

Dec. 15, 1925.

1,565,932

C. H. HANSON

MEANS FOR ACTUATING PLAYER PIANOS

Filed May 24, 1921

4 Sheets-Sheet 1

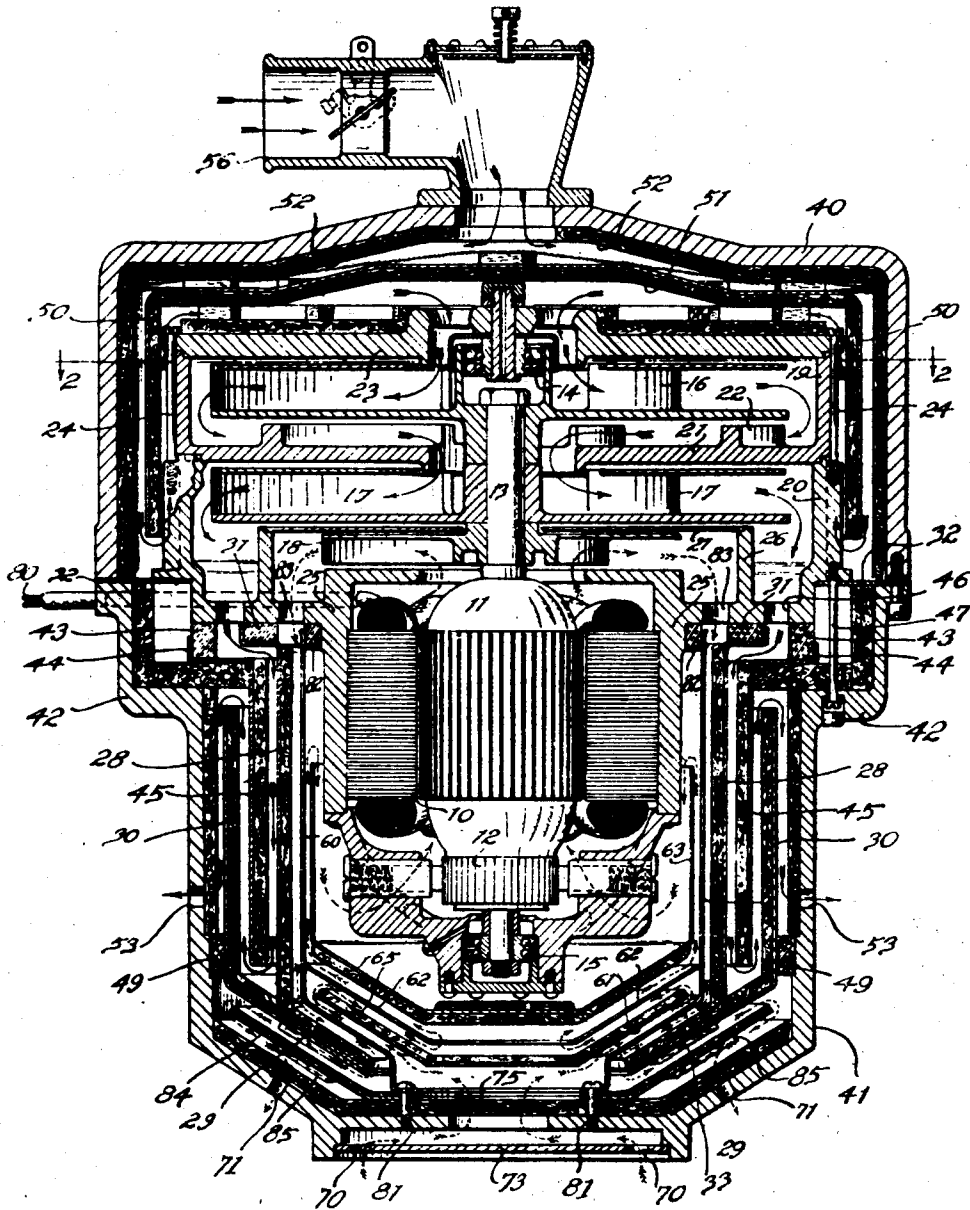


FIG. 1

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4 Sheets-Sheet 2

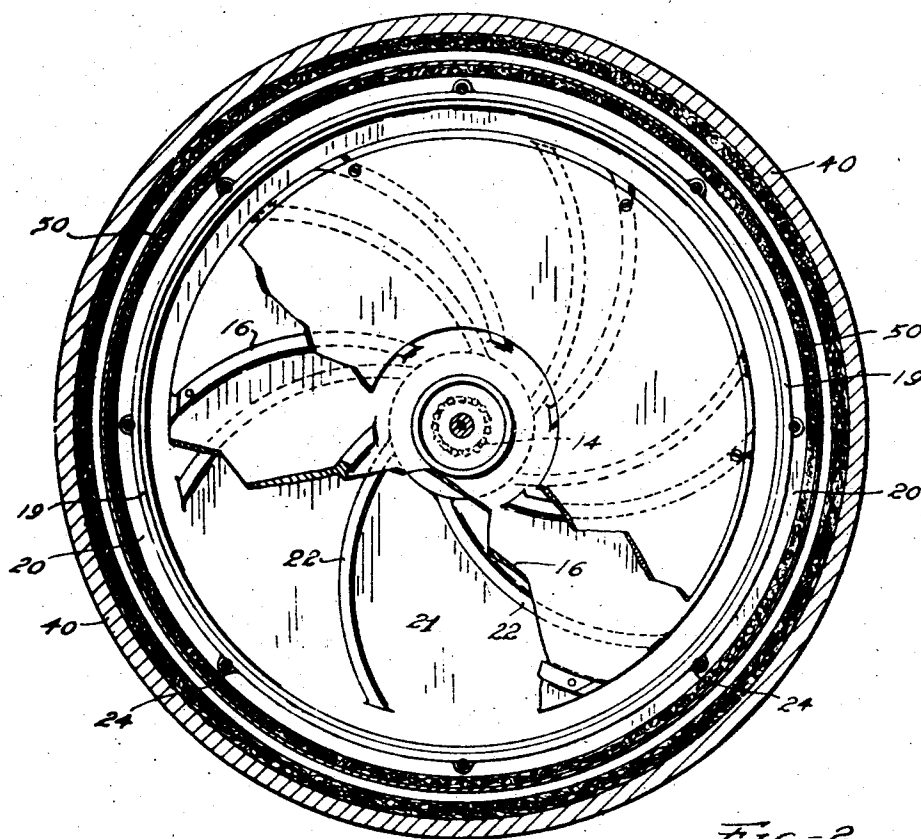
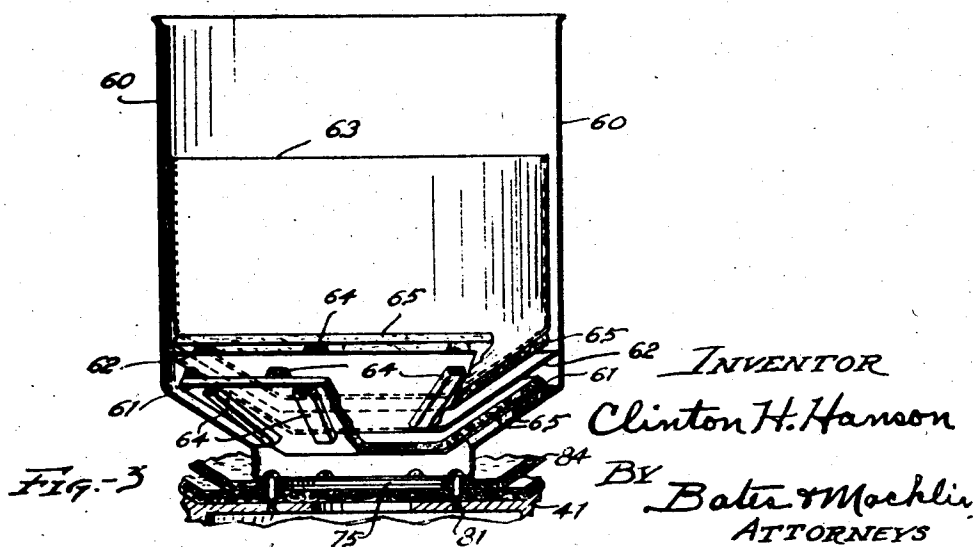


Fig. 2



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4 Sheets-Sheet 3

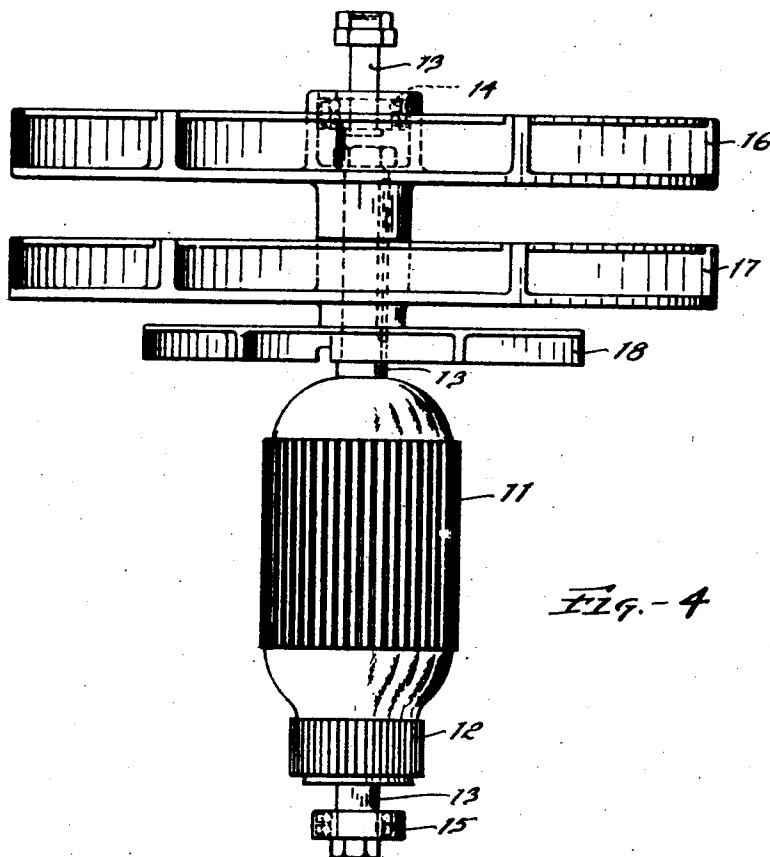


FIG. 4

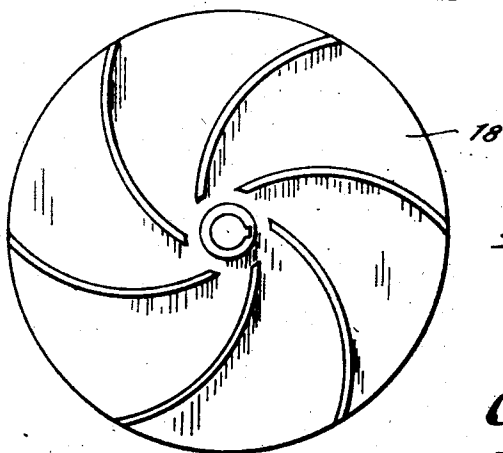


FIG. 5

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4 Sheets-Sheet 4

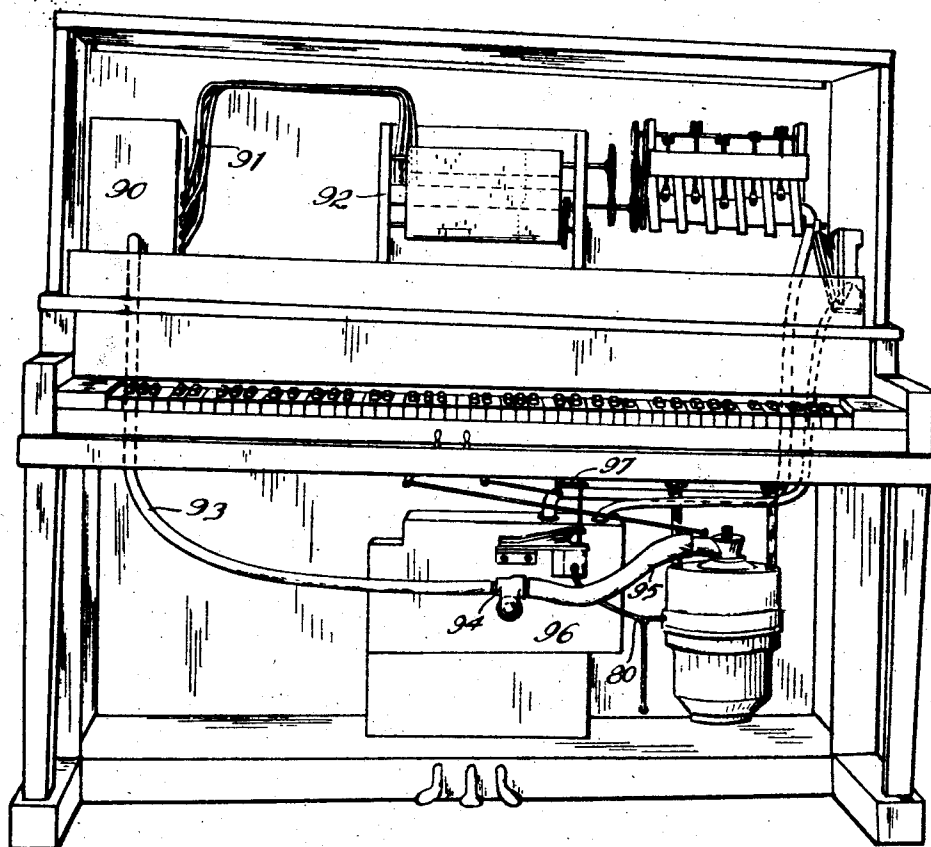


Fig. 6

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Patented Dec. 15, 1925.

1,565,932

UNITED STATES PATENT OFFICE.

CLINTON H. HANSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO MOTOR PLAYER CORPORATION, A CORPORATION OF ILLINOIS.

MEANS FOR ACTUATING PLAYER PIANOS.

Application filed May 24, 1921. Serial No. 472,040.

To all whom it may concern:

Be it known that I, CLINTON H. HANSON, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Means for Actuating Player Pianos, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to suction producing apparatus and is primarily concerned with improvements in a machine which is adapted for use in operating player pianos. More particularly, my invention relates to a form of suction producing apparatus, wherein a motor and fan are mounted on the same shaft, and are housed in a single casing. A machine embodying this construction, in general, is shown in Patent No. 1,320,224, issued October 28th, 1919, to the Electora Manufacturing Company.

In the above mentioned patent the air which passes through the tracker bar of the piano is caused to pass through the suction device, and is employed for cooling the motor. In operating such a device, however, I have found that much difficulty is experienced in cooling the motor, and at the same time maintaining a high degree of vacuum therein. The difficulties presented in maintaining a satisfactory degree of vacuum have been particularly manifested, in connection with the "reproducing" type of piano, wherein a pneumatic expression device is employed for controlling the volume of air passing through the suction element. The installation of the expression device places an additional load on the motor and simultaneously increases the probability for leaks which tend to destroy the vacuum.

In constructing a suction element having sufficient capacity for use with a reproducing piano, I have found that excessive heat is developed within the motor housing and that the degree of heat so developed is sufficient to affect the lubrication, and even the motor windings. Since the quantity of air passing through the motor is governed by the number of perforations on the note sheet, in simultaneous registration with the apertures in the tracker bar, it follows that, at times, there is little or no air passing through the motor.

One of the objects of my invention there-

fore is the provision of a suction device which is capable of being installed in a player piano and operated in connection with an expression device for transforming the ordinary player piano into a reproducing piano. In this connection, my invention contemplates the provision of means for cooling the motor, irrespective of the volume and temperature of the air passing through the pneumatics.

Another object is the provision of a suction device which in addition to effecting a high degree of vacuum is compact in form and quiet in operation. Still another object is the provision of a machine wherein the various sound-deadening elements are so constructed that they may be cheaply manufactured and readily assembled in position.

In accomplishing the above objects, I provide a suction device, which is adapted to rotate at a high rate of speed, and simultaneously to produce a high degree of vacuum for operating the usual pneumatics in a "reproducing" piano or other player pianos. In this connection my invention provides a cooling system, for maintaining a temperature surrounding the motor at a degree sufficient to prevent burning of the windings. Accordingly, I provide two independent air chambers within a single container, and I provide means for connecting one of said chambers with the usual pneumatics in such manner that the volume of air passing therethrough may be varied, either at will, or by the expression device, without affecting the air employed for cooling the motor.

In a device of this character the necessity for isolating sound waves so as to prevent the emission of sound from the container itself, is of course, of the utmost importance. Accordingly, I have provided suitable acoustical treatment to retain the sound waves within the container to the greatest possible degree.

The means for accomplishing the above objects will be more fully set forth in the following description which relates to the drawings, and essential characteristics of my invention will be set forth in the claims.

In the drawings, Fig. 1 is a vertical section taken through a suction device embodying features of my invention; Fig. 2 is a horizontal section taken through the upper fan casing; Fig. 3 is a section partly in elevation showing the baffling arrangement

adjacent the motor; Fig. 4 is an elevation of the rotary elements apart from the casing; Fig. 5 is a plan showing a form of fan plate employed; Fig. 6 is a view showing the use of my invention in connection with the expression device.

In the various figures, 10 represents the field windings of a motor having an armature 11, a commutator 12 and shaft 13. This motor constitutes the driving means for the various fan elements and, as shown, is positioned centrally in the device, and is supported vertically by upper and lower bearings 14 and 15 respectively. The particular bearing construction shown, provides for self-alignment of the rotating elements and enables lubrication to be effectively accomplished. The particular embodiment of bearings shown, forms the subject matter of a co-pending application, Serial No. 457,339, filed March 31, 1921.

Referring now to Fig. 4, the armature shaft 13 is shown as having a set of fan blades, 16 and 17, rigidly secured thereto, and positioned adjacent the upper end thereof. These fan blades constitute the power plant or vacuum producing elements for operating the pneumatics and are preferably constructed in accordance with the manner described in the above mentioned patent.

Beneath the fan blades 16 and 17, I have shown another blade 18 which is also rigidly secured to the shaft 13, and preferably constructed in a manner similar to that employed for the other blades. While I have shown this blade 18 as positioned intermediate the armature and the blade 17, and as arranged to throw the air outwardly toward the periphery of the disk, it is to be understood that the position and arrangement of the vane is purely arbitrary, as will be hereinafter set forth in the description relating to the various air chambers.

The method of housing the blades 16 and 17 is shown as embodied in upper and lower casings 19 and 20 respectively. The casing 19 may be provided with an inwardly extending member 21 on which a series of deflecting vanes 22 project upwardly and serve to deflect the air which passes from the blade 16 to the blade 17. A suitable cover 23 is shown as extending across the casing 19 and as secured thereto by means of the threaded members 24.

In the mechanism described, I have provided a container having two compartments which are separated by a substantially airtight wall. A portion of this separating medium comprises the cylindrical wall 26 and cover plate 27. To complete the dividing wall, I have shown a cup shaped member 28, which is preferably cylindrical in form and adapted to extend from the bottom of the wall 26 downwardly. The bottom of this member is preferably conical in

form, as at 29, such form being complementary to the lower portion of the baffle 30. A suitable insulating ring or gasket 31 may be interposed between the wall 28 and the casing 20 to eliminate the possibility of vibration being transmitted from one part of the casing to the other part thereof. This ring 31 also comprises a portion of the dividing wall between the air chamber for the pneumatics and the air chamber for the motor. The members 28 and 30 are preferably stampings of light sheet metal, and, as shown in Fig. 1, are arranged to nest one within the other, to provide a passageway for air therebetween. The member 30 may be supported, as will be hereinafter explained, by strips of felt 33, which are shown as positioned radially, beneath the conical portion thereof, so as to permit the passage of air, and at the same time support the weight of the stampings.

Extending around the fan casings I provide a container which retains the movable elements in alignment with each other, and provides a compact dust proof housing, which constitutes a means for retaining the suction device, as a unit, within a piano. This casing is shown as comprising a top 40, and bottom 41, which are separated by a layer of insulating material 32. The various layers of insulating material serve, as above explained, to eliminate the transmission of vibration from one part of the casing to another part thereof, and to decrease materially the transmission of any vibration that may be set up within the casing.

To support the fan casings 19 and 20 within the container, I have shown the lower casing 41 as having a shoulder 42, upon which a ring of insulating material 43 is adapted to bear. This insulating ring is shown as positioned within the upturned flange 44 on a baffle 45, and as extending around the periphery thereof. The member 20 rests on the ring 43 in such manner, that the wall of the bottom casing 41 is in a vertical line with the ring 43, and with that part of the casing 20 in abutting engagement therewith. Suitable screws 47 may extend through the shoulder 42 and be attached to the member 20 for rigidly securing it in position. The compression stresses resulting from tightening the screws 47 are taken up partially by the insulating ring 43, and partially by the layer of non-vibratory material 32. This layer 32 is preferably an annular member which is positioned between the casing 40 and 41, so as to extend inwardly therefrom, and to provide in effect a cantilever member in abutting engagement with the casing 20. Since the layer 32 is composed of non-vibratory material, it is obvious that any vibration set up within the fan casing 19 and 20 will not be transmitted to the exterior casing 40 and 41.

To isolate any sound waves which may be set up within the casing, I provide a baffling arrangement which comprises alternate layers of metal and sound-deadening material, such as felt, and I provide insulating rings of non-vibratory material, so as to avoid, as nearly as possible, all metal to metal contact. In the fan chamber, I have shown a baffle as interposed between the inner and outer casing and as comprising a cup shaped member 50, which may be provided with a layer of sound deadening material 51, on the interior portion thereof. Furthermore, I have provided a lining of such insulating material, as at 52, on the interior portion of the casing 40, provision being made, however, for the passage of air between such layers and the cup shaped baffle 50.

After the air passes the vacuum creating fans 16 and 17, I have provided a series of baffles for causing the air to pass downwardly and to be thereafter reversed, before finally leaving the exhaust ducts 53 in the side of the casing. One of these baffles comprises the depending member 45 which terminates short of the conical portion 29 on the dividing wall 28, and another baffle comprises the upright member 30 which terminates short of the upper surface on the shoulder 42. These baffles may be provided with insulating felt and may be so arranged as to be held in spaced relation with each other, whereby passageways for air are provided, as indicated by the arrows in full line. The upright baffle 30 may be positioned adjacent the bottom of the casing 41, by an annular ring 49 of insulating material, such as rubber. This ring 49 also comprises a portion of the dividing wall between the air chamber for the pneumatics and the air chamber for the motor. The various baffles beneath the casing 20 provide a two-fold service, namely an expansion of the air, and a provision of means for securing layers of sound deadening material, for absorbing any sound waves that may be emitted from the motor.

In tracing the passage of air through the fan blades, in Fig. 1 the arrows at the top of the figure indicate the path through which air flows from the tracker bar through the suction producing elements. The connection 56 at the top of the casing is arranged to be connected with the usual pneumatics and with the control mechanism for varying the force with which the hammers strike the strings. Since the motor is essentially a constant speed one, it follows that the pressure in the fan chamber varies in accordance with the regulation of the control mechanism for governing the tone, and in accordance with the volume of air emitted through the various apertures in the tracker bar.

For baffling the air employed for cooling

the motor and for deadening the noise occasioned by operation of the motor, I have shown a series of baffles, which, in general, comprise complementary members that are arranged to nest one within the other, and to be provided with layers of sound-deadening felt. In Figs. 1 and 3 in particular, I have shown a cup shaped member 60, which is provided with an aperture 75 at the bottom thereof, and which comprises preferably a stamping that is complementary in form to the members 28, 30 and 45, respectively. The bottom of the cup shaped member 60 is secured, as at 81, to the casing 41, and the top of this member is in frictional engagement with an insulating ring 82, which ring extends around the casing 20 adjacent the top of the depending portion 25 thereon. The cup shaped member 60 provides a dividing wall between the inlet and outlet passageways with relation to the fan 18, and accordingly that portion of the member 60 in engagement with the ring 82 is positioned inside the ring of apertures 83 in the casing 20.

The lower casing 20 is provided with a depending portion 25 which constitutes a supporting means for the motor field. This depending portion is shown as being cylindrical in form and as providing a passageway through which the air employed for cooling the motor, is caused to flow. Intermediate the portion 25 and the periphery of the casing 20, I may provide an upwardly projecting wall 26 which is also preferably cylindrical in form and provided with a cover plate 27. This cover plate is provided with an aperture at the center thereof through which the hub of the fan blade 18 extends, and is employed for preventing the passage of air from one side of the plate to the other side thereof. This plate provides a dividing means for separating the container into two compartments, namely the fan chamber and the motor chamber. In the embodiment shown the fan chamber is positioned at the top of the container, and the motor chamber is positioned at the bottom thereof, and each chamber is separated from the other by substantially air tight walls, so that the pressure in one chamber may be varied at will without affecting the pressure in the other chamber.

Positioned within the cup shaped member 60 I have shown a series of baffles 61, 62 and 63, respectively. These baffles are arranged to be separated by strips of insulating material, such as felt 64, which strips extend radially and permit the passage of air between adjacent baffles. Intermediate the bottom of the cup shaped member 60 and the casing 41, I provide an exhaust baffle 84, which, as shown, is complementary to the other baffles. This exhaust baffle is maintained in spaced relation with the other baffles.

fles of insulating material 85, which are positioned radially so as to permit the passage of air therebetween. Wherever convenient, I have provided layers of felt, as at 65, to
 5 silence the motor without materially increasing the back pressure on the suction elements.

In Fig. 1 the passage of air through the motor is indicated by dotted arrows from
 10 the inlet passages 70 in the plate 73 to the outlet ducts 71 in the casing 41. The direction of travel, however, is arbitrary, but for purposes of illustration I have shown the inlet passages as having more turns than the
 15 outlet passages, and I have shown the air exhaust in the motor chamber, as adjacent the exhaust passage in the fan chamber. This construction prevents the short circuiting of air from one chamber to another, and
 20 thereby insures the provision of an air-tight wall therebetween. In this connection, it is to be noted that the bottom 29 of the supporting baffle 28 may be rigidly secured, as by cement and rivets, to the upright baffle 30.

In Fig. 6 I have shown a piano equipped with my invention, and as employed in connection with an expression device, indicated generally at 90. This expression device
 25 comprises a plurality of pneumatics which are connected individually by tubes 91 with apertures near the end of the tracker bar 92 and one connected with the tube 93 which leads downwardly and is connected, as at 94,
 30 with the motor suction inlet 95. The connection 94 may comprise a three-way member which leads to the expression device, to the motor, and to the wind chest 96, respectively. In connecting the expression device
 35 with the motor, it is to be noted that the tube 93 does not extend through the wind chest, but is connected directly with the motor. A direct connection of this character tends to decrease the loss of vacuum
 40 which may be occasioned either by a leaky wind-chest, or by the pneumatics controlled thereby.

The operation of my device is as follows:

Assuming that the unit is installed within a piano, preferably in the lower portion
 50 thereof, and is connected through the aperture 56, with the usual pneumatics, and assuming that the motor is connected with a suitable source of current through the terminals 80, then when a switch 97 is closed,
 55 the motor is set in operation. As the fan blades 16 and 17 rotate, air is drawn through the pneumatics and into the suction device, through the aperture 56, until it reaches the baffle plate 50, whereupon the air divides,
 60 passes downwardly as indicated by the full line arrows, then upwardly through the fan blade 16, the stationary deflecting vanes 22, fan blade 17, and then through the series of vertical baffles 45 and 30 until it finally
 65 reaches the outlet ducts 53. Since the air

chamber in which the fans 16 and 17 are located, is separated by air tight walls 26 and 28, and plate 27, it follows that as the fan blade 18 is rotated, the air for cooling the
 70 motor is caused to enter the ducts 70, to pass around the various baffles 61, 62 and 63 through the motor, out the fan blade and then downwardly between the baffle 60 and
 75 wall 28, around the conical portions of the members 28 and 30 and finally out of the duct 71. Since the blade 18 rotates at a constant speed, it follows that the pressure within the motor chamber is necessarily
 80 constant, and that the volume of air employed for cooling the motor is therefore independent of any variations in pressure in the fan chamber.

The variations in pressure within the fan chamber may be caused, either by manual
 85 manipulation of a control valve, or by means of the automatic expression device 90. Since the volume of air passing through the fan chamber is independent of the volume passing through the motor, it is obvious that
 90 a suction device, constructed according to my invention, is particularly applicable for operation with a reproducing piano without having a detrimental effect upon the
 95 motor itself.

From the foregoing description it will be
 100 seen that I have provided a suction device wherein separate chambers are employed for creating the necessary vacuum to operate the pneumatics of a piano and for cooling the
 105 motor respectively. Furthermore it will be seen that I have provided a device, wherein the suction producing elements and motor therefor are mounted on the same shaft
 110 within a single container, whereby an integral compact unit which is readily adapted for acoustical treatment is obtained. An
 115 advantage of my invention is that it possesses sufficient capacity for operating a reproducing piano without producing noises which are detrimental to the satisfactory
 120 operation of the piano.

Having thus described my invention, I claim:

1. In a suction device for operating the pneumatics of a player piano, the combination
 125 with a container having two compartments therein, of an electric motor mounted in the container, and means operable by the motor for circulating air in said compartments, each compartment being arranged
 130 to circulate air independently of the other compartment.

2. In a suction device for operating the pneumatics of a player piano, the combination
 135 with a container having two compartments therein, of an electric motor mountable in the container, means operable by the motor for circulating air in said compartments, the air circulating in one compartment being employed for operating the
 140

pneumatics of the piano, and the air in the other of said compartments being employed for cooling the motor.

3. In a suction device for operating the pneumatics of a player piano, the combination with a container having two substantially air-tight compartments therein, of an electric motor in one of said compartments and means operable by the motor for circulating the air in one of said compartments, whereby the pneumatics of the piano may be operated, and means operable by the motor for circulating air in the other of said compartments for cooling the motor.

4. In a suction device for operating the pneumatics of a player piano, the combination with a container having two separated air-tight compartments therein, of a motor positioned in one compartment and having the armature shaft thereof extending into the other compartment, and means carried by the shaft for circulating air in both of said compartments.

5. In a device for operating the pneumatics of a player piano, the combination with a container comprising two air-tight compartments, one of said compartments being connected with the pneumatics of the piano, of means for circulating air in both of said compartments whereby the air pressure in one compartment may be varied without affecting the air pressure in the other compartment.

6. In a suction device for operating the pneumatics of a player piano, the combination with a container having an air-tight motor and fan compartment therein, the fan compartment being connected with the pneumatics of the piano, of an electric motor within one of the compartments, means operable by the motor for maintaining a constant pressure in the motor compartment and means operable by the motor for drawing air from said pneumatics through the fan compartment.

7. In a device of the character described, the combination with a container having two separate air-tight compartments, said compartments being positioned one within the other, means for circulating air in each of said compartments whereby the air pressure in one remains constant, and means for varying the pressure in the other compartment without affecting the pressure in the first mentioned compartment.

8. In combination a container, a motor therein, means for separating the container into two air-tight compartments, tortuous air passageways in each of said compartments, and means operable by the motor for circulating air in each compartment.

9. In a suction device for operating the pneumatics of a player piano, the combination with a container, of a casing therein, said casing being divided into a fan cham-

ber and a motor chamber respectively, means for circulating air through said chambers, for operating said pneumatics; and for cooling the motor, respectively, air passageways through said chambers, said passageway being so positioned that the exhaust end of one air current is adjacent the exhaust end of the other air current.

10. In a suction device, the combination of a container having an air inlet which is connected with the operating pneumatics of a player piano, means within the container for drawing air through the pneumatics, a motor for operating said last mentioned means, a tortuous air passageway surrounding the motor and leading from said air circulating means, and an air tight connection between said passageway and the motor.

11. In a suction device for operating the pneumatics of a player piano, the combination with a container having two air tight compartments therein, one of said compartments being connected with said pneumatics, a motor within the other compartment, a fan operable by the motor in each compartment and a tortuous air passageway surrounding the motor and leading from each of said compartments.

12. In a suction device the combination with a container having an aperture therein connected with the pneumatics of a player piano, a motor within the container, fan blades rotatable by the motor, said blades being arranged to draw air through the pneumatics, a tortuous air passageway leading from the blades whereby air may surround the motor and pass out the side of the container, and means for providing an air tight connection between the motor and passageway.

13. In a suction device the combination with a container having one compartment therein connected with the pneumatics of a player piano, a fan in said compartment for circulating air through said pneumatics, a motor operating said fan, an air tight wall separating the motor and the fan, a fan operable by said motor for circulating air within the motor compartment, and means for providing a series of air passageways within said motor compartment.

14. In a suction device for operating the pneumatics of a player piano, the combination with a container, of a motor therein, means connected with the motor for circulating air through said pneumatics and for cooling the motor, the air for cooling the motor being circulated independently of that flowing through the pneumatics, and a series of complementary conical shaped baffles, said baffles being positioned in spaced relation to each other, whereby a tortuous air passageway is provided within the container.

15. In a suction device, the combination

with a container, of a casing therein, said casing having a fan chamber, and a motor chamber, the fan chamber being connected with the pneumatics of a player piano and the motor chamber being separated by a substantially air-tight wall from the fan chamber, an electric motor for circulating air within said motor chamber, said motor having bearings in the top and bottom of the casing whereby the suction producing elements may be removed from the container as a unit.

16. In a suction device, the combination with a container having a fan chamber and a motor chamber therein, said chamber being separated by an air tight wall, means for circulating air within said chamber, a tortuous air passageway in each chamber, a vertically disposed baffle having a conical portion adjacent the bottom thereof, the conical portion of said baffle being in abutting engagement with a portion of said air tight wall, whereby the air passageway in one chamber is separated from the passageway in the other chamber.

17. In a suction device, the combination with a container of a casing therein, a motor and fan chamber within said casing, means for providing an air tight connection between said chambers, an air passageway leading from the fan chamber out the side of the container, said passageway comprising separated complementary upwardly and downwardly extending baffles.

18. In a suction device, the combination with a container having a fan chamber and a motor chamber therein, the fan chamber being connected with the pneumatics of the piano and the motor chamber being separated by an air tight wall from the fan chamber, means within the motor chamber for circulating air therein, means comprising alternate layers of metallic and non-metallic material surrounding the motor and adapted to provide a tortuous air passageway.

19. In a suction device, the combination with a container having a fan chamber and a motor chamber, said chambers being separated by an air tight wall, means for circulating air within the motor chamber, a series of cup shaped members beneath the motor, said members being separated by layers of insulating material whereby an air passageway is provided between the members.

20. In a suction device, the combination with a container, of a casing therein, a motor and fan chamber within the casing, said casing having a depending portion arranged to receive a motor, means for providing an air tight connection between said chambers, a series of baffles intermediate the depending portion and the container, each of said baffles comprising alternate layers of metallic and non-metallic material.

21. In a suction device, the combination with a container, of a casing positioned therein, said casing having two concentric rows of apertures extending therethrough, an air tight wall intermediate the passageways for providing a fan chamber and motor chamber respectively, a series of baffles on each side of said air tight wall, one set of baffles being connected with the motor chamber and the other set of baffles being connected with the fan chamber.

22. In a suction device, the combination of a container comprising a fan chamber and a motor chamber, an air tight wall separating said chambers, means within each of said chambers for circulating air, a series of complementary baffles within the motor chamber, said baffles comprising alternate layers of metallic and non-metallic material, and a series of baffles surrounding the motor chamber and comprising alternate layers of metallic and non-metallic material, said last mentioned baffles providing passageways leading from the fan chamber.

23. A suction device for operating the pneumatics of a player piano comprising a cylindrical casing having a fan chamber and a motor chamber therein, means for circulating air in each of said chambers, a cylindrical wall separating said chambers, complementary cylindrical baffles intermediate the wall and the container, said baffles being spaced apart to provide an air passageway from the fan chamber, and complementary cylindrical baffles within said wall, said last mentioned baffles being spaced apart to provide passageways within the motor chamber.

24. A suction device for operating the pneumatics of a player piano comprising a cylindrical casing having a fan chamber and a motor chamber therein, means for circulating air in each of said chambers, a cylindrical air-tight wall separating said chambers, and complementary cylindrical baffles intermediate the wall and the container, said baffles being spaced apart to provide an air passageway from the fan chamber.

25. In a device for operating the pneumatics of a player piano, the combination of a container with a motor therein, means for circulating air around the motor, and a series of complementary baffles spaced apart for providing passageways for the air, some of said baffles having conical portions which nest together, and means for retaining said baffles in spaced relation to each other whereby air may pass in a tortuous path through the motor.

26. In a device for operating the pneumatics of a player piano, the combination of a container with a motor therein, means for circulating air around the motor, and a series of complementary cylindrical baffles spaced apart for providing passageways for the air, each of said baffles nesting one within

the other, means for rigidly securing some of said baffles to the container.

27. In a device for operating the pneumatics of a player piano, the combination with
5 a container having a fan chamber and a motor chamber therein, means for circulating air in each of said chambers, said chambers being separated whereby the air circulating in one is independent of the air circulating
10 in the other, a plurality of cylindrical baffles for providing a tortuous air passageway in one of said chambers, and a plurality of conical baffles for providing a tortuous path in the other of said chambers.

28. In a device for operating the pneumatics of a player piano, the combination with
15 a container comprising an upper and lower section, the lower section being provided with a shoulder, a casing within the container, said casing having a fan and motor
20 chamber therein, means for circulating air in each of said chambers, and means intermediate the casing and container for providing a tortuous passageway for said air in
23 each of said chambers, the passageway leading from the fan chamber being formed par-

tially by a baffle, which rests upon said shoulder and extends downwardly within the lower casing, and partially by another baffle intermediate the first mentioned baffle
30 and the casing.

29. In a device for operating the pneumatics of a player piano, the combination with a container having an upper and lower section therein, a casing within the container, said
35 casing having a fan and motor chamber therein, means for circulating air in each of said chambers, means intermediate the casing and container for providing a tortuous passageway for the air, the passageway lead-
40 ing from the fan chamber being formed partially by a baffle which rests upon and extends downwardly within the lower casing, and partially by another baffle intermediate the first mentioned baffle and the casing, and
45 the passageway leading from the motor chamber being formed, partially by conical baffles which nest within each other.

In testimony whereof, I hereunto affix my signature.

CLINTON H. HANSON.