April 12, 1932. B. KERN 1,854,042

VACUUM CLEANING MACHINE

Filed Feb. 20, 1926 5 Sheets-Sheet 1

Fig. 1.

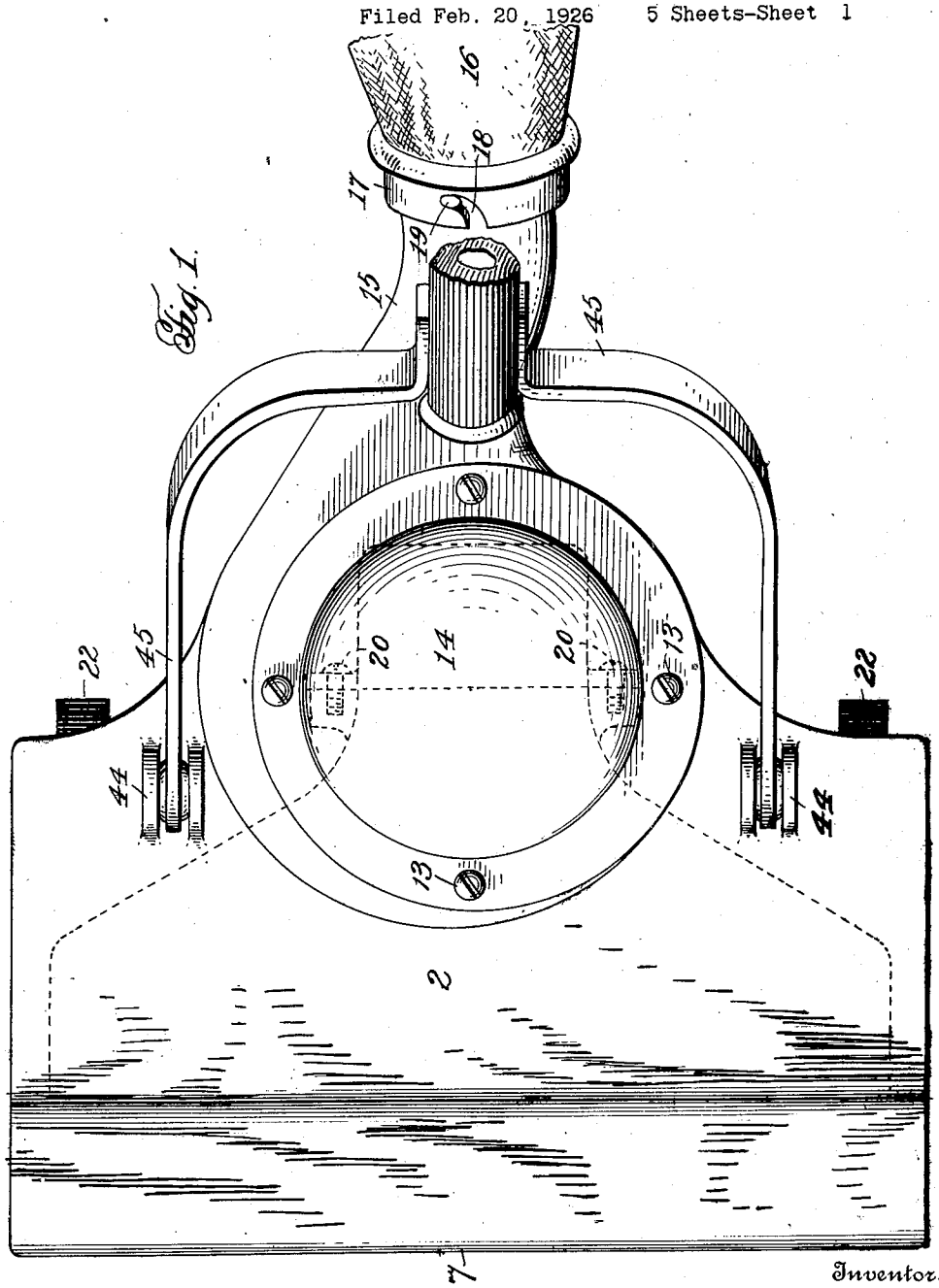

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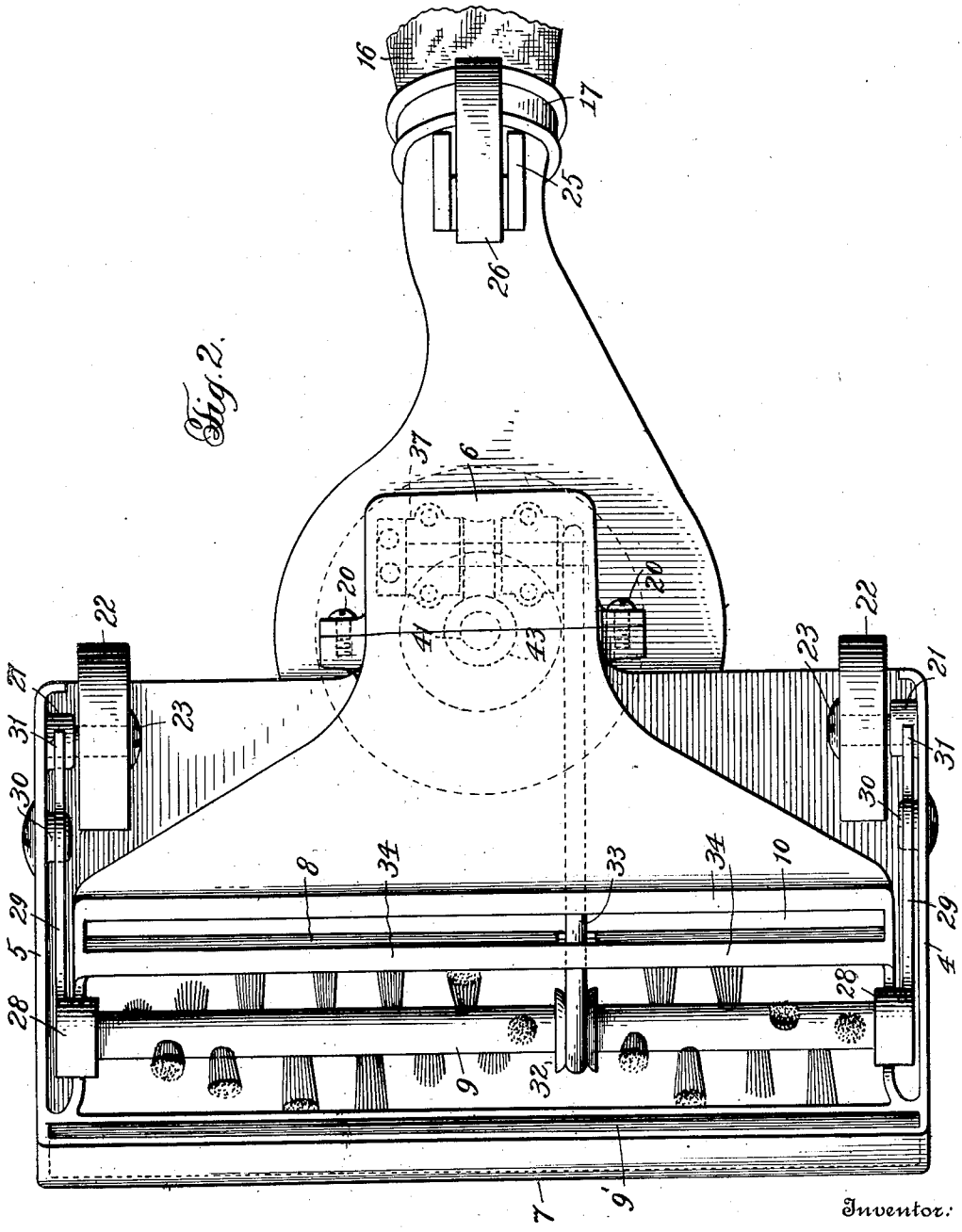
Fig. 2.



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VACUUM CLEANING MACHINE

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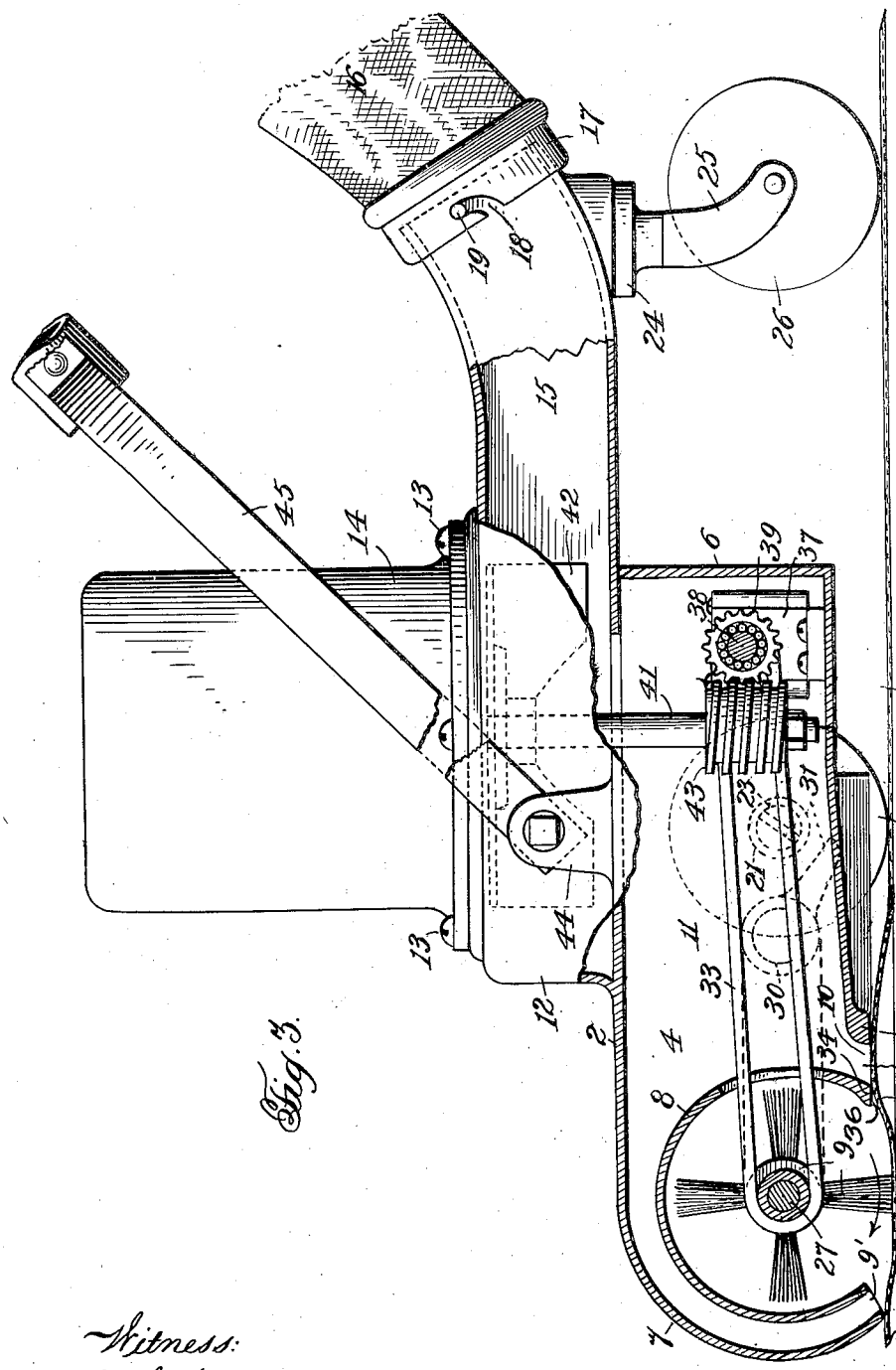

Fig. 3.

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VACUUM CLEANING MACHINE

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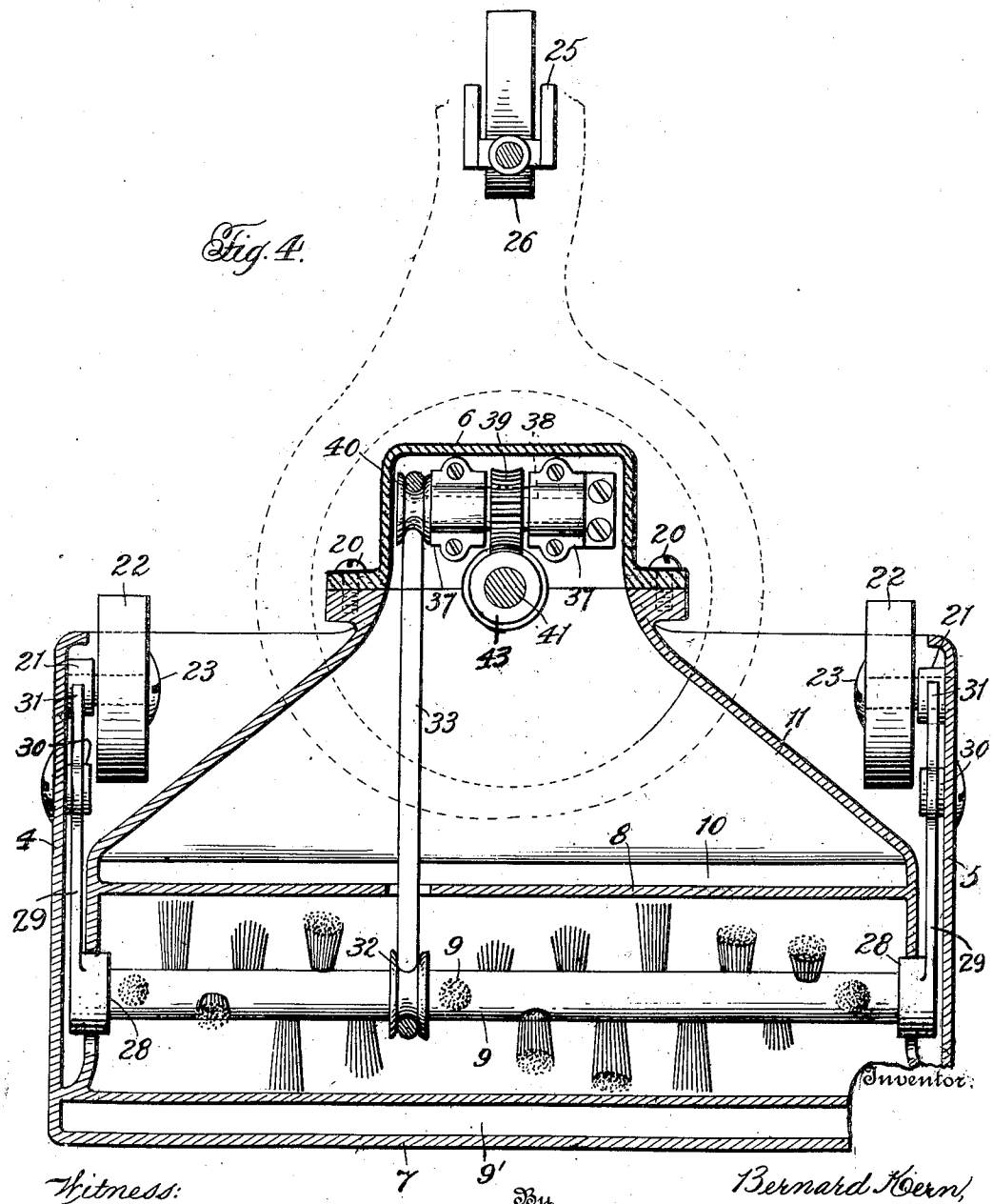
Fig. 4.



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VACUUM CLEANING MACHINE

Filed Feb. 20, 1926 5 Sheets-Sheet 5

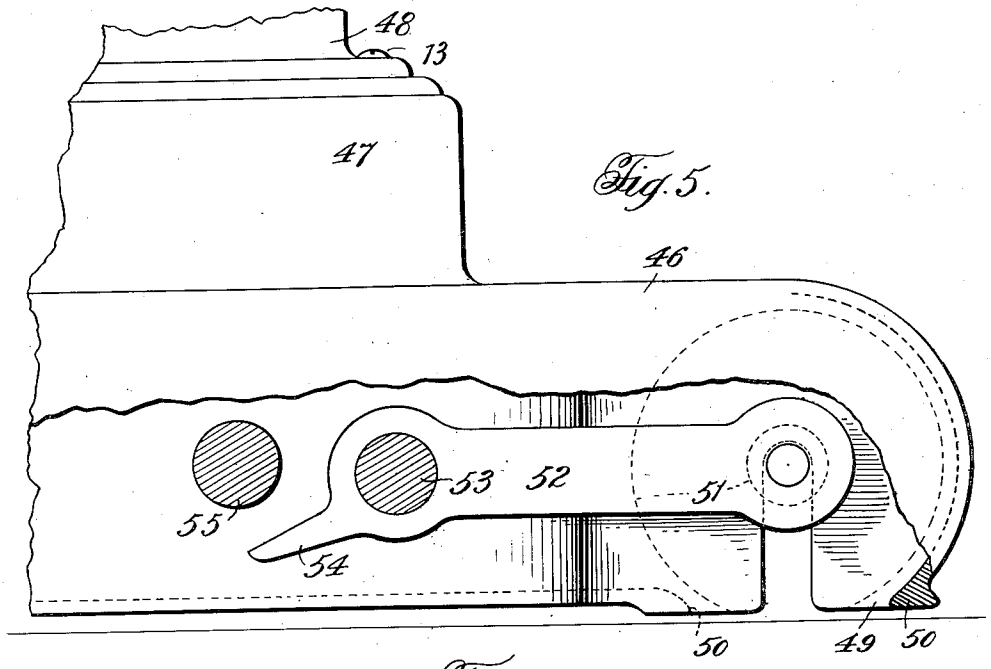

Fig. 5.

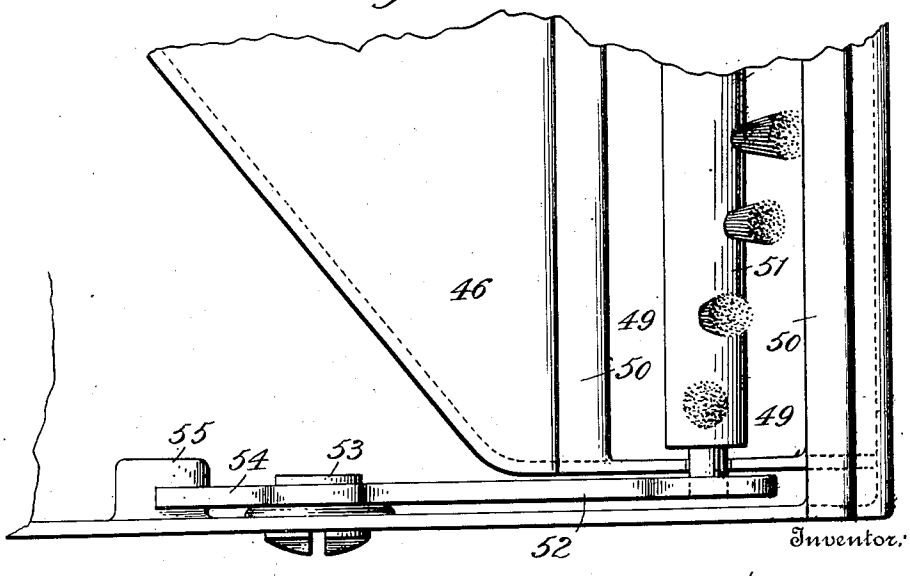

Fig. 6.

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Patented Apr. 12, 1932 1,854,042

UNITED STATES PATENT OFFICE

BERNARD KERN, OF SYRACUSE, NEW YORK

VACUUM CLEANING MACHINE

Application filed February 20, 1926. Serial No. 89,647.

My invention relates to new and useful improvements in vacuum cleaners and has for its principal object the provision of a cleaner of this character which is relatively simple and inexpensive in construction, which is relatively light so that it may be easily carried from place to place, and which is so constructed as to efficiently gather the dirt from a floor or other object to be cleaned.

Another object of the invention consists in providing a cleaner of the character described with a rotatable brush and so mounting the brush that it may be adjusted to compensate for wear, the brush being pivotally connected within the nozzle chamber or housing whereby it will fall by gravity to contact with the surface being cleaned at all times.

A further object resides in forming a lip on each side of the nozzle opening for reducing the velocity of the air by friction.

With the above and other objects in view, which will appear as the description proceeds, my invention consists in the novel details of construction, and arrangement of parts, described in the following specification and illustrated in the accompanying drawings, and while I have illustrated and described the preferred embodiments of the invention, as they now appear to me, it will be understood that such changes may be made as will fall within the scope of the appended claims.

In the drawings:—

Fig. 1 is a top plan.

Fig. 2 is a bottom plan.

Fig. 3 is a side elevation with parts shown in section.

Fig. 4 is a horizontal section with parts shown in plan.

Fig. 5 is a side elevation, with parts shown in section, of a slightly modified form of the invention; and

Fig. 6 is a fragmental bottom plan of the construction shown in Fig. 5.

In the drawings 1 indicates the base or nozzle housing or casing which consists of the top 2, the bottom 3, the sides 4 and 5, the rear wall 6, and the arcuate shaped front wall 7. Formed within the housing or casing is a substantially circular wall or partition 8 which forms a housing for a rotatable brush 9 and forms between the front wall 7 and the end of the bottom 3 the two nozzle passages shown at 9′ and 10, each of the passages 9′ and 10 communicating with the passage 11, at the top of the housing or casing 1. The rear end of the passage 11 communicates with the fan casing 12, formed on or secured to the top of the housing or casing 1 and secured to the top of the fan casing 12 by the screws 13 or similar fastening means is a motor housing 14 in which is supported an electric motor not shown. Extending from and communicating with the fan casing 12 is the extension or outlet 15 to which will be secured the dust bag 16. Secured to the lower end of the dust bag 16 is the metal thimble or sleeve 17 having the bayonette slot 18 to receive the lug or pin 19 secured to or formed on the extension or outlet 15. The rear portion of the housing or casing 1 is preferably detachable, for a purpose which will be presently described, and this rear portion is secured to the main portion by means of the screws 20 or similar fastenings.

Formed on the inner face of each of the side walls 4 and 5, adjacent the rear end, is an interiorly threaded lug or boss 21 to which the supporting wheels 22 are adapted to be rotatably connected by means of the screws, bolts, or similar means 23. Secured to the under side of the extension or outlet passage 15 is a plate or bearing 24 to which is swiveled the fork 25 carrying the wheel or casting 26.

The brush 9, previously described, is carried upon the horizontal shaft 27 which is supported at each end in the bearings 28, the bearings being carried by the arms or links 29 which are pivoted at their rear ends to the sides of the housing or casing by means of the studs 30. While balls are not shown the bearings are preferably ball bearings. An extension 31 is formed on the rear end of each of the arms or links 29 and are so positioned that when the forward ends of the arms or links, carrying the brush, are lowered to the desired degree they will engage the lugs or bosses 21 and thereby prevent further downward movement. As shown in the drawings the brush 9 is of such a diameter as to contact with the surface to be cleaned between

the nozzle passages 9' and 10. A pulley 32 is secured to the brush shaft 27, intermediate the ends thereof, to receive the driving belt 33 which is operated in a manner to be later described.

Formed on each side of the nozzle passage 10 is a lip 34 of sufficient width that when the cleaner is in use for cleaning a carpet 35 or the like the carpet will be drawn up by the air into contact with the passage as shown more particularly in Fig. 3 of the drawings but will not contact with the entire under surfaces of the lips, leaving a passage 36 between the carpet or other member and the under surface of the lips so that air may pass therebetween. These lips being formed and operating as described reduce the velocity of the air by friction. This is done by drawing the air, or forcing the air to travel, between the lips and the carpet or other member being cleaned and then working through the pile of the carpet and into the nozzle passage. It will be noted, as previously stated, that the carpet or other member is drawn up to the nozzle passage and leaves a slight opening or space on each side. In reducing the velocity of the air it is not reduced sufficiently to impair the efficiency because it allows for a larger volume of air to pass through the nap of the carpet or rug which means that a larger amount of dust is extracted from the carpet or rug.

Secured within the rear portion of the housing or casing 1 are the bearings 37 which support the countershaft 38, intermediate the ends of which is secured the worm gear 39. Secured to one end of the counter shaft 38 is the pulley 40 around which operates the belt 33. As has been previously stated an electric motor, not shown, is operable in the motor housing 14 and secured to and operated by the motor is the depending shaft 41 to which is secured the fan 42 adapted to operate in the fan casing 12. Adjacent the lower end of the shaft 41 is secured the worm 43 adapted to mesh with the worm gear 39.

Formed on or secured to the top 2 of the housing or casing 1 are the transversely spaced pairs of lugs or ears 44 to which is pivotally connected the handle 45.

From the above detail description it is thought that the construction and operation will be understood. The rotation of the shaft 41 by the motor rotates the countershaft 38 through means of the worm 43 and worm gear 39. The belt 33 is operated from the pulley 40 on the countershaft and in turn rotates the brush 9 in the direction of the arrow Fig. 3. The brush loosens the litter on the surface to be cleaned and throws it towards the nozzle passage 9 through which it is drawn by suction created by the fan 42. The dust will be drawn out of the nap of the carpet or rug into the nozzle passage 10 by the suction of the fan 42 and all dust and litter is discharged by the fan through the extension or outlet 15 into the dust bag 16. The greatest suction will be at the nozzle passage 10 because the flow of air will follow the course of least resistance. The carpet or rug being cleaned will be drawn into contact with the nozzle passage 10 in the manner which has been previously described. By mounting the brush as I have shown and described it is not necessary that the carpet or rug be raised by suction to contact with the brush. Instead the brush falls by gravity and is in contact with the surface being cleaned at all times. As the brush wears it is allowed to drop a little further to remain at all times in contact with the surface being cleaned but the downward movement is limited when the extension 31 engages with the stud or boss 21. When the extension thus engages the stud or boss the brush has been worn to such an extent that it should be replaced. The cleaner may be moved over the surface to be cleaned by the handle 45 and the entire device is of such a weight that it may be easily pushed over the surface or may be raised and carried from place to place. The dust bag 16 is detachably connected to the extension or outlet 15 by means of the sleeve 17 engaging with the pin or projection 19.

In Figs. 5 and 6 of the drawings I have illustrated a slightly modified form of the invention wherein but a single nozzle passage or inlet is formed. In this form of the invention the base or nozzle housing or casing is shown at 46, the fan casing at 47, and the motor housing at 48. At the forward end of the housing or casing 46 is formed the nozzle passage 49 on each side of which is formed a lip 50 for the same purpose as pointed out for the preferred form of the invention. Rotatably mounted in the housing or casing 46, above the nozzle passage 49, is the brush 51, said brush being carried by the outer ends of the arms or links 52 which are pivotally connected to the studs 53. An extension 54 is formed on each of the arms or links 52 for the same purpose as described for the preferred embodiment of the invention and are adapted to engage a lug or stud 55. The brush is rotated in the same manner as described for the preferred form of the invention and all dust and litter enters the nozzle passage 49 and is drawn rearwardly by means of the fan operating in the fan casing 47. The dust or litter is discharged into the dust bag 16. In this modified form of the invention the brush will always contact with the carpet, rug or other surface being cleaned and as the bristles of the brush wear away the brush will drop by gravity. The carpet or rug will be drawn up on either side of the brush, by suction, into contact with the nozzle and with the space left between the surface

of the lips and the rug or carpet for the purpose previously described.

It will be appreciated that my improved form of machine will be adapted for use on wooden or like floors as well as on carpets, rugs or the like, and may both clean and polish such floors. At times where rugs or the like do not entirely cover a floor surface it is necessary that both the rug surface and the floor surface be cleaned and my machine will allow this to be done. The rotation of the brush will not only clean a floor but will polish the same and as the brush rotates at a relatively low speed the floor will not be injured.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. A vacuum cleaner having spaced air inlet passages with a brush housing formed therebetween, a brush rotatably mounted within the housing, the lower opening of one of said passages being directed towards the lower portion of the brush to receive the sweepings therefrom and the surfaces on opposite sides of the lower opening of the other passage being substantially horizontal to be engaged by the article being cleaned, and means for rotating the brush so that its lower portion moves toward the lower opening of the first mentioned passage.

2. A vacuum cleaner having spaced air inlet passages with a brush housing formed therebetween, a brush rotatably mounted within the housing, the lower opening of one of said passages being directed towards the lower portion of the brush to receive the sweepings therefrom, wide substantially horizontal lips formed on opposite sides of the lower opening of the other passage and extending longitudinally thereof, portions of the lips being adapted to be engaged by the article being cleaned, and means for rotating the brush so that its lower portion moves toward the lower opening of the first mentioned passage.

3. A vacuum cleaner including a casing having an air passage therein, arms pivotally connected to the interior of the casing, a brush carried by the arms on one side of the pivots, a rearwardly directed extension formed on each of the arms on the opposite side of the pivots, projections extending inwardly of the casing in position to overlie the extensions, said projections allowing normal pivotal movement of the arms but adapted to be engaged to limit downward swinging movement thereof, and means for rotating the brush.

4. A vacuum cleaner including a casing having an air passage therein, arms pivotally connected to the casing, a brush carried by the arms on one side of the pivot, a rearwardly directed extension formed on each of the arms on the opposite side of the pivot, means extending inwardly of the casing and positioned relative to the extensions of the arms to be engaged thereby for limiting the pivotal movement of the arms, and means for rotating the brush.

In testimony whereof I hereunto affix my signature.

BERNARD KERN.