

July 5, 1938.

J. BACIGALUPI ET AL  
AUTOMATIC MUSICAL INSTRUMENT

2,122,905

Filed Oct. 6, 1936

4 Sheets-Sheet 1

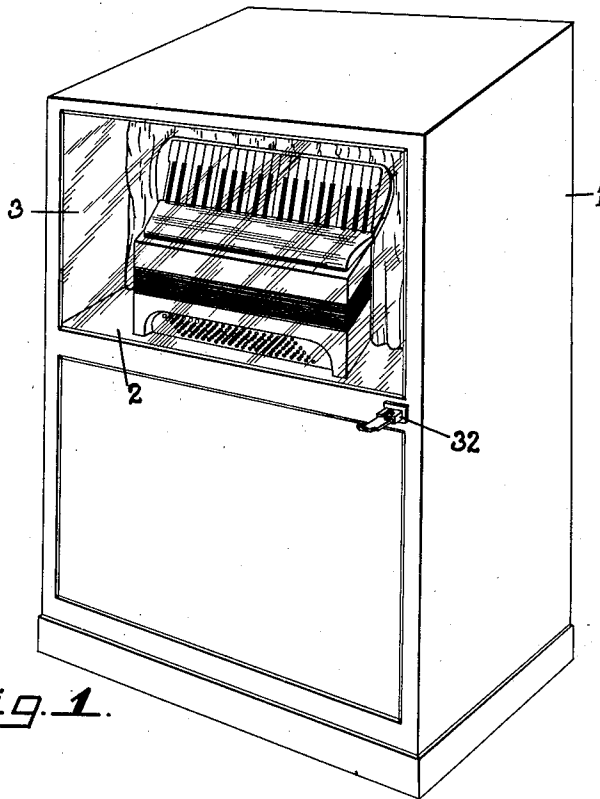


Fig. 1.

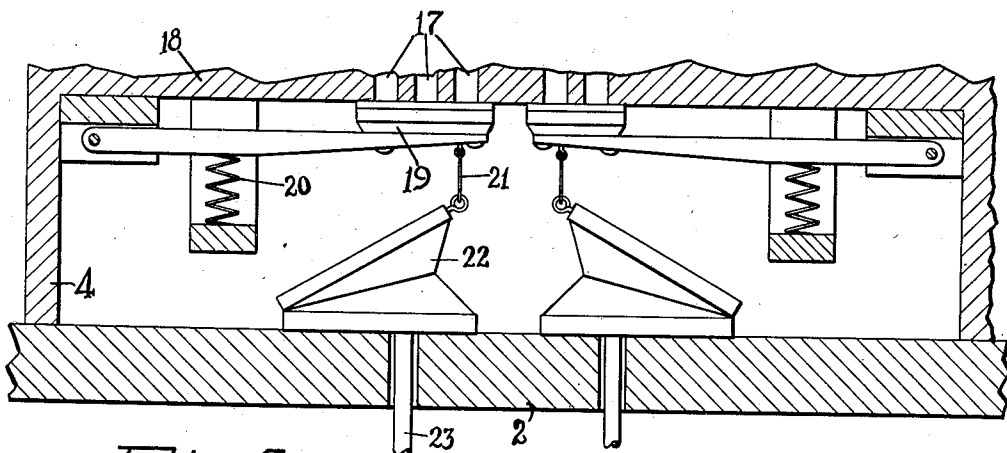


Fig. 4.

INVENTORS,  
*John Bacigalupi and  
Louis Bacigalupi Sr.*  
BY *J. E. Praluceo*  
ATTORNEY

July 5, 1938.

J. BACIGALUPI ET AL  
AUTOMATIC MUSICAL INSTRUMENT

2,122,905

Filed Oct. 6, 1936

4 Sheets-Sheet 2

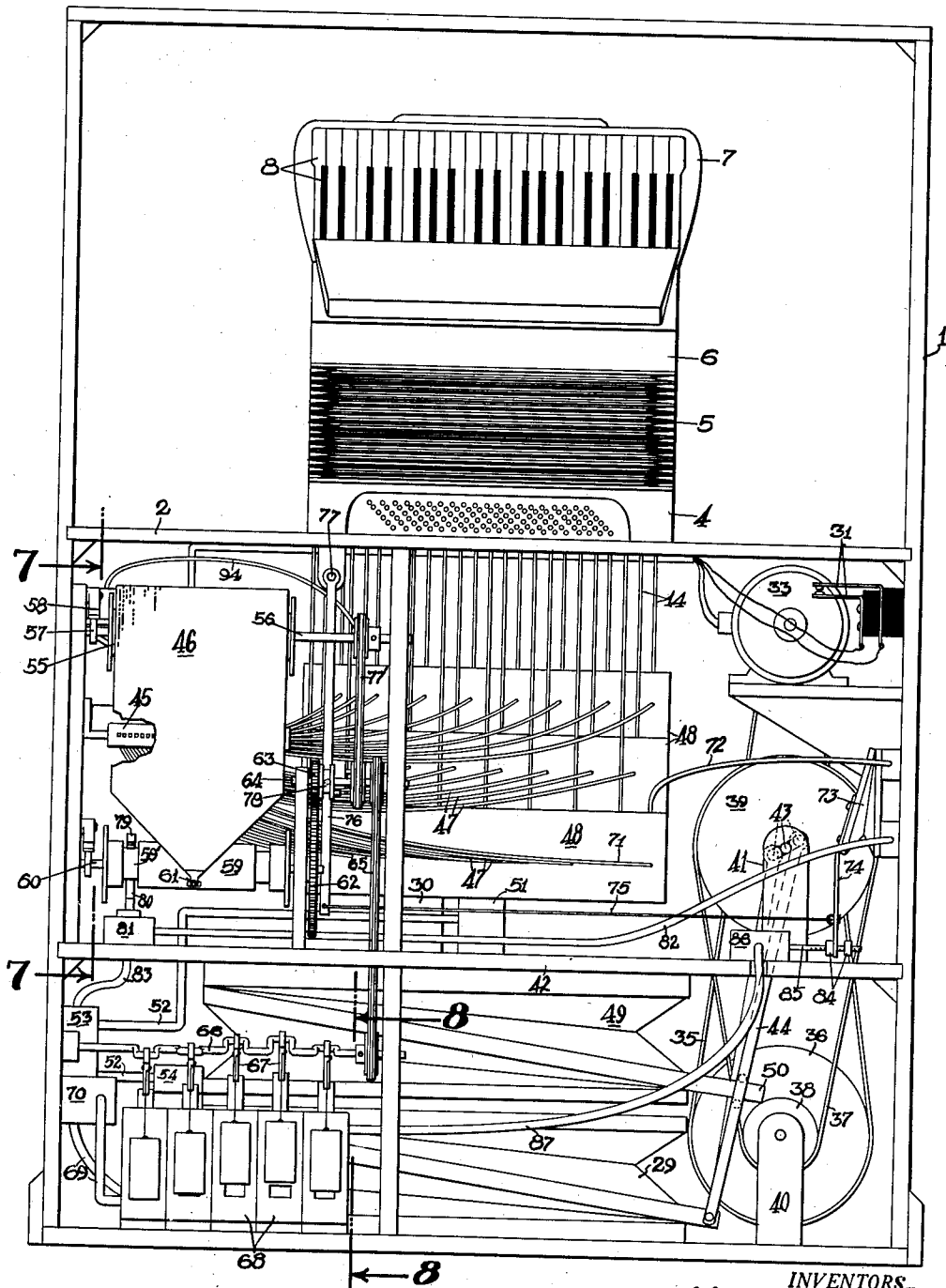


Fig. 2.

INVENTORS,  
*John Bacigalupi and  
Louis Babigalupi Sr.*  
BY *J. E. Trabucco*  
ATTORNEY.

July 5, 1938.

J. BACIGALUPI ET AL

2,122,905

AUTOMATIC MUSICAL INSTRUMENT

Filed Oct. 6, 1936

4 Sheets-Sheet 3

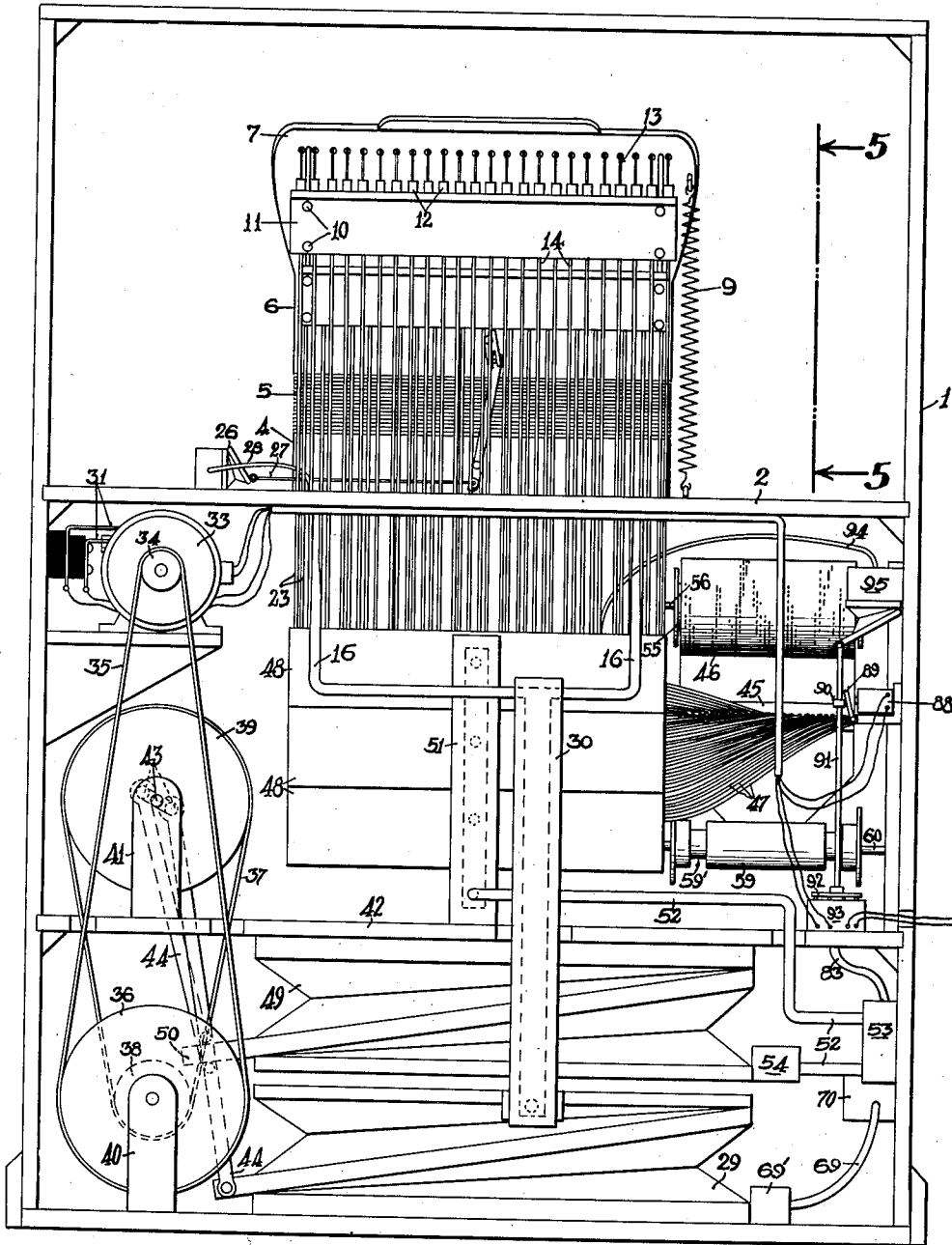


Fig. 3.

INVENTORS,  
*John Bacigalupi and  
Louis Bacigalupi Sr.*  
BY *J. E. Tralucco*  
ATTORNEY

July 5, 1938.

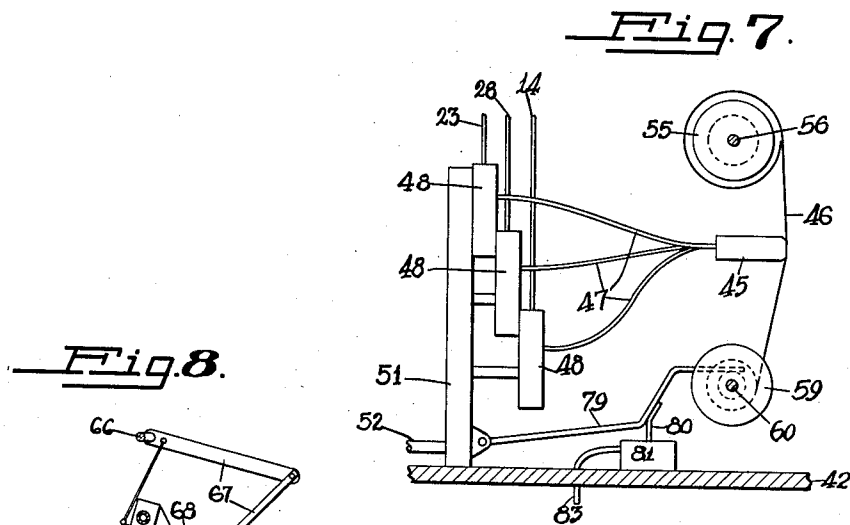
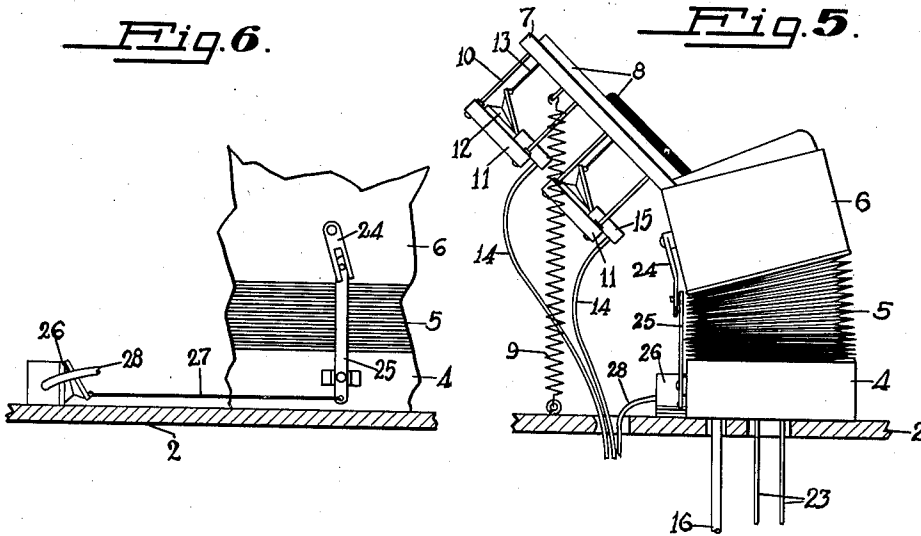
J. BACIGALUPI ET AL

2,122,905

AUTOMATIC MUSICAL INSTRUMENT

Filed Oct. 6, 1936

4 Sheets-Sheet 4



INVENTORS, and  
John Bacigalupi and  
Louis Bacigalupi  
BY J. E. Trabucco  
ATTORNEY.

# UNITED STATES PATENT OFFICE

2,122,905

## AUTOMATIC MUSICAL INSTRUMENT

John Bacigalupi and Louis Bacigalupi, Sr., Los Angeles, Calif.

Application October 6, 1936, Serial No. 104,213

4 Claims. (Cl. 84—83)

This invention relates to improvements in pneumatically controlled and operated musical instruments.

An object of our invention is to provide an improved pneumatically operated musical instrument embodying novel means for automatically controlling the movement of compressed air to a plurality of reeds or other tone producing elements, in accordance with the prearranged perforations in a music sheet.

Another object of our invention is to provide a pneumatically controlled and operated musical instrument embodying a plurality of reeds or other similar tone producing elements which are capable of being vibrated by compressed air, and pneumatic control means for directing compressed air to the said reeds in accordance with the prearranged perforations in a music sheet.

A still further object of our invention is to provide an improved automatically operated accordion embodying pneumatic means having a perforated music sheet associated therewith for controlling the movement of compressed air upon a plurality of tone producing reeds in accordance with the arrangement of perforations of the sheet.

Other and further objects of our invention will be pointed out hereinafter, indicated in the appended claims, or obvious to one skilled in the art upon an understanding of the present disclosure. For the purposes of this application we have elected to show herein certain forms and details of a pneumatically controlled and operated musical instrument representative of our invention; it is understood, however, that the embodiment of our invention herein shown and described is for the purpose of illustration only, and that therefore it is not to be regarded as exhaustive of the variations of the invention, nor is it to be given any interpretation such as might have the effect of limiting the claims, short of the true and most comprehensive scope of the invention in the art.

In the accompanying drawings:

Fig. 1 is a perspective view of a pneumatically controlled and operated musical instrument of the accordion type embodying our invention;

Fig. 2 is a front view of the instrument with the front panels or side of the cabinet removed;

Fig. 3 is a rear view of the instrument with the rear side of the cabinet removed;

Fig. 4 is a sectional view through a part of the instrument showing the control means for the bass or low tone producing members;

Fig. 5 is a side elevation of a part of the instru-

ment as viewed from the broken lines 5—5 of Fig. 3;

Fig. 6 is a fragmentary rear elevation of the instrument illustrating the pitch control mechanism;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 2; and

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 2.

Referring to the drawings, the numeral 1 designates a cabinet of any suitable size and shape having a horizontal shelf or partition 2 for supporting an accordion or other similar musical instrument which is visible through a front glass panel 3.

The body of the musical instrument is made up of a lower base section 4 which supports a series of bass keys, a bellows section 5 overlying and secured to the base section and an upper section 6 positioned above and secured to the bellows section. Secured to the upper section 6 is an inclined keyboard 7 having a plurality of keys 8 movably mounted thereon. Secured to and interposed between the inclined keyboard 7 and the shelf 2 is a coiled spring 9 which tends to maintain the bellows 5 in such a position that the pressure therein is properly equalized. Secured in spaced relation, as by bolts 10, to the keyboard 7, are two rearwardly disposed panels 11, one being positioned directly behind and associated with the white keys 8 and the other being positioned behind and associated with the black keys 8. Secured to the panels 11 are a plurality of small normally expanded bellows 12, each of which is connected by a rigid rod 13 movably extending through a hole in the keyboard 7 to an individual key 8. There is an individual bellows 12 for each key 8, thus providing individual means for operating the keys. Each bellows 12 is connected to a small tubular conduit 14 by a hollow connecting member 15. The keys 8 are each connected, in the well known and customary manner, to a suitable air valve means associated with one of a plurality of tone producing reeds which are capable of being vibrated by compressed air located in the bellows section 5 of the accordion. The tone producing reeds and the valvular means for controlling the compressed air thereto are of the well known and usual kind, and for this reason are not illustrated or described in detail. Communicating with the interior of the bellows section 5 are tubular conduits 16 which supply air under pressure to the bellows 5 for vibrating the tone producing reeds when the keys are depressed by the contraction of

the small bellows 12. The keys 8 are associated with those reeds which are capable of producing the higher musical tones, while other means illustrated in Fig. 4 are employed to admit compressed air to vibrate other reeds for producing the bass tones required in properly reproducing musical compositions. As shown in Fig. 4, groups of holes 17 associated with groups of reeds are provided in a partition 18, and each group of holes is controlled by a pivoted valve 19 which is yieldably pressed upwardly to close said holes by a spring 20. The valves 19 are each associated with and connected by a rod 21 to a small normally expanded bellows 22 having a tubular air conduit 23 connected thereto. When the air is withdrawn from any of the bellows 22 the valve 19 associated therewith is moved to uncover the associated group of holes 17, thereby admitting compressed air so as to cause the vibration of the several bass tone producing reeds associated with said group of holes.

Connected in the usual manner to suitable pitch or tone shifting means located inside the upper section 6 of the accordion is a forked bar 24 which is operated by a pivoted lever member 25. The lever member is actuated by a small normally expanded bellows 26 which is connected thereto by a rigid rod 27. Connected to the bellows 26 is a tubular conduit 28 which serves to exhaust air from the bellows to cause the shifting of the tone or pitch changing mechanism.

Mounted on the bottom of the cabinet, one behind the other, are two large air pumping bellows 29 which are connected to an air distributing manifold 30. The large tubular conduits 16 which are connected to the interior of the bellows 5 are also connected to the manifold 30. The operation of the bellows 29 is accomplished by electrically operated means which is connected in an electrical circuit controlled by a coin operated switch 31. The coin operated switch 31 is closed by suitable mechanism of well known construction, through the instrumentality of a coin inserted in a coin chute 32 positioned at the front side of the cabinet. The electrical circuit is connected to a motor 33, the shaft of which is provided with a pulley 34. A belt 35 extending over the pulley 34 and over a large wheel 36 serves to rotate the latter, and a second belt 37 extending over an axially disposed pulley 38 on the large wheel 36 and over a large wheel 39 serves to rotate the said wheel 39 at a reduced rate of speed. The wheel 38 is mounted on upright standards 40 extending from the bottom of the cabinet and the large wheel 39 is mounted on similar standards 41 secured to a horizontal supporting member 42. Secured to or forming the axle of the large wheel 39 is a crank shaft 43 which has depending connecting rods 44 loosely secured thereto, the said rods being connected at their lower ends to the bellows 29. The rotation of the wheel 39 by means of the motor 33 causes the bellows 29 to be operated so as to pump air to the distributing manifold 30, from whence it is conducted by the tubular conduits 16 to the bellows 5 of the accordion where it is available for use to cause the vibration of the various tone producing reeds. The bellows 29 are so arranged and connected by the connecting rods 44 to the crank shaft 43 that one is expelling air while the other is drawing it in, thereby insuring a constant flow of air under pressure to the manifold 30.

Suitably mounted on a supporting member secured to a side wall of the cabinet is a perforated

tracker bar 45 with which a perforated music sheet 46 engages. The perforations of the tracker bar are connected in the customary manner to a plurality of tubular conduits 47 leading to one or more suction distributors 48 in which there is normally a partial vacuum. Also leading into the suction distributors are the tubular conduits 14, 23 and 28. As is customary in constructions of this kind there is associated with each tube 47 and with one of the tubes 14, 23 or 28, suitable valvular means of the kind disclosed in the publication entitled "Piano Playing Mechanisms" by William B. White which is operated by air entering a distributor 48 through a perforation of the tracker bar 45 when a corresponding perforation in the music sheet 46 registers therewith. The operation of the valvular means associated with a particular perforation of the tracker bar 45 and a tubular conduit 14 leading to a certain bellows 12, causes the collapse of the latter thereby operating its associated key 8, which in turn causes compressed air to be directed from the interior of the bellows 5 upon the particular tone producing reed associated with the depressed key.

Suitably mounted on the horizontal support 42, one behind the other, are two large suction bellows 49 that are connected to the connecting rods 44 by means of projecting pieces 50 interposed between two pins secured to and extending from the said connecting rods. The movement of the connecting rods 44 causes the alternate expanding and contracting of the suction bellows 49. The suction bellows 49 are connected to a suction distributing manifold 51 which in turn is connected by tubular means to the distributors 48. The suction created by the bellows 49 exhausts the air from the manifold 51, thereby causing a partial vacuum to be created and maintained in the distributors 48. The means connecting the bellows 49 with the distributing manifold 51 is a tubular conduit 52 having a hollow casing 53 and a one-way check valve 54 connected thereto at points between the said bellows and manifold.

The perforated music sheet 46 is unwound from an upper roller 55 which has an axially disposed shaft 56 secured thereto. One end of the shaft is supported by a vertical support and its other end is supported in a suitable bearing secured to the side wall of the cabinet, and adjacent said last mentioned end the shaft is provided with an annular flange 57 with which a spring pressed member 58 engages to provide sufficient friction for tension purposes and to prevent the too rapid unwinding of the music sheet 46. Positioned beneath the roller 55 is a second roller 59 having an axial shaft 60 supported at its ends by suitable bearings provided on the cabinet's side wall and in a vertical supporting member. The shaft 60 of the roller 59 is also provided with similar friction means for preventing the said roller from turning too rapidly when the music sheet is being rewound therefrom onto the upper roller 55. Suitable means 61 is provided on the lower roller 59 for attaching the end of the music sheet 46.

Secured to the shaft 60 of the lower roller 59 is a large circular gear 62 that detachably meshes with a small circular gear 63 splined to a short shaft 64. The short shaft 64 is rotatably supported by the aforementioned vertical supports, and also secured to said shaft is a pulley over which an endless belt 65 extends, the said belt also extending over a similar pulley secured on the end of a crank shaft 66. The crank shaft 66 is rotatably supported at its ends by the cabinet's side wall and by a vertical support.

Connecting rods 67 serve to connect the crank shaft 66 with the bellows 68 of a suitable wind motor which is supplied with compressed air for operating purposes by means of a tubular line 69 leading from the pressure bellows 29. Connected in the tubular line 69 is a check valve 69' and a hollow casing 70. When the wind motor is operating, the crank shaft 66 is rotated so as to rotate the roller 59 and cause the winding of the perforated music sheet 46 on the latter. As the perforations of the music sheet come into registry with the holes of the tracker bar 45, the tones and notes of the musical composition are reproduced automatically by the apparatus previously described. The tracker bar 45 has a certain hole therein with which a certain perforation in the music sheet 46 registers when the end of the composition has been concluded, and through suitable means associated with said hole the winding of the sheet on the roller 59 is discontinued and a rewinding thereof on the roller 55 is commenced. Connected to this last mentioned hole in the tracker bar 45 is a tubular conduit 71 which is connected in one of the suction distributors 48 to a valvular means associated with a tubular conduit 72 leading to a bellows 73. The movable side of the bellows 73 is secured to a forked bar 74 which extends in a downward direction and has one end of a small rod 75 secured thereto, the other end of said rod being secured to a gear shifting lever 76. The gear shifting lever is suspended from a pivot member 77 and carries a projecting part which extends between the annular end flanges of a wheel 78 that is rigidly secured to the small circular gear 63. When the last perforation in the music sheet 46 comes into registry with the particular hole of the tracker bar 45 associated with the tubular conduit 71, the suction is applied to the bellows 73 thereby bringing about the latter's contraction, which in turn causes the pulling of rod 75 sufficiently to carry the lever member 76 to a position whereby the gear 63 is disconnected from the large gear 62. The rotation of the roller 59 in a clockwise direction by means of the wind motor is thereby discontinued. Loosely secured to the shaft 64 is a pulley over which a belt 77' extends, the said belt also extending over a similar pulley secured to the shaft 56 of the roller 55. The lower pulley over which the belt 77' extends has a projecting lug which is engaged by a similar lug on the adjacent side of the wheel 78 when the latter is shifted in the manner just described. The engagement of the lugs of the said wheel 78 and the said pulley causes the rotation of the roller 55, thereby starting the rewinding thereon of the music sheet. The rewinding of the roller 55 continues until the last winding of the music sheet on the roller 59 has been removed, and at that moment a pivoted member 79, having been held in an elevated position by the last winding on the roller, drops into an annular groove 59' in the said roller, thereby carrying a valve operating member 80 into such a position in a valve casing 81 that a tubular line 82 leading from said casing to the bellows 73 is opened to the atmosphere, thus breaking the vacuum in the said bellows and allowing the latter to expand. The expansion of the bellows 73 causes the pushing of the rod 75 in a direction so as to cause the lever 76 to move the wheel 78 away from the pulley over which the belt 77 extends, thereby disengaging the lugs of the wheel and pulley and again bringing the gears 63 and 62 into mesh with one an-

other. When the winding of the music sheet 46 on the roller 59 commences, the pivoted member 79 is lifted from the groove 59' by the first winding of the sheet on the said roller, thereby closing the tubular line 82 to atmospheric pressure and again establishing the bellows 73 in a sealed condition so it can again function to shift the gears upon the commencement of the rewinding of the music sheet, as previously described.

In order to break the vacuum in the suction distributors 48 when the music sheet is being rewound on the roller 55 so as to prevent the unharmonious operation of the instrument, suitable mechanism of the kind commonly used is actuated by the raising of the pivoted member 79 to a certain height by the winding of the music sheet 46 on the roller 59. The valve operating member 80 associated with the pivoted member 79, upon being raised to a certain height, opens a tubular line 83 connecting the valve casing 81 and the hollow casing 53 to the atmosphere, thereby breaking the vacuum in the distributors 48. The dropping of the pivoted member 79 when the music sheet is being rewound from roller 59 again causes the valve operating member 80 to close the line 83 so outside air cannot enter and interfere with the producing of a partial vacuum in the distributors 48. The speed at which the wind motor operates is controlled by the following described mechanism. The forked end of the bar 74 is positioned between adjustably spaced nuts 84 which are secured to a control rod 85 entering a valve casing 86 which is connected in a tubular line 87 leading to one of the bellows 68 of the wind motor. By adjusting the nuts 84 on the rod 85 the valvular means may be operated by the bellows 73 to allow a greater or a lesser amount of air to be available for the operation of the wind motor, either for the normal playing of the instrument or for the rewind of the music sheet after it is played.

The electric switch mechanism for starting and stopping the operation of the apparatus includes a solenoid 88 connected in the circuit leading from a source of electrical power to the coin controlled switch 31. Armature 89 of the solenoid 88 detachably engages with a collar 90 secured to a vertical rod 91 having a contact member 92 carried at its lower end which is adapted to engage with terminals in a switch box 93 connected in the circuit leading from the source of electrical power to the motor 33. When a coin enters the coin chute and closes the switch 31, the circuit to the solenoid 88 is closed, thereby causing the armature 89 to be pulled from engagement with the collar 90 of the rod 91. The releasing of the collar allows the rod to drop downwardly and carry the contact member into engagement with the terminals in the switch box 93, thereby completing the circuit to the motor to commence its operation. After the music sheet 46 has been rewound on the roller 55 a perforation in the extreme front end or beginning of the latter engages with a certain hole in the tracker bar 45 which is connected to a suction distributor 48 and associated with a tubular conduit 94 leading to a small bellows 95. The upper end of the vertical rod 91 is secured to the bellows 95, and when the latter is contracted by the suction of air therefrom the rod 91 is elevated so as to cause the contact member 92 to be disengaged from the terminals of the electrical circuit, thereby breaking the circuit to the motor 33 to cause the stopping thereof. When the circuit is broken the armature 89 falls down-

wardly and engages the collar 90 to prevent the playing of the instrument until a coin is again inserted in the coin chute.

Having described our invention what we claim is:

1. In an automatic musical instrument, a plurality of keys for controlling the movement of compressed air to a plurality of sound producing members, means for supplying compressed air for the vibrating of the members, a collapsible bellows associated with each key having means connecting it to a key, a suction distributor, means for withdrawing air from the distributor, a tubular conduit connecting each bellows with the distributor and a valve means therein, a perforated tracker bar with which a perforated music sheet normally engages, a tubular conduit connecting each perforation of the tracker bar with the suction distributor, each of the conduits leading from the tracker bar being associated with a particular conduit leading to a collapsible bellows, whereby a certain perforation in the tracker bar being opened by a perforation in a music sheet registering therewith allows air to pass to the distributor to cause the suction of air from a particular bellows, whereby a certain key may be operated in accordance with the registering of a certain perforation of the music sheet with a certain perforation of the tracker bar to control the movement of compressed air to a particular sound producing member.
2. In an automatic musical instrument a plurality of keys for controlling the movement of compressed air to a plurality of sound producing members, means for supplying compressed air for the vibrating of the members, separate pneumatically operated means associated with each key for operating the latter, a suction distributor, tubular means connecting each of the pneumatic key operating means with the distributor, means for providing a partial vacuum in the distributor, a perforated tracker bar with which a movable music sheet engages, a plurality of tubular conduits connecting each perforation of the tracker bar with the distributor, the said conduits leading from the tracker bar each being associated through a valvular means with a separate conduit leading to a certain pneumatic key operating means, whereby upon a certain perforation in the tracker bar being opened by a certain perforation in a music sheet registering

therewith and thereby allowing air to pass to the distributor to cause the operation of a particular pneumatic key operating means, a certain key may be operated to allow air to be directed to a certain sound producing member, an electric motor connected in a circuit for operating the means for supplying compressed air and for operating the means for producing a partial vacuum in the distributor, a switch in the circuit, and pneumatic switch operating means connected to the suction distributor and associated with a certain perforation in the tracker bar through a tubular conduit leading from said perforation to the distributor, the said switch operating means being adapted to operate the switch to open the circuit when a certain perforation in the sheet registers with the last mentioned perforation of the tracker bar.

3. In an automatically operated accordion having sound producing means therein, a plurality of keys for controlling the operation of the sound producing means, means for supplying air under pressure to the sound producing means, pneumatically operated means for the keys, a pneumatically operated tone shifting means in the accordion, and means controlled by a perforated sheet for controlling the operation of the key operating means and the tone shifting means.

4. In an automatic musical instrument, a plurality of spaced rollers upon which a perforated music sheet is wound, one of the rollers having an annular groove therein, a tracker bar interposed between the rollers and engaging the said sheet, operating means for the rollers, clutch means associated with the operating means for connecting the operating means with one roller and disconnecting the same from the other roller, and a pivoted lever member for operating the clutch means, the said lever member being normally supported above the annular groove of the grooved roller by the sheet wound on said grooved roller, the said lever member being so constructed and arranged as to actuate the clutch means when the said lever drops into the groove of the grooved roller upon the said lever member being released from an elevated position by the last winding of the sheet on the grooved roller being unwound therefrom.

JOHN BACIGALUPI,  
LOUIS BACIGALUPI, SR.