May 8, 1923. 1,454,041

S. S. CRAMER

BEARING

Original Filed Aug. 21, 1919

Fig. 1.

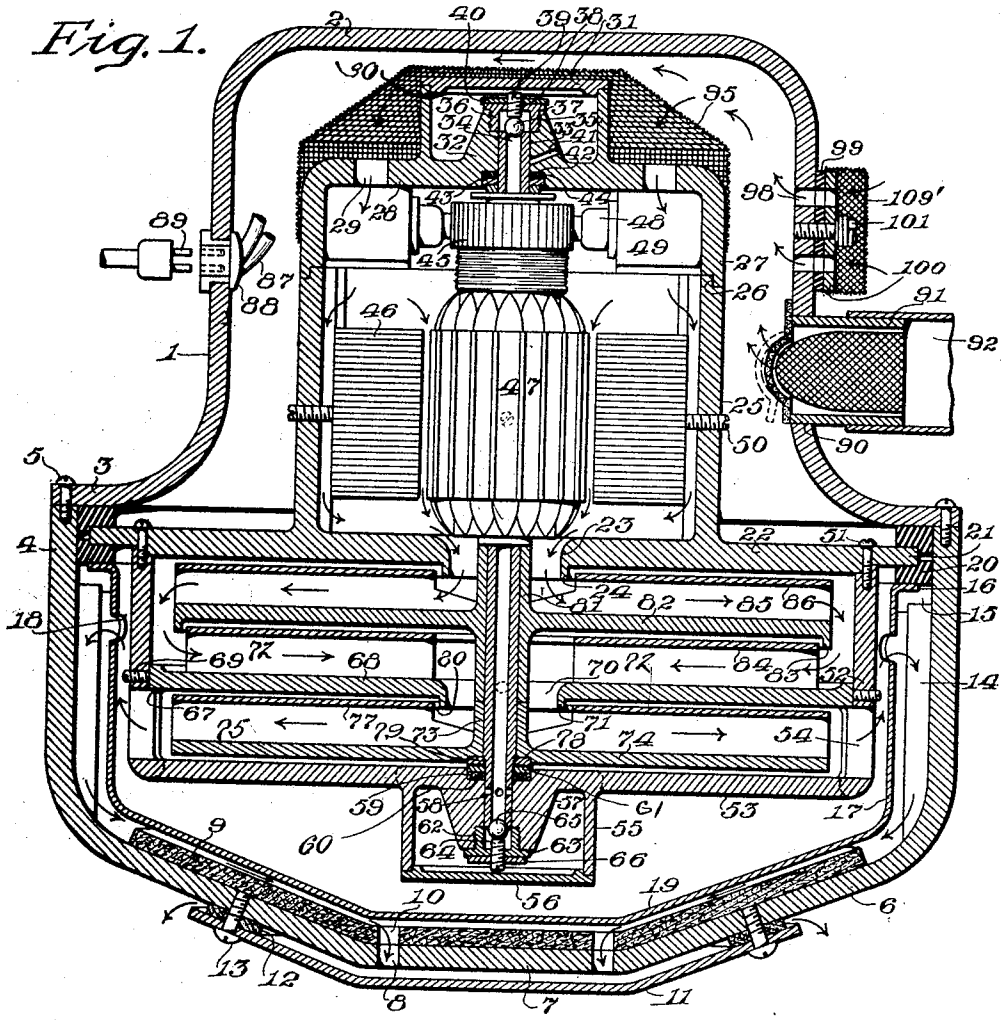
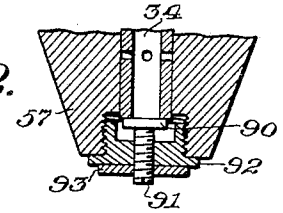


Fig. 2.



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UNITED STATES PATENT OFFICE.

STANLEY S. CRAMER, OF CAMDEN, NEW JERSEY.

BEARING.

Original application filed August 21, 1919, Serial No. 318,886. Divided and this application filed April 20, 1920. Serial No. 375,208.

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 Bearings, of which the following is a specification, this application being a division of application Serial No. 318,886, filed August 21, 1919, for pneumatic power generators.

The object of this invention is to provide an improvement in pneumatic power generators, and particularly those designed to be driven by electric motors at relatively high speeds, and used among other places in creating the vacuum necessary to the operation of pneumatic player-pianos.

In addition to player-pianos and other pneumatically operated musical instruments, this invention relates to a mechanical construction exceedingly well adapted for use in any mechanism wherein elements thereof, especially when comprising electric motor armatures, normally revolve at high speeds, either intermittently or steadily over extended periods.

Devices of this character are generally used for domestic purposes or in other words where the operator does not, nor is he or she expected to, know how to care for delicate apparatus and mechanisms, as does an experienced mechanic or skilled worker, and wherefore it is obviously a standing requisite that such devices must be constructed so as to operate with the highest efficiency often under adverse circumstances and without necessitating frequent lubrication and other attention generally demanded by such structures.

As has been stated, this invention is particularly applicable to vacuum creating devices for use on player-pianos, for, throughout long periods with little or no appreciable wear or deterioration, it is also necessary to so design every element of the construction so as to aid in lessening to a minimum the audible vibrations set up by the device when performing the function for which it is intended, the effect of such vibrations being much more apparent when used with musical instruments of the constantly tensioned string variety as the sounding-board mounting for the strings serves to magnify the vibrations of apparatus in any way connected thereto, and to convey such extraneous vibrations to said strings, with the obvious effect of mutilating an otherwise perfect rendition of a given piece of music.

Further details of the construction and operation of the present invention are fully brought out on the following description, when read in conjunction with the accompanying drawings, in which Fig. 1 is a longitudinal, transverse section of a vacuum-producing apparatus embodying one form of the invention; and Fig. 2 is an enlarged detail section of a modified form of lower thrust bearing for the shaft.

Referring to the drawings, there is provided an upper cylindrical casing 1, closed at its upper limit by means of a horizontally extending imperforate wall 2, and at its lower portion provided with a radially outwardly directed peripheral flange 3. The lower portion of the inclosing casing comprises a cylindrical section 4, which is normally secured by any suitable means 5 to the flange 3 of the section 1, while the sides of said lower section are at their lower extent directed diagonally inwardly at 6, and centrally closed by means of a horizontally extending wall 7, said wall, however, being provided with spaced apertures 8. The inner surfaces of the sections 6 and 7 are covered by a relatively thick layer of fibrous material 9, which is also provided with spaced apertures 10 registering with the apertures 8 and the wall 7. Partially covering the lower outer surfaces of the wall sections 6 and 7 is a baffle-plate 11, spaced from the section 6 by means of suitable sound-insulating walls 12, yet secured against accidental removal therefrom by suitable attaching means 13.

The inner surface of the cylindrical portion 4 is provided with spaced longitudinally extending ribs 14, upon the upper portions of which are mounted an equal number of yielding sound insulating bushings 15, and between and upon which is positioned the upper flanged portion 16 of an inner cylindrical sheet-metal shell 17, which, adjacent to its uppermost limits, is provided with spaced apertures 18, and at its lower limits is closed by a frusto-conical section 19, conforming

in general to the shape of the adjacent portions 6 and 7 of the surrounding casing and spaced equi-distant therefrom.

Resting directly upon the bushings 15 and shell flanges 16 are spaced sound insulating sections of yielding material 20, upon which directly rests the reduced radially extending peripheral flange portion 21 of a substantially plain casting 22, centrally apertured at 23 and surrounding the lower edge portion of said aperture provided with a depending annular flange 24, while integral with the portion 22 and surrounding said aperture is an upwardly extending cylindrical section 25, provided at its peripheral edge portion with an outwardly directed cylindrical shoulder 26.

Supported by the cylindrical portion 25 of the casting just described and surrounding the shoulder 26 is a cylindrical casting 27, closed at its upper portion by a transversely extending wall 28, which in turn is provided with spaced apertures 29 adjacent to the periphery of said wall, while the latter is provided with a centrally positioned upwardly extending integral cylindrical portion 30, adapted to serve as an oil reservoir and normally closed at its upper end by means of a removable cap or plug 31.

The wall 28 is furthermore centrally provided with an upwardly extending integral boss 32 provided with a central axially extending bore 33, forming a bearing for the tubular shaft 34 extending revolvably therethrough. The bore 33 is enlarged and internally threaded at 35 to receive a plug 36 shaped as an inverted cup and housing a ball 37, which is larger than the bore of the shaft 34 and is seated within the end of said last-named bore. The plug 36 is provided centrally with a tapped bore 38, through which extends a flat-ended set-screw 39, which in turn is surrounded adjacent to its outer end portion by means of a lock-nut 40. The boss 32 is also provided with a capillary diagonally extending bore 41, adapted to convey a predetermined amount of lubricant from the oil-cup 30 into the bore 33 for lubricating the shaft 34 in its bearing.

The wall 28 is furthermore provided upon its under surface and concentric with the bore 33 with a centrally disposed recess 42, in which is forced a washer 43, loosely surrounding the shaft 34 but conforming within the recess, thus inclosing a suitable section of fibrous absorbent material 44 adapted to prevent the lubricant from passing in any substantial amount down the shaft to the commutator 45 of the electric motor, which comprises field-coils 46, within which is revolvably mounted an armature 47, while suitable brushes 48 are supported by brush-holders 49, and said field-coils are axially positioned with respect to the rotating armature by means of radially directed set-screws 50 extending through the cylindrical portion 25 of the casting 22.

Suspended beneath the casting 22, and secured thereto by any suitable means 51, is a cylinder 52, which co-operates with a shoulder at the base of the flange 21 in order to position said cylinder exactly concentric with the said casting 22. The lowermost portion of said last-named cylinder is spanned by means of ribs 53, in order to provide spaced laterally directed openings 54, while depending from the center of said ribs is an inverted cup-shaped lubricant reservoir 55 normally closed by means of a plug 56, while disposed within said reservoir and forming an integral extension of said ribs is a depending boss 57 provided with an axially positioned bore 58, which forms a bearing for the lower end portion of the tubular shaft 34.

At its upper extent, the bore 58 is enlarged to provide an annular recess 59, in which is placed a section of fibrous absorbent material 60, retained in position by means of a washer 61 secured by a forced fit into the said last-named aperture. Downwardly, the bore 58 is enlarged and internally threaded at 62 to receive an internal cup-plug 63, which is centrally drilled and tapped to support a set-screw 64 having a flat upper end and supporting a ball 65, similar to the ball 37, and against which the tubular shaft directly co-operates. The set-screw 64 is furthermore surrounded at its lower end portion by a lock-nut 66, in order to prevent the set-screw from accidental dislodgment.

The cylinder 52, immediately above the laterally directed aperture 64, is provided preferably with an annular shoulder 67, upon which rests a transversely extending annular partition 68, which is maintained in normal fixed position by means of radially directed set-screws 69, and is provided centrally with an aperture 70, surrounded at its immediate lower peripheral edge portion by a depending flange 71. This partition 68 is provided with a plurality of upwardly extending stationary blades 72, each starting from the aperture 70, and as it progresses radially outwardly being curved in a clockwise direction, for a purpose hereinafter described.

Mounted upon the lower portion of the tubular shaft 34 is a hub 73, provided with a radially extending plane flange 74, upon the upper surface of which are secured spaced vanes or ribs 75 and 76, said vanes being preferably designed so that the latter extend downwardly from the said hub to the periphery of said flange, while the former vanes extend to the periphery of said flange from points spaced from said hub. This construction, together with the disc 77, forming a shroud and connecting the upper free edge portions of said vanes, comprises a

centrifugal fan or blower unit, which upon its under side is preferably provided with an axially positioned recess 78, into which extends a nut 79, operative to secure the said fan units upon the shaft 34, and positioned opposite to though normally spaced from the washer 61. The shroud 77 is centrally apertured at 80 to admit air into the spaces between the vanes 75 and 76 from the region above the horizontally extending partitions 68, as it passes through the aperture 70 in said partition.

A second blower unit is likewise secured to said shaft in any suitable manner, and is positioned between the unit first described and the armature of the driving-motor, said unit comprising a hub 81, which extends and contacts with the hub 73 up to the armature above referred to, and is provided substantially mid-way its longitudinal measurement with a radially extending plane flange 82, which latter terminates at its outer periphery in a depending cylindrical flange 83, operative to direct air-currents passing thereby over the peripheral edge portion of a shroud 84 which covers the three upper edge portions of the vanes 72 of the partition 68. The flange 82 is provided with upwardly extending vanes 85 preferably exactly similar in number, position and shape with those hereinbefore described as comprising portions of the first fan unit, and these vanes 85 are connected at their upper free edges by means of a shroud 86.

And referring to Fig. 2, the hollow shaft 34 is shown as resting substantially vertically upon a hard metallic disc 90, adjustably supported by a set-screw 91, carried centrally by a plug 92 and fixed in position by means of a locknut 93. The said plug is cupped to preferably partially surround and position the said disc, and is removably threaded in the lower portion of the boss 57 hereinbefore described, and through which boss is also journalled the shaft 34.

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

1. In combination with a shaft having a bore operative to convey a lubricant, a ball of larger diameter than said bore and extending thereinto, said ball forming a bearing for said shaft against the lateral limits of said bore and adapted to be lubricated by a lubricant from within said bore, and means to removably support said ball.

2. In combination with a shaft having a lubricant-conveying bore, means having a journal bearing for said shaft, a ball of larger diameter than and extending into said bore to form a bearing for said shaft, and means adjustably carried by said first means to support said ball.

3. In combination with a shaft having a bore, means having a journal bearing for said shaft and an enlarged aperture in said means concentric with said bearing, a ball of greater diameter than the bore of said shaft and in uniform contact with the sides of said bore, and axially adjustable means extending into said aperture and supporting said ball to predetermine the longitudinal position of said shaft.

4. In combination with a shaft having a bore, means having a journal bearing for said shaft and an enlarged internally threaded aperture in said means concentric with said bearing, a ball of greater diameter than the bore of said shaft and in uniform contact with the sides of said bore, and a plug extending into said aperture in threaded contact therewith and supporting said ball to adjustably determine the longitudinal movement of said shaft in one direction.

In testimony whereof I have affixed my signature.

STANLEY S. CRAMER.

Witness:
J. STUART FREEMAN.