S. S. CRAMER.

PNEUMATIC POWER GENERATOR.

APPLICATION FILED NOV. 2, 1920.

1,418,238.

Patented May 30, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

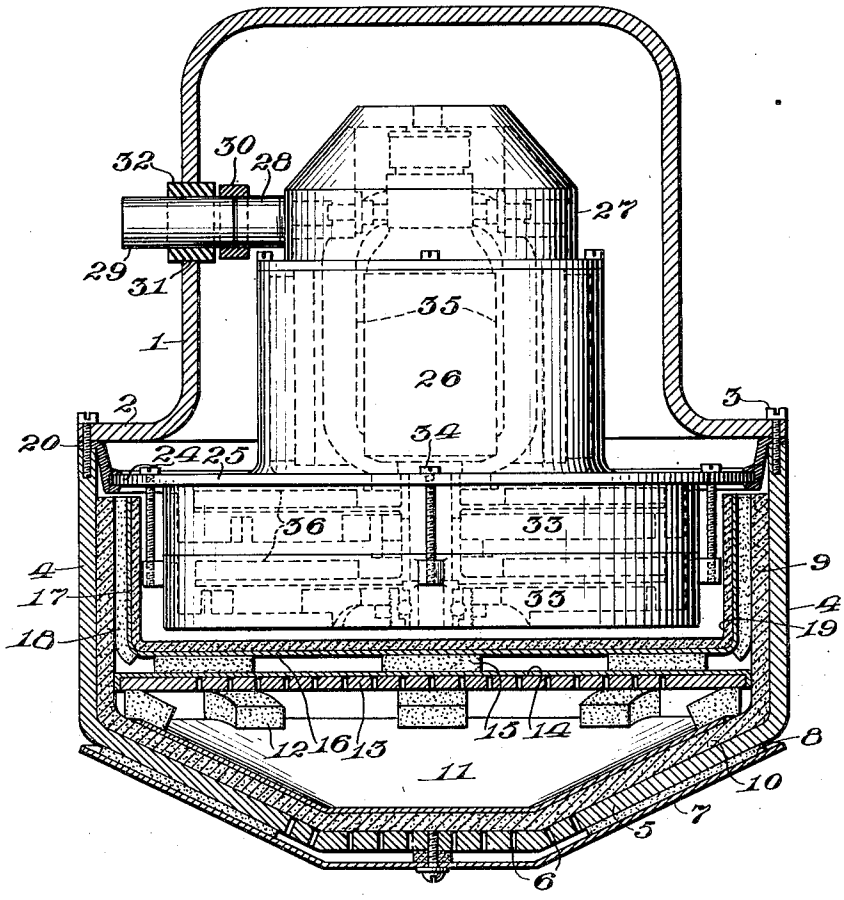
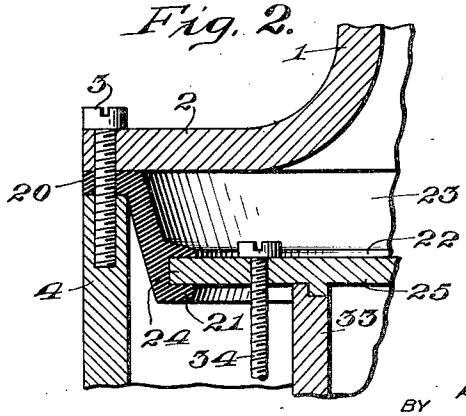


Fig. 2.



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Fig. 3.

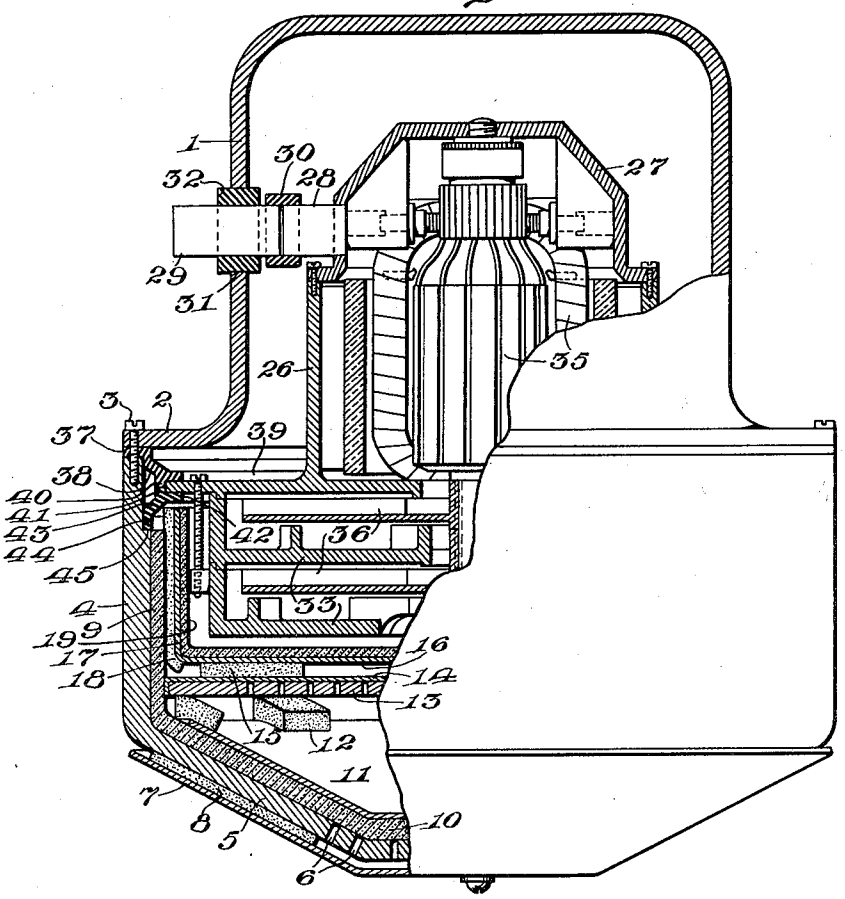


Fig. 4.

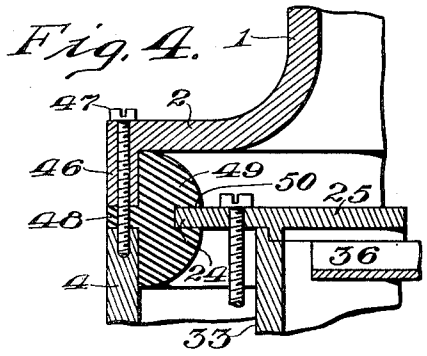
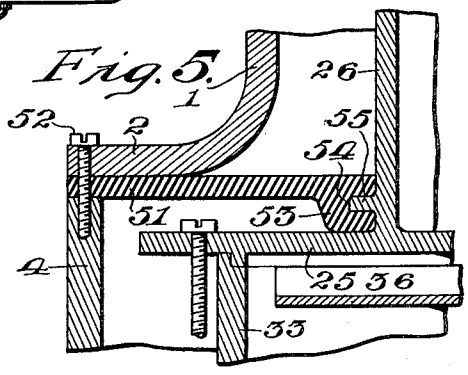


Fig. 5.



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STANLEY S. CRAMER, OF CAMDEN, NEW JERSEY.

PNEUMATIC POWER GENERATOR.

1,418,238. Specification of Letters Patent. Patented May 30, 1922.

Application filed November 2, 1920. Serial No. 421,249.

To all whom it may concern:

Be it known that I, STANLEY S. CRAMER, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Pneumatic Power Generators, of which the following is a specification.

The object of this invention is to provide improvements in the construction of pumps, with particular relation to those employed to compress or rarify air for the operation of player pianos and other pneumatically-actuated musical instruments.

The preferred embodiment of the invention will be hereinafter described as applied to vacuum player-pianos of all well-known types, and the pumps for this purpose being of that class which comprises one or more stage centrifugal fans rotated at high speeds by electrical motors.

Heretofore pumps of this character have had a tendency even under the most favorable operating conditions to create considerable noise of relatively high pitch, due to the speed at which the motors revolve, the rapid rush of air through an irregular course, the swift revolving of the anti-friction ball bearings, etc., wherefore it has been necessary to inclose the pump proper within a container, separated from the casing of the pump by various sound-insulating media.

However, by seeking out the many sources of the objectionable sounds referred to and eliminating them one by one, it is now possible to do away with most if not all of the said sound insulating media, and support or suspend the pump casing proper within and in spaced relation with a surrounding container, one means of support being in the form of an annular gasket either secured to or yieldingly surrounding the inner casing and also removably attached to the outer container, as well as modifications of this arrangement as hereinafter brought out. The generic function of the gasket hereinafter described for providing a yielding air-tight partition extending between an inner pump-casing and a surrounding container, in contra-distinction from the function of said gasket as a support for a casing with respect to a surrounding container, is broadly claimed in a co-pending application, Serial No. 318,886, filed August 21, 1919.

Furthermore, in designing such a construction as that described below, it has been found to be possible to decrease the cost of manufacture of the improved pumps by eliminating much of the material used in the earlier types, at the same time that the efficiency of the devices is increased. This comprises the employment of an imperforate annular gasket, closely surrounding the outside surfaces of the pump casing, and having its peripheral portion secured between the adacent portions of the sectional container casing, or by arranging the gasket in modified variations of this principle.

In each arrangement contemplated the gasket is made to function not only as a mere support for the pump casing within the container, but also as a means of sound-insulating the one from the other, and to form an air-tight partition between compartments within said container having different air pressures, one of which is a partial vacuum or minus pressure, while the other is exhaust or positive pressure, said partition also acting to prevent the exhaust air on one side from short circuiting into the compartment on the other side and again entering the pump and thus decreasing the vacuum drawing air through the pneumatics of the piano.

With these and other objects in view, the present invention comprises further details in construction and operation fully brought out in the following description, when read in conjunction with the accompanying drawings, in which Fig. 1 is a vertical diametrical section through a pump container and showing a pump casing suspended in spaced relation with said container by means of a gasket comprising one embodiment of the present invention; Fig. 2 is an enlarged transverse sectional portion of the gasket shown in Fig. 1; Fig. 3 is a combined partially elevational and in part a vertical diametrical section taken through the pump container and showing a pump and its casing suspended therein by means of a second form of gasket; Fig. 4 is an enlarged fragmentary transverse section illustrating a modified form of gasket; and Fig. 5 is a similar view of another form of said gasket.

Referring to Figs. 1 and 2, a pump container is illustrated as comprising an upper section having substantially the shape of an inverted cup, and flared outwardly at its lower extent to provide a substantially plane flange 2, secured by any suitable means 3 to the adjacent peripheral edge portion of a substantially cylindrical lower section 4,

closed at the lower end by means of any suitably shaped wall 5 provided with spaced ports 6, and covered by means of a preferably spun muffler 7 positioned in spaced relation with the adjacent wall of said lower container section by means of porous material 8.

Within the lower container section there is provided a porous lining having a cylindrical section 9 covering the inner surface of the cylindrical portion 4, and a lower section 10 covering the wall 5 and ports 6, said lower portion of the lining being held in position by means of a spun or pressed, preferably metallic, member 11. About the peripheral edge portion of the said last-named member 11 there are placed spaced cushioning blocks 12, upon which directly rests a perforated disc 13 covered by a porous filtering medium 14, upon which in turn rest spaced sound insulating blocks 15, and they in turn supporting a cup-shaped member 16 having peripheral cylindrical sides 17 substantially parallel with the cylindrical portion 4 of the container, and spaced from the lining 9 by means of porous material 18. This said cup member 16 is furthermore provided with a lining 19 covering its entire inner surfaces.

When the two sections of the container are connected together by the securing means 3, there is positioned between their adjacent peripheral surfaces a plane flange portion 20 of a flexible elastic sound insulating gasket, preferably formed of rubber or other material having the essential characteristics of rubber, while from the radially inner extent of said flange portion depends downwardly and having a shape similar to that portion of a cone, and provided at its lower extent with the radially inwardly extending plane flange 21 in spaced relation, above which extends radially a second and also plane flange 22, both of said flanges comprising integral projections from a central body portion 23 of the gasket, which body portion is connected with the container only through the medium of its upper flange 20.

The flanges 21 and 22 yieldingly surround and effect an elastic support for the adjacent peripheral edge portion 24 of a disc 25, forming the lower portion of a motor housing section 26 of a pump casing, said housing rising centrally from the said disc and being substantially cylindrical, while its upper end is closed by means of an inverted cup-shaped cap 27 provided with an aperture extending into one side portion, and into which aperture is preferably secured a short tube 28 in alignment with the second tube 29, from which latter the first tube is slightly spaced and connected only by means of an elastic, preferably rubber, sleeve 30 bridging the gap and forming an air-tight connection between them, the second sleeve 29 being arranged to extend freely through an aperture 31 in one side of the upper container section 1, and preferably separated from the sides of said last-named aperture by means of a sound-insulating gasket 32, preferably formed of rubber and if desired sealing the space between the sides of said aperture and tube 29 extending therethrough.

The lower portion of the pump casing comprises two or more cylindrical sections 33 connected together in air-tight relation, and secured directly to the disc 25 by any suitable means such for instance as the bolts 34. Within the motor housing section 26 there is positioned any desired type of motor 35 preferably operated by electricity and operative to drive any suitable type of fans 36 revolvably mounted within the fan housing sections 33.

When assembled as shown in Figs. 1 and 2 of the drawings, it will be apparent that there is provided a sectional container, within which is suspended by means of a peripheral yielding gasket a pump casing, said gasket comprising, not only a support for the pump casing with respect to the container, but also a means of sound-insulating the one from the other, as well as to form an air-tight partition between the compartments within said container having different air-pressure, one of which compartments contains a partial vacuum, while the other compartment contains an exhaust pressure for the motor-driven fans within the pump casing, said partition also acting to prevent the air upon one side from short-circuiting into the compartment upon the other, in which case it would again enter the pump and thereby decrease the vacuum or minus pressure which operates to draw air through the pneumatics or operating parts of a pneumatically-actuated instrument.

And, furthermore, the relative elasticity of the radially intermediate portions of each of the gaskets (shown in Figs, 1, 2, 3 and 5) has been so designed as to permit the difference between the relative air pressures above and below the casing to cause said casing, when the pump is in operation, to rise and float by virtue of what might be termed a differential air cushion within the said container. In order to explain the significance of this so-called "differential air-cushion" more fully, it should be added that prior to the preparation of this application pumps were successively operated having a construction shown in each of Figs. 1 and 3, but omitting the tube 28 and sleeve 30, the difference being that the fans 36 exhaust the air from the upper portion 1 of the container into which space air is thus drawn through the second tube 29 (from the musical instrument), with the result that the air pressures in the upper and lower parts of the container differ to an

even greater degree than before, and make it thus possible to "float" a much heavier casing than in the former case between the said differential air cushions.

Referring now to Fig. 3, the same numerals are used as those in Fig. 1, except those relating to the gasket. In this instance, the adjacent co-operating peripheral portions of the container sections 1 and 4 are separated by a plain flange portion 37 of a flexible elastic sound insulating gasket, which may comprise either a circular member or may be divided as illustrated into a plurality of co-operating members. As shown in Fig. 3, the gasket depends downwardly from the inner edge portion of the flange 37 and thence conically inwardly at 38, whence it is divided to form a plane flange 39 and a cylindrical flange 40.

A second section of the gasket is shown comprising a cylindrical flange 41 adapted to abut against and form a continuation of the flange 40, and also with a plane flange 42 parallel and in spaced relation with the flange 39, while the flanges 41 and 42 diverge from a conical portion 43, which terminates downwardly in a cylindrical section 44 resting upon a shoulder 45, formed integrally or otherwise upon the inner surface of the cylindrical portion of the lower container section 4. The flanges 39 and 42 co-operating respectively with the flanges 40 and 41 serve to surround the peripheral edge portion 24 of the disc 25 of the pump casing as and for the purposes described.

Referring to Fig. 4, the lower plane flange portion 2 of the upper container section 1 terminates outwardly in a depending cylindrical flanged portion 46, similar to and in alignment with the cylindrical portion 4 of the lower container member, the said cylindrical portions being secured together by any suitable means such for instance as the bolts 47, while between said portions is removably positioned an outwardly extending plane flange portion 48 of a gasket which upon the inner side of and closely adjacent to said supporting cylindrical portions comprises an enlarged body section 49, substantially semi-circular in cross-section and provided radially of its curved surface, and preferably in alignment with its flanged portion 48, with an annular groove 50, within which is removably positioned the peripheral edge portion 24 of the pump casing disc 25, the said end portion of this disc being yieldingly gripped by the opposite sides of the groove 50 of the said gasket, and the said gasket performing all of the functions hereinbefore described with relation to the gasket shown in Figs. 1 and 2.

Referring now to the form shown in Fig. 5, the plane flanged portion 2 of the upper container section 1 co-operates with the cylindrical portion 4 of the lower container section through the medium of a plane sound-insulating gasket 51 secured between the supporting container sections by means of bolts 52 or the like. The radially inner portion of this last-mentioned gasket is provided with an enlarged depending section 53, the radially inner surface of which is interrupted by an annular groove 54, the sides of which are adapted to be yieldingly sprung around an annular substantially plane flange 55 forming an integral projection from the lower portion of the cylindrical part of the motor housing 26 of the pump casing, the lower flange of the inner gasket portion 53 being inserted between said flange and the upper surface of the disc 25 of the said casing, and thereby co-operating to form a sound-insulating air-tight partition between the motor casing and container, and also operating to support one with respect to the other, either by itself or with the other of sound-insulating media in the lower portion of the container upon which in this case the said pump casing might rest.

In developing the various types of gaskets hereinbefore described, there has been provided means to support pump casings within their surrounding containers in such a manner that all vibration of the casing, due to the high speed at which the pump of whatever character is operated, is positively insulated from the said container, in addition to which there has been provided an air-tight partition between two chambers within the container having different air pressures, and also an elastic support for the pump casing adapted to permit within certain predetermined limits the greatest possible freedom of movement or vibration in operation or in handling the device, without allowing the casing to contact at any time with the adjacent walls of the container.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:—

1. The combination of a sectional container, with a gasket having a portion removably secured between and supported by the adjacent portions of said container, and a pump casing supported by another portion of said gasket in spaced relation to the walls of the container.

2. In an article of the class described, a gasket comprising a flanged portion adapted to be secured between the adjacent portions of a container, a portion adapted to support a member within said container, and a body portion connecting said first portions, said body portion comprising a conical section adapted to maintain the member supporting portion in spaced relation with the adjacent walls of a container.

3. In an article of the class described, a gasket comprising a flanged portion adapted

to be secured between the adjacent portions of a container, a grooved portion adapted to surround and resiliently grip a portion of a member within said container, and a body portion comprising a conical section adapted to maintain the member supporting portion in spaced relation with the adjacent walls of the container.

4. In an article of the class described, a gasket comprising a flanged portion adapted to be secured between the adjacent portions of a container, and an inwardly positioned transversely enlarged portion provided with a groove adapted to receive and support a member within said container.

5. The combination of a sectional container with a gasket having a portion removably secured between and supported by the adjacent portions of said container, and a pump casing in spaced relation with the walls of the container and forming an air-tight connection with another portion of said gasket, said gasket being operative to divide the space between said container and said casing into a plurality of chambers adapted to contain air at different pressures.

6. An air pump comprising a container, a casing within said container, air-impelling means within said casing operative to draw air from the upper portion of said container and to force air under pressure into the lower portion of said container, and a gasket forming a partition dividing the upper portion of the space between said container and casing from the lower portion, and said gasket having a peripheral portion connected with said container and having an annular portion connected with said casing, said gasket being operative to permit the air pressures within said container to raise said casing with respect thereto when in operation.

7. The combination of a casing, with a sectional container, one of said sections having a supporting surface, and a gasket in contact with said supporting surface and also forming an air-tight connection with said casing, said gasket being maintained in contact with the said surface of one section by pressure exerted thereupon by another section of said container.

In testimony whereof I have affixed my signature.

STANLEY S. CRAMER.