachment is as follows: The proper tune-sheet is inserted after the retaining-bar \( C' \) has been lifted, and this retaining-bar is lowered and locked after the tune-sheet has been attached to the playing-roller \( D' \). The press-button \( W' \) is pressed to start the mechanism, which continues to play in the manner described until the end of a tune-sheet, when a hole \( a' \) in the tune-sheet registers with a corresponding duct \( b \) of the bridge-piece \( B' \) whereby the main valve \( P \) is closed and the mechanism stopped, all parts being returned to the original positions ready for starting again.

The note-sheet can be removed to be replaced by another or the same tune can be repeated. By means of the cock \( I \) the mechanism can be adjusted to repeat an indefinite time, and if ever it becomes necessary to rewind before a melody is completed for any reason whatever the button \( W' \) can be pushed.

As shown, the cylinders \( h' \), for operating the white keys \( w' \) and the black keys \( w' \) are arranged in two groups.
It is evident that the mechanism can be reversed and placed below the inner ends of the levers on which the keys are fixed, so as to press such inner ends of the levers upward, with which arrangement the entire mechanism would be concealed within the piano.

As has been stated and described, the time of playing can be easily regulated by means of the screw F, as by turning said screw inward the pressure of the brake-lever \( F^2 \) on the brake-disk \( F^3 \) is increased and the time will be slower, while, on the contrary, when said screw is moved outward the pressure on the brake-lever is decreased and the playing will be more rapid.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a perforated tune-sheet is wound, of a motor for rotating said rollers, a brake-disk loosely mounted on one roller, a brake-lever engaging said brake-disk, a clutch on the shaft of said roller for rotating the brake-disk when the roller rotates in one direction, only, substantially as herein shown and described.

2. In a self-playing attachment for key musical instruments, the combination with two rollers, upon which a tune-sheet is wound, a motor for rotating said rollers alternately, a governor operated by said motor, a brake-lever acting on said governor and means adjacent to one roller for controlling the brake-lever according to the amount of the tune-sheet wound on said roller, substantially as herein shown and described.

3. In a self-playing attachment for key musical instruments, the combination with two rollers, upon which a tune-sheet is wound, a motor for rotating said roller, a governor operated by said motor, a brake-disk on said governor, a spring brake-lever bearing on said brake-disk, a wedge rested against the said brake-lever and means for shifting said wedge automatically from the tune-sheet as the same is wound upon one roller, substantially as herein shown and described.

4. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a tune-sheet is wound, a motor for operating said roller, a governor operated by the motor, a brake-lever acting on said governor, a wedge adjacent to said brake-lever, an adjustable abutment for said wedge and means for shifting said wedge from the quantity of tune-sheet wound on one roller, substantially as herein shown and described.

5. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a tune-sheet is wound, of a motor for rotating said roller, a governor operated by said motor, a brake-lever acting on said governor, a wedge bearing against said brake-lever, an angle-lever, one end of which forms an abutment for said wedge, a screw on which the other end of said angle-lever rests and a pointer for indicating the adjustment of said screw, substantially as herein shown and described.

6. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a note-sheet is wound, of a motor for rotating said rollers, a governor operated by the motor, a brake-lever acting on the governor, a wedge resting against said brake-lever, a pivoted lever having one end adjacent to the circumference of one of the note-sheet rollers and a connection between the opposite end of said lever and said wedge, whereby said wedge is moved in relation to the brake-lever by the action of the note-sheet wound on that end of the lever adjacent to the periphery of the note-sheet roller, substantially as herein shown and described.

7. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a note-sheet is wound, of a motor for rotating said rollers alternately, a governor for said motor, gearing for throwing the motor in gear with either of said rollers, a wedge connected with said gearing and moving with the same, a brake-lever on which said wedge acts and which brake-lever acts on the governor and an abutment for said wedge, substantially as herein shown and described.

8. In a self-playing attachment for key musical instruments, the combination with rollers upon which a tune-sheet is wound, of a motor for rotating these rollers alternately, gearing for throwing the motor in gear with either of said rollers, a governor operated by the motor, a brake-lever acting on said governor, two wedges in contact, of which one acts on the brake-lever and an abutment against which the other wedge rests and means for shifting one wedge when the tune-sheet is being wound on one roller and means for shifting the other wedge before the tune-sheet is being wound on the other roller, substantially as herein shown and described.

9. In a self-playing attachment for key musical instruments, the combination with rollers upon which a note-sheet is wound, of a motor for rotating these rollers alternately, gearing for throwing the motor in gear with either of said rollers, a governor operated by the motor, a brake-lever acting on said governor, two wedges in contact, of which one acts on the brake-lever and an abutment against which the other wedge rests and means for shifting one wedge when the motor-gearing is in engagement with one roller and means for shifting the other wedge as the quantity of tune-sheet wound on the other roller increases, substantially as herein shown and described.

10. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a note-sheet is wound, of a motor, a cog-wheel rotated by the motor.
and adapted to engage either of said rollers, a swinging lever supporting the said cog-wheel, a governor operated by the motor, a brake-lever acting on the governor, a wedge adjacent to said brake-lever and a rod connecting said wedge with the lever that throws the swinging cog-wheel into gear for rotating the one roller or the other, substantially as herein shown and described.

11. In a self-playing attachment for key musical instruments, the combination with a compressed-air chamber extending across the keys of the instrument in close proximity thereto, of a series of cylinders connected with the compressed-air chamber, a piston in each cylinder, a piston-rod on each piston, which piston-rods each act directly on a key, a perforated note-sheet for controlling the admission of compressed air into said cylinders and means for moving said sheet, substantially as herein shown and described.

12. In a self-playing attachment for key musical instruments, the combination with a bridge-piece having a number of ducts terminating in its flat top, of a valve for each duct, a spring to which each valve is attached and a key-lever above each spring, substantially as herein shown and described.

13. In a self-playing attachment for key musical instruments, the combination with a bridge-piece having a number of ducts terminating in its flat top, of a valve above each duct, a spring for each valve, to which the valve is attached, a pivoted key-lever above each spring and means for depressing and holding down all the key-levers together, substantially as herein shown and described.

14. In a self-playing attachment for key musical instruments, the combination with a bridge-piece having a series of ducts terminating in its flat top, of a valve above each duct, a spring-strap for each valve to which spring-strings the valves are attached, a pivoted key-lever above each valve, an arm projecting from each key-lever, a shaft having a flat side and extending over the several arms and mounted to turn axially and means for turning said shaft to press down the several key-levers and close the several valves, substantially as herein shown and described.

15. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a slotted note-sheet is wound, of a motor for rotating said rollers alternately, a bridge-piece having a series of ducts terminating in the flat top of the bridge-piece, a valve above each duct, a key-lever for each valve, a shaft for pressing down the several key-levers and means for operating said shaft to press down the key-levers at the same time that the motor is thrown in gear with one of said note-sheet rollers, substantially as herein shown and described.

16. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a note-sheet is wound, a motor rotating said rollers alternately, means for throwing the motor in gear with either of said rollers, a bridge-piece having a series of ducts terminating in the top of the bridge-piece, a valve for each duct, a key-lever for each valve, a shaft for pressing down the several key-levers and closing the several ducts, means for turning said shaft axially which means are operated by the same mechanism which throws the motor in gear with one of the rollers, substantially as herein shown and described.

17. In a self-playing attachment for key musical instruments, the combination with two rollers upon which a note-sheet is wound, of a motor for operating said rollers alternately, means for throwing the motor in gear with either of said rollers, a bridge-piece having ducts terminating in the same, a valve for each duct, a key-lever for each valve, an arm on each key-lever, a half-round shaft above the said arms and mounted to rotate, a crank on the end of said half-round shaft, a rod connecting said crank with the mechanism for shifting the motor-gear from one of said note-sheet rollers to the other, substantially as herein shown and described.

18. In a self-playing attachment for key musical instruments, the combination with a plurality of compressed-air chambers extending across the keys and means for supplying them with compressed air, of a series of mechanisms operated by compressed air, a valve-casing for each such mechanism, a compressed-air-escape tube connected with one end of each valve-casing and means for controlling said compressed-air-escape tubes, substantially as herein shown and described.

19. In a self-playing attachment for key musical instruments, the combination with a compressed-air chamber extending across the keys and means for supplying the same with compressed air, of a series of mechanisms operated by compressed air, a valve-casing for each mechanism, a compressed-air-escape tube connected with one end of each valve-casing and a perforated tune-sheet for controlling said escape tubes, substantially as herein shown and described.

20. In a self-playing attachment for key musical instruments, the combination with a compressed-air chamber extending across the keys and means for supplying the same with compressed air, of a series of mechanisms operated by compressed air, a valve-casing for each mechanism, a compressed-air-escape tube connected with one end of each valve-casing, a perforated tune-sheet for controlling the air-escape tubes and a compressed-air-operated mechanism for moving the note-sheet, substantially as herein shown and described.

21. In a self-playing attachment for key musical instruments, the combination with a compressed-air chamber extending across the keys and means for supplying it with compressed air, of a series of mechanisms operated by compressed air, a valve-casing for
each mechanism, a compressed-air-escape tube connected with one end of each valve-casing, a bridge-piece in which the several air-escape tubes terminate, valves for controlling the several air-escape tubes and means for moving a note-sheet for the purpose of operating the said valves, substantially as herein shown and described.

22. In a self-playing attachment for key musical instruments, the combination with a compressed-air chamber extending across the keys and means for supplying it with compressed air, of a series of mechanisms operated by compressed air, a valve-casing for each mechanism, a compressed-air-escape tube connected with one end of each valve-casing, a bridge-piece in which the several air-escape tubes terminate, a valve for each tube, a key-lever for each valve, means for moving a note-sheet over the key-levers to operate the same, substantially as herein shown and described.

23. In a self-playing attachment for key musical instruments, the combination with a compressed-air chamber extending across the keys and means for supplying it with compressed air, of a series of mechanisms operated by compressed air, a valve-casing for each mechanism, a compressed-air-escape tube connected with one end of each valve-casing, a valve for each air-escape tube, means for moving a note-sheet over said valves to operate the same, an additional air-escape-controlling valve in some of said air-escape tubes, for the purpose of operating some of the mechanism at the will of the operator, substantially as herein shown and described.

24. In a self-playing attachment for key musical instruments, the combination with a plurality of compressed-air chambers extending across the keys and means for supplying them with compressed air and a series of mechanisms operated by compressed air, a valve-casing for each such mechanism, a compressed-air-escape tube connected with each valve-casing means for controlling said compressed-air-escape tubes, a pressure-controlling valve in the compressed-air-supply tube, a ratchet-and-pawl mechanism for operating said controlling valve, and one of the above-described compressed-air mechanisms for operating the ratchet-and-pawl mechanism above mentioned, substantially as herein shown and described.

25. In a self-playing attachment for key musical instruments, the combination with a compressed-air chamber and means for supplying the same with compressed air, of a series of mechanisms to be operated by the compressed air for the purpose of operating the keys, a valve in the main compressed-air-supply pipe, two such compressed-air mechanisms for operating said main valve, a valve-casing for each such compressed-air mechanism, a compressed-air-escape tube connected with one end of each compressed-air-valve casing, mechanism for moving a tune-sheet controlling some of the compressed-air-escape tubes, a hand-operated valve in the compressed-air-escape tube of one of the mechanisms for operating the main valve and a hand-operated valve in the compressed-air-escape tube of the other compressed-air mechanism for operating the main valve, which latter hand-operated valve is capable of adjustment in various positions for various purposes, substantially as herein shown and described.

26. In a self-playing attachment for key musical instruments, the combination with a plurality of compressed-air chambers extending across the keys and means for supplying them with compressed air, of a series of mechanisms operated by compressed air, a valve-casing for each such mechanism, a compressed-air-escape tube connected with one end of each valve-casing, means for controlling said air-escape tubes and a pressure-regulating valve connected with the compressed-air-supply tube, substantially as herein shown and described.

27. In a self-playing attachment for key musical instruments, the combination with a plurality of compressed-air chambers and means for supplying them with compressed air and a series of mechanisms operated by compressed air, a valve-casing for each such mechanism, a compressed-air-escape tube connected with each valve-casing means for controlling said compressed-air-escape tubes, a pressure-controlling valve in the compressed-air-supply tube, a ratchet-and-pawl mechanism for operating said controlling valve, and one of the above-described compressed-air mechanisms for operating the ratchet-and-pawl mechanism above mentioned, substantially as herein shown and described.

28. In a self-playing attachment for key musical instruments, the combination with a plurality of compressed-air chambers and means for supplying them with compressed air, of a series of mechanisms operated by compressed air, a valve-casing for each such mechanism, a compressed-air-escape tube connected with each valve-casing means for controlling said compressed-air-escape tubes, a pressure-controlling valve in the compressed-air-supply tube, a ratchet-and-pawl mechanism for operating said controlling valve, and one of the above-described compressed-air mechanisms for operating the ratchet-and-pawl mechanism above mentioned, substantially as herein shown and described.
automatically-controlled pressure-regulator in said latter tube, substantially as herein shown and described.

29. In a self-playing attachment for key musical instruments, the combination with a plurality of compressed-air chambers and means for supplying them with compressed air, of a series of mechanisms to be operated by compressed air for operating the keys and another series of such mechanisms for actuating other parts, a valve-casing for each such mechanism, a compressed-air-supply tube for the mechanism for operating the parts other than keys, a hand-controlled pressure-regulator in said tube, another air-supply tube for the compressed-air mechanism for operating the keys, an automatically-controlled pressure-regulator in said latter tube, and means for operating said latter air-controlling valve automatically by means of one of the above compressed-air mechanisms, substantially as herein shown and described.

30. In a self-playing attachment for key musical instruments, the combination with a plurality of compressed-air chambers and means for supplying them with compressed air of a series of mechanisms operated by compressed air for operating the keys, compressed-air mechanisms for operating the pedals, a valve-casing for each such compressed-air mechanism, a compressed-air-escape tube connected with one end of each valve-casing, means for automatically controlling said compressed-air-escape tubes, a ratchet-and-pawl mechanism operated by the compressed-air mechanism for the pedal, and means for operating the pedal-levers from said ratchet and pawl, substantially as herein shown and described.

31. In a self-playing attachment for key musical instruments, the combination with compressed-air chambers and means for supplying them with compressed air, of a series of mechanisms to be operated by compressed air, for operating the keys, compressed-air mechanisms for operating the pedals, a valve-chamber for each compressed-air mechanism, a compressed-air-escape tube connected with one end of each valve-chamber, means for automatically controlling the compressed-air-escape tubes, a pawl-lever operated by each compressed-air mechanism for the pedals, a ratchet-wheel operated by such pawl-lever a tooth-wheel on the same shaft with the ratchet-wheel, a lever actuated by the toothed wheel and means for operating the pedals from said levers, the toothed wheel of one of the mechanisms having each tooth provided with a shoulder, substantially as herein shown and described.

32. In a self-playing attachment for key musical instruments, the combination with a plurality of compressed-air chambers and means for supplying them with compressed air, of a series of compressed-air-operated mechanisms for operating the keys, compressed-air-operated mechanisms for working other parts, compressed-air-operated mechanisms for automatically controlling the pressure of the compressed air admitted to the key-operating mechanism, a valve in the compressed-air-supply tube for said compressed-air-operated mechanism and a compressed-air mechanism for operating said valve, substantially as herein shown and described.

33. In a self-playing attachment for key musical instruments, the combination with a compressed-air motor, of tune-sheet rollers operated by said motor, a series of compressed-air-operated mechanisms for working the keys, a reversing-gear for gear driven by said motor, a compressed-air mechanism for operating the reversing-gear, compressed-air-operated mechanisms for working the pedals, a main supply-tube for the compressed air, a valve in the same, a compressed-air-operated mechanism for controlling said main valve and means for controlling all said compressed-air-operated mechanisms from a tune-sheet wound on the above-mentioned roller, substantially as herein shown and described.

Signed at New York city, in the county of New York and State of New York, this 12th day of June, A. D. 1899.

HARRY M. SALYER.
Witnesses:
ROBT. HoIT JOHNSTON,
OSCAR F. GUuZ.