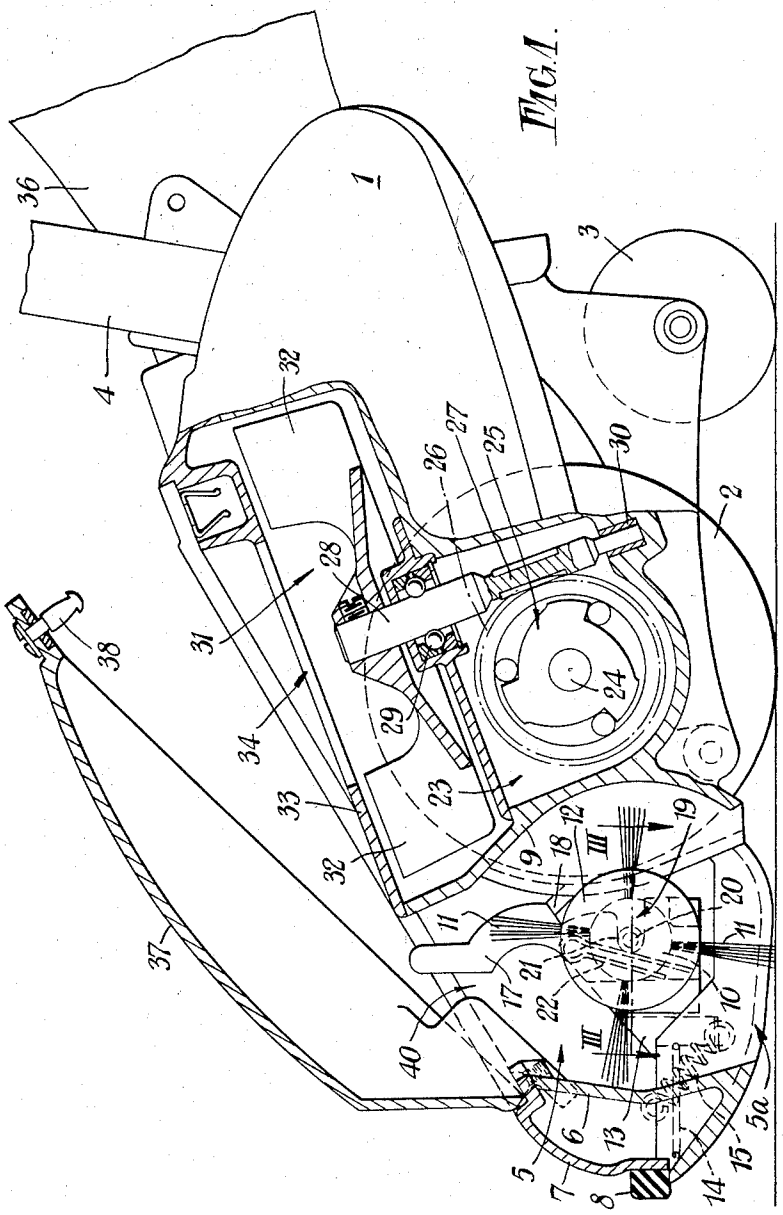
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NON-ELECTRIC VACUUM CLEANING MACHINES

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FIG. 1.

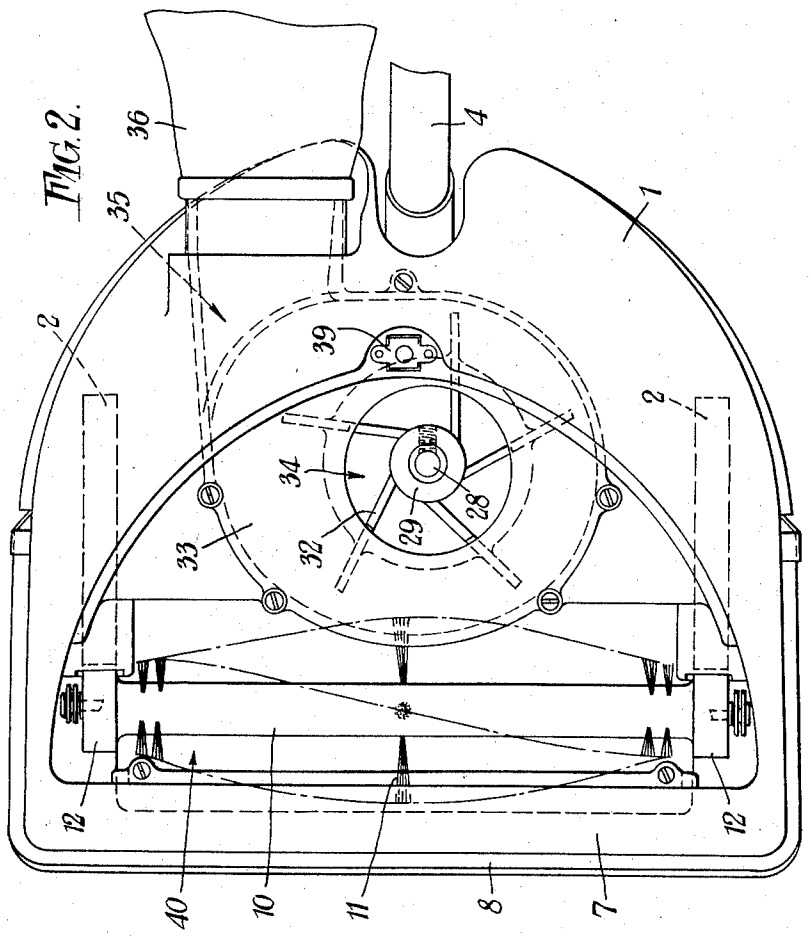


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FIG. 2.



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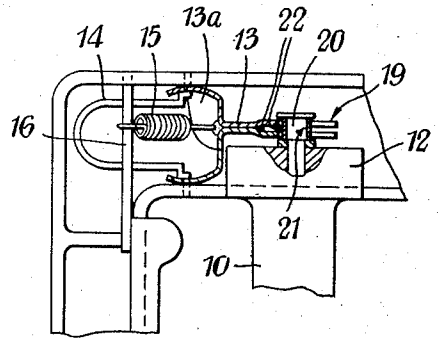


FIG. 3

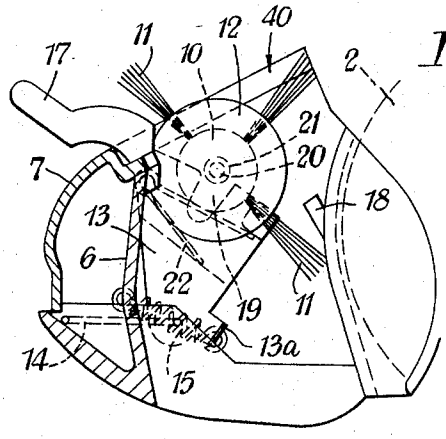


FIG. 4

United States Patent Office 2,910,721 Patented Nov. 3, 1959

2,910,721

NON-ELECTRIC VACUUM CLEANING MACHINES

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Application December 5, 1956, Serial No. 626,408

Claims priority, application Great Britain December 15, 1955

2 Claims. (Cl. 15—342)

This invention relates to floor wheel driven vacuum cleaning machines of the kind having a wheeled casing containing a fan chamber with suction and blowing ports and a transverse downwardly opening front nozzle which communicates with the suction port of the fan chamber and carries a driven rotary brush.

A main object of the invention is to improve the general efficiency of such machines especially in dealing with heavier particles of litter and dirt such as grit, sand, matchsticks or cigarette ends.

Accordingly the invention provides a floor wheel driven vacuum cleaning machine of the kind specified wherein the upper end of the front suction nozzle and the suction port of the fan chamber open upwardly through the floor of an overlying suction chamber, the arrangement being such that the brush, during operation of the machine, aids the suction effect on dirt and litter by lifting heavier particles on to the suction chamber floor from whence such particles can readily be pulled down into the fan chamber for disposal through the blowing port.

In order that the invention may be clearly understood and readily carried into effect, an embodiment thereof will now be described in detail with reference to the accompanying drawings, in which:

Figure 1 is a part-sectional side elevation showing the body portion of a non-electric vacuum cleaning machine constructed in accordance with the invention, a detachable cover for the body being shown in a partially open position,

Figure 2 is a top plan view of Figure 1 to a reduced scale and with the cover removed,

Figure 3 is a fragmentary plan view in partial section on the line III—III of Figure 1, and shows a detail of the brush mounting, and

Figure 4 is a further detail view in partial transverse section and shows the brush mounting according to Figure 3 alternatively positioned for removal of the brush.

Referring now to the drawings, the invention is applied to a vacuum cleaning machine of the non-electric type, the machine including a main body or casing **1** mounted on an intermediate pair of co-axial wheels **2** and a rear centrally disposed support wheel or roller **3**. A detachable handle **4** is secured to the machine for manually propelling the latter on the wheels over an area to be cleaned.

The casing **1** is shaped at the forward end, in front of the wheels **2**, to provide a transverse nozzle and brush housing **5** which is open at the bottom **5***a* and has a front wall **6** shaped to provide an upward deflecting surface, the purpose of which will be later described. Forwardly of the front brush housing wall **6**, the machine is provided with a rounded nose **7** which carries, in known manner, a resilient buffer strip **8**. The rear brush housing wall **9** is of part-cylindrical form and is slotted at each end to allow parts of the peripheries of the intermediate wheels **2** to project into the brush housing or nozzle near opposite ends of the latter.

A cylindrical brush is rotatably mounted in the housing so as to be capable of making light contact with the floor through the open bottom **5***a* of the housing or nozzle. The brush is provided with a central stock or spindle **10** from which bristles **11** radiate, the spindle having a cylindrical boss **12** at each end arranged to make frictional driven contact with the respective intermediate wheel peripheries which project into the brush housing as aforesaid.

The brush is rotatably supported at each end of the housing **5** by means of bracket arms **13** each of which may be of double plate thickness. The arm plates are outwardly bent and returned in bowed form at the rear of the arm for pivotal connection with co-axial out-turned extremities of a U-shaped hinge pin **14**, the pin extremities being in turn supported in bearing apertures in opposed side walls of the casing **1** as shown in Figure 3. Each bracket arm **13** is under the influence of a spring **15** which is located between the U-arms of the associated hinge pin **14** and connected at one end with a fixed bar **16** on the casing and, at the other end, with a lateral projection **13***a* which is located on the arm **13** below the arm hinge axis and on the side thereof nearer the intermediate wheels **2**. The springs **15** thus act to pull the arms **13** downwardly about their pivotal axes and into an operative position as shown in Figure 1 in which an indent in an upward handle extension **17** provided on each arm abuts an underlying stop **18** provided on the machine casing.

To engage the respective ends of the brush spindles **10**, each bracket arm is provided, at the end thereof remote from the arm hinge axis, with a rearwardly directed open U-slot **19**, the U-slots **19** on the arms being arranged respectively to receive co-axial end pivots **20** which are provided on the brush spindle **10** and are rotatable in oil-impregnated bushings **21**. In order to urge the spindle bosses **12** into firm frictional contact with the intermediate wheel peripheries, a U-shaped leaf spring **22** is incorporated between the plates of each bracket arm immediately behind the open U-slot **19**, these U-springs **22** then acting to urge the brush pivots towards the open slot ends.

In order to withdraw the brush from its housing, it is necessary only to pull the handles **17** forwardly of the machine into the inoperative position shown in Figure 4 in which the brush spindle pivots can readily be lifted from the slots **19** in the bracket arms **13**, ejection being then aided by the leaf springs **22**. When the arm **13** is moved between the operative and inoperative positions as aforesaid, the springs **15** are caused to pass through dead center.

Between the intermediate wheels **2** and behind the nozzle and brush housing **5**, the casing is provided with a lower compartment **23** through which an axle **24** for the wheels **2** extends, and which contains a free wheel clutch **25** of the involute type, mounted on the aforesaid axle **24**. This free wheel clutch transmits a unidirectional drive to a worm wheel **26** which is loose on the axle **24** and meshes with a worm **27** on the lower end of a fan spindle **28**. The fan spindle **28** is supported in bearings **29** and **30** provided respectively in the top and bottom of the clutch compartment and, at the upper end, projects through the top of the clutch compartment into a fan chamber **31** which is disposed above the clutch housing and immediately behind the upper end of the brush housing and nozzle.

Fan blades **32** are mounted on the projecting upper end of the fan spindle **28** to rotate in the fan chamber **31**. The top of this fan chamber **31** is partially enclosed by a table-like surface **33** having an aperture **34** therethrough which constitutes the suction port of the fan chamber. In one side of the fan chamber there is provided a blowing port **35** to which one end of a removable dust bag **36**

of known form is connected, the arrangement being such that, rotation of the fan draws in air through the suction port 34 of the fan chamber and ejects the air through the blowing port 35.

Detachably positioned over the top of the main casing is a slightly domed cover 37 which can be held in a substantially air-tight position on the top of the casing by engaging toes at each end at the front of the cover with the upper edge of the casing nose part 7 and by securing the rear cover end to the casing by a spring clip 38 which projects from the cover to enter a clip plate 39 on the casing. The cover 37 extends over the fan chamber and brush housing or nozzle to provide a suction chamber, the floor of which is constituted by the table-like top 33 of the fan chamber. The top of the brush housing or nozzle 5 opens at 40 into the upper suction chamber through the table-like floor 33.

With the arrangement as described, forward manual propulsion of the machine over a floor to be cleaned serves to transmit a friction drive to the brush and a worm gear drive to the fan so that both brush and fan rotate in appropriate directions. If the machine is withdrawn in the reverse direction, this will have the effect of reversing the rotation of the brush but the free wheel arrangement 25 will break the drive to the fan so that the latter can continue to rotate for a time in its forward direction in the manner of a fly wheel. As a result of a sweeping stroke, particles of dust, litter and the like are disturbed by the brush and the suction effect set up by the fan is amply sufficient to draw the smaller of these particles up through the brush housing or nozzle 5 and into the suction chamber, from whence they are drawn down through the fan chamber suction port 34 and ejected through the blowing port 35 into the dust bag 36. Heavier particles of litter, dust and the like which would not normally be lifted by the suction effect alone are thrown up at the same time by the rotating action of the brush and, in co-operation with the front deflecting wall 6 of the brush housing, are also directed on to the floor 33 of the suction chamber. In this way the vertical lift to which such heavier particles have to be subjected is supplied or materially aided by the mechanically propelled brush. Once on the table-like top 33 of the fan housing, the heavier particles are then very readily drawn through the fan suction port 34 as a result of suction aided by gravity and are thence also ejected into the dust bag 36.

The arrangement of the detachable cover 37 over the fan and brush housings offers the very important technical advantage that the whole suction area can readily be exposed for cleaning, and equally the brush can readily be lifted out through the top of its housing for cleaning or other purposes without the necessity of inverting the machine.

I claim:

1. In a floor-wheel driven vacuum cleaning machine, the combination of a machine casing, floor wheels supporting said casing, a front transverse upwardly and downwardly opening suction nozzle on said casing, a suction chamber which overlies said nozzle and has a substantially flat floor through which the upper nozzle end opens and in which is formed a suction port rearwardly of said upper nozzle opening, suction means for drawing dirt and litter through said nozzle, suction chamber and suction port, a brush rotatably mounted in said nozzle to sweep through the lower nozzle opening, means for rotating said brush in a direction opposed to the operative direction of rotation of said floor wheels, a deflector surface disposed in said nozzle immediately in front of said brush and shaped to direct sweepings on to said suction chamber floor whereby the brush action is rendered operative to aid the lifting, particularly of heavier dirt particles, into position for continuous disposal through the suction port, a domed cover removably attached to said casing in an air-tight manner to form the top of said suction chamber, two spring influenced bracket arms pivoted at opposite ends of said nozzle and having open slots therein and end pivots on said brush engaging the respective slots, said arms being angularly displaceable between a lowered operative position, in which the brush is driven by resilient frictional contact with said floor wheels, and a raised inoperative position in which said brush can be lifted from said slots and withdrawn through the upper nozzle end when said suction cover is removed, the machine remaining upright during said withdrawal of the brush.

2. The combination as claimed in claim 1 further comprising a domed cover removably attached to said casing in an air-tight manner to form the top of said suction chamber, two spring influenced bracket arms pivoted at opposite ends of said nozzle and having open slots therein and end pivots on said brush engaging the respective slots, said arms being angularly displaceable between a lowered operative position, in which the brush is driven by resilient frictional contact with said floor wheels, and a raised inoperative position in which said brush can be lifted from said slots and withdrawn through the upper nozzle end when said suction cover is removed, the machine remaining upright during said withdrawal of the brush.

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CERTIFICATE OF CORRECTION

Patent No. 2,910,721 November 3, 1959

Albert Edward Burrage

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 31, beginning with "2. The combination as claimed" strike out the entire claim, ending with "bruch." in line 44, same column; column 3, line 56, strike out "1."; in the heading to the printed specification, line 9, for "2 Claims." read -- 1 Claim. --.

Signed and sealed this 10th day of May 1960.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents