Aug. 14, 1934. P. J. ERNZER 1,970,290

VACUUM CLEANER

Filed Aug. 4, 1930

Fig. 1

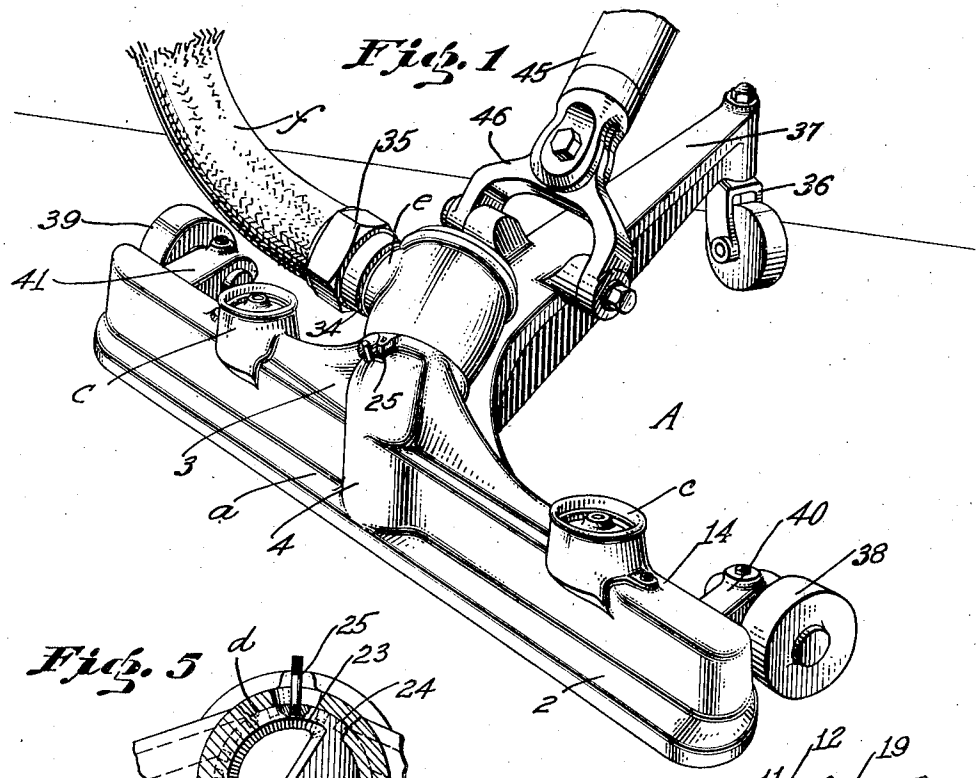


Fig. 5

Fig. 4

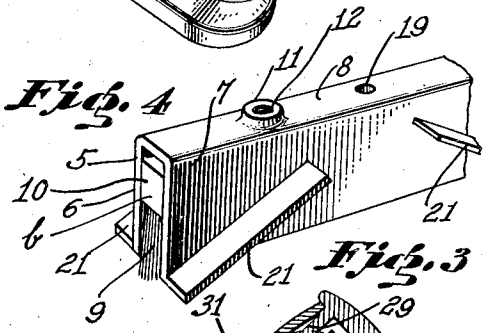


Fig. 2

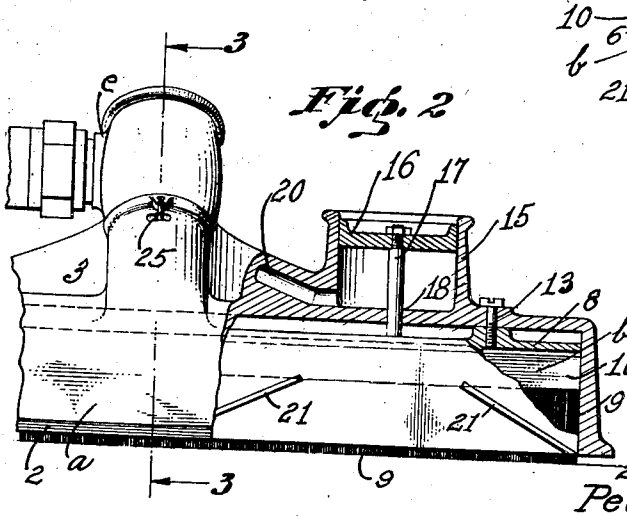
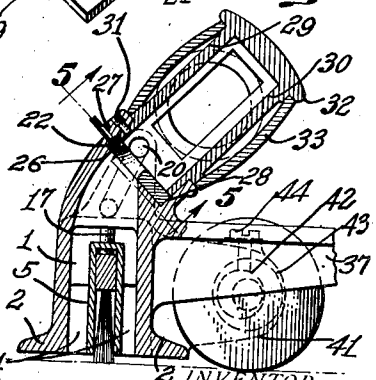


Fig. 3



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VACUUM CLEANER

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4 Claims. (Cl. 210—207)

This invention relates to vacuum cleaners.

The invention has for an object the provision of a vacuum cleaner head which is particularly adaptable for the cleaning of plunges. After a plunge has been used, accumulated grease, dirt and the like, settles to the bottom of the plunge if the water is not disturbed. As a result, it is necessary to clean the tank periodically in order to maintain the plunge in a sanitary condition. Vacuum cleaners are ordinarily employed for this purpose. Most vacuum cleaners employ a brush of some type, which sweeps the base of accumulations. However, the method of attaching the brush to the vacuum head is such as to bend the brush when any pressure is exerted against the same, with the result that the bristles wear quite quickly. Brushes of this character are expensive and the present invention has for an object the provision of a vacuum head so constructed and arranged that the brush element will give long continued, efficient service. Furthermore, the brush is arranged relative to the vacuum head in such a manner that the bristles wear evenly. As generally practiced, the brushes ordinarily wear adjacent the ends and the bristles are pressed so hard against the plunge base that the bristles are bent out of shape, rendering the brush practically useless.

An object of the present invention is the provision of a vacuum head employing a brush in which the pressure contact of the brush against the side walls or base of the plunge may be regulated at the will of the operator and in accordance with working conditions.

Another object is the provision of a vacuum head which permits an even flow of the water therethrough to the end that sediment is readily removed without undue agitation thereof.

Other objects of the invention include a vacuum head for the purpose intended which is simple of construction, inexpensive of manufacture, durable, capable of giving long continued service, easy to operate, and which is generally superior.

With the above and other objects in view, the invention consists in the novel and useful provision, formation, construction, association, and relative arrangement of parts, members and features, all as shown in certain embodiments in the accompanying drawing, described generally, and more particularly pointed out in the claims.

In the drawing:

Figure 1 is a fragmentary perspective view of the improved vacuum head,

Figure 2 is a fragmentary and partially longitudinal sectional view of the vacuum head,

Figure 3 is a cross sectional view on the line 3—3 of Figure 2,

Figure 4 is a fragmentary perspective view of an element of the invention, and,

Figure 5 is a cross sectional view on the line 5—5 of Figure 3.

Referring to the drawing, the improved vacuum head is designated as an entirety by A, and the same includes a foot or nozzle *a*, a brush *b*, means *c* adapted to control movement of the brush, means *d* adapted to regulate the pressure with which the brush *b* will engage an object, and a swivel head *e* adapted to be associated with a tube or the like *f* leading to an exhauster pump (not shown), all of the elements *a* to *e*, inclusive, being embodied in one practice of the invention.

In the present invention, I provide a foot or nozzle *a* which as is customary, is elongated and provided with an elongated inlet orifice 1. Said nozzle is formed with a base flange 2, adjacent to and bounding the orifice. Preferably, the bottom surface of the flange 2 is of considerable width transversely, as shown in Figure 3. The nozzle swells midway between its ends at 3, called the median zone, and at this portion is secured the swivel *e*. The median zone is enlarged at 4 and at said zone is a valve constituting the means *d* which controls passage between the orifice 1 and the interior of the swivel *e* (see Figure 3). Adapted for placement within the orifice 1 is a guide 5. This guide is provided with two spaced side walls 6 and 7 and an interconnecting top wall 8 between which side walls is placed a brush *b*, the said brush including the usual bristles 9 embedded in a back 10. The back has sufficient depth so that the same will slide freely between the side walls without binding. The top wall 8 of the guide is provided with one or more enlargements 11 which are centrally recessed and screw-threaded, as shown at 12. The top wall 14 of the foot or nozzle is transversely bored at 13 in order that a screw may be passed therethrough for threaded engagement with threads 12, and thus secure the guide within the nozzle as shown in Figure 2. Integrally formed with the nozzle and extending from the top wall 14 are one or more of the means *c*. In the present instance, two of said means are provided, as shown in Figure 1. Both said means are identical and one thereof will be described.

The means *c* includes a cylinder 15 within which is a plunger 16. Connected to the plunger is an arm 17, which arm is passed through an opening 18 of the top wall 14 and likewise through

an opening 19 in the end wall 8 of the guide, the arm finally being secured to the back 10 of the brush *b*.

The arm 17 is secured to the back 10 of the brush *b* and which arm is passed through openings 18 and 19 of the guide and nozzle, respectively, and finally secured to the plunger 16 in any approved manner, such as by that shown in Figure 2. Thus, when the piston or plunger moves, the brush will correspondingly move. In order to cause movement of the plunger or piston, I have formed in the part 3 a port 20 communicating with the interior of both the cylinder and the swivel *e*, as shown in Figure 3. As before stated, two of the means *c* are provided, and separate ports 20 communicate with said means. Deflectors 21 are provided for the guide, and these deflectors are inclined relative to the side walls 6 and 7 of the said guide. In each instance, there are four deflectors for both ends of the guide. The deflectors are so arranged that they do not meet at a common point or apex but pairs are adapted to converge upwardly from the base portion of the guide toward the means *c*. The means *c* is not affected in the least by arranging the deflectors in this manner but mention is made in order to indicate the relative arrangement of said deflectors. Each deflector constitutes an elongated strip of metal of a width just sufficient to permit the deflector to be received within the slot 1 of the nozzle *a*.

The valve *d* is in the medial portion of the nozzle and controls to a certain extent the flow of fluid through the nozzle into the swivel. In this connection, the valve constitutes a disc 22 provided with a segmental opening 23. The periphery of the disc is provided with a plurality of radially arranged screw-threaded bores 24, it being intended that a key 25 should be inserted in a selected bore in order to rotate the disc. The enlargement 4 is provided with a segmental opening 26 corresponding in size to the segmental opening 23 of the valve disc. Thus, by rotating the valve disc relative to the segmental opening 26, it is possible to control the volume of fluid passing through the valve (see Figure 5). It will be noted that the part 4 at the zone of the valve is formed to best accommodate said valve. For instance, the enlargement 4 is curved at 27 and annularly shouldered at 28, said valve disc fitting against said shoulder.

The swivel *e* includes a headed tubular member 29 formed with a transverse opening or port 30, and this tubular member is adapted to be secured to the enlargement 4 by any appropriate means, such as shown at 31. Surrounding the tubular member and bearing against a head 32 thereof is an outwardly bowed cylindrical member 33. This member constitutes the outer housing or body of the swivel. Communicating with this housing or body is a tubular member 34 carrying a connector 35 for the hose or conduit *f*. It will thus be seen that the member 33 may rotate about the tubular member 29. To support the nozzle, I have provided a carriage. The nozzle is provided with a central extension or arm 37 and brackets 40 and 41. A caster is carried by the arm 37 and rollers are secured to the brackets 40 and 41. In the present instance, adjustment of the height of the rollers 38 and 39 relative to the brackets is permitted by providing cams 42 and 43. Both cams are locked after adjustment in any desired position by means of set screws 44.

To manipulate the head, I have provided a handle 45 secured to a yoke 46, the yoke in turn being pivotally secured to the arm 37.

The operation, uses and advantages of the invention just described are as follows:

The pipe or conduit *f* communicates with an exhauster. When it is desired to use the device for cleaning, say, the bottom of a tank, the exhauster is put into operation, the vacuum head is placed on the floor of the tank, whereupon the operator cuts in the vacuum line. When this occurs, the pistons or plungers 16 will be drawn downwardly within the cylinders 15 due to the reduced pressure created back of said plungers, it being noted that the ports 20 communicate with the interior of the swivel and rearwardly of the valve *d*. As the plungers move downwardly, the brush *b* is also forced downwardly and against the bottom of the tank, say, into the position shown in Figure 2. The base of the flange 2 is wide so that the water, which is drawn up through the nozzle, is forced over the surface of the flange and into the orifice 1. However, the deflectors 21 and 22 will deflect water upwardly in a given path, through the valve, into the swivel, thence through the hose to the exhauster. However, the width of the base portion of the flanges causes the water to flow into the orifice of the nozzle in a relatively smooth manner and without creating turbulence and eddy currents exterior the nozzle. Eddy currents would, of course, tend to agitate the debris which it is desired to remove. The brush will have the bristles thereof in direct contact with the bottom of the tank and the pressure which said brush will exert against the bottom of the tank may be regulated by turning the valve *d*. If the valve is entirely open, a greater volume of water will flow therethrough and as a consequence, less pressure will be exerted against the plungers or pistons with the result that the bristles of the brush will not contact as forcibly with the bottom of the tank as the bristles would otherwise. The less the volume of water flowing through the nozzle, the greater the pressure exerted by the plungers against the brush. However, pressure will always be exerted to move the plunger irrespective of a turning of the valve. The guide for the brush prevents the bristles from being swept backwardly and bent or broken and also assures that all the bristles are worn evenly.

As before pointed out, the end bristles are usually bent and broken off due to striking objects sideways and likewise where the bristles are not protected, the force exerted downwardly against the head is such as to bend the bristles backwardly away from the direction of movement of the head with the result that the bristles soon are broken off or at best wear unevenly. Uneven wearing of the bristles renders the brush of no further use.

The arrangement of the deflectors 21 and 22 is such as to cause cavitation of the fluid, as it is drawn through the orifice 1 and into the swivel *e*. This construction allows heavy objects to be readily picked up by the vacuum head.

It is obvious that various changes, modifications and variations may be made in practicing the invention in departure from the particular showing of the drawing and description as given without departing from the true spirit of the invention.

I claim:

1. In a vacuum head, a nozzle, a brush within said nozzle, and sub-atmospheric controlled means induced by the flow of a fluid through the nozzle for positively moving said brush outwardly from

the nozzle when the vacuum head is in operation.

2. In a vacuum head adapted to operate in a fluid, a nozzle formed with an orifice, a brush within said orifice, a guide for the brush, and means associated with said guide for deflecting the path of movement of said fluid toward a given zone when the vacuum head is in operation, in combination with sub-atmospheric controlled means induced by the flow of a fluid through the nozzle for positively moving said brush during said operation.

3. In a vacuum head adapted to operate in a fluid, a nozzle formed with an intake orifice, a guide within said orifice and between which and the walls of the nozzle bounding the orifice, fluid is adapted to be passed, a brush movable within said guide, said guide being constructed and arranged to enclose the brush, there being no passage for fluid therethrough, and a piston secured to said brush, said piston being moved by suction created by passage of fluid being drawn through the intake orifice of the nozzle to move the said brush outwardly from said guide.

4. In a vacuum head adapted to operate in a fluid, a nozzle formed with an intake orifice, a guide within said orifice and between which and the walls of the nozzle bounding the orifice, fluid is adapted to be passed, a brush movable within said guide, a piston secured to said brush, said piston being moved by suction created by passage of fluid being drawn through the intake orifice of the nozzle to move the said brush outwardly from said guide, and adjustable valve means for controlling action of said piston during passage of fluid through said orifice.

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