

Oct. 19, 1937.

M. S. HURLEY

2,096,517

SUCTION CLEANER

Filed Dec. 3, 1935

2 Sheets-Sheet 1

Fig. 1

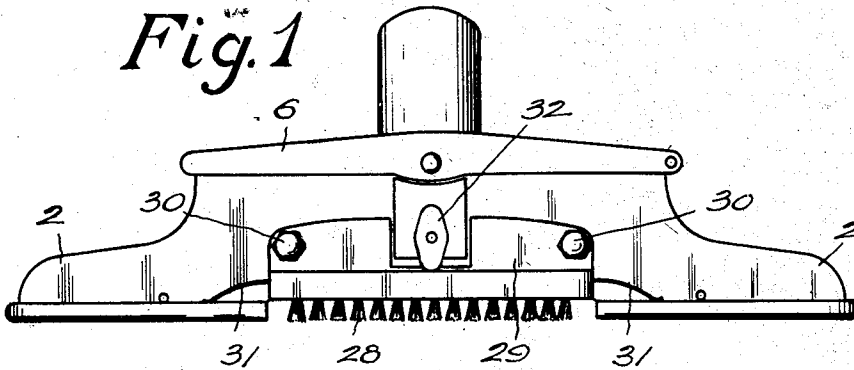


Fig. 2

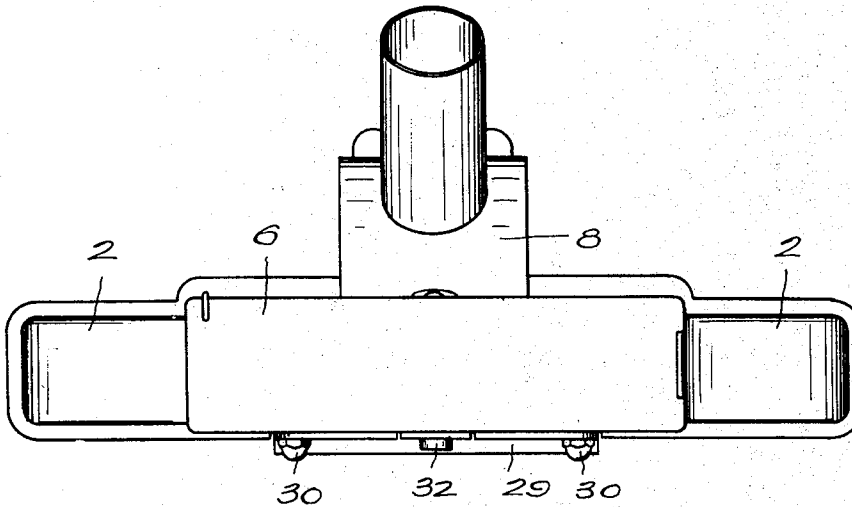
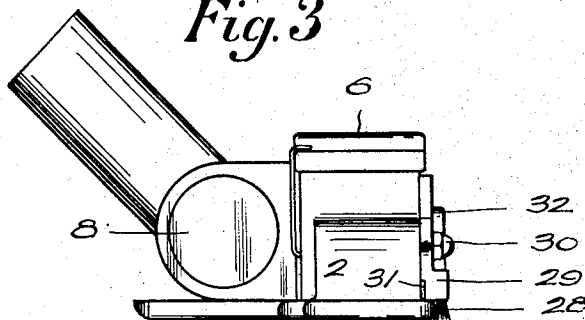


Fig. 3



Inventor:
Melvin S. Hurley
By *Wm. Appleman*
Attorney.

Oct. 19, 1937.

M. S. HURLEY

2,096,517

SUCTION CLEANER

Filed Dec. 3, 1935

2 Sheets-Sheet 2

Fig. 4

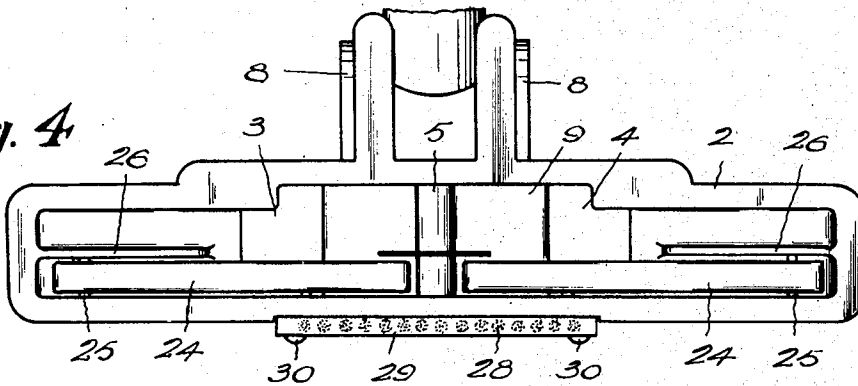


Fig. 5

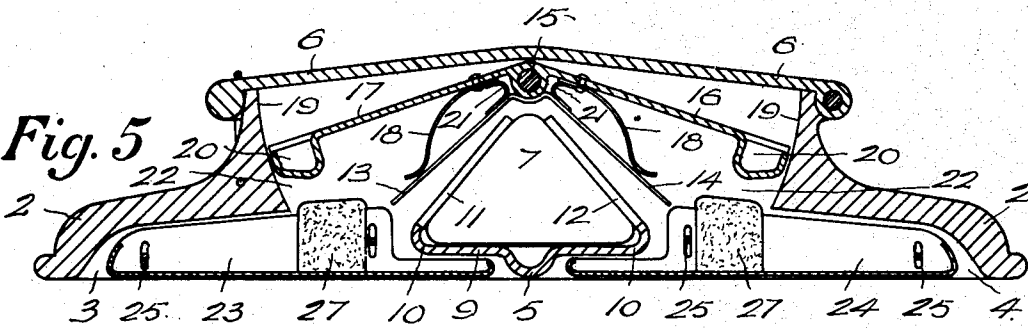


Fig. 6

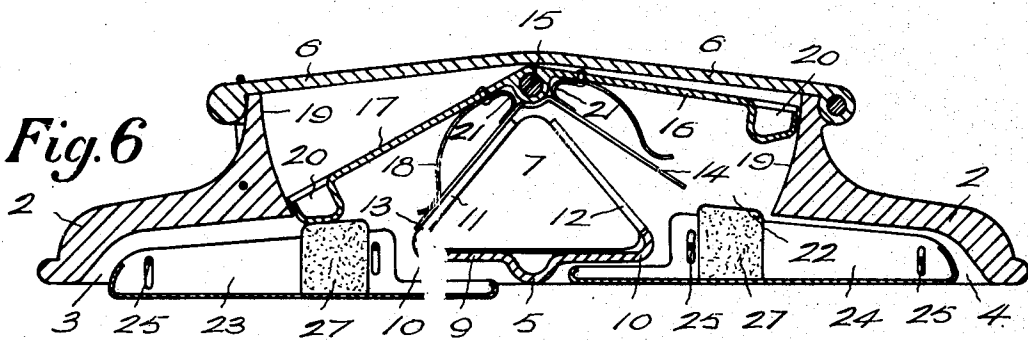
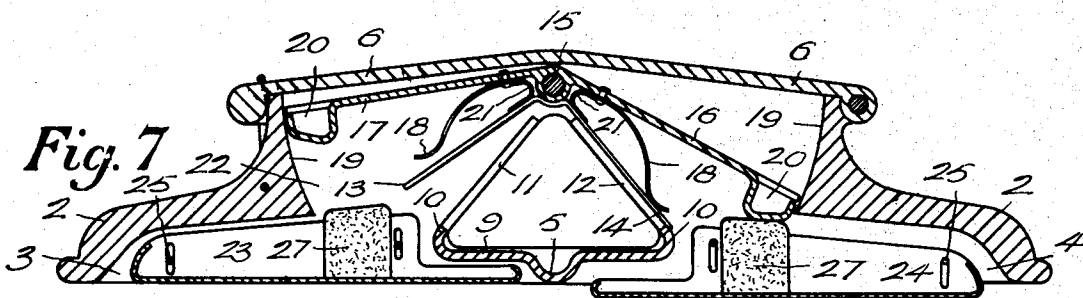


Fig. 7



Inventor:
Melvin Singer Hurley.
By Frank Appleman
Attorney

UNITED STATES PATENT OFFICE

2,096,517

SUCTION CLEANER

Melvin Sivyer Hurley, Shirley, Birmingham,
EnglandApplication December 3, 1935, Serial No. 52,723
In Great Britain December 4, 1934

6 Claims. (Cl. 15—13)

This invention relates to improvements in suction cleaners.

In the usual suction cleaner the suction is created by a motor-driven fan in a portable casing, and connected to the casing is a flexible hose having at its outer end an open-mouthed nozzle which is moved over the carpet or other surface to be cleaned so that the dust is extracted by the suction and collected in a bag in the casing. Such a suction nozzle will pick up surface dirt and dust from a carpet or the like but does not extract dust embedded in the pile of the carpet, and for this reason various forms of beating mechanism have been fitted to cleaners to beat the surface being cleaned and disturb or loosen the dirt and dust which is then picked up by the suction. The beating mechanism is commonly mounted within the nozzle and driven from wheels travelling on the carpet or the like.

The object of my invention is to provide an improved form of suction nozzle for cleaners whereby a much higher degree of efficiency is obtained than is possible with an ordinary suction nozzle, and whereby dirt and dust embedded in a carpet or like surface can be extracted without any risk of damaging or wearing the surface.

According to my invention a suction nozzle is divided by one, two or more partitions into open-mouthed compartments which are alternately put into communication with and cut off from the suction pipe leading to the cleaner by means of a rotary or reciprocating valve or valves, and the alternation of the suction in the compartments may if desired be employed to operate one or more vertically movable beater members which beat the surface to be cleaned.

The alternation of the suction in the different compartments with its consequent alternation of normal and reduced pressure on each part of the surface being cleaned disturbs and loosens the dirt and dust so that the surface is effectively cleaned.

One practical form of suction cleaner nozzle embodying my invention is illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a front elevation of the nozzle.

Figure 2 is a plan of the nozzle.

Figure 3 is an end elevation.

Figure 4 is an inverted plan.

Figure 5 is a longitudinal vertical section of the nozzle showing the moving parts in a neutral position.

Figure 6 is a similar section showing the parts in one extreme position.

Figure 7 is a similar section showing the parts in the other extreme position.

In the construction illustrated the body 2 of the nozzle is formed as an aluminium or other casting having in its bottom face a longitudinal rectangular opening divided into two parts 3 and 4 by a transverse partition 5. A smaller opening in the upper face of the body is normally closed by a flanged cover 6 which is hinged to the body at one end and secured at the other end by a clip. The cover carries the valve and the oscillating operating member as described below so that these parts can be readily inspected and cleaned by opening the cover 6. An opening 7 in the rear wall of the body leads into a swivel or other convenient connection 8 for receiving the suction hose of a vacuum cleaner.

The opening 7 opens within the body into a prism-shaped suction chamber formed by a flat bottom closure 9 and two oppositely inclined sides 10 in which are openings 11 and 12 of substantial dimensions. The parts 9 and 10 and the partition 5 are conveniently cast integral with the body.

The valve consists of a pair of opposed leaves or blades 13, 14 inclined to each other at an obtuse angle greater than the angle between the sides 10 of the suction chamber, and the valve is pivoted about a transverse pin 15 on the cover 6 directly above the apex of the suction chamber so that when the opening 11 in one side of the chamber is closed by the blade 13 of the valve the other blade 14 is spaced from the opening 12 in the other side of the chamber and vice versa.

Pivoted on the same pin 15 is an oscillating member which operates the valve and beaters and this member consists of two opposed arms 16, 17 which are of greater length than the blades of the valve and are inclined to each other at a slightly greater angle. Small blade springs 18 are secured to the under side of each arm 16, 17 adjacent to the pivot and are adapted to engage the upper surfaces of the valve blades 13, 14 as the oscillating member rocks. The width of the oscillating member is such that it just clears the back and front of the body and the arms 16, 17 are of such a length that their ends just clear curved surfaces 19 at the ends of the upper part of the body, these surfaces forming arcs about the pivot pin 15 as a centre, so that the arms make a substantially air-tight seal with the walls of the compartments in which they move.

The central part of the upper face of the oscillating member is spaced a short distance from the underside of the cover 6 so that air can pass

through this space as the member oscillates. When one arm of the member is drawn downwardly by the suction, the other arm simultaneously moves upwardly so that the combined volume of the two prism-shaped spaces between the arms 15, 16 and the cover remains substantially constant, and as air can pass freely from the one space to the other, there is no appreciable reduction of pressure above either arm as it is drawn downwardly.

Secured to or integral with the ends of the arms 16, 17 are strikers 20 for engagement with the beaters, and these strikers may be weighted to increase the force of the blows.

Small strips of fabric 21 may be secured to the oscillating member and valve blades adjacent to their pivot to exclude dust from the pivot, and the valve blades may if desired be covered with fabric, rubber or similar material.

Openings 22 of substantial area between the lower edges of the surfaces 19 and the sides 10 of the suction chamber lead into the two openings 3, 4 in the bottom face of the body.

Slidably mounted for vertical movement in the openings 3, 4 are longitudinally extending beater members 23, 24. Each of these beaters may be of wood or other suitable material but in the form illustrated it is made from sheet metal pressed into channel section and the beater is guided on pins 25 working in vertical slots in the sides of the beater. The beaters are considerably narrower than the openings 3, 4 so as to leave an unobstructed part of the opening behind each beater, and the outer end of each beater is conveniently located between the front wall of the opening and a longitudinal partition wall 26. A cork or other resilient pad 27 secured in each beater receives the blow from the end of the oscillating member and helps to reduce noise. The length of the guiding slots in the beaters is such that normally the lower surfaces of the beaters lie just below the plane of the bottom surface of the nozzle and the beaters are pressed upwardly when the nozzle is placed on a carpet or other surface to be cleaned.

The operation of the mechanism is as follows:—

Assuming the parts to be in the position shown in Figure 5 and suction to be applied to the nozzle one of the valve blades, say the blade 13, will be sucked down to close the opening 11 in the suction chamber. The suction then acts through the opening 12 on the arm 16 of the oscillating member which is drawn down into the position shown in Figure 7.

As the arm 16 moves downwardly the spring 18 engages the blade 14 and rocks over the valve to cause the blade 14 to close the opening 12, and as the arm 16 reaches the end of its travel the striker 20 engages the pad 27 of the beater 24 which is then given a sharp blow and transmits that blow to any surface on which the nozzle is resting. Immediately the valve is rocked over and closes the opening 12 suction is cut off from the arm 16, but simultaneously the opening 11 is uncovered by the blade 13 and suction is applied to the arm 17 which is now drawn down into the position shown in Figure 6. The spring 18 carried by the arm 17 thus rocks over the valve again to cause the blade 13 to close the opening 11, and the striker 20 on the arm 17 strikes the beater 23.

The movement of the valve at the same time causes the suction to be applied alternately to the openings 3 and 4 so that any surface over which the nozzle is moved is subjected both to

the beating action of the beaters 23, 24 and to a rapid alternation of suction and the nozzle gives an extremely thorough and effective cleaning action.

The application of the suction to each of the openings 3, 4 alternates with the actuation of the beater in that opening so that when a carpet is being cleaned each individual section of the carpet will be lifted by the suction and then beaten down again by the beater.

As the movement of the beaters is a purely vertical one the beaters apply a blow to a carpet or the like similar to that applied by a switch or cane so that any dust or dirt is effectively loosened but there is no appreciable wear of the carpet.

The springs 18 ensure a very rapid action of the valve and the speed of reciprocation can be readily varied by altering the strength of the springs. The force of the beating action can be varied by altering the weight of the strikers 20 or by altering the angle between the arms of the oscillating member.

The nozzle may if desired be fitted with a brush for picking up threads and to assist in stirring up and loosening dirt in the surface to be cleaned.

One convenient type of brush is shown in Figures 1 to 4. Downwardly directed bristles 28 are carried by a plate 29 which is vertically movable on guide pins 30 on the outer surface of the front face of the nozzle and is normally urged upwardly by springs 31 to hold the bristles clear of the surface to be cleaned. To bring the brush into use a cam member 32 pivoted on the nozzle is rotated into the position shown in Figure 1, and the cam bearing on a shoulder on the plate 29 presses the brush downwardly to bring the bristles into contact with the surface to be cleaned.

I claim:—

1. A nozzle for a suction cleaner comprising a hollow nozzle body, an opening in the body for connection to a suction pipe, a mouth opening in the body, a plurality of separated compartments in the body leading into the mouth opening, said mouth opening having ports each communicating with a respective compartment, an oscillating valve mounted in the body and operated by the suction to cause the suction to be applied alternately to each compartment, a movable beater member loosely mounted in the mouth opening, and means associated with the valve for operating the beater member.

2. A nozzle for a suction cleaner comprising a hollow nozzle body, said body having an opening for connection to a suction pipe, said body further having a plurality of mouth openings and a plurality of separated compartments leading into the mouth openings, an oscillating valve mounted in the body and operated by suction to cause suction to be applied alternately to each compartment, a movable beater member loosely mounted in each mouth opening, and means associated with the valve for operating the beater members.

3. A nozzle for a suction cleaner comprising a nozzle body, said body having a suction outlet, said body further having an elongated suction mouth in the bottom of the nozzle divided into separate openings, two compartments in the body each communicating with one of the mouth openings, oppositely inclined partitions arranged in the body between the suction outlet and said compartments, said partitions having apertures establishing communication between the suction outlet and the compartments, an oscillating valve, pivotally supported to rock on an axis in the body

above the partitions, said valve consisting of two blades inclined to each other at an angle greater than that between the partitions so that as the valve rocks it will close the apertures alternately to connect the compartments alternately to the suction outlet, an oscillating member pivotally supported in said body, said member consisting of two opposed arms working in substantially airtight relationship with the walls of the compartments and inclined to each other at an angle greater than that between the blades of the valves, whereby the application of suction to either compartment causes the suction to act on one arm of the oscillating member which is thus rocked over and engages and rocks over the valve to cause the suction to be applied to the other compartment.

4. In a vacuum cleaner, an elongated casing having a downwardly facing opening at each end, said openings being separated by a central transverse partition, a pair of beater elements each mounted in a respective opening of said casing, said casing having a vacuum chamber disposed centrally thereof and having port communication at each side with a respective opening, and means in said casing extending over said chamber and operable to alternately close and open said port

communications and including means to cause alternate actuation of said beater elements.

5. In a vacuum cleaner, an elongated casing having a downwardly facing opening at each end, said openings being separated by a central transverse partition, a pair of beater elements each mounted in a respective opening of said casing, said casing having a vacuum chamber disposed centrally thereof and having port communication at each side with a respective opening, and means in said casing extending over said chamber and operable to alternately close and open said port communications and thereby to cause alternate actuation of said beater elements, said means including actuating arms disposed to strike and depress said beaters.

6. A nozzle for a suction cleaner comprising a hollow nozzle body adapted to be connected to a suction pipe, a partition dividing the nozzle into a plurality of open-mouthed compartments, a beater member movably mounted in the mouth of each compartment, an automatically operated valve connecting the compartments alternately in rapid succession with the suction pipe, and means operated by the alternation of the suction in the compartments for actuating said beater members.

MELVIN SIVYER HURLEY.