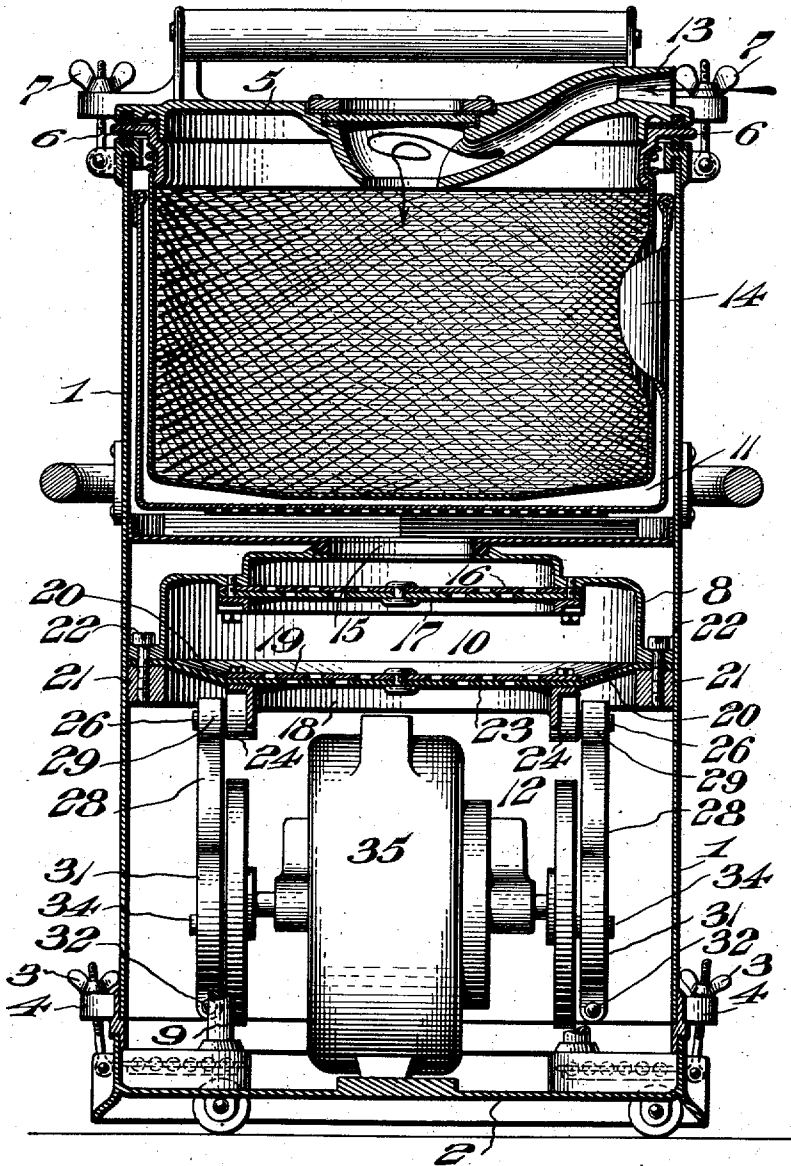


W. H. KELLER.
PUMPING APPARATUS FOR VACUUM CLEANERS AND THE LIKE.
APPLICATION FILED JUNE 23, 1909.

956,975.

Patented May 3, 1910.
2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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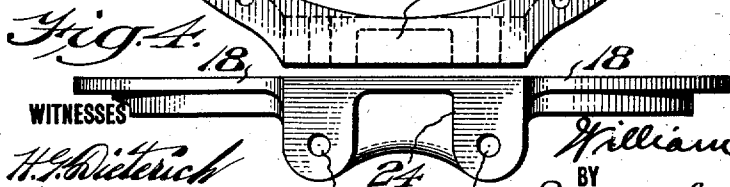
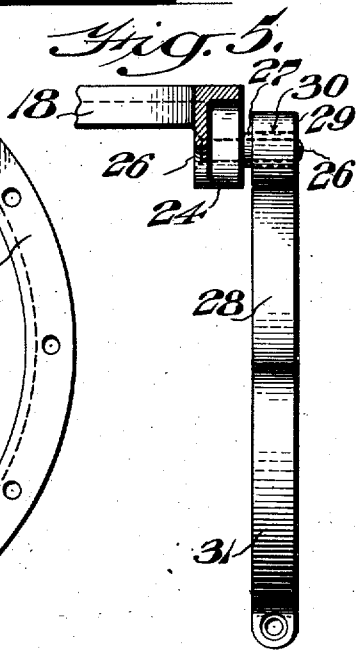
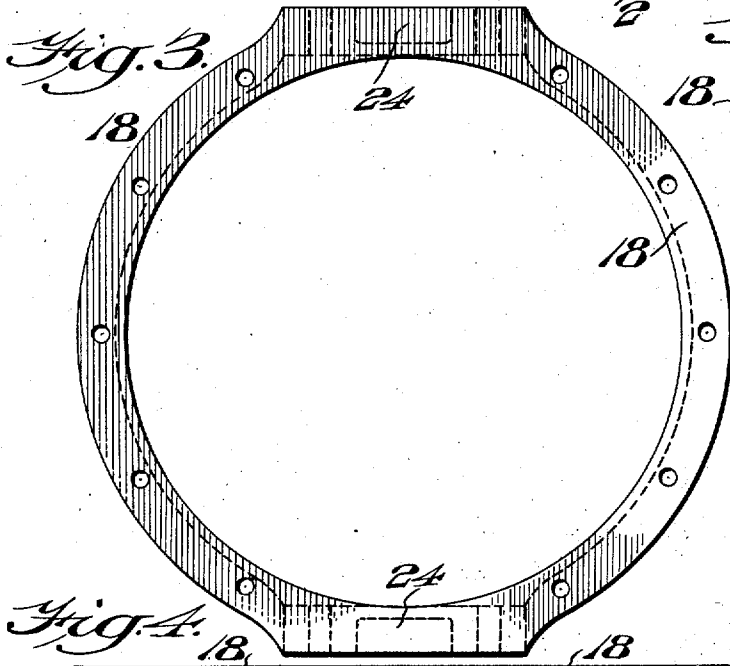
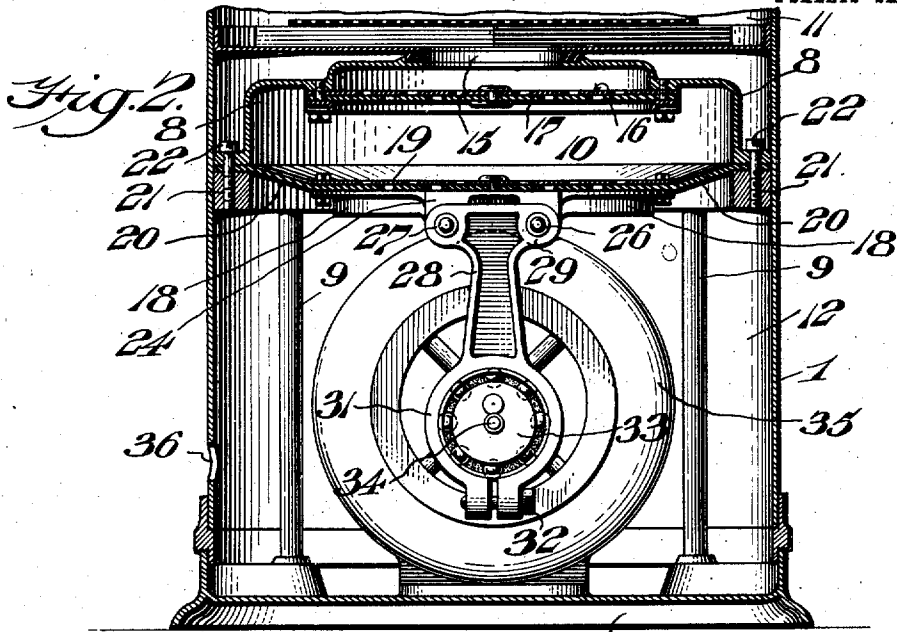
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2 SHEETS—SHEET 2.



WITNESSES

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PUMPING APPARATUS FOR VACUUM-CLEANERS AND THE LIKE.

956,975.

Specification of Letters Patent.

Patented May 3, 1910.

Application filed June 23, 1909. Serial No. 503,922.

To all whom it may concern:

Be it known that I, WILLIAM H. KELLER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Pumping Apparatus for Vacuum-Cleaners and the Like, of which the following is a specification.

In one type of pumping apparatus which is especially adapted for use in conjunction with vacuum cleaning apparatus it has heretofore been proposed to employ a follower-head either of the piston or diaphragm type and to rigidly secure to this follower-head one end of a connecting rod, the other end of which is mounted on a shaft which latter is actuated by a suitable motor.

As is well known to those skilled in the art to which this invention appertains, owing to variations in the load at the suction nozzle, the motor shaft moves longitudinally in order to automatically adjust the position of the armatures and it has been found in practice that when the load increases there is a tendency of the motor shaft to move longitudinally in one direction and if one end of the connecting rod is rigidly connected with the follower-head the connecting rod is unable to adjust itself to these conditions so that a much greater amount of current is necessary in case an electric motor is employed and the motor becomes overheated, with consequent injury thereto. It has also been found by numerous experiments that in cases wherein two connecting rods are mounted on cranks on opposite sides of the motor and the other end of the connecting rods rigidly secured to the follower-head that the ball bearings intermediate the crank and the connecting rod are subjected to an enormous strain owing to the peculiar movement which the follower-head receives during this reciprocation, it being remembered that in practice these devices are run at a speed between twelve hundred and four thousand revolutions per minute and it will be apparent that in such cases not only is the life of the ball bearings greatly reduced but there is a liability of either the fastening device for securing the connecting rod to the follower-

head becoming broken or the end of the rod itself broken off.

With the above in view my present invention consists of a pumping apparatus wherein I have overcome the disadvantages to which I have hereinbefore referred and in my present construction I employ a connecting rod, one end of which is mounted on a crank actuated by the motor while the other end of the connecting rod is secured to the follower-head in such a manner that the connecting rod is permitted to move laterally relatively to the follower-head while at the same time no pivotal connection is formed at this point.

My invention further consists of a novel construction of a follower-head having a plurality of pins or their equivalents secured thereto with which the connecting rod is adapted to co-act.

It further consists of a novel construction of a connecting rod which preferably comprises an integral piece of material one end of which is adapted to be secured to a crank while the other end thereof is provided with a plurality of openings through which pass fastening devices to secure the same with respect to the follower-head.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings one form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein set forth.

Figure 1 represents a sectional elevation of a pumping apparatus for vacuum cleaners embodying my invention. Fig. 2 represents a sectional elevation of a portion of Fig. 1. Fig. 3 represents a plan view of the follower-head in detached position. Fig. 4 represents an end view of Fig. 3. Fig. 5 represents a sectional elevation of a portion of the device

showing the manner in which the connecting rod is secured with respect to the follower-head, certain portions of the device having been omitted for the sake of clearness of illustration.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—For the purposes of illustration I have preferred to show my novel pumping apparatus in conjunction with a well known type of vacuum cleaners many thousands of which are now on the market and I will only briefly refer to the vacuum cleaning mechanism in order that the complete operation of the device may be clearly understood and in order to more clearly set forth the marked advantages of my construction.

1 designates a pump casing which is provided with a removable bottom 2 which if desired may be provided with suitable rollers, said bottom being secured with respect to the main body portion of the casing 1 by means of suitable fastening devices 3, which interlock with lugs 4, carried by said body portion. The casing 1 is provided with a cover 5 which is seated on a dust bag ring 6 mounted on the top of the casing, suitable packing material being provided in order to form an air tight engagement between the cover 5 and the casing.

7 designates fastening devices by means of which the cover is removably secured to the casing 1.

The pumping mechanism comprises a casing 8, which is mounted on standards 9, carried by the base 2, and the pumping mechanism is provided with a pumping chamber 10, which divides the pump casing into a vacuum reservoir 11, and a pressure reservoir 12. The dust laden air enters through the air inlet 13, in the cover 5, and passes through the filtering mechanism 14 in the vacuum reservoir 11, passing thence through the aperture 15 and through the apertures in the apertured plate 16; then through the apertures in the flexible valve 17 into the pumping chamber 10, it being noted that the apertures in the valve 17 are in the present instance staggered with respect to the apertures in the plate 16.

The follower-head 18 has secured thereto an apertured metal plate 19 to which the diaphragm 20 is secured, it being seen that the outer periphery of the diaphragm is fixedly secured with respect to the casing 1 by means of the annulus 21 and the fastening devices 22, the outer periphery of the diaphragm preferably extending outwardly in order that it may serve as a packing to prevent leakage of air from the vacuum compartment to the pressure compartment.

The diaphragm 20 is provided with apertures 23 therethrough which are staggered with respect to the apertures in the plate 19.

In the present instance I have shown my device in connection with a diaphragm wherein two connecting rods are employed, although it is of course apparent that in many types of machines employed in practice but one connecting rod is employed and it is to be understood that I do not desire therefore to be limited to a construction wherein two connecting rods are employed.

The follower-head 18 is provided on opposite sides, in the present instance, with a depending flange or bracket 24 which is provided with a plurality of apertures 25. 26 designates pins or their equivalents which are suitably secured within the apertures 25 the ends of such pins extending outwardly beyond the bracket 24 and having mounted thereon a bushing 27 of any desired type.

28 designates a connecting rod one end of which is provided with an enlarged head 29 in which are located a plurality of apertures 30, which when the parts are in assembled position engage the bushings 27 on the pins 26. The opposite end of each connecting rod 28 is preferably provided with a split collar 31, and with suitable fastening devices 32, whereby the connecting rod may be suitably secured to a crank 33 mounted on a shaft 34 which is driven by a motor 35 carried by the base 2, whereby when the motor is actuated the diaphragm 20 will be given a combined reciprocatory and oscillatory movement so that air will be drawn in through the inlet 13, into the vacuum compartment 11, thence into the pumping chamber 10 and into the pressure compartment 12 the air discharging from the pressure compartment 12 through the main exhaust port 36 to the atmosphere or other desired point of utilization.

As the load varies at the suction nozzle the armatures on the motor shaft will automatically position themselves and owing to my novel manner of securing the connecting rod with respect to the follower-head there will be no strain on the motor such as is the case when the end of the connecting rod is rigidly secured to the follower-head, it being apparent to those skilled in this art, that as the lower end of the connecting rod is moved laterally the upper end may also move in a lateral direction with respect to the follower-head so that the overheating of the motor, which arises in cases wherein the connecting rod is rigidly secured to the follower-head, is entirely obviated.

I wish to call particular attention to the fact that in my novel construction no pivot or hinge connection is formed between the connecting rod and the follower-head, and in so far as I am aware I am the first in the art to secure the connecting rod with respect to the follower-head in the novel manner herein shown and described, and it is to be understood that my claims to these features

are to be interpreted with corresponding scope.

While in the present instance I have shown the connecting rod as being provided with a split collar and mounted on the ball bearings mounted on the crank, it will be apparent that the connecting rod may be otherwise adapted to be secured to the crank and still be within the scope of my invention.

It has been found in practice that a very great saving in amount of current necessary to operate the motor is produced when the connecting rod is secured to the follower-head in the manner herein described whereby I am enabled to greatly reduce the cost of operating the cleaning apparatus.

It is to be understood that while in the present instance I have shown the movable member of the pumping mechanism as comprising a follower-head to which the diaphragm is secured, that the follower-head may be in the form of a piston having packing secured thereto, and it is to be understood that in the claims the term follower-head is intended to include both a diaphragm or a piston.

I am aware that it has heretofore been proposed to provide means for permitting longitudinal movement of an electric motor shaft relatively to an aligning driven shaft and I am also aware that it has heretofore been proposed in the patent to John W. Smith, No. 921,632, granted May 11th, 1909, to employ a connecting rod actuated by a motor shaft and having a rigid connection to an apertured plate or follower-head but my present invention is differentiated from the aforesaid prior art, since I employ connecting means between the portion of the follower juxtaposed to the end of the connecting rod which is constructed to admit of lateral movement of the end of said connecting rod parallel to the longitudinal movement of the motor shaft, which construction permits the necessary lateral play for said connecting rod or rods and reduces the expense of breakage to a minimum. My invention is therefore clearly differentiated from the devices herein above mentioned and to none of the constructions of the prior art do I herein make my claim.

It will now be apparent that I have devised a novel and useful construction of a pumping apparatus for vacuum cleaners and the like which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have in the present instance shown and described a preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit

or scope of the invention or sacrificing any of its advantages.

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

1. In a pumping mechanism, the combination with a motor, a motor shaft capable of limited longitudinal movement in its bearings, and a reciprocating follower for the pumping mechanism, of a connecting rod connected to the motor shaft to be actuated by the same in a plane at a right angle to it and having one end in juxtaposition to the follower, and connecting means between said end and the follower and constructed to admit of movement of the end of the connecting rod parallel to the longitudinal movement of the motor shaft and prevent relative pivotal movement between the connecting rod and follower.

2. In a pumping mechanism, the combination with a motor, a motor shaft capable of limited longitudinal movement in its bearings and a reciprocating follower for the pumping mechanism, of a connecting rod connected to the motor shaft to be actuated by the same in a plane at a right angle to it and having one end adjacent to the follower, and a pin common to the follower and connecting rod and parallel to the motor shaft and having longitudinal play in one of said elements, whereby the connecting rod will be permitted to follow the longitudinal movement of the shaft while maintaining its operative connection with the follower and whereby relative pivotal movement between the connecting rod and follower is prevented.

3. In a pumping mechanism, the combination with a motor and a motor-shaft capable of longitudinal movement in its bearings, of a reciprocating follower for the pumping mechanism, a connecting-rod connected to the motor-shaft to be actuated by the same and having one end adjacent to the follower, and a plurality of pins common to the follower and connecting-rod and parallel to the motor-shaft and having longitudinal play in one of said elements, whereby the connecting rod will be permitted to follow the longitudinal movement of the shaft and pivotal movement between the follower and connecting-rod will be prevented.

4. In a pumping mechanism, the combination with a motor, a motor shaft capable of longitudinal movement in its bearings and a reciprocating follower for the pumping mechanism, of a connecting rod connected to the motor shaft to be actuated by the same in a plane at a right angle to it and having one end adjacent to the follower, and a pin projecting from the follower parallel to the motor shaft and engaging an opening in the connecting rod to

admit of the latter following the longitudinal play of the motor shaft while maintaining its operative connection with the follower and preventing relative pivotal movement between the follower and connecting rod.

5 5. In a pumping mechanism, the combination with a motor, a motor-shaft capable of longitudinal movement in its bearings, 10 and a reciprocating follower for the pumping mechanism, of a connecting-rod connected to the motor-shaft to be actuated by the same and having one end adjacent to the follower and formed with a plurality 15 of openings, and a plurality of pins projecting from the follower parallel to the motor shaft and engaging the openings in the connecting-rod to admit of the latter following the longitudinal play of the motor-shaft 20 and to prevent pivotal movement by the connecting-rod in its relation to the follower.

6. In a pumping mechanism, the combination with a motor, a motor-shaft capable 25 of longitudinal movement in its bearings and formed with cranks at its ends, and a follower for the pumping mechanism, of connecting-rod connected to and actuated by said cranks and having their ends adjacent to diametrically opposed points of

the follower and formed each with two openings, and two pairs of pins projecting at diametrically opposite points of the follower and parallel to the motor-shaft and engaging respectively the openings in the 35 connecting-rods, whereby said rods will have play in relation to the follower and with the longitudinal movement of the motor-shaft while maintaining non-pivotal connection with the follower.

7. In a device of the character named, the combination of a casing having a pumping chamber therein, a diaphragm having its outer periphery rigidly supported and closing one side of said pumping chamber, a 45 follower-head secured to said diaphragm, said follower-head and diaphragm having valve controlled ports therethrough, a plurality of pins carried by said follower-head, a connecting rod having a plurality of apertures engaging said pins so as to have relative movement with respect to the follower-head, a crank on which said connecting rod 50 is mounted, and a motor for actuating said crank.

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Witnesses:

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