Nov. 17, 1953 T. W. OTT 2,659,099

VACUUM CLEANER HEAD WITH HANDLE CONTROLLED VALVE

Filed Aug. 21, 1947 3 Sheets-Sheet 1

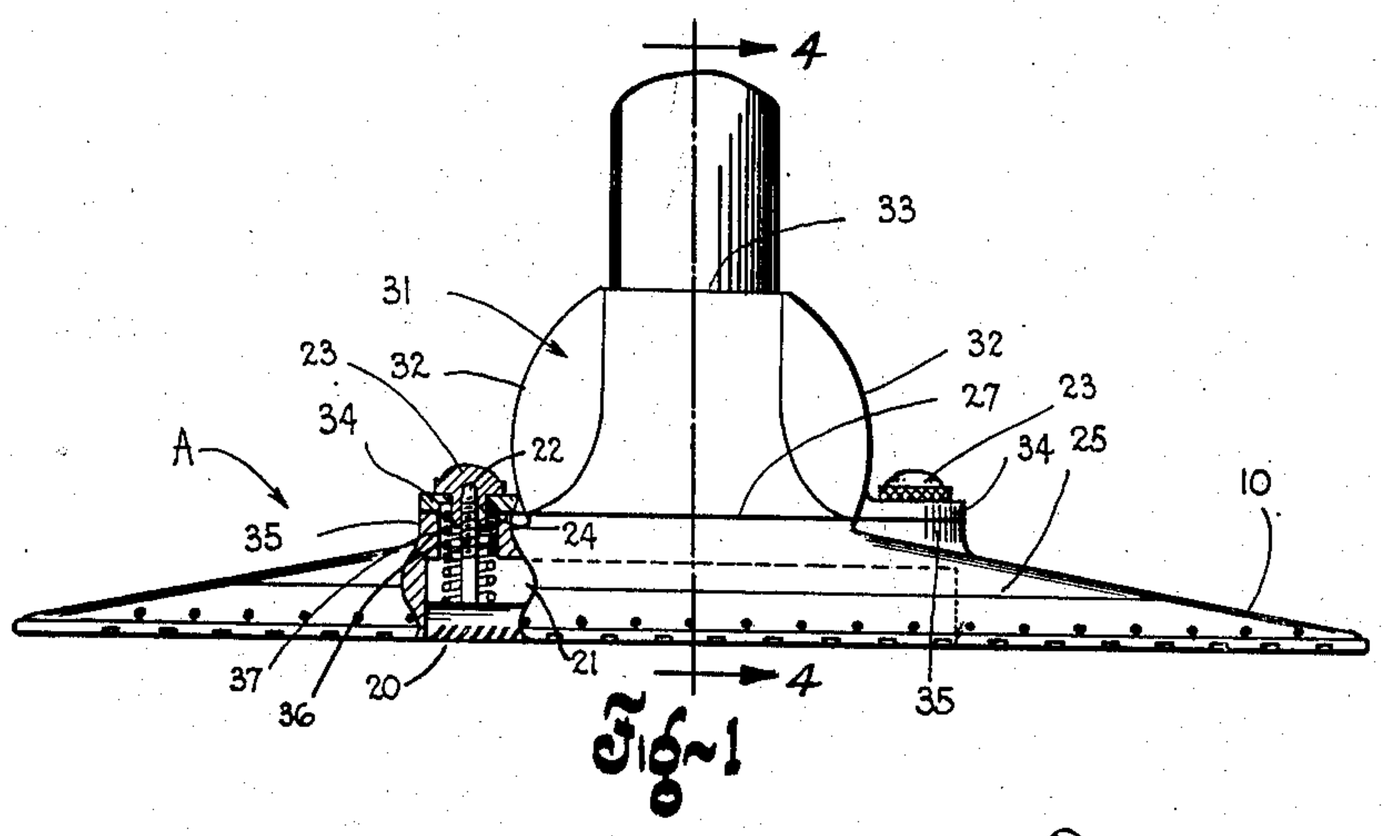

Fig-1

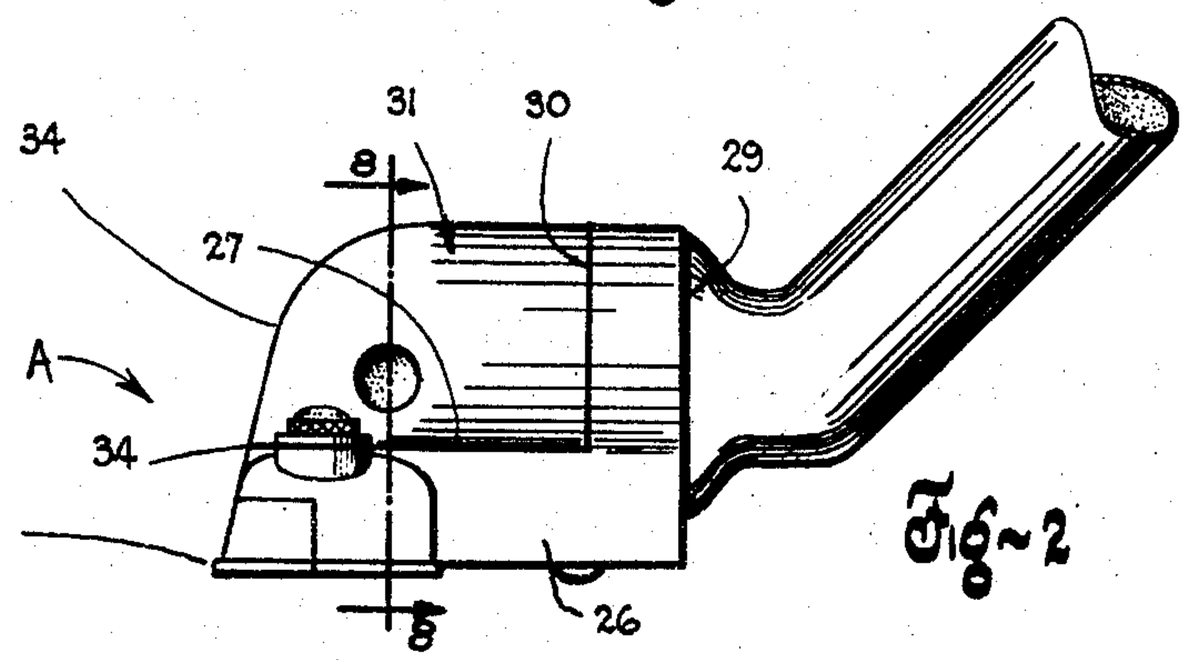

Fig-2

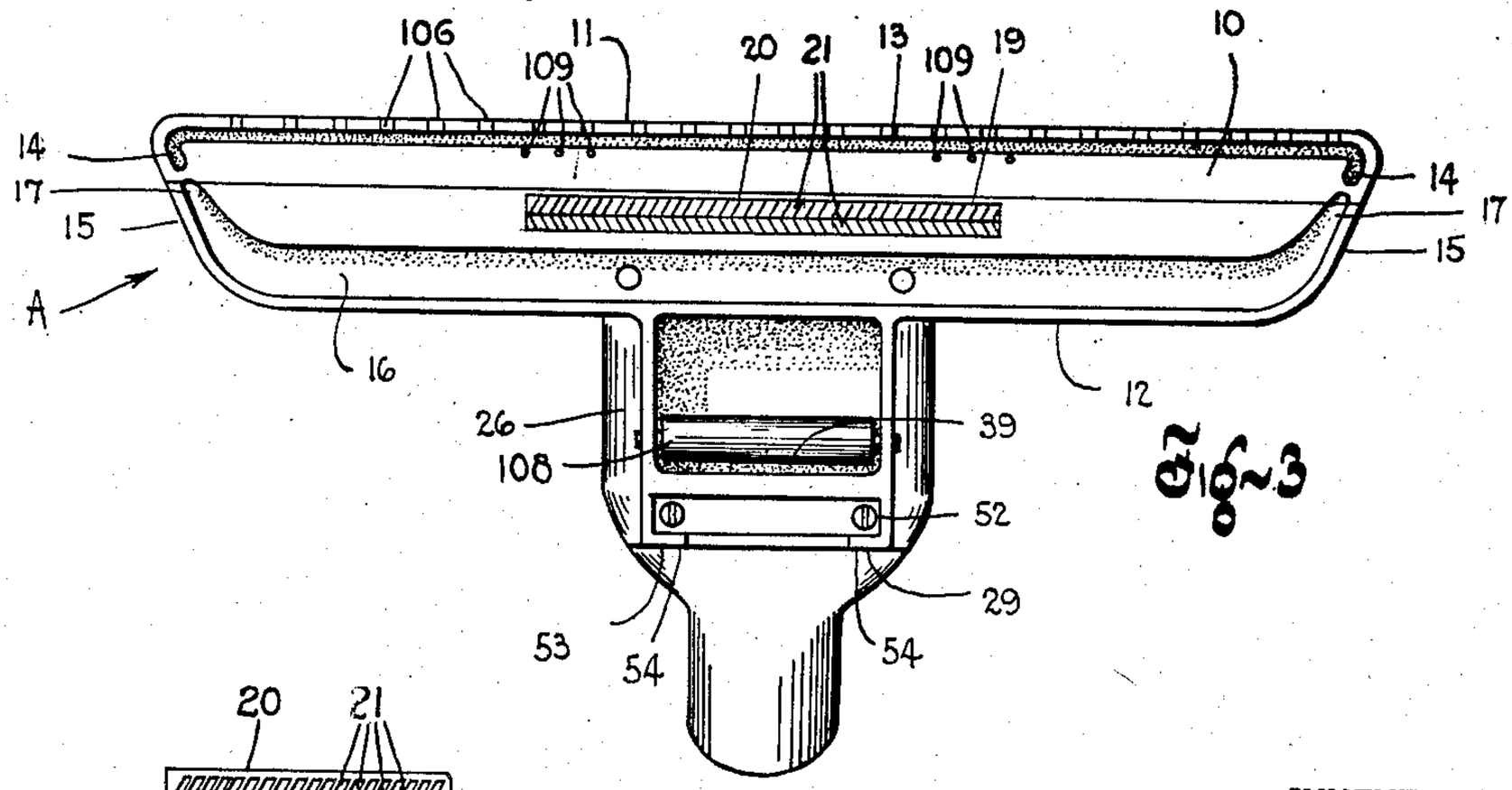

Fig-3

Fig. 13

INVENTOR.
Thomas Willington Ott
BY
Robert M. Dunning

Nov. 17, 1953 T. W. OTT 2,659,099

VACUUM CLEANER HEAD WITH HANDLE CONTROLLED VALVE

Filed Aug. 21, 1947 3 Sheets-Sheet 2

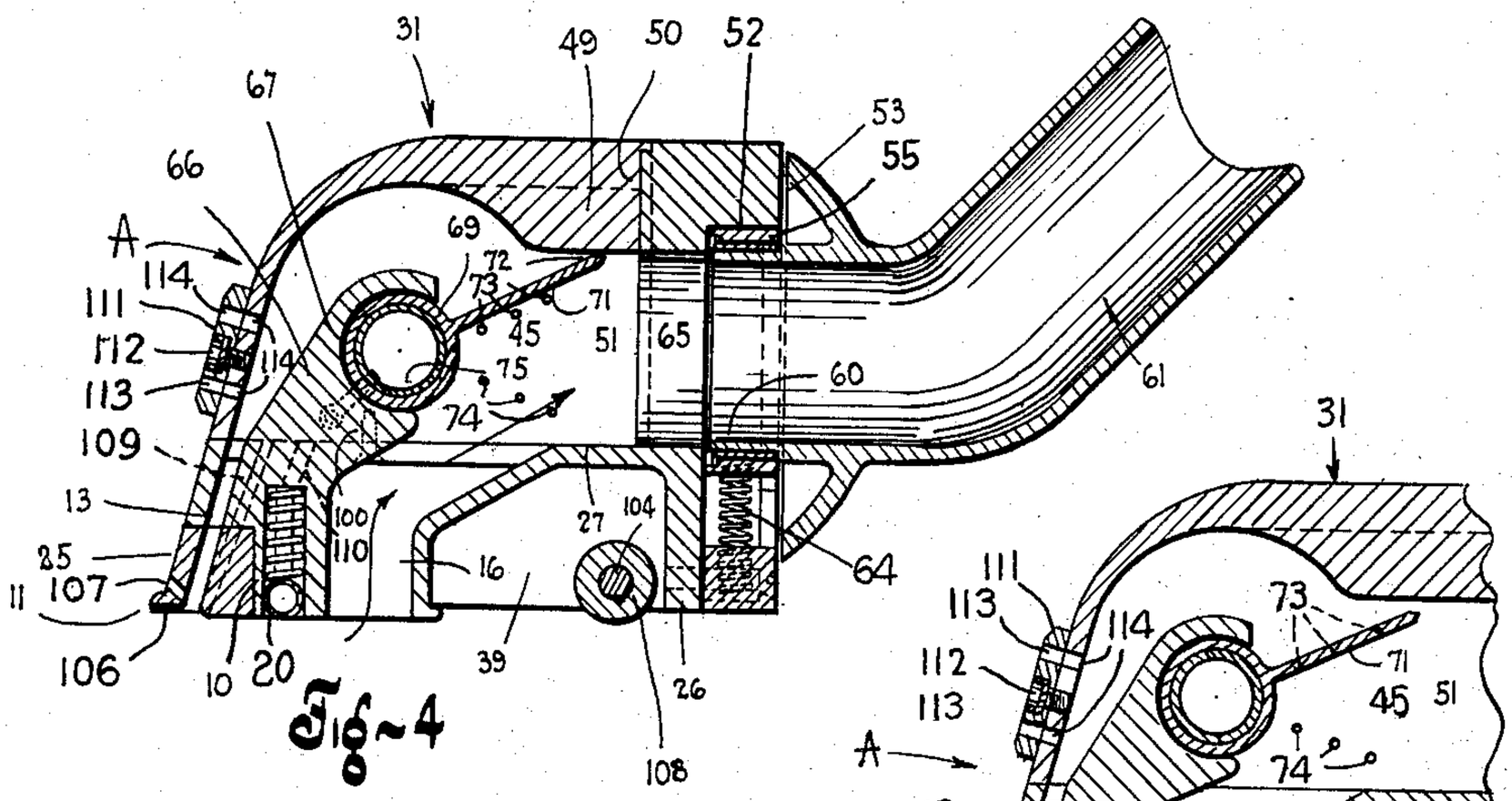

Fig-4

Fig-5

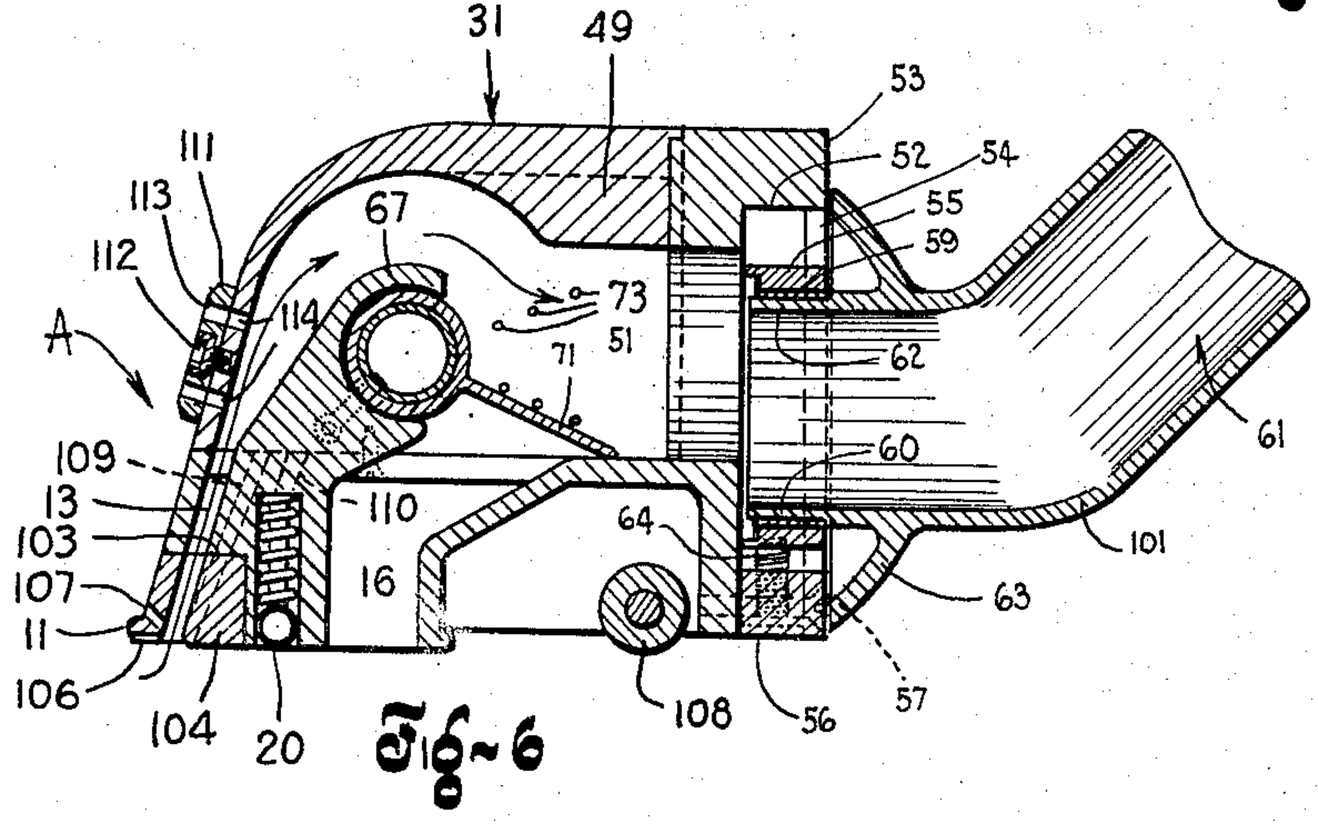

Fig-6

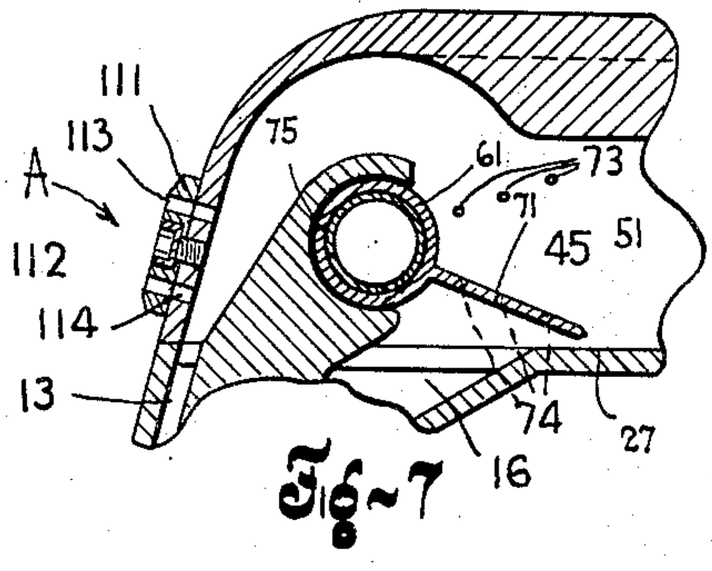

Fig-7

INVENTOR.
Thomas Wellington Ott
BY
Robert M. Dunning

Nov. 17, 1953 T. W. OTT 2,659,099

VACUUM CLEANER HEAD WITH HANDLE CONTROLLED VALVE

Filed Aug. 21, 1947 3 Sheets-Sheet 3

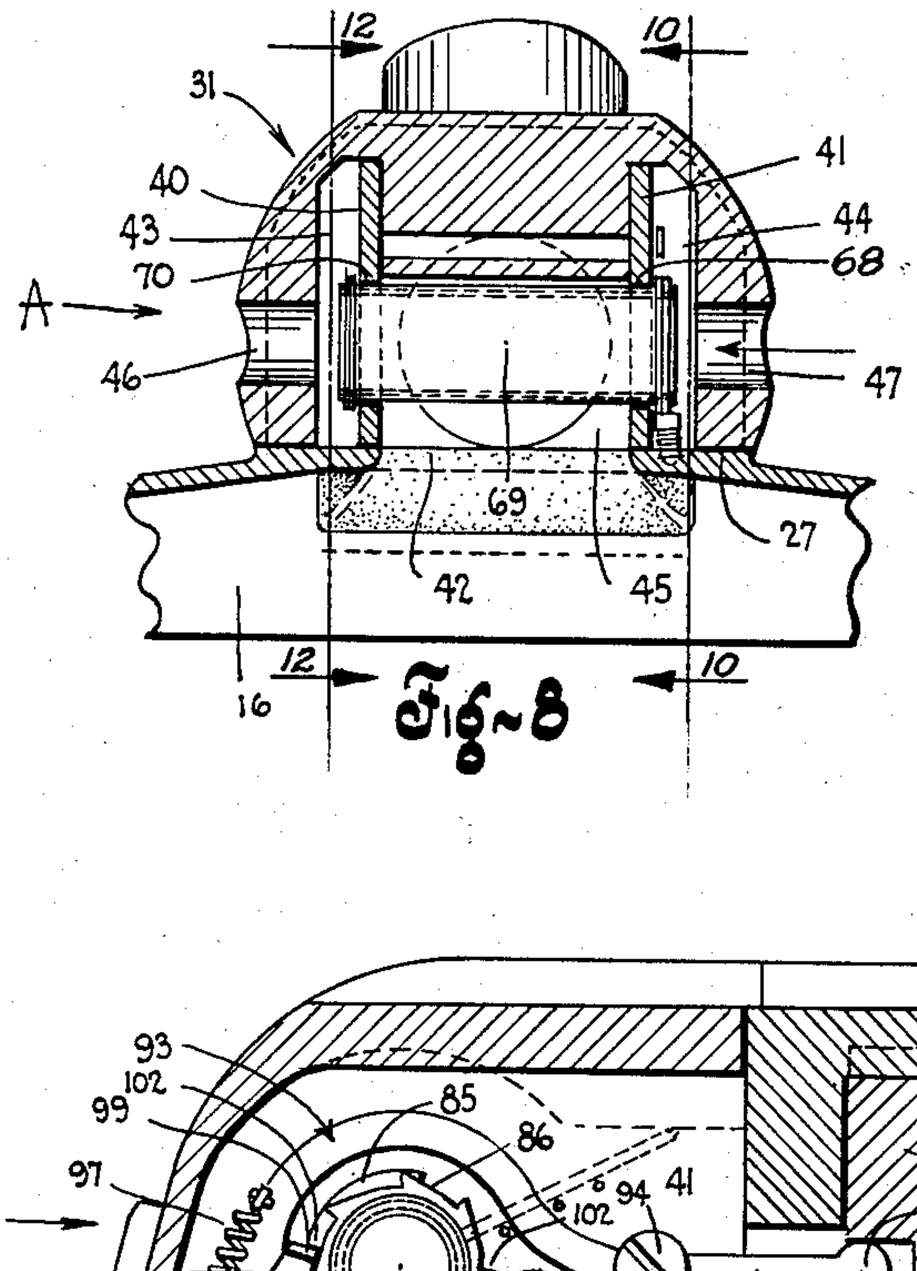

Fig-8

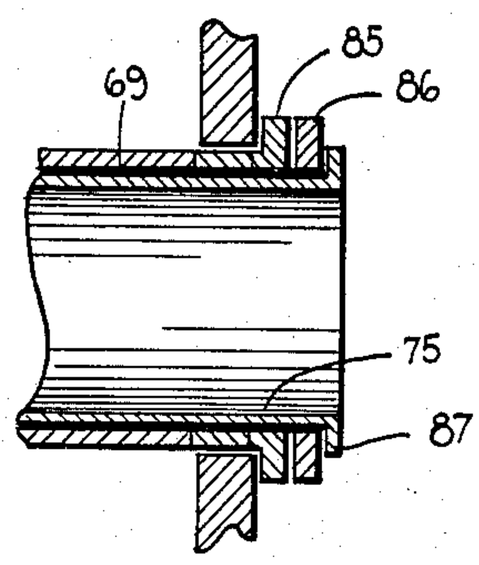

Fig-9

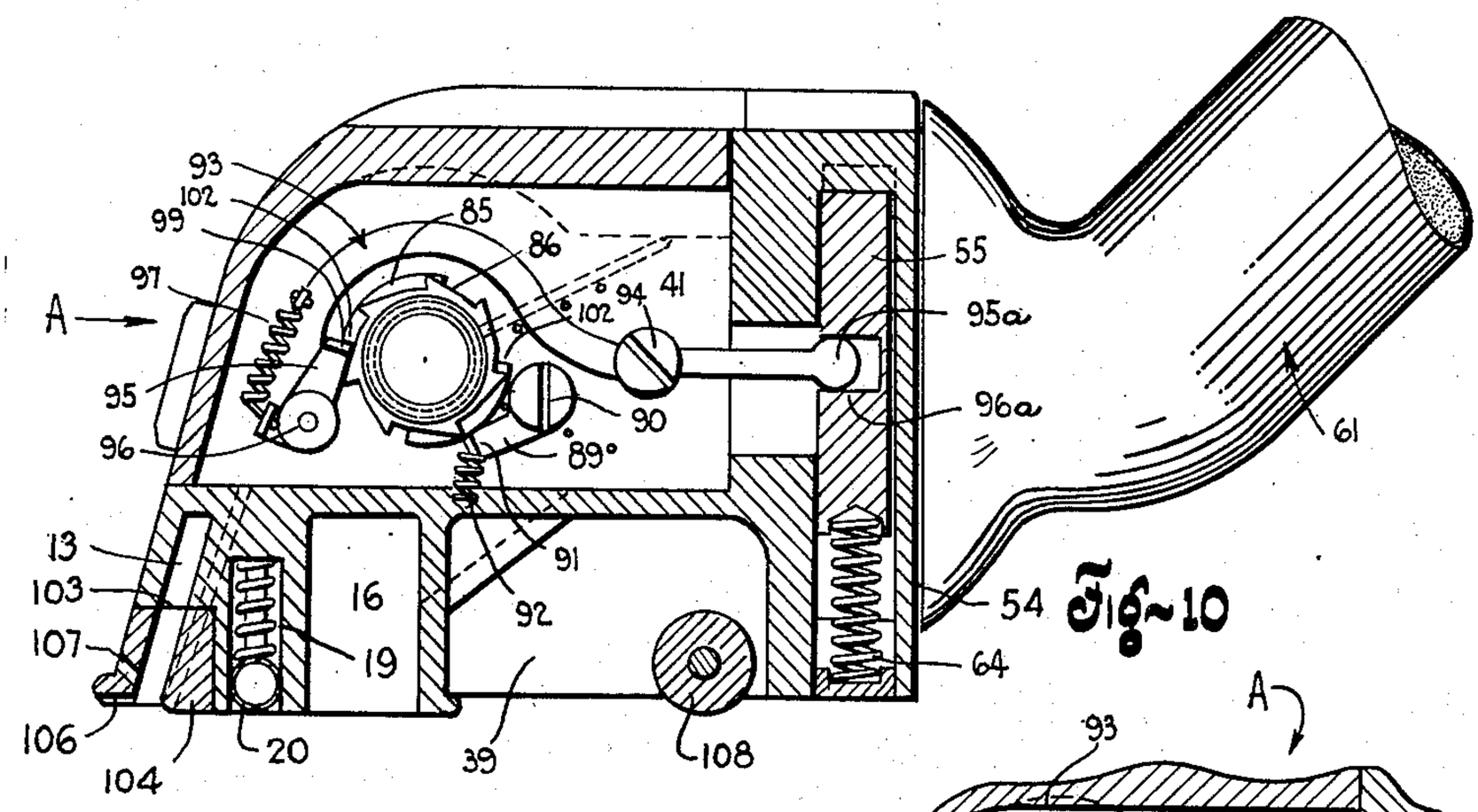

Fig-10

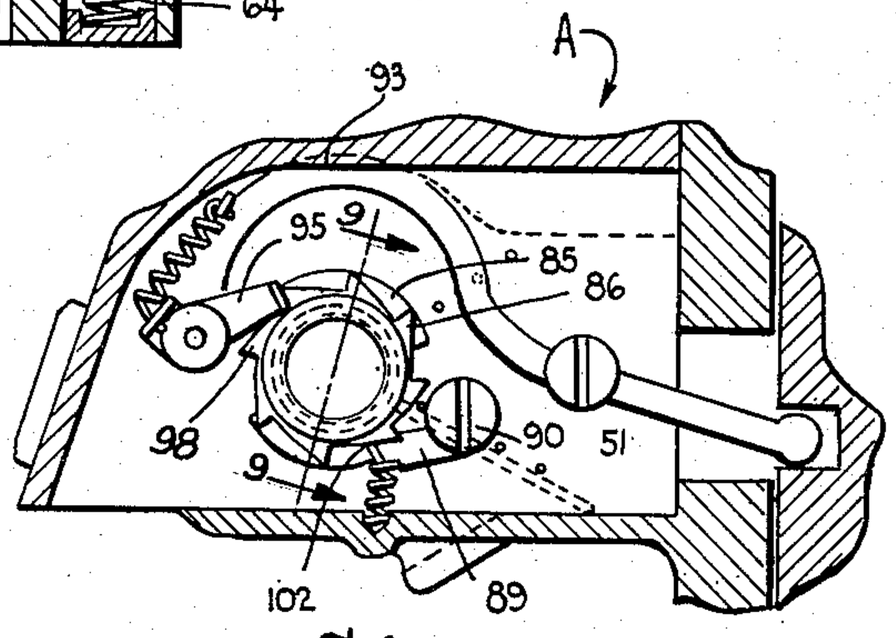

Fig-11

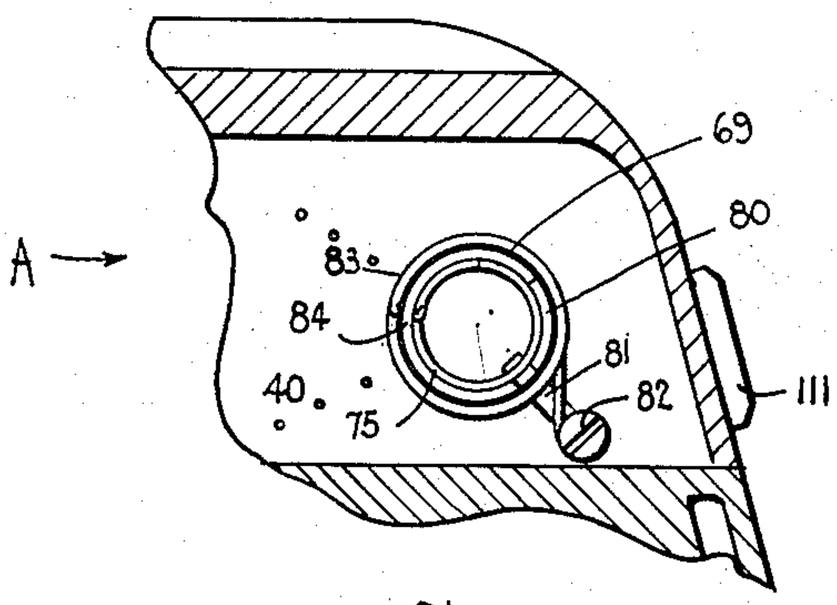

Fig-12

INVENTOR.
Thomas Wellington Ott
BY
Robert M. Dunning

Patented Nov. 17, 1953

2,659,099

UNITED STATES PATENT OFFICE

2,659,099

VACUUM CLEANER HEAD WITH HANDLE CONTROLLED VALVE

Thomas Wellington Ott, St. Paul, Minn.

Application August 21, 1947, Serial No. 769,835

7 Claims. (Cl. 15—416)

1

My invention relates to an improvement in handle controlled valve containing vacuum cleaner head wherein it is desired to provide a simple and effective head suitable for all cleaning purposes.

The object of the present invention is to provide a head for a vacuum cleaner which may provide variations in the velocity of air used for cleaning purposes. My head is provided with two slots in the undersurface thereof. One of these slots is several times the area of the other slot. Valve means is provided for selectively connecting either of the slots to the source of supply of partial vacuum. As a result the velocity at which the air will travel into the nozzle may be regulated.

A feature of the present invention lies in the provision of a vacuum cleaner head having an elongated base which is preferably slightly wider at its forward extremity than along its rear side. A relatively narrow slot extends along the base of the nozzle adjacent the forward edge thereof. This slot continues partially along the end edges of the base. A relatively larger slot is provided in the base of the head near the rear edge thereof, the ends of this larger slot extending along the end edges of the base toward the extremities of the smaller slot. As a result the two slots extend virtually along the entire periphery of the base.

A feature of the present invention lies in the provision of a vacuum cleaner head including a valve for selectively connecting either of a plurality of slots in the base with the source of supply of partial vacuum. This valve is controlled by movements of the handle so that in order to change position of the valve it is only necessary to properly manipulate the handle.

An added feature of the present invention lies in the provision of a vacuum cleaner head which is connected to a handle and which incorporates a valve. The handle is vertically reciprocable relative to the head and is normally biased upwardly. By exerting a downward pressure upon the handle, the position of the valve within the head may be changed.

An added feature of the present invention lies in the provision of a vacuum cleaner head incorporating a valve and a valve changing mechanism and in so designing this mechanism that the valve is moved to one extreme position by one actuation of the handle and moved into the other extreme position by a second actuation of the handle. As a result the valve remains in either extreme position until the valve moving mechanism is actuated.

2

A further feature of the present invention lies in the provision of a vacuum cleaner head having a plurality of channels in the base thereof and in the provision of a valve for selectively connecting any of these channels with the source of supply of partial vacuum. The valve is so designed that while the position of the valve is being changed, air may enter the vacuum cleaner head in such a manner as to clean the valve and valve seats. When the valve is in position to connect any of the base channels with the source of supply of partial vacuum, this auxiliary connection with the outer atmosphere is closed.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of my specification:

Figure 1 is a front elevational view of my suction head showing the construction thereof.

Figure 2 is a side elevational view of the same.

Figure 3 is a bottom plan view of my suction head showing the position of the channels therein.

Figure 4 is a sectional view through the head showing the arrangement of parts therein, the view being taken in the direction of line 4—4 of Figure 1.

Figure 5 is a sectional view of the portion of the head supporting the valve to show the valve in partially open position, the viewing direction corresponding to that of Figure 4.

Figure 6 is a view similar to Figure 4 showing the valve in its opposite extreme position.

Figure 7 is a view similar to Figure 6 showing the valve in slightly opened position.

Figure 8 is a sectional view transversely through the valve supporting members taken in the direction of line 8—8 of Figure 2.

Figure 9 is an enlarged detail view of one end of the valve supporting members taken in the direction of line 9—9 of Figure 11.

Figure 10 is a sectional view through one end of the head showing the valve actuating mechanism, the view being taken in the direction of line 10—10 of Figure 8.

Figure 11 is a view similar to Figure 10 showing the valve actuating mechanism in a second position.

Figure 12 is a sectional view through the end of the head opposite that shown in Figures 10 and 11, the view being taken in the direction of line 12—12 of Figure 8.

Figure 13 is a view of a detail of my device.

The vacuum cleaner head A is shaped exter-

nally as best illustrated in Figures 1, 2, and 3 of the drawings. The head A includes an elongated base 10 which is somewhat wider at its forward edge 11 than at its rear edge 12. The base 10 is provided with an elongated slot 13 extending parallel to the front edge 11 of the head throughout virtually the entire length thereof. The ends 14 of the slot 13 extend rearwardly for a short distance along the rearwardly tapering ends 15 of the base. A second slot 16 extends parallel to the rear edge 12 of the base 10 throughout most of the length thereof and is provided with forwardly extending extremities 17 which extend along the ends 15 of the base to a point spaced from but adjacent ends 14 of the slot 13. The slot 16 is several times the cross sectional area of the slot 13 as is evident in Figure 3 of the drawings.

A recess 19 is provided in the base 10 between the slots 13 and 16 and generally parallel thereto. A tubular member 20 is supported in the recess 19. The tubular member 20 is provided with angularly arranged slots 21 as best shown in Figure 13. A stud 22 is mounted upon each end of the tubular member and extends upwardly therefrom. A thumb nut 23 is provided on the upper extremity of the stud 22 and is provided with an integral sleeve 24. The tubular member is adjustably supported by the thumb nut 23 as will be noticed from an observation of Figure 1 of the drawings.

The vacuum cleaner head A includes an upwardly and inwardly tapering body 25 extending upwardly from the base 10. A generally rectangular rearwardly extending body portion 26 is integral with the body 25 and is centrally located with respect thereto. The tapering body 25 terminates along a horizontal plane 27 spaced above the flat undersurface of the base 10, this flat plate of separation of the casing extending to a point spaced from the rear wall 29 of the rectangularly rearwardly extending portion 26. The rear end of the head portion 26 extends upwardly the full height of the head along a casing separation line 30.

As will be obvious from Figures 1 and 2 of the drawings, a second casing section 31 is mounted upon the lower body portion 25 to fit on the upper surface 27 thereof and to fit against the vertical plane of separation 30. The casing or body portion 31 is provided with rounded sides 32, a flat undersurface to rest flush against the upper surface of the body portion 25, and a flat rear surface to fit against the casing portion 26 along the line of separation 30. The body portion 31 may be provided with a flat top 33 and a rounded forward end 34. The precise shape of the body portion 31 is not critical.

A pair of laterally extending ears or wings 34 are provided flush with the flat undersurface of the body portion 31. A pair of rounded projections or bosses 35 are provided on the tapered body 25 over which the ears 34 extend. The wings 34 are apertured as indicated in Figure 1 to accommodate the sleeve 24 of the thumb nut 23. The bosses 35 are likewise provided with apertures 36 therethrough coaxial with the sleeve 24. A spring 37 is interposed between each ear 34 and the top of the tube 20 tending to urge the tube downwardly. Thus by tightening the thumb nut 23 upon the stud 22, the tube 20 may be raised in position, compressing the spring 37. When the thumb nut 33 is loosened the spring 37 urges the tube 20 downwardly. Thus by operation of the thumb nuts 23 the elevation of the tube may be regulated.

In Figures 3 and 4 it will be noted that the base of the body portion 26 is recessed at 39 so as to decrease the weight of the head. The recess 23 does not communicate with the air outlet of the head and is closed except at its lower edge.

As illustrated in Figures 4 through 8 of the drawings the casing portion 31 is hollow so that air may be drawn therethrough. As illustrated in Figure 8 of the drawings the interior of the casing portion 31 is divided into three separate chambers by means of a pair of parallel partition walls 40 and 41. The partition walls 40 and 41 extend flush with the flat undersurface of the body portion 31 and rest upon the flat upper surface 27 of the body portion 25 on either side of the aperture 42 therein. A relatively narrow chamber 43 is provided between the partition wall 40 and the adjacent side of the body portion 31, while a similar narrow chamber 44 is provided between the partition wall 41 and the opposite side of the body portion 31. A central chamber 45 is provided between the partition walls 40 and 41, this central chamber being in communication with the slots 13 and 16. Aligned apertures 46 and 47 are provided through the sides of the casing portion 31 so that the chambers 43 and 44 are at all times in communication with the surrounding atmosphere.

The casing portion 31 is provided with a downwardly sloping projection 49 between the partition walls 40 and 41 to restrict the height of the chamber 45 near the rear vertical wall 50 of the casing portion 31. Thus a rectangularly shaped throat 51 is provided through which air may flow from either of the grooves 13 or 16, as will be later described.

A rectangular notch 52 is provided in the rear wall 53 of the casing portion 26 and oppositely disposed inwardly extending flanges 54 extend inwardly in opposed relation flush with the rear wall 53. A channel is thus provided for supporting a rectangular block 55 which is held in place by the flanges 54. A fixed block 56 closes the lower end of the slide thus formed, the block 56 being secured in place by any suitable means such as the screws or bolts 57. The rectangular block 55 is provided with a central aperture 59 therethrough to accommodate the reduced diameter end 60 of the air outlet tube 61. A flanged sealing ring 62 encircles the reduced diameter end 60 of the outlet pipe 61 to hold this outlet pipe connected to the block 55. The sealing ring 62 allows the outlet pipe end 60 to rotate within the apertured block 55. A skirt or flange 63 on the outlet pipe engages the rear wall 53 of the casing portion 26 to form a seal thereagainst. Springs 64 are recessed into the fixed block 56 and engage against the undersurface of the block 55 to urge the block upwardly. When in its upper position the end 60 of the outlet pipe 61 completely registers with a circular aperture 65 through the casing portion 26. The aperture 65 is in constant registry with the rectangular throat 51 of the casing portion 31.

As best illustrated in Figures 1 through 7 of the drawings the lower casing portion 25 includes an upwardly projecting partition 66 which terminates at its extremity in a semi-circular groove 67 having its axis transversely of the casing por-

tion 31. The semi-circular groove 67 is of proper internal diameter to fit snugly about the valve sleeve 69 which is rotatably supported by the partition walls 40 and 41. These partition walls are provided with aligned apertures 68 and 70 through which the ends of the valve sleeve 69 extend. A valve panel 71 is integral with the sleeve 69 and extends radially therefrom. The end of the panel 71 is oppositely tapered as indicated at 72 to fit against the projection 49 in one extreme position illustrated in Figure 4, and to fit snugly against the upper surface of the casing portion 25 in its other extreme position illustrated in Figure 6. In other words, the valve panel 71 is engageable with either the upper wall or the lower wall of the throat 51. As the valve panel 71 extends the full width of the chamber 45 between the partition walls 40 and 41, and as the projecting partition 66 also extends the full width of the chamber 45, the valve panel 71 selectively connects either the groove 13 or the groove 16 with the throat 51.

A series of openings 73 are provided through each of the partition walls 40 and 41 just below the valve panel 71 in raised position of this panel. As a result, air may be drawn into the chamber 45 through the partition walls 40 and 41, creating a stream of air just below the valve panel 71 when it is in engagement with the projection 49. A second series of openings 74 are provided through the partition walls 40 and 41 just above the level of the valve panel 71 in lowered position of the valve. The valve sleeve 69 is rotatably supported upon a fixed sleeve 75 which provides a support for the sleeve 69 and reinforces the same.

A spring 83 is anchored to the valve sleeve 69 at 84 and is anchored to the partition wall 40 at the bolt 82. Rotation of the sleeve 69 in a counter-clockwise direction will place tension upon the spring 83 and the spring 83 will tend to rotate the sleeve 69 in a clockwise direction as viewed in Figure 12.

A cam 85 is mounted upon the valve sleeve 69 to rotate therewith. A ratchet 86 is rotatably supported upon the projecting end of the fixed sleeve 75. A flange 87 is provided on the end of this fixed sleeve 75 to hold the ratchet wheel 86 in place. A ratchet 89 is pivotally supported at 90 to the partition wall 41. This ratchet is provided with a laterally extending end 91 which is of sufficient width to engage both the ratchet wheel 86 and the cam 85. A spring 92 urges the ratchet 89 against these rotative elements 85 and 86.

A lever arm 93 is pivotally supported at 94 to the partition wall 41. One end of the lever 93 is provided with a rounded extremity 95*a* designed to engage in a notch 96*a* in the square block 55. Thus as the block 55 reciprocates vertically the lever arm 93 will be oscillated about its pivot 94.

A dog or pawl 95 is pivotally connected at 96 to the free end of lever arm 93 and is urged in one rotative direction by a spring 97 connecting the pawl 95 with the lever arm 93. The pawl 95 is provided with a laterally extending end 99 which is of sufficient width to engage both the cam 85 and ratchet wheel 86. Thus upon oscillation of the lever arm 93 either the cam 85, the ratchet wheel 86, or both of these elements can be rotated.

The manner in which the various elements of the head are connected together is believed understood from the foregoing description. The

casing portion 31 is connected to the portion 25 by means of screws or bolts 100. The sealing ring 62 may be press fit onto the end 60 of the outlet pipe 61 to hold the outlet pipe assembled to the reciprocable block 55. The outlet pipe 61 is usually bent at 101 to incline upwardly and is designed for attachment to a hollow handle or conduit connected to a suitable source of supply of partial vacuum not illustrated in the drawings.

The operation of my vacuum cleaner head is simple and the position of the valve may be changed at any desired time. With the valve panel 71 in the position illustrated in Figure 4 of the drawings, the air enters the head through the relatively large groove 16 and accordingly travels at a relatively lower velocity. If it is desired to change the position of the valve 71, downward pressure is exerted upon the handle of the head which forms a continuation of the outlet 61. Downward pressure upon this outlet 61 tends to slide the block 55 downwardly, compressing the springs 64. This action moves the lever arm 93 from the position shown in Figure 10 of the drawings to the position shown in Figure 11 thereof. As the lever arm 93 begins its oscillation, the end 99 of the dog or pawl 95 is in engagement with a shoulder 102 on the cam 85. Oscillation of the lever arm 93 acts to rotate the cam 85 in a clockwise direction, thus swinging the valve panel 71 toward the lower wall of the throat 51. When the pawl 95 has traveled through a predetermined angular distance the pawl 95 engages the ratchet wheel 86, rotating this ratchet wheel until a tooth thereof is in position for engagement with the pawl 95 when the lever arm 93 returns to the position shown in Figure 10. In other words, with reference to Figure 11 of the drawings it will be seen that the pawl 95 has advanced the tooth 98 of the ratchet wheel 86 a distance sufficient so that this tooth 98 will be engaged by the pawl 95 upon return of the lever arm 93 to the position shown in Figure 10 of the drawings.

When the handle or outlet pipe 61 is in its lowermost position as indicated in Figure 11 of the drawings, the valve panel 71 is in contact with the lower surface of the throat 51. Furthermore, it will be noted that the ratchet 89 is in engagement with a shoulder 102 of the cam 85. Thus as downward pressure on the outlet tube 61 is removed the springs 64 slide the block 55 upwardly into the position shown in Figure 10. The valve sleeve 69 is prevented from returning to the position shown in Figure 10 by the ratchet 89 and its engagement with the cam 85.

Thus it will be seen that the valve panel 71 will remain in the position shown in Figure 6 of the drawings until means are provided to release the cam shoulder 102 from the ratchet 89. To effect this result downward pressure is again exerted upon the handle forming a continuation of the outlet tube 61. This action again moves the block 55 downwardly, compressing the springs 64. The lever arm 93 is again reciprocated in a clockwise direction. This time, however, the pawl 95 is in engagement with the tooth 98 of the ratchet wheel 86. Rotation of the ratchet wheel 86 about its center causes a tooth thereof to engage the end of the ratchet 89. This end 89 of the ratchet is gradually pivoted in a counter-clockwise direction about its pivot 90 until the end of the ratchet is disengaged from the shoulder 102 of the cam 85. As soon as the cam 85 is disengaged from the ratchet, it is immedi-

ately in position to be returned to its original starting position indicated in Figure 10 with a shoulder 102 of the cam engaging the pawl 95. The disengagement of the cam 85 causes the opposite shoulder to strike this ratchet 95, and downward movement of the handle may be terminated. Thus the spring 83 returns the valve panel 71 into engagement with the upper side of the throat 51.

The manner in which air is introduced into the head A during the time the position of the valve is being changed is an important feature of the operation of my device. As indicated in Figure 4 of the drawings when the valve panel 71 is raised, air may enter through the holes 73 and 74, causing cross currents of air which clean the dust and dirt from the walls of the chamber 45. Air through the holes 73 keeps the bottom of the valve panel 71 clean and blows the dirt from the upper surface as the panel moves downwardly. Air through the openings 74 blows dust off first the lower side and then the upper side of this panel 71 as it approaches its other extreme position.

In the formation of my suction head I prefer to make the nose portion of plastic, hard rubber, or the like. A notch 103 is provided extending transversely across the lower edge of the front of the suction head, and a strip 104 which is generally rectangular in section is secured therein. The slot 13 is formed through this strip 104, as well as through the body portion 10. The front edge 11 of the strip 104 forwardly of the passage 13 is raised above the level of the remainder of the bottom of the head. Laterally spaced notches 106 are provided in this strip edge 11. Apertures 107 extend angularly through the forward wall of the passage 13, terminating just above the lower end of the portion 105.

Passages 109 extend downwardly through the base portion of the head, extending through the strip 104. Three of these passages are provided on each side of the body. Each passage 109 terminates between the outer casing wall and the adjacent partition 40 or 41. The passages 109 terminate at their lower ends along the rear margin of the slot 13 at the lower end thereof.

Air is drawn inwardly through the spaced notches 106 and the alternate passages 107, causing cross currents of air tending to lift surface dust, hair, and the like into the passage 13. This action is assisted by air entering through the passages 109 and tending to lift the rear ends of particles of material over which the head travels. As a result the head is extremely efficient in removing surface particles from the rug being cleaned.

Passages 110 from each end of the recess 19 to the space between the casing wall and the partitions 40 and 41. These passages equalize air pressure in the recesses 19 and prevent the operation of the tubular member 20 from being affected by partial vacuum in this recess.

A manually operable valve 111 is provided in the casing portion 31 leading to the passage 13. From time to time it is found that the vacuum is so powerful as to draw light rugs against the undersurface of the head with sufficient pressure to make the head difficult to move. The force of vacuum may be reduced by manipulation of the valve 111. The valve 111 is rotatable about a pivot 112. Openings 113 therein are registerable with openings 114 in the body 31. Air may thus enter the passage 13 to lessen the force of vacuum at the mouth of this passage or slot.

In accordance with the patent statutes, I have described the principles of construction and operation of my vacuum cleaner head, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A vacuum cleaner head including a body having a nozzle inlet and an outlet, partition means dividing said inlet into two spaced inlets of different sizes, a valve adjacent said partition to selectively connect either of said two inlets to said outlet, means for holding said valve in either selected position, a handle connected to said outlet, vertically reciprcoable means connecting said handle to said body, and means connecting said vertically reciprocable means to said valve to actuate the same.

2. A vacuum cleaner including a pair of spaced inlets of different sizes and an outlet, a flap valve for selectively connecting either of said inlets to said outlet, said valve being movable between two extreme positions, oscillatable means associated with said valve for operating said valve in one direction, means for holding said valve in said one direction, spring means for moving said valve in the other direction, releasable means for releasing said valve holding means and reciprocable handle means for actuating said oscillatable means.

3. A vacuum cleaner including a body having a pair of spaced inlets of different sizes and an outlet, a valve selectively connecting either of said inlets to said outlet, said valve being pivotally movable between two extreme positions, pivotal lever means for pivoting said valve to one extreme position, a handle for actuating said lever means, spring means urging said valve toward its other extreme position, latch means for holding said valve in said one extreme position, and means actuated by said lever means for releasing said latch means.

4. A vacuum cleaner including a body having a pair of spaced inlets of different sizes and an outlet, a valve movable between two extreme positions to selectively connect either of said inlets to said outlet, lever means pivotally movable in one direction for pivoting said valve to one extreme position, a handle secured to said body and engageable with said lever means to operate the same, spring means for urging said valve in the other extreme position, latch means for holding said valve in said one extreme position, and means operable by movement of said lever in said one direction to release said latch means.

5. A vacuum cleaner head including a body having a pair of inlets of different sizes and an outlet, a valve movable between two extreme positions for selectively connecting either of said inlets to said outlet, means for holding said valve in either extreme position, a reciprocable block having an aperture therethrough in communication with said outlet, a tubular handle supported by said block, means normally urging said block in one extreme position, and lever means between said block and said valve for actuating said valve upon reciprocation of said block.

6. A vacuum cleaner head including a body having a pair of spaced inlets and an outlet, a valve selectively connecting either of said inlets to said outlet, a slot in the under surface of said body forming one of said inlets, spaced grooves in the lower surface of said body leading into

said slot and inclined passages through said body into said slot from the outer atmosphere, said inclined passages being on both sides of said slot.

7. A vacuum cleaner head including a body having a pair of inlets of different sizes and an outlet connected thereto, a valve having substantially parallel flat surfaces and being swingably movable between two extreme positions to selectively connect either of said inlets to said outlet, an air passage leading from the atmosphere through said head at a point spaced from the base thereof, said passage being located to direct air across first one surface of said valve and then the other as the valve swings, said air passage being adjacent to an edge of said valve to direct a cross flow of air against the same.

THOMAS WELLINGTON OTT.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
946,344	Gaudin	Jan. 11, 1910
1,081,744	Hubbard	Dec. 16, 1913
1,106,231	Marshall	Aug. 4, 1914
1,740,001	Carlstedt	Dec. 17, 1929
1,764,439	Fuhrmann	June 17, 1930
1,778,935	Cranmer	Oct. 21, 1930
1,860,854	Engberg	May 31, 1932
2,029,668	McCardle	Feb. 4, 1936
2,131,548	Barrner	Sept. 27, 1938
2,142,978	Eriksson-Jons	Jan. 3, 1939
2,268,699	Cotner	Jan. 6, 1942
2,274,560	Ott	Feb. 24, 1942
2,348,861	Smellie	May 16, 1944

FOREIGN PATENTS

Number	Country	Date
280,428	Great Britain	Nov. 17, 1927
581,172	Germany	July 22, 1933