Aug. 7, 1956 M. O. DECKER 2,757,406

APPARATUS FOR VACUUM-CLEANING UPHOLSTERY, CARPETS, ETC

Filed July 18, 1951 2 Sheets-Sheet 1

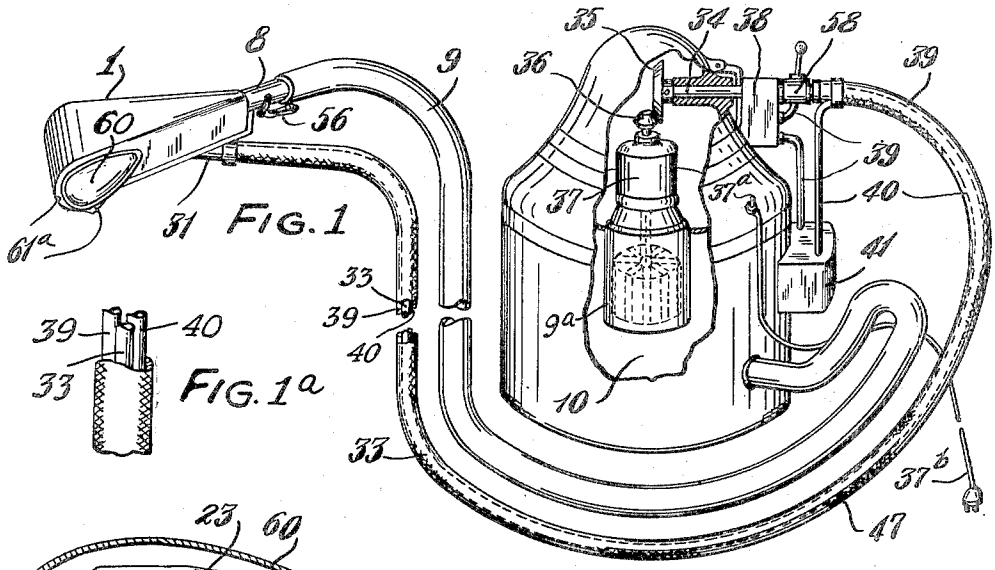


FIG. 1

FIG. 1a

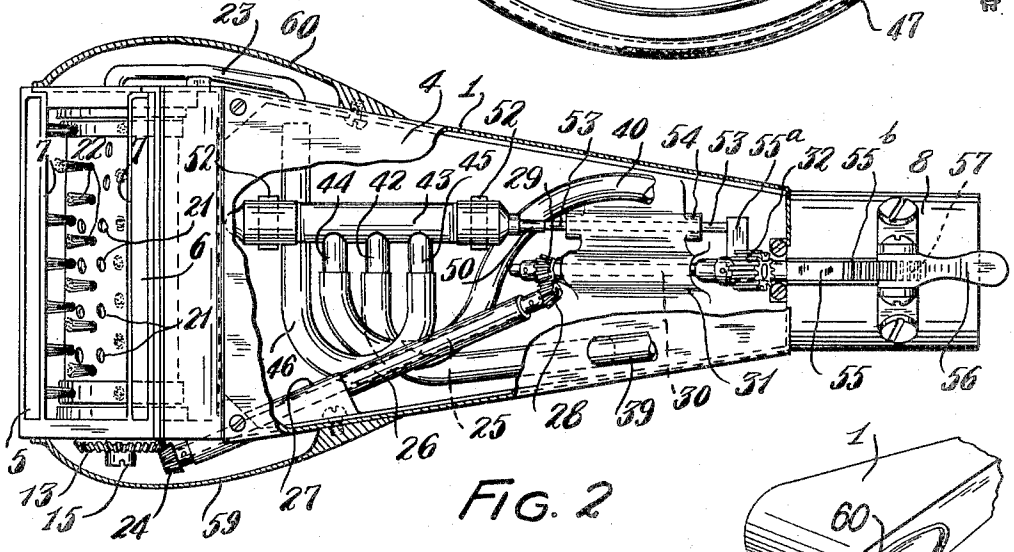


FIG. 2

FIG. 7

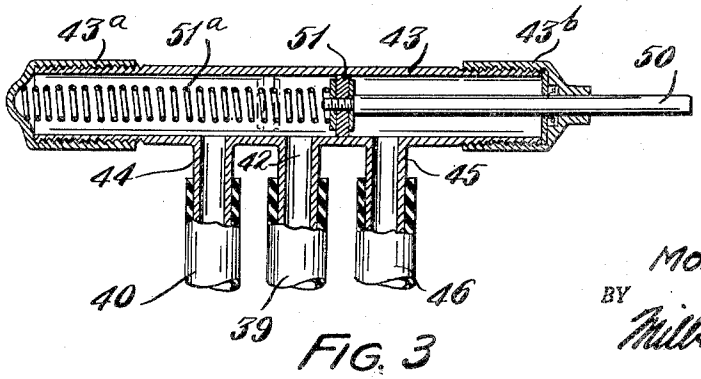


FIG. 3

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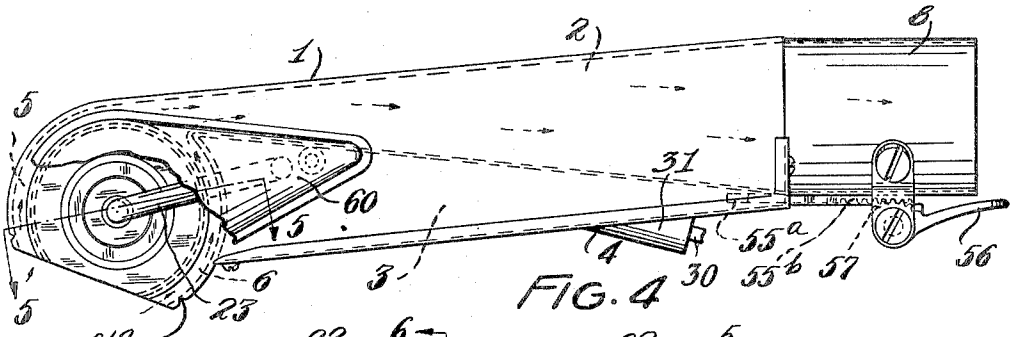


FIG. 4

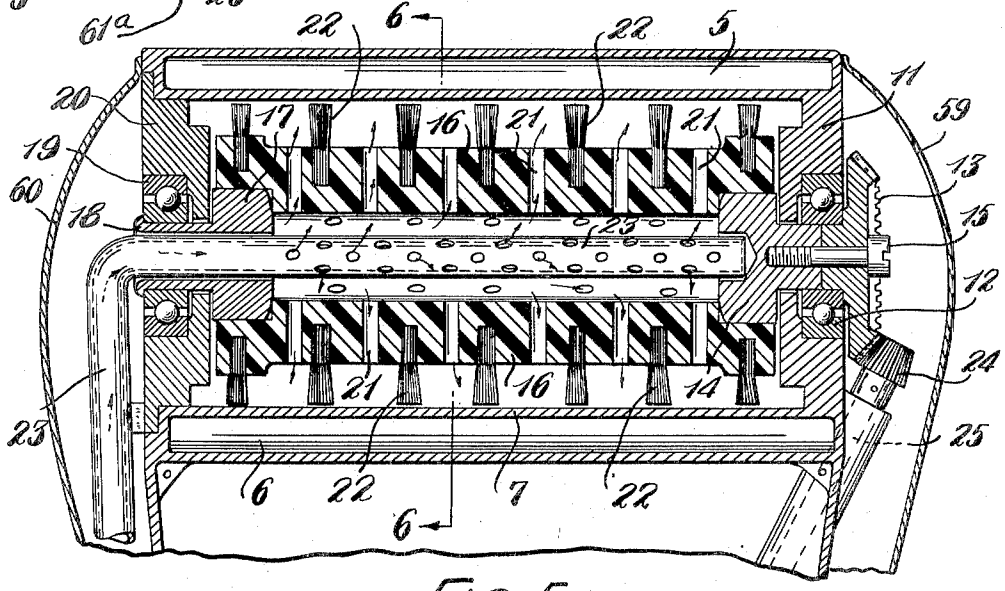


FIG. 5

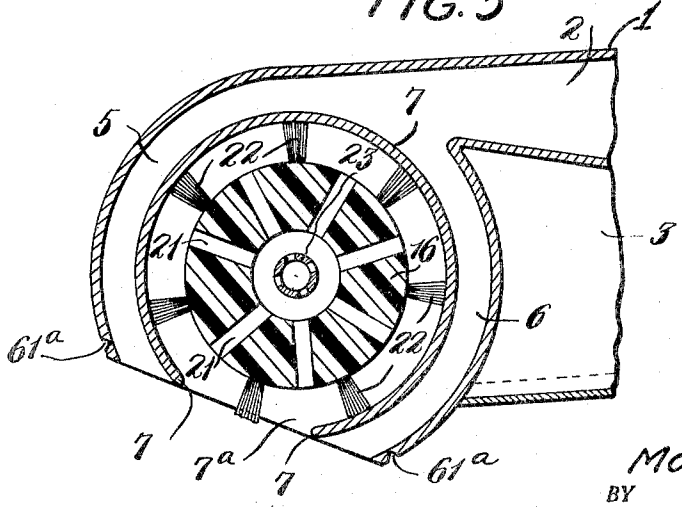


FIG. 6

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APPARATUS FOR VACUUM-CLEANING UPHOLSTERY, CARPETS, ETC.

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Application July 18, 1951, Serial No. 237,448

4 Claims. (Cl. 15—321)

This invention relates to the art of vacuum-cleaning apparatus and is adapted especially for cleaning furniture although it may be devised for cleaning carpets, rugs etc. as well.

One object of my present invention is to devise such an apparatus that is capable of performing in a most efficient and practical manner a vacuum-cleaning operation either with or without the application of a cleaning solution to the work.

Another object is to devise such an apparatus which is of compact form so as to be capable of convenient handling by the user.

Another object is to devise such an apparatus that may be built along most practical lines for access to all parts of the work to be cleaned.

Another object is to devise such an apparatus which may be operated for vacuum-cleaning either with or without a rotatable brush so as to permit the use of vacuum without the brush and without the use of the cleaning solution.

Other objects consist in the provision of the several constructions and arrangements of the operating parts of my present device as herein illustrated and described and with the various advantages as herein explained.

Other objects will appear from the following description and claims when considered together with the accompanying drawings.

Fig. 1 illustrates my complete assembly including the cleaning unit and the vacuum unit and the inter-connecting parts therebetween;

Fig. 1*a* is a partial enlarged view of Fig. 1;

Fig. 2 is an inverted plan view of the cleaning unit with the cover partly broken away so as to disclose the parts therewithin;

Fig. 3 is a longitudinal sectional view of the manifold for determining whether the cleaning solution is to be supplied to the rotatable brush;

Fig. 4 is a side elevation of the cleaning unit;

Fig. 5 is a longitudinal sectional view of the forward end of the cleaning unit, this view being taken through a plane corresponding to line 5—5 of Fig. 4;

Fig. 6 is a view taken on line 6—6 of Fig. 5; and

Fig. 7 illustrates the use of a slide closure that may be used whenever it is desired to restrict the extent of the inlet opening for cleaning a comparatively narrow piece of work.

Briefly, my present device includes a readily portable cleaning unit and a readily portable vacuum unit, each of which may be easily carried and manipulated by one hand during actual use. The cleaning unit comprises a rotatable brush with a vacuum passage rearwardly therefrom and a manifold by which there may or may not be delivered a cleaning solution to the brush and thence to the work from a reservoir included as part of the vacuum unit which houses a fan for creating the vacuum through a tube from the cleaning unit to a receptacle in the vacuum unit and which houses also a motor for

operating the fan as well as the brush and the pump for feeding the cleaning solution from its reservoir.

The cleaning unit has a casing 1 which is divided longitudinally into a vacuum passage 2 and a compartment 3, with a removable closure or cover 4, for housing the operating mechanism. The forward end of the vacuum passage 2 is divided into the circularly disposed portions 5 and 6 surrounding the inner cylindrical wall 7 which provides a chamber for the rotatable brush. The passages 5 and 6 open at their forward ends at points forwardly and rearwardly of the brush which is operatively arranged with respect to the opening 7*a* through the chamber wall 7 so as to be able to effectively engage the work that is to be cleaned. Such arrangement of the openings of the passages 5 and 6 with respect to the brush, ensures that all of the foreign matter will be removed after it has been released by the brush from the work. The vacuum passage 2 terminates at its rear end in a tubular form 8 for connection removably of a flexible tubing 9 for conveying and discharging the foreign matter into the vacuum chamber 10 in the lower part of the vacuum unit.

The cylindrical chamber 7 is provided at one end with the centrally apertured head 11 within which is set the ball bearing 12. Extending half-way through the ball bearing and meeting midway therewithin are the hub of the bevel gear 13 and the hub of the hexagonal member 14 which are secured together by the screw 15, the hub of the hexagonal member 14 having suitable clearance within the opening through the head 11 so as to permit rotation thereof with the gear 13. The hexagonal member 14 provides supporting engagement for the correspondingly formed one end of the hollow body 16 of the brush so as to be rotatable with the hexagonal member 14. The other end of the brush body 16 is also suitably formed for mounting engagement about the companion hexagonal member 17 which has a hub portion 18 extending through and mounted snugly within the ball bearing 19, the outer end of the hub portion being peened over for securing these parts in assembly as a unit. The hub portion of the hexagonal member 17 has suitable clearance within the central aperture of the head 20 within which the ball bearing 19 is mounted. The head 20, ball bearing 19 and hexagonal member 17 are removable as a unit from the end of the cylindrical chamber 7 so as to serve as a closure therefor as well as a means of support for the rotatable brush; and the head 20 may be provided with an annular marginal shoulder for secure frictional engagement in the correspondingly formed seat about the end of the cylindrical chamber 7. The hexagonal end openings of the brush are of the same size and thus the brush may be considered to be reversible, which means convenience in assembling the same.

The hollow body 16 of the rotatable brush is provided with radially disposed apertures 21 therethrough in alternating arrangement with respect to the bristles 22 thereof so as to be capable of delivering a cleaning solution from the interior of the hollow body 16 to the work to be cleaned and in the most effective manner with relation to the bristles. The cleaning solution may be supplied to the interior of the hollow body 16 of the brush by means of the perforated hollow tube 23 which extends with suitable clearance through the hexagonal member 17 and is freely supported at its end within a recess in the other hexagonal member 14 so as not to interfere with the rotation of the brush and the member 14 therewith.

Meshing with the bevel gear 13 there is the bevel pinion 24 on the shaft 25 which has a bearing sleeve 26 extending through and mounted in a bearing block 27 in the wall of the casing compartment 3. The rear end of shaft 25 has a bevel pinion 28 which meshes with the

bevel pinion **29** on the shaft **30** which extends through a bearing sleeve in a bearing block **31** provided within the casing compartment **3**. The shaft **30** has its rear end portion extending out through the removable cover **4** of the casing compartment **3** and has the spur gear **32** for driving engagement with a companion coupling member on the flexible shaft **33** which is connected to the rigid shaft **34** which, in turn, extends through the wall of the vacuum unit and has the bevel gear **35** meshing of the bevel pinion **36** on the shaft of the electric motor **37** within the upper part of the housing of the vacuum unit.

The shaft **34** serves also to operate a pump which is indicated in a general way by reference numeral **38** and which is located in circuit with the flexible supply line connection **39** and the flexible return line connection **40** of the solution reservoir **41**. This reservoir **41** may be mounted upon the vacuum housing so as to form a part of this unit. The supply line flexible tubing **39** is connected to the inlet tube **42** of the manifold **43** while the return line flexible tubing **40** is connected to the return tube **44** of the manifold **43**. The manifold **43** has also a tube connection **45** for the flexible tubing **46** leading to the tube **23**. The supply and return flexible tubings **39** and **40** extend through suitable openings in the cover **4** of the casing compartment **3** and may be enclosed within the same flexible casing **47** which encloses also the flexible shaft **33**.

The manifold **43** may be recognized as a self-contained unit, as indicated in Fig. 3 of the present drawings, and has a screw-threaded cap closure **43***a* at one end of this cylindrical body and the screw-threaded head **43***b* with suitable packing through which extends the rod **50** of the plunger valve **51** within the cylinder. This valve **51** is normally forced by the spring **51***a* to the position indicated by full lines in Fig. 3 of the present drawings so as to permit communication between the inlet tube **42** and the return tube **44**, whereby the cleaning solution may continue to be circulated through the circuit of the tubing and pump **38** but without passing through the tubing **46** and hence without being supplied to the rotating brush and the work to be cleaned. When the valve **51** occupies this position, there may be performed a dry vacuum-cleaning operation with the rotatable brush. Then, when it may be desired to apply the cleaning solution to the work, the plunger rod **50** will be forced inwardly so as to assume position indicated by dotted lines in Fig. 3 of the present drawings, thereby establishing communication between the supply or inlet tube **42** and the tubing **46**. That is to say, by manipulation of the valve **51** in such manner, the tube **40** may be cut out of communication with the inlet tube **39** which is then placed in communication with the tubing **46** to the brush and the work to be cleaned.

The manifold unit, illustrated in Fig. 3 of the present drawings, may be placed in position and supported in assembly by means of the resilient U-shaped clamps **52** within the casing compartment **3**; and, when in such assembled position, the rear end of the rod **50** will be in alignment with the rod **53** which is capable of longitudinal movement within its bearing **54** within the casing compartment **3**. The rear end of this rod **53** is adapted to be engaged by the L-shaped end **55***a* of the trigger **55** which is slidably mounted at the rear end of the casing compartment **3** and extends out beyond the same so as to be operated by means of the trigger arm **56** and its partial pinion **57** in meshing relation with the rack **55***b* provided upon the rear end of the trigger arm **55**. The arm **56** is pivotally mounted upon the tubular end **8** at the rear of the casing **1** and may be held by the same hand that holds and manipulates the cleaning unit **1**. In this way, the cleaning solution will be supplied to the brush and the work only so long as the cleaning unit **1** and the trigger arm **56** are being so grasped by the hand of the user; and, upon release of the trigger arm **56**, the spring **57***a* will automatically move the valve **51** to position for discontinuing the supply of the cleaning solution to the brush and to the work to be cleaned. Thus the supply of the cleaning solution to the brush and the work may be regulated according to the judgment of the user at any given time.

As above explained, it is possible to employ this device either with or without the application of the cleaning solution to the rotatable brush; that is to say, without the cleaning solution, the rotatable brush will engage the work to be cleaned and the foreign matter that is to be removed therefrom, will be drawn by vacuum rearwardly through the vacuum passage **2** to the tubing **3** and thence to the chamber **10**. Also, I have provided a clutch **58** by means of which the motor **37** may be disconnected from the shaft **33** when it may be desired to omit operation of the rotatable brush. That is to say, by disconnecting the clutch **58** and by manipulating the trigger arm **56**, only the fan **9***a* may be operated by the motor **37** so as to perform a vacuum cleaning operation without the brush. This manner of operation depends upon the particular arrangement of the vacuum passages **5** and **6** around the brush chamber **7**, whereby there is no obstruction to the passage of the foreign matter through the passages whether or not the brush be rotated. In the case of carpets and rugs to be cleaned, with the brush inactive, the casing **1** may be removed by disconnecting the tubing **9** from the nozzle **8** and then suspending the casing **1** upon a suitable hook upon the vacuum unit housing so as to be out of the way; and then there may be connected a conventional long-handle wand attachment to the nozzle **8**.

The casing **1** has the removable cap **59** to cover the gear **13** and the pinion **24**, and also the removable cap **60** to cover the tube **23**, so as to afford suitable protection to these parts which are located upon the outside of the casing.

In case it should be desired to clean a narrow arm or edge portion of a piece of furniture of less width than the distance between the mouth openings of the vacuum passages **5** and **6**, and in order to ensure that there will be obtained the benefit of the full force of suction through the passages **5** and **6**, I have provided a slidable closure **61** which may be applied to the desired extent along the slide grooves **61***a* at the forward end of the cleaning unit so as to leave exposed or open only as small a portion of the passages **5** and **6** as may be most suitable in any given case (see Fig. 7). Then, with this closure member so positioned, the exposed partial openings **5** and **6** may be applied to the narrow part of the work in a manner at ninety degrees to the regular position of the same so as to effectively apply the device longitudinally along the narrow part of the work to be cleaned.

As will be observed, the several operations in my present device are performed by the same single electric motor **37** which is provided with an electric cord **37***b* extending from the housing of the vacuum unit so that it may be plugged into an electric service socket in the usual manner; and there may be provided also an electric switch button **37***a* upon the housing of the vacuum unit so as to be readily accessible for turning on and off the electric current to the motor **37** as may be desired.

Thus I have devised an efficient form of apparatus that is capable of performing a vacuum-cleaning operation either with or without a cleaning solution; and, in case such solution be used, it is removed at once from the work so as to preclude any unduly wet or soggy condition of the work or any mildew therefrom. Neither are there any fumes or odor nor does the work retain any dampness as a result of using the cleaning solution, as the solution is removed immediately upon performance of the cleaning operation. Also, whenever desired, this device may be adapted to employ plain vacuum without using the rotatable brush or the entire cleaning unit

may be disconnected and a conventional long-handled attachment for carpets and rugs may be substituted. My device may be made of any desired size according to the class of work for which intended; and this device is so designed as to be capable of effectively reaching into the corner portions of the work to be cleaned and thereby perform a most thorough cleaning operation, it being possible also to restrict the extent of the vacuum passages 5 and 6 for especially narrow parts of the work. This device may be conveniently handled and operated by the user and it is well adapted to be constructed in an attractive form. When the cleaning solution is employed, it might be said that there is performed a shampoo operation upon the work to be cleaned, as will be understood by those who are familiar with the class of art to which the present invention relates.

It is to be understood that the present form of disclosure is merely for the sake of illustration and that there might be devised various modifications thereof without departing from the spirit of my invention as herein set forth and claimed.

What I claim is:

1. In a vacuum cleaner, a casing having a discharge opening at the rear end thereof, a brush rotatably mounted within said casing at the forward end thereof for operative engagement with the work to be cleaned, said casing having enclosed passages surrounding said brush and terminating forwardly and rearwardly thereof and adjacent thereto and communicating with said discharge opening for discharging the foreign matter from the work, suction means for effecting such discharge, said casing having a supply connection and a return connection for a cleaning fluid, a connection for supplying fluid through said supply connection to said brush, a cylindrical manifold located within said casing and having said supply and return connections and said fluid connection to said brush connected thereto at spaced points therealong and with said supply connection thereto located between said other points of connection, a reciprocatable plunger valve in said manifold and movable to positions upon opposite sides of said supply connection so as to determine whether said supply connection be connected to said brush connection or to said return connection, spring means normally tending to position said plunger valve between said supply and return connections, and a hand lever for manipulating said plunger valve.

2. In a vacuum cleaner, a casing having a discharge opening at the rear end thereof, a transversely disposed brush rotatably mounted within said casing at the forward end thereof for operative engagement with the work to be cleaned, said casing having enclosed passages surrounding said brush and terminating forwardly and rearwardly thereof and adjacent thereto and communicating with said discharge opening for discharging the foreign matter from the work, suction means for effecting such discharge, said brush having a radially perforated hollow body for supplying cleaning fluid to the work and with one end of said body open, said casing having a supply connection and a return connection for the cleaning fluid, a connection for supplying fluid through said supply connection to said open end of said brush body, a cylindrical manifold located within said casing and having said supply and return connections and said fluid connection to said brush connected thereto at spaced points therealong and with said supply connection thereto located between said other points of connection, a reciprocatable plunger valve in said manifold and movable to positions upon opposite sides of said supply connection so as to connect said supply connection to either said brush connection or said return connection, spring

means normally tending to position said plunger valve between said supply and return connections, a hand lever mounted upon said casing for manipulating said plunger valve, and operating means located within said casing and at the other end of said brush body for effecting rotation of the same.

3. In a vacuum cleaner, a portable casing divided longitudinally into a compartment and an enclosed passage, a removable cover for said compartment, said enclosed passage at its forward end having circularly diverging portions opening so as to enclose a cylindrical chamber with a forward opening between the ends of said circular portions of said passage, a brush rotatably mounted in said chamber so as to assume an operative position extending partially through said opening and adjacent the openings of said diverging portions and with respect to the work to be cleaned, said passage having a discharge opening at the rear end thereof and at the rear end of said casing, suction means for effecting such discharge, said casing having a supply connection and a return connection for a cleaning fluid, a connection for supplying fluid through said supply connection to one end of said brush, said supply connection and return connection having valve means located within said compartment for determining the flow of the fluid either through the connection to said brush or through said return connection, and operating means located within said compartment and connected to the other end of said brush for rotating the same.

4. In a vacuum cleaner, a casing, a transversely disposed brush rotatably mounted at the forward end of said casing for operative engagement with the work to be cleaned, said casing having enclosed passages surrounding said brush and opening at opposite points thereof and adjacent thereto and having a discharge opening communicating with said passages for discharging the foreign matter from the work, suction means for effecting such discharge, said brush having a radially perforated hollow body for supplying cleaning fluid to the work and with one end of said body open, said casing having a supply connection and a return connection for a cleaning fluid, a manifold located within said casing and having said supply and return conncetions connected thereto and having tubular connection therefrom and terminating in a perforated portion extending co-axially within one end of said hollow body, a valve in said manifold for connecting said supply connection to either said perforated end portion or to said return connection, and operating means located within said casing and at the other end of said brsuh body for effecting rotation thereof.

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