Sept. 5, 1950 W. H. LESLIE 2,520,942

VACUUM CLEANER HEAD

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Fig. 1.

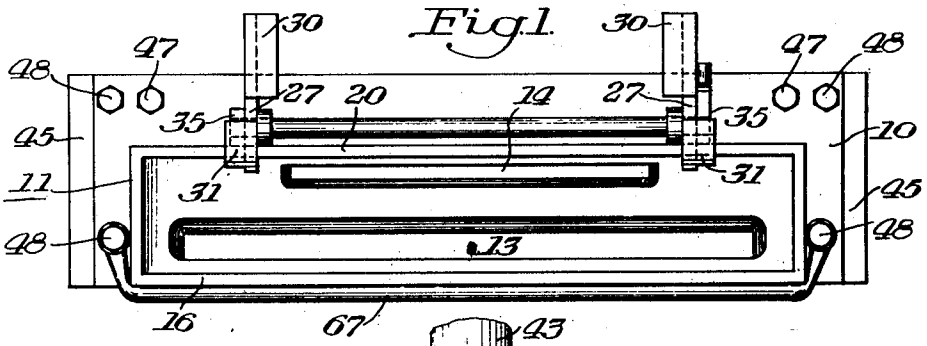


Fig. 2.

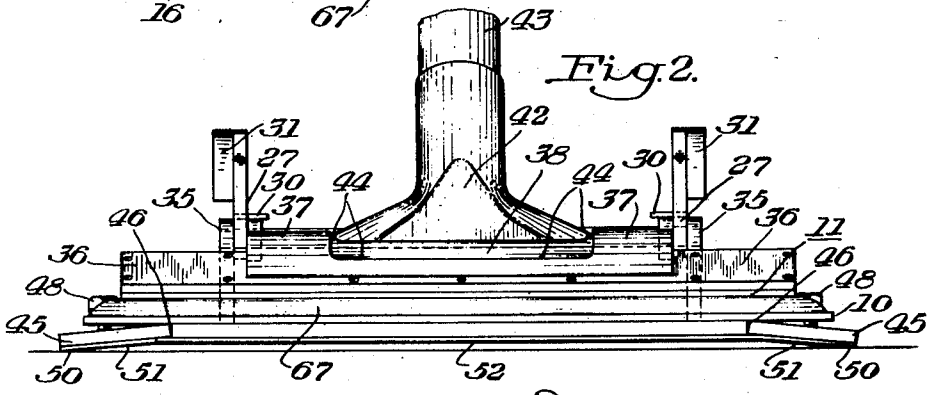


Fig. 3.

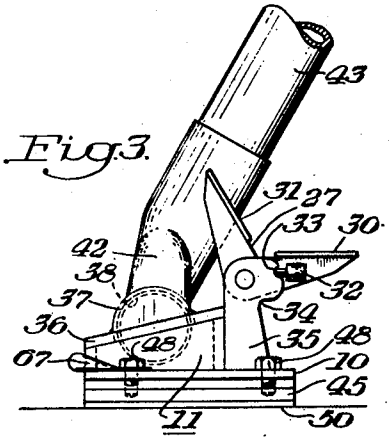
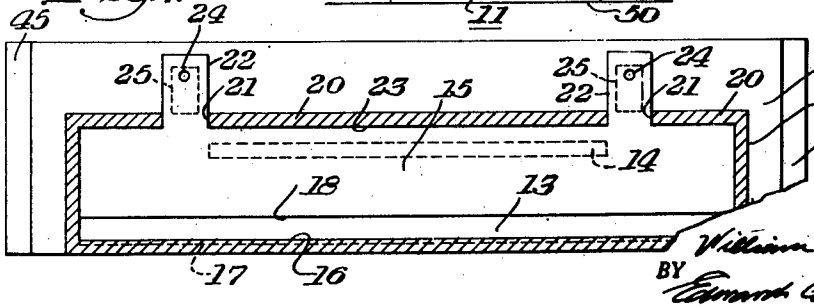


Fig. 7.



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Fig.4.

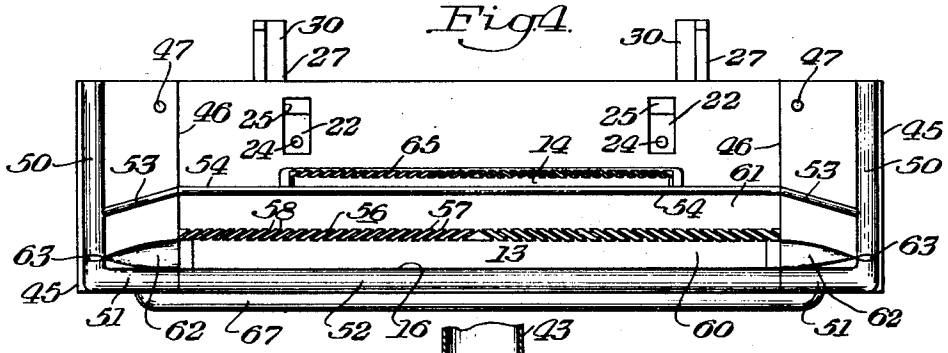


Fig.5.

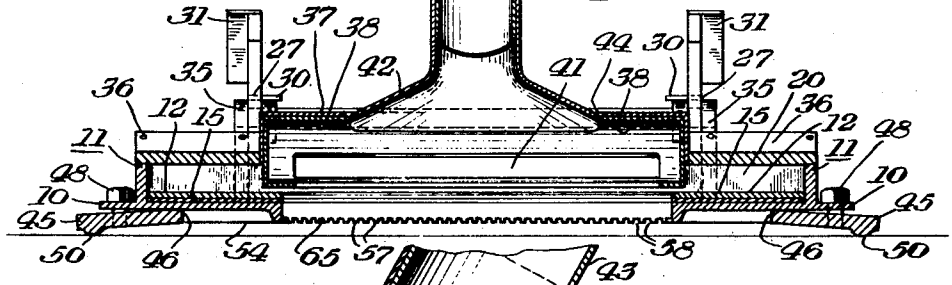


Fig.6.

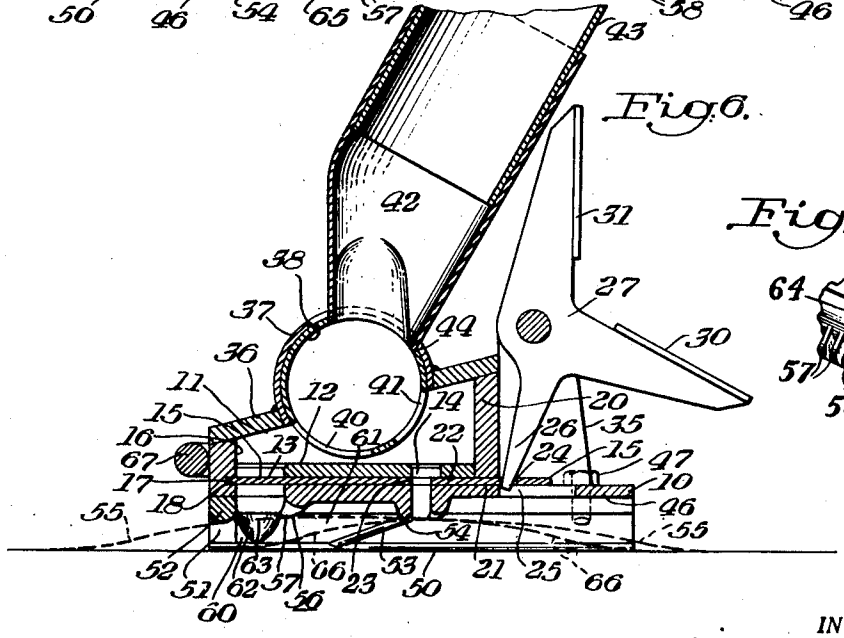
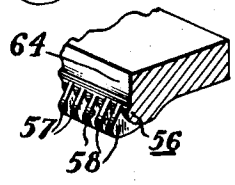


Fig.8.



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VACUUM CLEANER HEAD

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3 Claims. (Cl. 15—354)

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This invention relates generally to vacuum cleaners and more particularly to the head or surface engaging member of a vacuum cleaning apparatus.

The vacuum cleaning head of the character comprising this invention is arranged to be detachably connected to the end of a wand or tube having a flexible hose attached to the suction side of a blower which draws the air and dirt through the head and discharges it into a bag or similar container from which the dirt may be emptied. The wand is rigid and permits the operator to apply a reciprocating motion to the head to make it glide back and forth over the surface to be cleaned.

The principal object of this invention is the provision of a vacuum cleaner head that glides easily over a thick nap surface and quickly and efficiently removes waste particles, dirt and threads therefrom. The principal aim of this invention is efficiency in cleaning. A cleaning head that offers the least resistance to movement and removes the greatest percentage of dirt per pass or per unit of time with the same suction and from a surface having the same amount of dirt, is the most efficient.

Another object is the provision of a cleaning head which glides or has a low resistance to movement over the surface to be cleaned.

Another object is the provision of a vacuum cleaner head with a dome-shaped under surface outlined by depending ribs and terminating in a suction throat that lifts the rug or carpet into a complementary shape as the head is drawn thereover for the purpose of opening the nap.

Another object is the provision of a throat in the vacuum head bounded on one side with a comb having arcuately shaped teeth forming slots angularly disposed to transverse planes of the throat, the slots on one side of the center of the throat being disposed in one direction and on the other side in the other direction.

Another object is the provision of a vacuum cleaner head with a dome-shaped under surface outlined by spaced depending ribs and divided into two sections by a comb, one section having a suction throat and the other section being connected to the throat between the teeth of the comb when a rug is held by suction up against the dome.

Other objects and advantages appear in the following description and claims.

In the accompanying drawings a practical embodiment illustrating the principles of this invention is shown wherein:

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Fig. 1 is a plan view of the vacuum cleaner head comprising this invention, with the top cover and wand connection removed.

Fig. 2 is a view in front elevation of the head.

Fig. 3 is a view in side elevation of the head.

Fig. 4 is a plan view of the under side or rug-engaging surface of the head.

Fig. 5 is a longitudinal sectional view of the head.

Fig. 6 is a transverse sectional view of the head.

Fig. 7 is a plan view of the shutter.

Fig. 8 is a detailed view of a portion of the comb adjacent the large throat.

Referring to the drawings, the vacuum cleaner head is constructed on a rectangular base plate 10. A wind box 11 is carried by the base 10 and its bottom 12 is provided with the longitudinally disposed throat openings 13 and 14 aligned with similar throat openings in the base 10. The bottom 12 of the box 11 is spaced from the upper surface of the base 10 to provide clearance for the operation of the shutter 15 which has a sliding fit between the surfaces of these members.

The bottom edge of the front wall 16 of the box 11 is undercut as shown at 17 in Fig. 6 to receive the front edge 18 of the shutter 15. The bottom edge of the rear wall 20 of the box 11 is provided with slots 21 for receiving the rearwardly projecting tongues 22 of the shutter 15.

The shutter is substantially rectangular in shape as shown in Fig. 7. The rear edge 23 of the shutter uncovers the port 14 when the shutter is moved forward with its front edge 18 engaging in the undercut 17 of the front wall 16, as shown in Fig. 6. When the shutter is retracted, as indicated in Fig. 7, the rear edge 23 engages the rear wall 20 of the box 11 and closes the throat 14 in the base 10, while the front edge 18 is retracted and opens the throat 13 in the base 10 into the box 11. The rectangular shutter may be slid back and forth between the front and rear walls 16 and 20 of the box 11 by the rearwardly projecting tongues 22 of the shutter, which extend through the rear wall 20 and are provided with the holes 24 located above the openings 25 in the base 10. These holes are arranged to receive the lower end of the depending arms 26 of the double winged bell crank levers 27. Each wing of the levers 27 is provided with a foot pad which when depressed swings the lever and the depending arm 26 to move the shutter forwardly or rearwardly. When the foot pad 30 is depressed the shutter 15 moves forward to close the throat 13 and open the throat 14 to the box 11, as shown in Fig. 6. If the foot pad 31 is depressed the

shutter 15 moves rearwardly to open the throat 13 and close the throat 14 to the box 11, as shown in Fig. 7. Thus the operator may selectively control the opening of either throat 13 or 14 to the box 11.

One of the bell crank levers 27 is provided with a spring biased detent 32 arranged to engage in the recesses 33 and 34 on the standard 35, as shown in Fig. 3, for the purpose of locking the shutter in either its forward or retracted position and not permitting both throats to be opened simultaneously.

The lid 36 of the box 11 is provided with a cylindrical socket member 37 closed at its ends and open on the under side thereof. The inner cylindrical surface of this member is greater than 180° and thus provides an inner socket or bearing surface for the second cylindrical member 38 which swivels therein. The side of the second cylinder 38, which is exposed within the box 11, is provided with the ports 40 and 41 that open toward the throats 13 and 14 respectively. On the wall opposite these ports the cylindrical member 38 is provided with the bell attachment 42 which extends through the arcuate opening 44 of the outer or stationary cylindrical member 37 and is arranged to be connected to the wand 43. When the wand 43 is moved back and forth the inner cylindrical member 38 oscillates within the outer cylindrical socket member 37 and permits the wand to assume different angular positions relative to the head as the latter glides over the surface to be cleaned.

The base plate 10 is elevated from the surface to be cleaned by the wing plates 45 which are hingedly secured along their inner edge 46 to the under side of the base plate 10 by any suitable means, such as the bolts 47 which pivotally hold the inner edge of the wing plates 45 to the base plate 10, and are adjustably held in a set inclined position by the bolts 48. The inclination of the wings may thus be adjusted by the extent of the depth of the bolts 48 which force the outer edge of the wings away from the base 10.

The under face of each wing 45 is provided with a rib runner 50 along the outer marginal edge thereof, as shown in Fig. 4. At the front of each wing the runner 50 is joined at right angles to the inwardly directed depending rib 51 which mates and is aligned with the depending rib 52 that is secured to the under side or face of the base 10 and extends across the head between the ribs 51, as shown in Figs. 2 and 4. The rib 52 arches slightly in the center and forms an extension of the front wall of the throat 13 in the base 10.

Another depending rib 53 is secured to the under side or face of each wing 45 in spaced relation to the rear of the rib 51. The ribs 53 are joined to the runners 50 and extend inwardly and rearwardly to the edge 46 at approximately the center of the wing plate 45 where they are joined by the rib 54 that traverses the width of the base 10. The rib 54 is substantially parallel with the rib 52 and has a short intermediate section in which forms an extension of the front wall of the throat 14 in the base 10 as shown in Figs. 4 and 6.

Thus the parallel ribs 52 and 54, together with the inclined wing extension ribs 51 and 53 and the rib runners 50 form a substantially rectangular mouth on the under side or face of the head, which mouth arches to form the dome on the under side of the head that draws the rug

upwardly into engagement with the ribs, as indicated by the dotted line 55 in Fig. 6. Thus in the vicinity of the open throat 13 the arched rug is in the shape of a dome, the highest portion being directly under the throat 13.

A comb agitating rib or metal brush 56 is secured to the under side of the base 10 dividing the face of the dome between the front and rear ribs 52 and 54 into two sections. This comb is higher than the ribs 52 or 54 and forms an extension of the rear wall of the front throat 13 and is provided with spaced teeth 57 having slots 58 therebetween. The comb is a rib substantially triangular in cross section to produce a pointed tooth of material depth. The width of each tooth 57 is substantially twice the width of the slots 58 separating them. On each side of the center of the comb the teeth are parallel to each other but the teeth on one side are disposed at a divergent angle to the teeth on the other side and are disposed at an angle substantially normal to the path of flow of air drawn through the slots and into the throat 13 as shown in Fig. 4. The leading edges of the teeth are rounded so that they will not cut or tear the nap of the rug.

As previously stated the comb 56 divides the mouth of the dome produced by the depending ribs, into two sections, the front face section 60 and the rear section 61. The front section 60 is open directly to the front throat 13, whereas the rear section 61 is shallow and is connected to the throat 13 through the slots 58 between the teeth of the comb. Thus the air and dust must travel in divergent directions from each side of the center of the comb from the rear section 61 to the throat 13. At the same time the triangular teeth of the comb ruff up the nap of the rug at the top of the dome formed in the rug. The nap is not only opened up by the formation of the dome but it is ruffed in divergent directions by the teeth of the comb. The slots 58 between the comb teeth being deep permit the air and dirt to be drawn up from the nap and pass on to the throat 13. This action may be simulated by drawing a straight edge against the nap of the rug to ruff it and simultaneously fling the dirt particles upwardly onto the back of the straight edge. The reciprocating motion of the head causes the comb 56 to ruff the nap and kick up the dirt when traveling in either direction. When traveling backward the dirt passes directly up the throat 13 and when traveling forward it must pass through the slots 58. The section 60 is carried out into the wings 45 by the hollowed out portions 62 which terminate in the small transverse grooves 63 in the runners 50. The small transverse grooves 63 permit dirt to be drawn into the front section 60 of the head when the latter is moved along a wall or other similar object.

The apices of the teeth 57 in the comb 56 lead the front face 64 of the teeth and project into the throat 13. The angular side edges of each face 64 are abrupt. Air suction carrying dirt and string from the nap of the rug past the teeth and through the slots 58 of the comb must reverse its direction 90° to be drawn vertically up into the throat 13 and horizontally at an acute angle of approximately 30° to be directed back toward the center of the throat 13. The free end of a piece of string, which is ordinarily held by the nap of the rug, will catch on the angular edges of the face 64 of the teeth 57 by

trying to make these bends with the air. As the head is moved the string will be drawn free from the nap of the rug and pass on up the throat. A thread being smaller and lighter has a greater affinity for the nap of the rug and may be too short to catch on the edge of the face 64 of the teeth and therefore will not be drawn off the rug.

The small throat 14 is provided to pick up threads and other material requiring a high velocity suction. The throat 14 is materially shorter in length and smaller in width than the throat 13. Thus the same suction produces a materially higher velocity of the air drawn therethrough. The rear edge of the throat 14 is provided with a comb or agitating rib 65 similar in shape to the comb 56 as shown in Fig. 4. The ends of the comb 65 have forwardly extending short ribs connecting with the rib 54 closing the ends of the throat 14. When the shutter 15 is moved forward to close the throat 13 and open the throat 14, the rug or carpet continues to be held up in the shape of a dome and approximately assumes the contour designated by the dotted lines 66 in Fig. 6, the apex of the dome being under the throat 14 and being more abrupt due to its width. The high velocity of the air at the apex of the dome formed in the rug opens the nap, drawing threads and other particles from the surface being cleaned. This action is aided by the comb 65 which grasps the end of loose threads raised by the suction and thus aids the suction in withdrawing it from the nap.

If the nap is heavy and long the wings 45 may be lowered to increase the height of the dome formed in the carpet. If the nap is very short the wings 45 may be flattened or drawn up to the base and the arched contour of the ribs 52 and 54 forming the mouth on the under side of the head are depended upon to form the low dome. By changing the elevation of the head in this manner the cleaning head efficiency is increased. In a plane transverse to the throat 13 and to one side of the throat 14, the bottoms of the rounded rib 54 is higher from the rug than the rib 52. A straight edge engaging the center sections of the rib 52 and comb 65 slants upwardly to the rear and is spaced from the comb 56. The rounded bottom surface of rib 54 is in the same horizontal plane as the bottom surface of the comb 65 and since this portion of the rib 54 is higher than the rib 52 the straight edge lying across the rib 52 and the comb 65 will not engage the rib 54. However the comb 56 is more than twice as far from the straight edge as the central portion of the rib 54. These relative positions of the underhead structure produce the dome in the rug or carpet, as illustrated by the dotted lines 55 and 56 in Fig. 6, depending upon which throat is open. Thus the under structure of the head is constructed to have dual throats which may be selectively used and the elements associated with each throat do not interfere with the other throat in raising the carpet in the shape of a dome to open the nap thereof.

A soft rubber guard 67 is secured to the base by the bolts 48 and extends around the front of the head to protect the wall and furniture from being marred by impact of the head. The bell attachment 42 is arranged to swivel relative to the head and permit the wand 43 to be held in a horizontal position so that the head may be operated under furniture without tilting on the runners 50.

This tank type vacuum cleaning head has been found to remove 17.9% more dirt from a carpeted surface than other similar and well known heads. This improved result in the tank type vacuum cleaning apparatus, which has a materially stronger suction than the exterior bag type cleaning apparatus, is believed to be due to the arching of the rug or carpet in the shape of a dome in combination with the serrated metal brush 56 which engages the nap at the crest of the dome. The nap at the crest of the dome is open and loose due to the arching of the rug by the suction and the metal brush flexes the nap under these conditions to free the embedded dirt particles. This is an important object of this invention. The depending ribs, which outline the mouth of the nozzle, have a similar effect on the nap of the rug or carpet but they also produce a seal around the dome determining its shape and enabling the metal brush to work effectively on the nap to loosen and remove the embedded dirt particles with the aid of the suction. The metal brush 56 being disposed substantially midway between the depending ribs that are parallel therewith produces the effect of a nozzle opening substantially twice the width of the throat 13 as the suction is effective on both sides of this metal brush.

I claim:

1. A suction cleaning tool consisting of an elongated hollow nozzle body having an outlet adapted to be connected to a source of suction, a face on said nozzle body arranged to be applied to a surface to be cleaned, a wing on each end of said face extending below said face to form a gliding surface for said nozzle, an inlet in said face defined by a longitudinal throat of uniform width, a depending rib on the face and wings completely encircling the inlet with a portion thereof providing the front marginal lip of said throat, and an agitating rib having downwardly and forwardly projecting teeth and forming the rear marginal lip of the throat and in spaced relation with the encircling rib, said agitating rib being spaced above the surfaces of the encircling rib.

2. A suction cleaning tool consisting of an elongated hollow nozzle body having an outlet adapted to be connected to a source of suction, a nozzle face on said nozzle body arranged to be applied to a surface to be cleaned, an inlet in said nozzle face defined by a longitudinal throat of uniform width, an elevating wing extending laterally on each end of the nozzle face to raise the latter, a depending rib on the face and wings completely encircling the inlet with a portion thereof providing the front marginal lip of the throat, and an agitating rib carried by said face between the wings and forming the rear marginal lip of the throat, said agitating rib being spaced from and higher than the encircling rib.

3. A suction cleaning tool consisting of an elongated hollow nozzle body having an outlet adapted to be connected to a source of suction, a nozzle face on said nozzle body arranged to be applied to a surface to be cleaned, an inlet in said nozzle face defined by a longitudinal throat of uniform width, an elevating wing extending laterally on each end of the nozzle face to raise the latter, a depending rib on the face and wings completely encircling the inlet with a portion thereof providing the front marginal lip of the throat, an agitating rib carried by said face between the wings and forming the rear marginal lip of the throat, said agitating rib

being spaced from and higher than the encircling rib, and means to change the angular position of the elevating wings to increase and decrease the height of the nozzle face from the surface to be cleaned.

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