Aug. 19, 1924. 1,505,374

T. F. CHEEK

RECORD CONTROLLED GRAND PIANO

Filed July 13, 1923 3 Sheets-Sheet 1

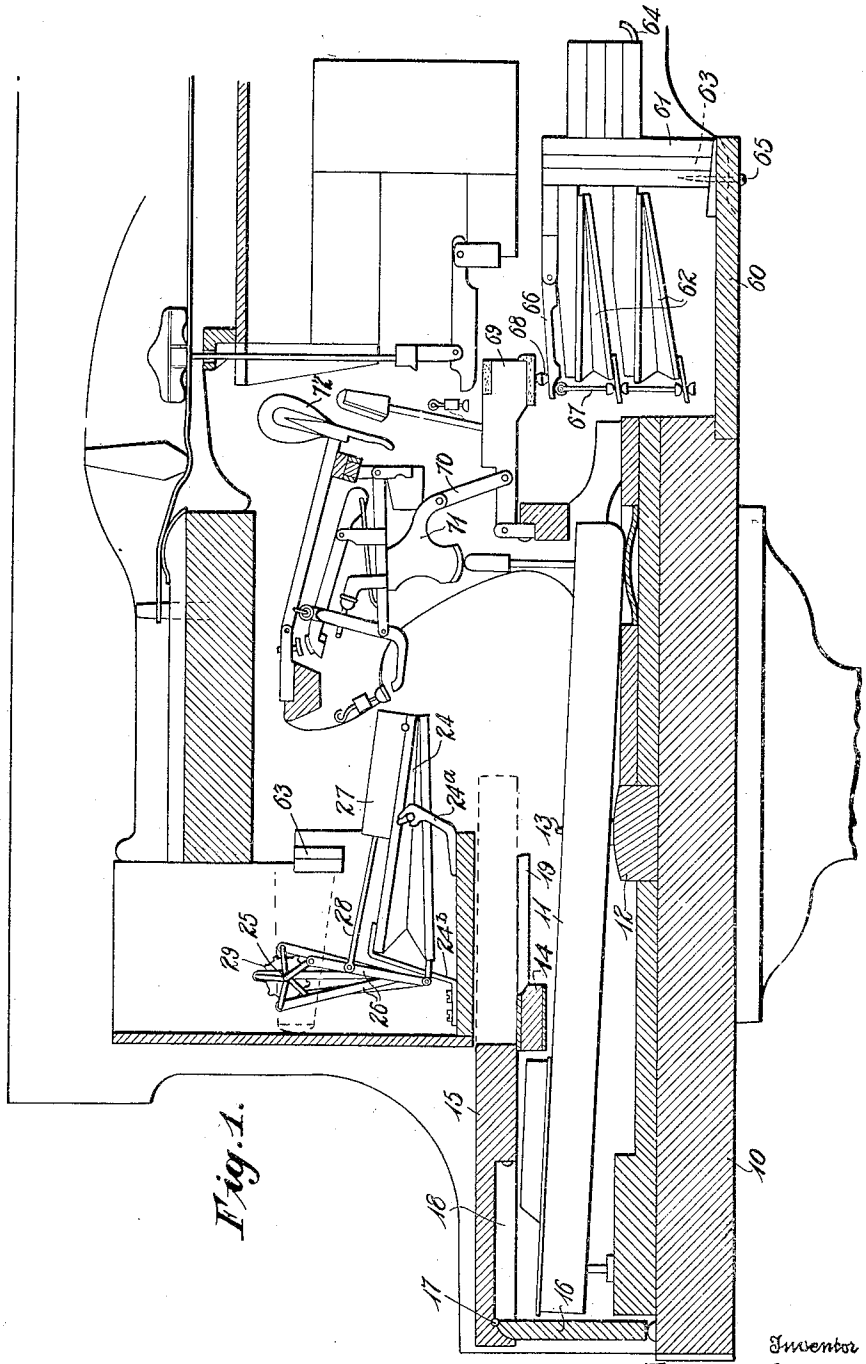

Fig. 1.

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Fig. 4.

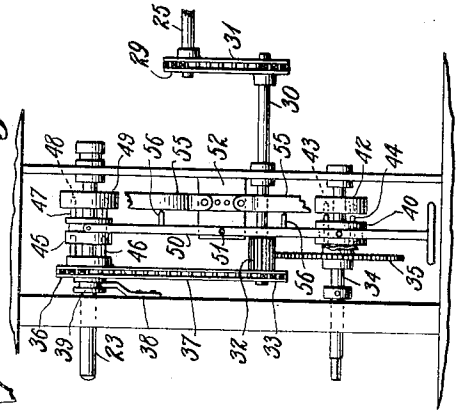

Fig. 2.

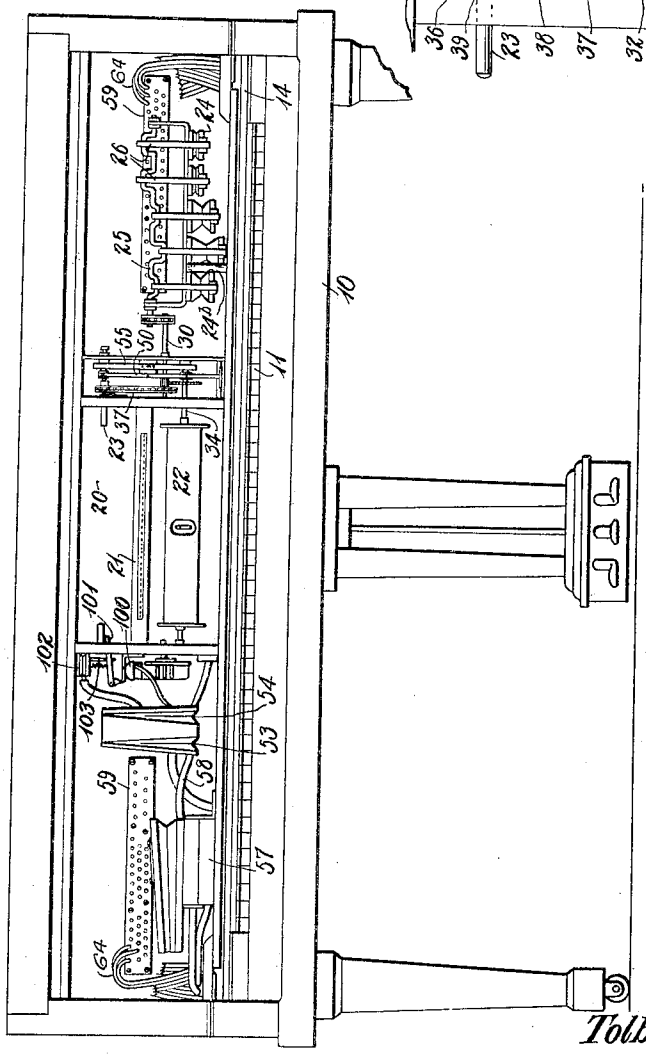

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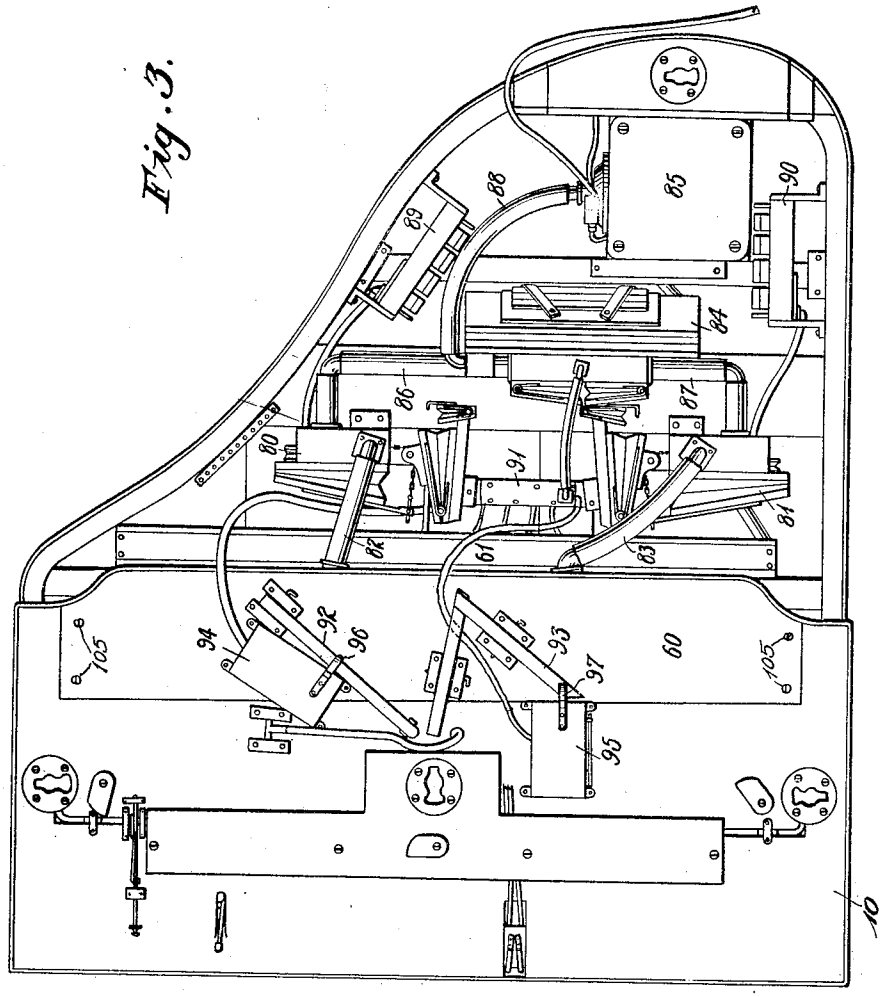
Fig. 3.



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UNITED STATES PATENT OFFICE.

TOLBERT F. CHEEK, OF NEW YORK, N. Y., ASSIGNOR TO WELTE-MIGNON CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

RECORD-CONTROLLED GRAND PIANO.

Application filed July 13, 1923. Serial No. 651,344.

To all whom it may concern:

Be it known that I, TOLBERT F. CHEEK, a citizen of the United States, residing at New York city, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Record-Controlled Grand Pianos, of which the following is a specification.

This invention relates to grand pianos and particularly to grand pianos having an improved player and expression mechanism arranged within the confines of the piano casing.

In the manufacture of player grand pianos and particularly reproducing grand pianos, it has been recognized as being desirable without increasing the size of the casing to place as many, as possible, of the parts of the mechanism in the structure in such a way that their presence will not be apparent to one in the same room with the piano.

In carrying out this aim, great difficulty has been experienced in arranging the several parts so that the air conduits between the component parts will be short and direct without the use of unsightly protuberances.

The primary object of this invention is the provision of an improved construction wherein, without enlarging the piano case, the tracker, driving motor, motor governor, power pneumatics, expression mechanism, reservoir and suction apparatus are so constructed and arranged within the confines of the grand piano casing as to avoid the appearance of the instrument being other than a simple grand piano.

Another object of my invention is the provision of a record controlled grand piano having a tracker box above the key bed at the front of the piano and having the drive motor for the music record arranged at the side of the tracker box and extending beneath the frame of the piano.

Another and further object of my invention is the provision of a record controlled grand piano having its tracker box, wind motor, wind governor, replay and rewind devices arranged in a unit to be removed integrally from the piano.

A further object of my invention is the provision of a record controlled grand piano having its striker pneumatic mechanism arranged in a unit within the confines of the casing at the rear of the forward portion thereof and being slidable into position from the rear of the forward portion.

Another and further object of my invention is the provision of a record controlled grand piano having its striker pneumatics arranged in a unit within the confines of the casing and being removable at the bottom of the casing.

A still further object of my invention is the provision of a pedal operating mechanism having the operating pneumatics thereof fastened flat against the bottom board of the forward portion of the piano and adjacent the pedal operated levers for controlling the soft and sustaining pedals.

Another and still further object is the provision of a record controlled grand piano having its striker pneumatic mechanism supported on the piano frame in the rear of the forward portion of the piano case, the expression mechanism supported on the frame to the rear of the striker pneumatic mechanisms and having its source of pneumatic power supported on the frame and to the rear of the expression mechanism.

Referring to the drawing where I have illustrated an embodiment of my invention.

Figure 1 is a cross section of the forward portion of a piano constructed according to my invention,

Figure 2 is a front view,

Figure 3 is a bottom plan view,

Fig. 4 is a detail view of the drive mechanism for the take up roll and music spool shafts.

Similar reference characters refer to the same parts throughout the several views.

10 designates the key bed of the instrument, 11 the keys supported on the rail 12 and held in position by the pins 13.

Above the keys is a rail 14 which acts as a support and guide for the fall board 15. This fall board is arranged with a front piece 16 which is pivoted at 17 and is capable of folding up within the cut away portion 18 on the underside of the main body of the fall board. In order to perform this folding operation, the forward end of the board is lifted. After the folding operation is complete the fall board is permitted to return to its horizontal position. The fall board per se is not a part of the invention and will not be described more in detail.

The rear edge of the fall board is supported at its ends on guides 19 which guide

the rear end when the fall board is pushed to the rear to expose the keys as shown in dotted lines on Figure 1.

At the forward portion of the middle of the case and above the keys is a tracker box 20 having the usual tracker 21, the take up roll 22 and the music roll drive shaft 23. At the right of the tracker box, above the fall board's rearmost position and extending under the frame of the piano in a substantially horizontal position, is a wind motor 24 which I have illustrated as a five-point motor. This motor has a crank shaft 25 having a crank opposite to each of five pneumatics and connected to the respective movable members thereof by connecting rods 26. These connecting rods control suitable valves in the valve box 27 (Figure 1), the valves being operated by the valve rods 28. The motor 24 lies partially below the frame F and is supported by the jawed supports 24^a and the brace 24^b. When it becomes desirable to remove the motor, the screws holding the brace 24^b are removed. The motor may then be lifted from the jawed supports 24^a as is apparent from an inspection of Figure 1.

On the end of the crank shaft 25 is a sprocket wheel 29 which is connected to a drive shaft 30 by the chain 31. The drive shaft 30 carries a pinion gear 32 and a sprocket wheel 33, both of which are keyed thereto.

A take up shaft 34 which carries the take-up roll 22 has a gear 35 freely mounted thereon. The gear 35 is in constant mesh with the pinion 32. Slidably and freely mounted on the shaft 34 and rigid with the gear 35 is a clutch member 40.

Keyed to the shaft 34 is a clutch member 42 having openings 43 to receive pins 44 which latter are mounted in the clutch member 40 and are outwardly spring pressed in the direction of the cooperating clutch member 42. The pins 44 are engaged or disengaged, from the openings 43 of the clutch member 42, according as the clutch member 40 is moved to the right or left.

The music roll shaft 23 carries a sprocket wheel 36 which is connected to the sprocket wheel 33 by the sprocket chain 37. This sprocket wheel 36 is freely rotatable on the shaft and is held from axial movement by the retaining member 38 which engages the groove 39 of the hub of the wheel 36. Mounted to rotate with the wheel 36 and to slide axially upon the shaft 23 is a clutch member 45. Suitable means as the pins 46, attached to the wheel 36 and freely movable in openings in the clutch member 45, are provided to cause the wheel 36 and the clutch member 45 to rotate together. Pins 47 are mounted in the clutch member 45 to engage openings 48 in the clutch member 49 when the clutch member 45 is moved to the right. The clutch member 49 is always rotatable with the shaft 23 and the clutch member 45 is always connected to the sprocket wheel 36, so that when the clutch member 45 moves to the right, the pins 47 engage the openings 48 to cause the sprocket wheel 36 and the shaft 23 to rotate together.

A clutch operating lever 50 is pivoted at 51 on the block 52 and is operated by a connection beneath the tracker box to the "re-roll" and "play" pneumatics 53, 54. The construction and operation of these pneumatics are described in my application Serial No. 467,648 and will not be described in detail here.

Spring brakes 55 are attached to the block 52 and engage at their free ends, the clutch members 49 and 42, respectively. Projections 56 are provided on the lever 50 to engage and lift respectively the spring brakes 55 during the rewinding and winding operations.

At the left side of the tracker box is mounted the regulator 57 for controlling the vacuum in the motor 24. This regulator 57 is connected to the motor 24 by the duct 58.

At each side of the tracker box and immediately beneath the front of the piano frame is a junction block and dust collector 59. The details of construction and operation of this junction box are described in my copending application, Serial No. 592,833 and will not be repeated here.

At the rear of the keys, the key bed is cut away inward of the outer edges thereof and a securing means as the board 60 inserted to provide means for supporting the striker pneumatic unit 61. This striker pneumatic unit supports the pneumatics 62 which latter are arranged in rows and operated from tension supplied from the chest 63 under control of valves operated from impulses supplied through the tubes 64. The latter lead to the front side of the junction blocks 59, and through the junction box to the respective tracker ducts. The unit 61 is held in place by screws 65 shown in Figure 1.

To the upper side of the upper row of pneumatics is secured a series of swinging arms 66, one for each note. These swinging arms 66 are connected to their respective pneumatics by links 67. On the top of each of the arms 66 is a capstan screw 68 which is adjustable and engages a suitable portion, such as the lever 69, of the piano mechanism to operate the same through the link 70, wippen 71 to the hammer 72.

Referring particularly to Figure 3, 80 and 81 designate the wind expression control device for the treble and bass, respectively, such as described broadly in the patent to Welte & Bockisch, No. 1,008,291 and in detail in my copending application Serial No. 592,834. These expression mechanisms are

connected to respective treble and bass sections of the tension chest 63 by the tubes 82 and 83. The expression is controlled through expression tracker ducts which control the amount of tension in the tubes 82 and 83 and consequently in the treble and bass sections of the chest 63. This in turn determines the pressure in the striker pneumatics in a well known manner and as described in detail in my aforesaid copending application and in the aforesaid patent to Welte and Bockisch.

At the rear of the expression mechanism is placed the main reservoir 84 and the pump mechanism 85, which together form the source of tension. The expression mechanisms deliver their air, respectively, through the tubes 86 and 87 to the main reservoir 84. The main reservoir construction may be of any suitable form as shown in either my copending application No. 592,835 or my copending application No. 664,708. The pumping mechanism may be any suitable electrically operated pump having structure for silencing devices for silencing the air discharged from the pump and also the motor vibrations. The pump is connected to the main reservoir by the tube 88.

At either side of the frame and inward of the edge as at 89 and 90 are the expression valves units which control the operation of the expression devices 80 and 81.

At 91, I have illustrated the valve box for controlling the pneumatics which operate the soft and sustaining pedal levers. At 92 and 93, I have shown the sustaining pedal lever and soft lever, respectively. Suitable pneumatics 94 and 95 are arranged adjacent to the respective levers 92 and 93 and have respective arms 96 and 97 extending under the levers 92 and 93 to operate the latter. These pneumatics are placed flat against the underside of the piano and consequently may not be seen, except by one bending down and looking up under the edge.

The expression and tension means are entirely above the key bed of the piano and extend so slightly below the plane of the rear portion of the piano and are so far inward of the edge thereof that this slight projection below the plane of the rear is not visible to one in the room with the piano without bending down and looking thereunder.

The placing of the expression control units 89 and 90 at the sides and within the casing is a particularly desirable construction. The unit may be disconnected from its securing means and permitted to hang by its communicating tubes while being tested. This accessibility is a great aid in making adjustments and in making repairs in the control pneumatics.

It has been found to be of great advantage to have all of the mechanism for producing and controlling the tension, in the same plane. This includes the expression mechanism, its control valves, the tension devices and the control valves for the so-called pedal mechanisms. This construction facilitates repairs and adjustments and so places the parts that they are distributed in the available space.

The current for the electric motor which drives the air pump in the tension unit 85 is controlled by a switch 100 having a spring held switch handle 101 extending into the tracker box. A stop pneumatic 102 carries, on its movable member, a detent 103 which releases the switch handle 101 to open the switch when the pneumatic 102 is collapsed.

Referring to Figure 2, the motor 24, the tracker box 20 with the driving mechanism for the shafts, the replay and rewind pneumatics 53, 54, the stop pneumatic 102, the motor governor 57 and the junction boxes 59, are all embodied as a unit and by removing the fronts of the junction boxes, and releasing the securing means, the unit may be removed, as a whole, from the piano.

In order to remove the pneumatics 62 and the chest 63 as a unit, the screws 65 may be removed. The whole unit may then be removed from the rear and replaced after any desired repair or adjustment is made. If found to be desirable, the screws 65 may be permitted to remain in place and the supporting board 60 and unit removed by the removal of the screws 105 shown in Figure 3. The unit in this case would be removed through the bottom of the piano.

While I have described an embodiment of my invention in detail, I desire to have it understood that I do not limit myself to the exact showing and that modifications and changes may be made without departing from the spirit of my invention and within the scope of the appended claims.

Having described my invention, what I claim is:—

1. A record controlled grand piano having a casing, a keybed, keys, a piano action, a striker pneumatic action unit at the rear of the keys and in position to operate on the piano action, the unit being above the bottom of the keybed and removable as a unit.

2. A record controlled grand piano having a casing, a keybed, keys, a piano action, a striker pneumatic action unit at the rear of the keys and in position to operate on the piano action, the unit being above the bottom of the keybed, the piano having an opening for insertion and removal of the unit.

3. A record controlled grand piano having a casing, a keybed, keys, a piano action, a striker pneumatic action unit at the rear of the keys and in position to operate on

the piano action, the unit being above the bottom of the keybed, the piano having an opening in the bottom thereof for insertion and removal of the unit.

4. A record controlled grand piano comprising a piano action having a wippen, a keybed, a key mounted on the keybed, means mounted on the rear of the key for operating the wippen, a pneumatic above the level of the bottom of the keybed, means for carrying the pneumatic, an abutment operated by the pneumatic and in position to operate a movable portion of the piano action, means for securing the pneumatic carrying means in place, the keybed having its rearward edge forward of the pneumatic carrying means the piano having an opening whereby the pneumatic and its carrying means may be removed through the bottom of the piano upon loosening the securing means.

5. A record controlled grand piano comprising a piano action having wippens, a keybed, keys mounted on the keybed, means mounted on the rear of the keys for operating the wippens, a pneumatic unit comprising pneumatics having a rigid mounting relative to each other, the unit, including the pneumatics, being above the bottom of the keybed, the unit having movable abutments operated by the pneumatics and in position to operate movable portions of the piano action, means for securing the unit in place, the rearward edge of the keybed being forward of the greater portion of the pneumatic unit, the piano having an opening through which the unit may be removed through the bottom of the piano upon loosening the securing means.

6. A record controlled grand piano comprising a piano action having wippens, a keybed, keys mounted on the keybed, means mounted on the rear of the keys for operating the wippens, a pneumatic unit comprising pneumatics having a rigid mounting relative to each other, the unit, including the pneumatics, being above the bottom of the keybed, the unit having movable abutments operated by the pneumatics and in position to operate movable portions of the piano action, means for securing the unit in place, the rearward edge of the keybed being forward of the greater portion of the pneumatic unit, the piano having an opening for the insertion and removal of the unit independent of the other mechanism.

7. A record controlled grand piano comprising a piano action having wippens, a keybed, keys mounted on the keybed, means mounted on the rear of the keys for operating the wippens, a pneumatic unit comprising pneumatics having a rigid mounting relative to each other, the unit, including the pneumatics, being above the bottom of the keybed, the unit having movable abutments operated by the pneumatics and in position to operate movable portions of the piano action. means for supporting the unit, the portion of the piano rearward of the unit being constructed to permit the rearward movement of the unit for removal of the same from the instrument.

8. A record controlled grand piano comprising, a frame, a piano action, a tracker box mounted within the casing and forward of the piano frame, take-up roll and music spool shafts mounted in the tracker box, a driving motor within the casing and for operating the shafts, a portion of the motor being underneath the piano frame.

9. A record controlled grand piano comprising, a frame, a piano action, a tracker box mounted within the casing and forward of the piano frame, take-up roll and music spool shafts mounted in the tracker box, a driving motor within the casing and for operating the shafts, a portion of the motor extending to the rear of the forward part of the frame, the remainder of the motor being forward thereof.

10. A record controlled grand piano comprising, a frame, a piano action, a tracker box mounted within the casing and forward of the piano frame, take-up roll and music spool shafts mounted in the tracker box, a driving motor for the shafts, the motor comprising a plurality of power pneumatics arranged a substantial angular distance from a vertical plane, a portion of the motor being underneath the frame of the piano.

11. A record controlled grand piano comprising a piano action, a tracker box mounted within the casing and forward of the frame, a wind governor at one side of the tracker box, take-up roll and music spool shafts mounted in the tracker box, a wind motor connected to the governor and in operative driving connection with the shafts, the wind motor having a portion extending underneath the piano frame.

12. In a record controlled grand piano having a casing and a keybed, the combination of keys mounted on the keybed, a piano action operatively connected to the keys, a tracker box, a striker pneumatic action operatively connected to the piano action, expression means for controlling the pressure in the striker pneumatics and tension means for supplying the exhaust tension, all being placed and secured above the bottom of the keybed of the piano.

13. In a record controlled grand piano having a casing and a keybed, the combination of keys mounted on the keybed, a piano action operatively connected to the keys, a tracker box, a striker pneumatic action operatively connected to the piano action, and tension means for supplying the exhaust tension, all being placed and secured above the bottom of the keybed of the piano.

14. In a record controlled grand piano

having a casing, a keybed, keys, a piano action and a striker pneumatic mechanism for operating the piano action, the combination of a wind control expression device, a tension reservoir and tension producing means, and means for securing the expression device, reservoir and tension producing means in place above the bottom of the keybed, to the rear thereof and within the confines of the piano casing.

15. A record controlled grand piano, having a casing, a keybed, keys, a piano action, a striker pneumatic action unit at the rear of the keys and in position to operate on the piano action, the unit being above the bottom of the keybed, an expression device and a wind tension producing device rearward of the pneumatic action unit, the expression device and tension device being at substantially the same level.

16. A record controlled grand piano having a casing, a keybed, keys, a piano action, a striker pneumatic action unit at the rear of the keys and in position to operate on the piano action, the unit being above the bottom of the keybed, a wind control expression device adjacent to and to the rear of the pneumatic unit and being connected thereto and a tension producing device adjacent to and connected to the expression device.

17. A record controlled grand piano having a casing, a keybed, keys, a piano action, a striker pneumatic action unit at the rear of the keys and in position to operate on the piano action, the unit being above the bottom of the keybed, the unit having a plurality of chests therein, a wind control expression device connected to each chest and adjacent the rear thereof, and a tension producing device to the rear of the expression devices and connected to both expression devices, the expression devices and the tension device being substantially at the same level.

18. A record controlled grand piano having a casing, a keybed, keys, a piano action, a striker pneumatic action unit in position to operate on the piano action, the unit being above the bottom of the keybed, a wind control expression device adjacent to and to the rear of the pneumatic unit and being connected thereto and a tension producing device adjacent to and connected to the expression device.

19. A record controlled grand piano having a casing, a keybed, keys, a piano action, a striker pneumatic action unit in position to operate on the piano action, the unit being above the bottom of the keybed, the unit having a plurality of chests therein, a wind control expression device connected to each chest and adjacent the rear thereof, and a tension producing device to the rear of the expression devices and connected to both expression devices, the expression devices and the tension device being substantially at the same level.

In testimony whereof I affix my signature.

TOLBERT F. CHEEK.