R. B. HUTCHISON.

PUMPING MECHANISM FOR VACUUM CLEANERS.

APPLICATION FILED APR. 10, 1912.

1,067,118.

Patented July 8, 1913.

2 SHEETS—SHEET 1.

FIG. 1.

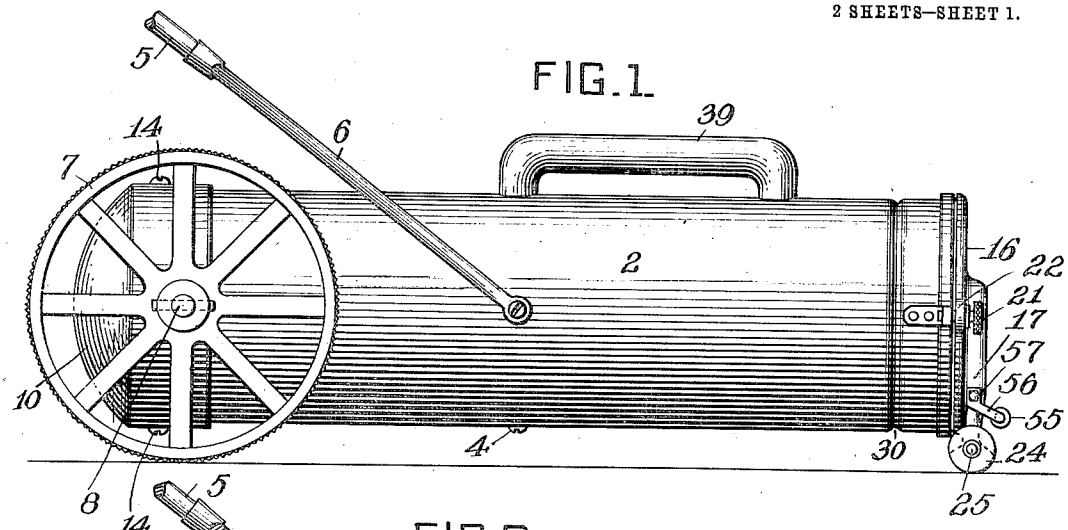


FIG. 2.

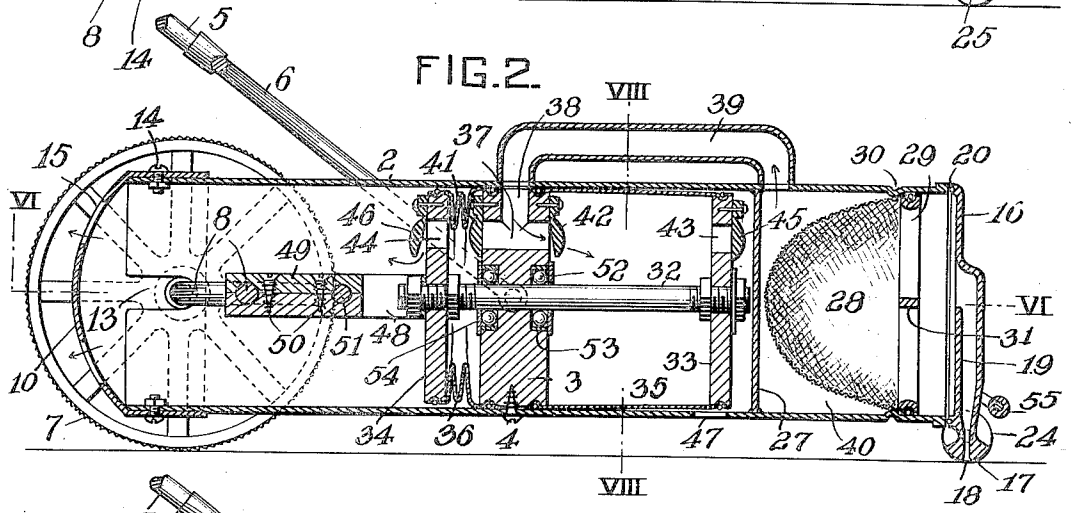


FIG. 3.

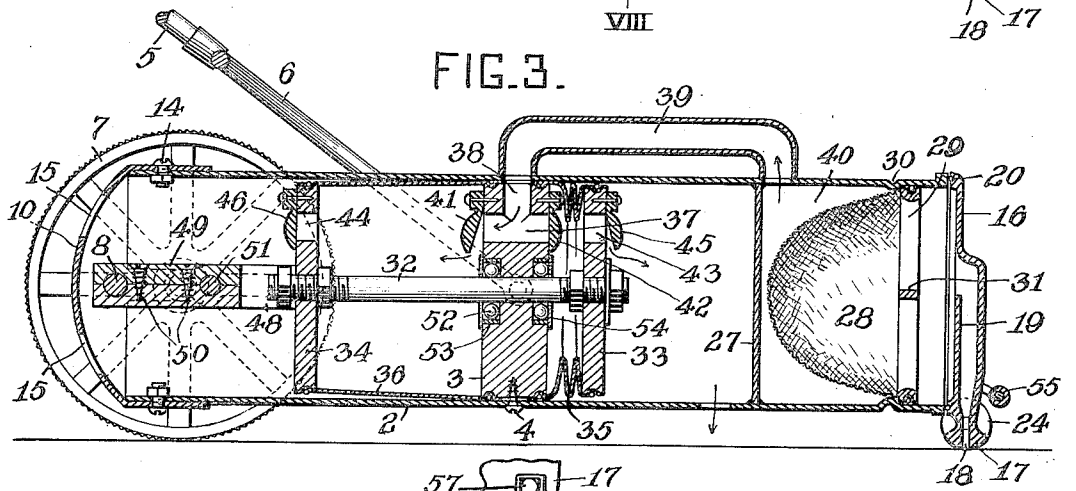
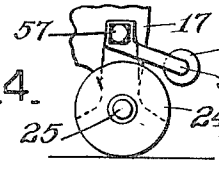


FIG. 4.



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2 SHEETS—SHEET 2.

FIG. 5.

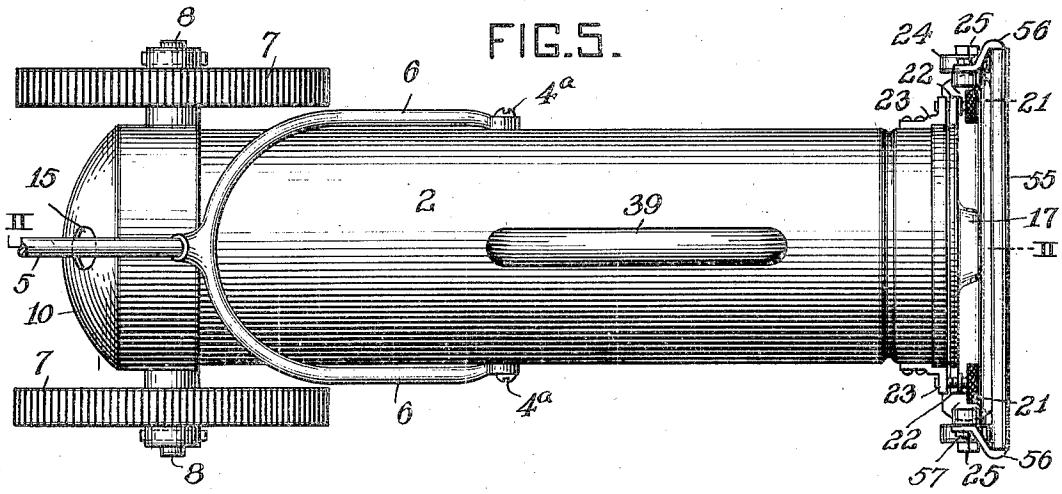


FIG. 6.

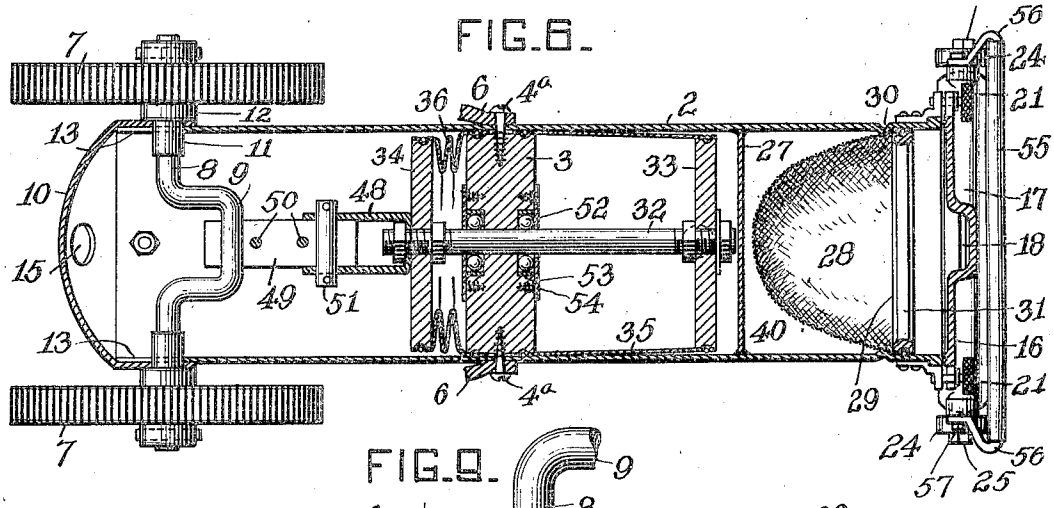


FIG. 9.

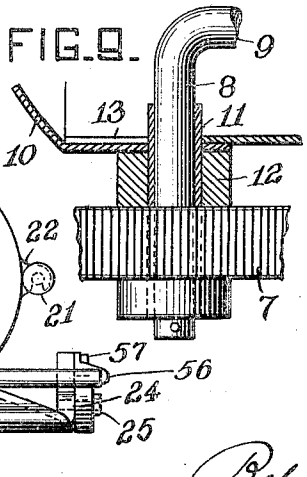
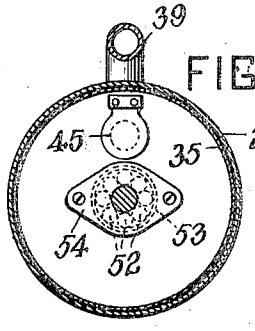


FIG. 7.

FIG. 8.



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PUMPING MECHANISM FOR VACUUM-CLEANERS.

1,067,118. Specification of Letters Patent. Patented July 8, 1913.

Application filed April 10, 1912. Serial No. 689,780.

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 consists 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, bellows mechanism and valves controlling the circulation of induced air currents in operative connection with said crank shaft, 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 indicated by the line II. II. of Fig. 5. Fig. 3 is a similar sectional view showing the bellows mechanism in reversed position. Fig. 4 is a detail view illustrating the use of a fender device. Fig. 5 is a plan view of the device. Fig. 6 is a horizontal sectional view, indicated by the line VI. VI. of Fig. 2. Fig. 7 is a front end view. Fig. 8 is a vertical section indicated by the line VIII. VIII. of Fig. 2. Fig. 9 is an enlarged sectional detail view illustrating the bearing for the crank shaft.

The body portion of the cleaner consists of a cylindrical barrel shaped 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, 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 clearly shown in Fig. 6.

The rear portion of the machine is mounted upon wheels 7, 7, the peripheries of which may be corrugated or covered with rubber shoes, either smooth or corrugated as preferred, 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 a 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. These bearings, more clearly shown in Fig. 9, consists of tubular sections 11 having outer reinforcing sleeve terminals 12, said parts being fixedly connected together and to the shell of the cap 10 by soldering, as indicated at 12, or in any other suitable manner.

The rear side portions of the shell 2 are slotted, as indicated at 13, for clearance of the bearings 11, 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 provided around its inner edge with a packing ring or cord 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 suitably receiving lugs 23. By this construction, upon loosening the screws 21 the head 16 may be slightly rotated and released for access to the interior, and as readily replaced.

The nozzle 17 is preferably provided with supporting rollers 24 rotatably mounted on studs 25 screwed into suitable supporting lugs 26 at each end of the nozzle, by which arrangemeht the nozzle is supported slightly above the floor surface, and its weight freely carried thereover in the operation of the machine.

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 reciprocating plunger stem 32, upon each end of which is fixedly secured by nuts, the reciprocating heads 33 and 34 respectively, which may also be of wood. Between the stationary head 3 and reciprocating heads 33 and 34, are the collapsible bellows sections 35 and 36 respectively, of leather, cloth, or other suitable fabric, and operable to create air suction.

The head 3 is provided with a transverse port 37 communicating by a central port 38 and an outer by-pass tubular conduit 39 with the dust bag compartment or suction chamber 40 beyond the partition 27, as clearly shown. The conduit 39 may be of sheet metal or other suitable material and its function is to establish continuous circulating communication between the chamber 40 and the interior of bellows 35 and 36 respectively, alternately during the operation of the device. The port 37 through head 3 is provided with flap valves 41 and 42 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 reciprocable head 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 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 bearing 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.

For the purpose of providing a protecting fender or guard, I may employ a device like that shown in Fig. 4, consisting of a section of rubber hose or other suitable material 55, mounted upon a transverse shaft or rod 56 extending across the front of the nozzle 17 and fixedly secured at each side thereof by a screw or bolt 57.

The machine as a whole is generally similar to that of my application filed June 24, 1912, Serial No. 705487, embodying piston mechanism for creating suction.

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 supporting 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 bellows are operated back and forth and effect a strong suction in each direction through conduit 39, the dust being arrested in the bag 28, and the incoming air escaping through the openings 15 and 47.

The device is very easily manipulated; it is small 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 supporting wheels and a connected crank shaft at one end and a suction opening at the other end, a middle transverse partition having valve-controlled ports opening at each side thereof and communicating with the suction opening, a central reciprocable plunger extending through said partition connected with the crank shaft and provided with a valved suction head at each side of said partition, and bellows sections connecting each of said heads with the transverse partition, substantially as set forth.

2. In a vacuum producing apparatus, the

combination of a portable cylindrical casing having supporting wheels and a connected crank shaft at one end and a removable head having a suction opening at the other end, 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 of said head, a central reciprocable plunger extending through said partition connected with the crank shaft and provided with a valved suction head at each side of said partition, and bellows sections connecting each of said heads with the transverse partition, substantially as set forth.

3. In a vacuum producing apparatus, the combination of a portable cylindrical casing having supporting wheels and a connected crank shaft at one end and a removable head having a suction opening at the other end, a middle transverse partition having a central plunger stem bearing opening and valve-controlled ports opening at each side thereof, a conduit outside of the casing communicating with said ports and with the suction opening of said head, a central reciprocable plunger extending through said partition connected with the crank shaft and provided with a valved suction head at each side of said partition, and bellows sections connecting each of said heads with the transverse partition, substantially as set forth.

4. In a vacuum producing apparatus, the combination of a portable cylindrical casing having supporting wheels and a connected crank shaft at one end and a suction opening at the other end, a middle transverse partition having valve-controlled ports opening at each side thereof and communicating with the suction opening, a central reciprocable plunger extending through said partition connected with the crank shaft and provided with a valved suction head at each side of said partition, and bellows sections connecting each of said heads with the transverse partition, said casing having exhaust openings to the atmosphere at each side of said transverse partition, substantially as set forth.

5. In a vacuum producing apparatus, the combination with the main casing, of a transverse partition having a ported connection with a terminal suction opening, and a central opening through the partition provided with rolling bearings; of a reciprocable shaft extending therethrough having ported bellows heads flexibly connected with the partition, an endmost removable cap on the casing, and a crank shaft rotatably mounted therein having terminal traction wheels and a crank operatively connected with the reciprocable shaft, substantially as set forth.

6. In a vacuum producing apparatus, the combination with the cylindrical casing, of an endmost closing cap therefor having attached journal bearings, and a crank shaft rotatably mounted therein provided with traction wheels and adapted to be operatively connected with suction creating mechanism, substantially as set forth.

7. In a vacuum producing apparatus, the combination with the cylindrical casing, of an endmost removable head having an inlet opening, a transverse partition set inwardly therefrom providing a suction chamber, a middle transverse partition beyond said first named partition having valve-controlled ports opening at each side thereof, reciprocable bellows mechanism at each side of said partition, a by-pass conduit connecting the suction chamber with the ports of the partition, an endmost removable cap on the casing, and a crank shaft rotatably mounted therein having terminal traction wheels and a crank operatively connected with the reciprocable shaft, substantially as set forth.

8. In a vacuum producing apparatus, the combination with the cylindrical casing, of an endmost removable head having an inlet opening, a transverse partition set inwardly therefrom providing a suction chamber, a middle transverse partition beyond said first named partition having valve controlled ports opening at each side thereof, reciprocable bellows mechanism at each side of said partition, a supporting crank shaft mounted on said removable head connected with said bellows mechanism and having terminal traction wheels, and a by-pass conduit connecting the suction chamber with the ports of the partition, substantially as set forth.

9. In a vacuum producing apparatus, the combination with a cylindrical casing having an intake opening and a suction producing plunger head, of a terminal apertured closure for the casing having axle bearings, an axle mounted therein having supporting wheels and a crank, and means connecting the crank with the plunger head, substantially as set forth.

10. In a vacuum producing apparatus, a cylindrical casing having a transverse head provided with valve-controlled ports opening to each side thereof, a suction opening communicating with said ports, a valved plunger head at each side of said head, exhaust ports from the casing at each side of said transverse head, supporting wheels and an axle therefor mounted in one end of the casing and having an inclosed crank, a removable endmost cap on the casing having bearings for the axle, and means connecting said valved plunger heads with the crank, substantially as set forth.

11. In a vacuum producing apparatus of the class described, the combination with the suction-producing mechanism and the cylindrical casing therefor having inwardly extending slots at each side, of a removable

closure for the casing having axle bearings at each side adapted to co-act with said slots, means securing the closure to the casing, and an axle mounted in said bearings having terminal supporting wheels and a middle crank connected with the suction-producing mechanism, substantially as set forth.

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

ROBERT B. HUTCHISON.

Witnesses:
H. HECK,
C. M. CLARKE.