P. HEILIGER.

PUMPING MECHANISM FOR STATIONARY VACUUM CLEANERS.

APPLICATION FILED NOV. 8, 1919.

1,351,210.

Patented Aug. 31, 1920.

2 SHEETS—SHEET 1.

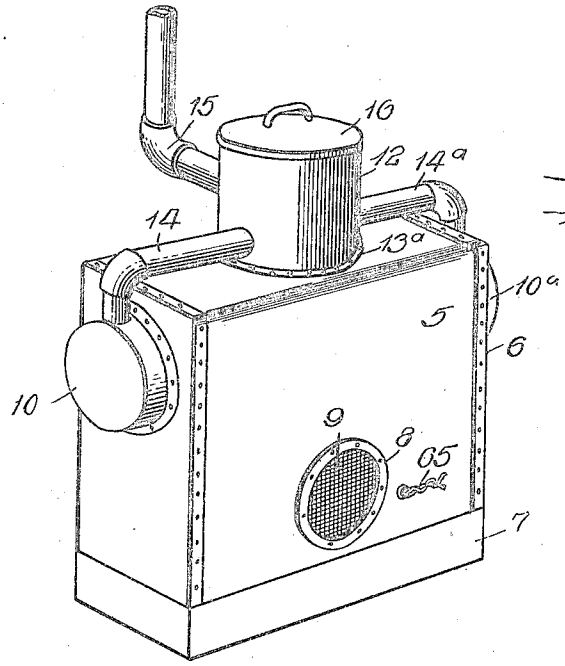


Fig. 1

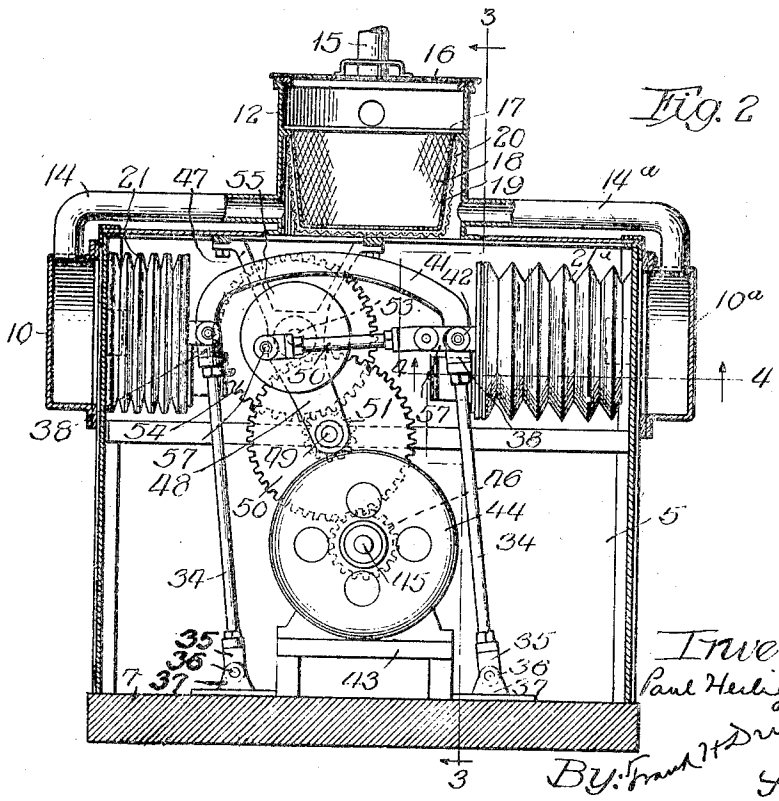


Fig. 2

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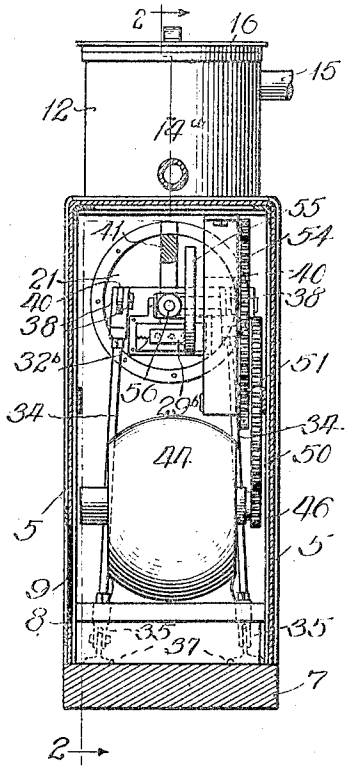
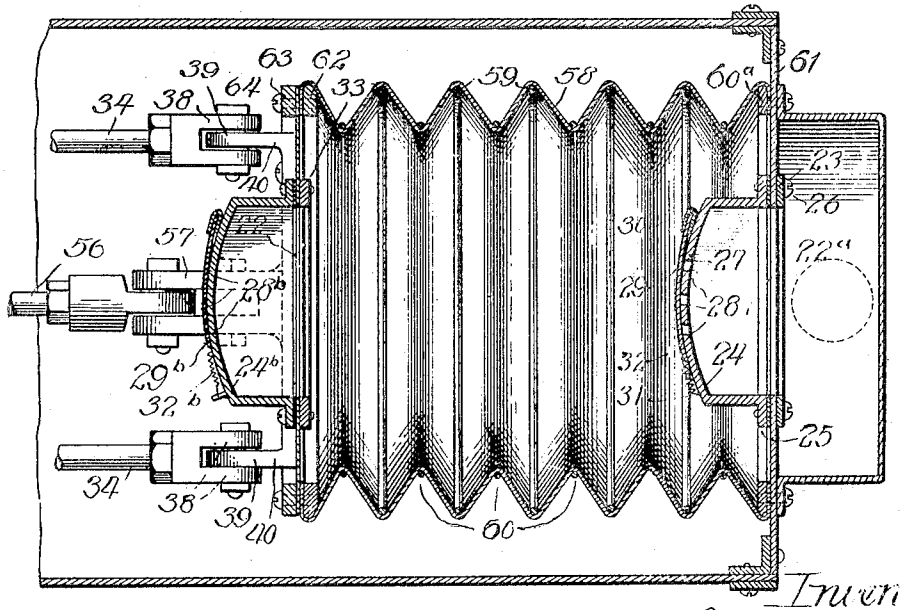


Fig. 3

Fig. 4



Inventor

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UNITED STATES PATENT OFFICE.

PAUL HEILIGER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-THIRD TO LYMAN J. CLARKE AND ONE-THIRD TO ELMER E. CLARKE, BOTH OF CHICAGO, ILLINOIS.

PUMPING MECHANISM FOR STATIONARY VACUUM-CLEANERS.

1,351,210. Specification of Letters Patent. Patented Aug. 31, 1920.

Substitute for application Serial No. 51,602, filed September 20, 1915. This application filed November 8, 1919. Serial No. 336,583.

To all whom it may concern:

Be it known that I, PAUL HEILIGER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Pumping Mechanism for Stationary Vacuum-Cleaners, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in pumping mechanism for stationary vacuum cleaners, and has for its object the production of a device in which all sliding valves are eliminated and a maximum of efficiency obtained.

A further object is the production of a device embodying improved forms of bellows construction capable of giving great length of service without deterioration.

A further object is the production of a device of simple construction involving few parts, and one that is not liable to get out of order.

These and such other objects as may hereinafter appear are attained by my device, an embodiment of which is illustrated in the accompanying drawings, in which—

Figure 1 represents a perspective view of my device without the nozzle;

Fig. 2 represents a sectional view on the line 2—2 of Fig. 3 looking in the direction indicated by the arrows;

Fig. 3 represents a vertical sectional view on the line 3—3 of Fig. 2 looking in the direction indicated by the arrows; and

Fig. 4 represents a horizontal sectional view on the line 4—4 of Fig. 2 looking in the direction indicated by the arrows.

Referring now to the drawings, 5 represents the outer box or casing preferably formed from sheet metal and having reinforcing side strips 6 and a base 7. The box is provided with an opening 8 near the base protected by wire mesh or netting 9. At either end and toward the top of the casing are provided bellows openings over which are mounted cylindrical caps or casings 10, 10^a. These casings at their inner end are flanged outwardly as shown at 11 and riveted to the sides of the main casing. An opening is provided in the top of the casing, and a dust or suction chamber 12 mounted thereon, the flanges 13 being riveted or bolted to the top of the casing. Communicating tubes 14, 14^a connect the interior of the casing 10 with the dust receptacle 12, and from the dust casing extends a vacuum tube 15, which is intended to extend to any portion of the premises where the vacuum is to be utilized. The dust receptacle is provided with a cover 16 and an interior peripheral flange 17 on which is mounted a dust bag 18 formed with stiffening wires 19 and a fine mesh or net 20. The bag is made somewhat smaller at the bottom so as to allow a clear space between the bag and the mouth of the tubes 14, 14^a.

Mounted within the interior of the casing, and registering with the openings covered by the casings 10, 10^a, is a pair of bellows 21, 21^a. The particular construction of the bellows will be described later. The openings 22, 22^a in the main casing covered by the casings 10, and 10^a, are of smaller area than the exterior diameter of the casing, and are reinforced with outer flanges or frames 23. An inner front bellows casing 24 provided with flanges 25 registers with the reinforcing frame 23, and is held in place by series of bolts 25, 26 passing through both members. This front bellows casing is preferably curved on the inner end 27, and is provided with a plurality of openings 28 opening into the interior of the bellows, and a leather valve 29 is mounted on the outer surface of the end 27 covering the openings 28. This valve is rigidly secured at one end at 30 and at the other end 31 by means of a spring 32, thus permitting the movement of the leather valve toward and away from the openings 28. At the inner end of the bellows a frame 33 surrounds the opening 22, and a duplicate of 24, marked 24^b is mounted thereon, in a similar manner. In this case, however, the leather valve 29^b is located outside the bellows over the openings 28^b and provided with a similar spring 32^b.

The bellows 21, 21^a are supported within the interior of the casing on movable bars 34, the lower ends 35 being pivotally connected at 36 to the supporting yoke members 37 mounted on the base. At their upper ends these rods terminate in a yoke 38 pivotally mounted at 39 on a supporting lug 40 secured to the inner face of the bellows. Four supporting rods are provided, two at each end of the inner face of each bellows.

The inner ends of the bellows themselves are connected through the medium of a curved connecting arm 41 pivotally mounted on a supporting yoke member 42 on the inner ends of the bellows.

Mounted on a supporting standard 43 within the main casing is a motor 44 having a central shaft 45 on which is mounted a pinion 46. A supporting yoke 47 is mounted on the upper surface of the casing and provided with a downwardly projecting extension 48 within which is mounted the shaft 49 carrying a gear 50 and a pinion 51, the gear meshing with the teeth of the pinion 46, and the teeth of the pinion 51 meshing with the gear wheel 52 mounted on the shaft 53 supported on a yoke 57. A disk or wheel 55 is also mounted on the shaft, and one end of the connecting rod 56 is eccentrically mounted on this disk at 57. The other end of the crank shaft is pivotally supported between the arms of the yoke 57 mounted on the inner face of the bellows 21ª. It will be noted that the connecting member 41 is sufficiently curved so as not to interfere with the movement of the connecting rod 56 during the revolution of the disk 55.

Referring now to the construction of the bellows which is clearly shown in Fig. 4, the bellows are preferably circular in cross-section and preferably formed from a sheep skin covering 58 stretched over a series of metallic rings 59, intermediate spring members 60 being provided between alternate rings. The sheep skin or other material forming the bellows proper is stretched over an interior ring or flange 60ª and secured between this flange and the outer plate 61 of the casing and at its inner end, an interior ring 62 and an outer ring 63 are provided and the sheep skin stretched over the inner ring and clamped in place between the two rings, by means of a series of bolts 64. The material is extended toward the center and clamped between the frame 33 and the casing.

It will be noted that the frame 33 and the opening which it surrounds is preferably rectangular, as shown in Fig. 3.

Referring now to the operation of my device, it will be clearly seen that with the motor in operation one of the bellows will be at work creating a vacuum, while the other will be discharging its air and getting into position to perform its work on the return stroke. With the bellows distended, as shown in Fig. 4, the air has been drawn from that side of the system from the pipe 14ª and the dust receptacle and the valve 29 closed. At this point it is just ready to commence the back stroke and the bellows 21 put into operation to create a vacuum through the pipe 14. On the return stroke, the valve 29 being closed, the increased pressure of the air within the bellows forces the valve 29ᵇ away from the openings 28ᵇ and permits the air to enter the receptacle and pass out through the opening 8. On the beginning of the return stroke the valve 29 is forced open by the air drawn through the system and filling the bellows again, the valve 29ᵇ being closed. This assures a continuous vacuum while the motor is in operation.

The supporting of the bellows on the rods 34 which are preferably tilted inwardly as shown in Fig. 3 makes an especially strong and rigid construction and prevents side vibration. There are no sliding members to wear and become leaky, the only appreciable wear being on the supporting members and at the bearing.

The valves 29 and 29ᵇ are vertical, consequently there is no opportunity for dust to collect and clog up the opening as would be liable if the valves were placed horizontally.

I have not shown any special form of nozzle, as any of the ordinary forms now in use can be attached and used to advantage, my invention residing in the portions of the device described.

My device is especially adaptable for placing in basements and flats and buildings when erected, with the pipes extending therefrom throughout the house, and with connections in the different rooms, to which any ordinary form of nozzle with flexible hose may be attached.

The motor, of course, is connected to any source of electrical current supply through a wire 65 as shown in Fig. 1, but other sources of power might be used and still retain the other features of my invention.

It is quite evident that various details in construction may be changed or equivalent parts substituted without in any way departing from the spirit of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a vacuum cleaner system the combination with a casing, a suction chamber in open communication therewith, a pair of bellows mounted on upright movable supports within said casing, said supporting members being connected with the free end of said bellows, a rigid connecting bar mounted between the free ends of said bellows, and means for operating said bellows to create a vacuum within the system.

2. In a vacuum cleaner system the combination with a casing, a suction chamber in open communication therewith, a pair of bellows pivotally mounted on upright movable supports within said casing, said supporting members being connected with the free end of said bellows, a rigid connecting bar mounted between the free ends of said bellows, and means for operating said bellows to create a vacuum within the system.

3. In a vacuum cleaner system the combination with a casing, a suction chamber in open communication therewith, a pair of bellows within said casing, a plurality of supports for said bellows pivotally secured thereto at their movable ends and pivotally mounted at the bottom, a connecting bar mounted between the free ends of said bellows, and means for operating said bellows to create a vacuum within the system.

4. In a vacuum cleaner system the combination with a casing, a suction chamber in open communication therewith, a pair of bellows mounted within said casing, upright supporting members therefor pivoted on the base of said casing and connected with said upright members, a vertically disposed valve at either end of the bellows, a rigid connecting bar mounted between the free ends of said bellows, and means for operating said bellows to create a vacuum within the system.

5. In a vacuum cleaner system the combination with a casing, a suction chamber in open communication therewith, a pair of bellows pivotally secured at their movable ends to rods, said rods being pivotally mounted on the bottom of said casing, a vertically disposed valve at either end of said bellows, a rigid connecting bar mounted between the free ends of said bellows, and means for operating said bellows to create a vacuum within the system.

6. In a vacuum cleaner system the combination with a casing, a suction chamber in open communication therewith, a pair of cylindrical bellows mounted within said casing, upright supporting members therefor pivoted on the base of said casing, a rigid connecting bar mounted between the free ends of said bellows, and connected with said upright members, and means for operating said bellows to create a vacuum within the system.

7. In a vacuum cleaner system the combination with a casing, a suction chamber in open communication therewith, a pair of cylindrical bellows pivotally mounted on upright movable supports within said casing, a rigid connecting bar mounted between the free ends of said bellows, and connected with said upright members, and means for operating said bellows to create a vacuum within the system.

8. In a vacuum cleaner, a main casing, a motor mounted therein, a pair of cylindrical bellows operatively connected with said motor and with each other, independent upright supporting means for the free ends of each of said bellows, and means for permitting horizontal and vertical movement of said free ends.

9. In a vacuum cleaner, a main casing, a motor mounted therein, a pair of cylindrical bellows operatively connected with said motor, a curved connecting arm pivotally secured to the opposite ends of said bellows, independent upright supporting means for the free ends of each of said bellows, and means for permitting horizontal and vertical movement of said free ends.

In witness whereof, I have hereunto subscribed my name.

PAUL HEILIGER.