R. B. HUTCHISON.

PUMPING MECHANISM FOR VACUUM CLEANERS.

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1,067,029.

Patented July 8, 1913.

FIG. 1.

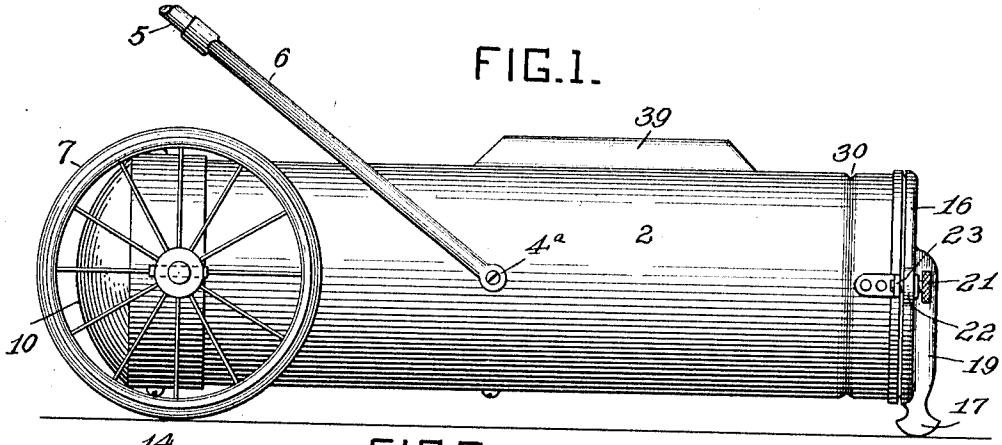


FIG. 2.

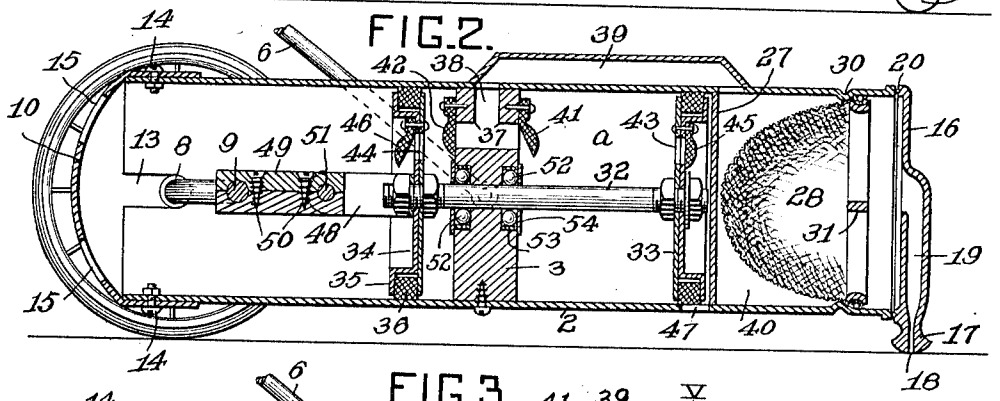


FIG. 3.

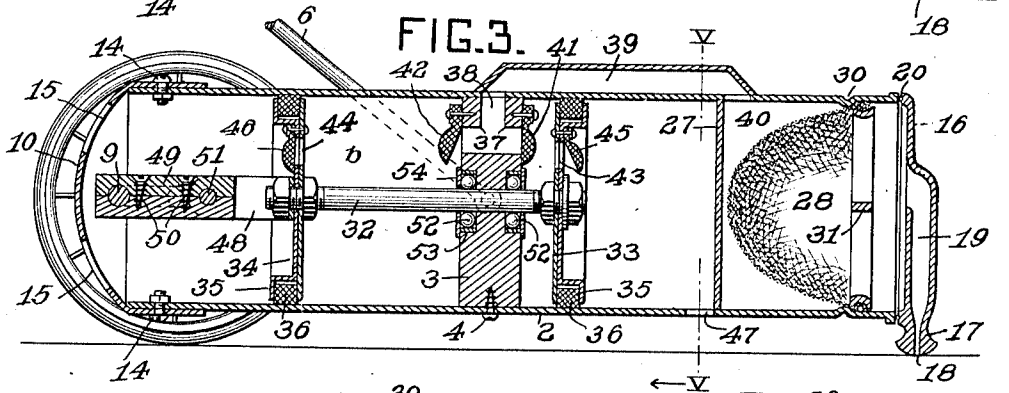


FIG. 4.

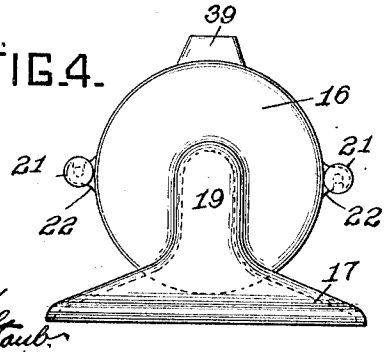
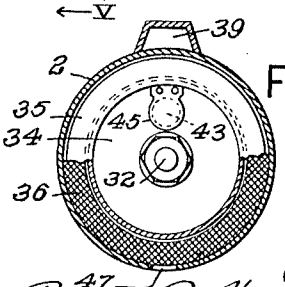


FIG. 5.



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PUMPING MECHANISM FOR VACUUM-CLEANERS.

1,067,029. Specification of Letters Patent. Patented July 8, 1913.

Application filed June 24, 1912. Serial No. 705,487.

To all whom it may concern:

Be it known that I, ROBERT B. HUTCHISON, a citizen of the United States, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Pumping Mechanism for Vacuum-Cleaners, of which the following is a specification.

My invention is an improvement in vacuum cleaners.

It consist of a portable apparatus operable by traction and comprises a hollow cylindrical body or barrel having at its forward end a suction nozzle, at its rear end a pair of supporting wheels and a crank shaft, plunger mechanism and valves controlling the circulation of induced air currents in operative connection with said crank shaft and with relation to a middle valved partition or head, a removable dust bag, and an operating handle, together with other features of detail construction and improvement as shall be more fully hereinafter described.

In the drawings Figure 1 is a view of the device in side elevation. Fig. 2 is a longitudinal vertical sectional view of the device. Fig. 3 is a similar sectional view showing the plunger mechanism in reversed position. Fig. 4 is a front end of the apparatus. Fig. 5 is a cross sectional view on the line V. V. of Fig. 3.

The body portion of the cleaner consists of a cylindrical barrel portion or case 2 of sheet metal provided at or about its middle with a transverse stationary head 3 fixedly secured to the shell or barrel 2 by screws 4, or otherwise, the device being provided with an operating handle 5 of any desired length having the bifurcated or forked extremity consisting of the sides 6. The terminals of these sides are pivotally connected at about the middle portion of the apparatus by the screws or studs 4^a which extend through the shell and into the head 3, as indicated.

The rear portion of the machine is mounted upon wheels 7, 7, the peripheries of which are preferably provided with rubber tires, or otherwise formed to provide for good traction upon the surface of the floor. The wheels 7 are fixedly attached by their hubs to the outer ends of crank-shaft 8 having a middle crank portion 9. The rear end of the cylinder 2 is closed by a cap 10 of sheet metal tightly fitting around the end of the main case to which are fixedly connected the bearings for shaft 8 in the same manner as that shown in my prior application, filed April 10, 1912, Ser. No. 689,780. The said application shows a structure which is generally similar, but embodying bellows mechanism. The rear side portions of the shell 2 are slotted, as indicated at 13, for clearance of the bearings so that when the cap is inserted in position, the bearings are fixedly located and the parts are connected in operative relation. The cap 10 is secured upon the rear end of shell 2 by means of bolts and nuts 14, openings 15 being provided through the cap for the double purpose of providing for air circulation and for manipulation of the bolts and nuts in connecting these parts.

At the front end of the casing 2, I provide a removable head 16 having at its lower portion a nozzle terminal 17 longitudinally slotted across its middle portion, as indicated at 18, of ample width to cover the desired floor area, and communicating with the interior of the case by an upwardly and inwardly disposed circulating passage 19. The head 16 is preferably provided around its inner edge with a packing ring or cover 20 of any suitable material set in an annular receiving groove and is tightly clamped against the end of the case by securing screws 21 having finger terminals, as shown, said screws extending through slotted ears 22 projecting outwardly at each side of head 16 and threaded into suitable receiving lugs 23. By this construction, upon loosening the screws 21, the head 16 may be slightly rotated or released for access into the interior, and as readily replaced.

Inwardly beyond the outer end of the case 2 is a transverse imperforate partition 27, soldered or otherwise secured to the case, between which and the outer end of the case is provided a sufficient receptacle 40 for the dust collecting bag 28. Said bag is mounted upon a circular frame 29 which bears inwardly against an inner annular shoulder 30 making a sufficiently tight fit with the interior of the casing to prevent the passage of dust. The frame 29 is provided with a transverse bar 31 by which it may be readily grasped for removal or insertion.

The transverse head 3, which is preferably of wood, is of ample thickness to provide a

substantial middle stationary supporting frame for a reciprocable plunger stem 32 upon each end of which is fixedly secured by nuts the reciprocable pistons 33 and 34 respectively, which are preferably made of sheet metal in two circular sections, formed to provide an annular receiving groove 35 for an inserted packing ring 36, and operable to create air suction.

Packing ring 36 for each piston is preferably rectangular in cross section, of comparatively soft rubber like cushion rubber or other similar material, and is loosely mounted in the annular cavity 35 with its ends abutting or overlapping diagonally, and having sufficient resiliency to maintain it normally distended into contact with the inner faces of the shell.

The head 3 is provided with a transverse port 37 communicating by a central port 38 and an outer by-pass conduit 39 with the dust bag compartment 40 beyond the partition 37, as clearly shown. The conduit 39 may be of sheet metal or other suitable material and of any desired form in cross section, and its function is to establish continuous circulating communication between the chamber 40 and the interior spaces *a*, *b*, respectively, between the head 3 and reciprocable pistons 33 and 34, alternately during the operation of the device. The port 37 through head 3 is provided with flap valves 41 and 42 respectively, of any suitable material as rubber, leather, etc., preferably having circular thickened body portions connected by a flexible neck with a securing portion of the flap valve by which it is secured, as shown, to head 3.

Each piston 33 and 34 is likewise provided with a circulating port 43 and 44 respectively, which are also covered on their outer sides with similar flap valves 45 and 46, respectively. The case 2 is likewise apertured, as at 47, between head 3 and partition 27 for outward circulation of air.

The rear end of plunger 32 is connected in any suitable manner, as by a clevis 48 of sheet metal or other material and a two-part link 49 with the crank 9. The link 49 may be of hard wood in halves secured together by screws or bolts 50 and embracing the crank shaft 9 and a pin 51 extending transversely through each side of the clevis 48.

For the purpose of maintaining plunger 32 in alinement centrally through the head 3, I provide at each side of the head surrounding the plunger, series of ball or roller bearings 52, 52, mounted within surrounding bushing rings 53 and retained by cover plates 54, 54. The middle portion of the head 3 snugly embraces the plunger 32 without any unnecessary binding by which construction a practically air-tight fit is secured.

Due to the ample thickness of head 3 and the alining action of bearings 52, the plunger 32 is retained centrally in position at all times independent of any lateral thrust due to its connection with the actuating crank 9.

Due to the construction and arrangement of the working parts, the wheels, crankshaft, cap, link, pistons, plunger and head 3 are connected as one unitary structure, and may be assembled and applied to the machine or taken away therefrom by merely removing screws 4 and 4ª and bolts 14.

The operation of the device will be readily understood from the foregoing description.

The weight of the case 3 and its contents by the pivotal mounting upon the axle shaft causes the nozzle to remain in close operative position over the floor surface. By merely manipulating the machine to and fro by its handle, the suction heads 33 and 34 are operated back and forth and effect a strong suction in each direction through conduit 39, the dust being arrested in the bag 38 and the incoming air escaping through the openings 14 and 47. The use of plungers 33 and 34 with their loosely mounted resilient packing rings effects efficient suction by tight engagement with the inner cylindrical wall of the case, avoiding the necessity of supplemental bellows, without undue friction.

The device is very easily manipulated; it is simple and compact in construction and sufficiently low to be passed under beds or other articles of furniture; and is very durable and strong and not liable to get out of order.

Having described my invention, what I claim is:—

1. In a vacuum producing apparatus, the combination of a portable cylindrical casing having at one end a suction opening and at the other end a removable apertured cap provided with journal bearings, a crank shaft mounted in said bearings having supporting wheels, a middle transverse partition having valve controlled ports opening at each side thereof and communicating with the suction opening, and a central reciprocable plunger extending through said partition connected with the crank shaft and provided with a valved piston at each side of said partition, the crank shaft and its connected parts forming a removable unitary structure, substantially as set forth.

2. In a vacuum producing apparatus, the combination of a portable cylindrical casing having at one end a suction opening and at the other end a removable apertured cap provided with journal bearings, a crank mounted in said bearings having supporting wheels, a middle transverse partition having valve controlled ports opening at each side thereof, a conduit outside of the casing communicating with said ports and with the suction opening, and a central reciprocable plunger extending through said partition

connected with the crank shaft and provided [illegible] having a valve controlled port communicat

10. In a vacuum producing apparatus, the combination of a cylindrical casing having a middle transverse head provided with a transverse valve-controlled port and a central bearing opening, a removable suction head having an intake opening, a partition between the suction head and the middle head providing an air chamber and a suction chamber, a filter removably mounted in the air chamber, a conduit connecting the air chamber and said valve-controlled port, a removable closure for the other end of the casing having axle bearings, an axle mounted therein having supporting wheels and a crank, and a reciprocable piston in the suction chamber having a stem extending through the central bearing opening of the middle transverse head and connected with the axle crank, substantially as set forth.

11. In a vacuum producing apparatus, the combination of a portable cylindrical casing having at one end a bearing portion provided with a suction opening and having at the other end an apertured cap and journal bearings, a crank shaft mounted in said bearings and having traction wheels supporting the other end of the apparatus, a middle transverse partition within the casing having valve-controlled ports opening at each side thereof and communicating with the suction opening, and a central reciprocable plunger extending through said partition connected with the crank shaft and provided with a valved piston at each side of said partition, the crank shaft and its connected parts forming a unitary structure, substantially as set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ROBERT B. HUTCHISON.

Witnesses:
C. M. CLARKE,
FREDK. STAUB.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."