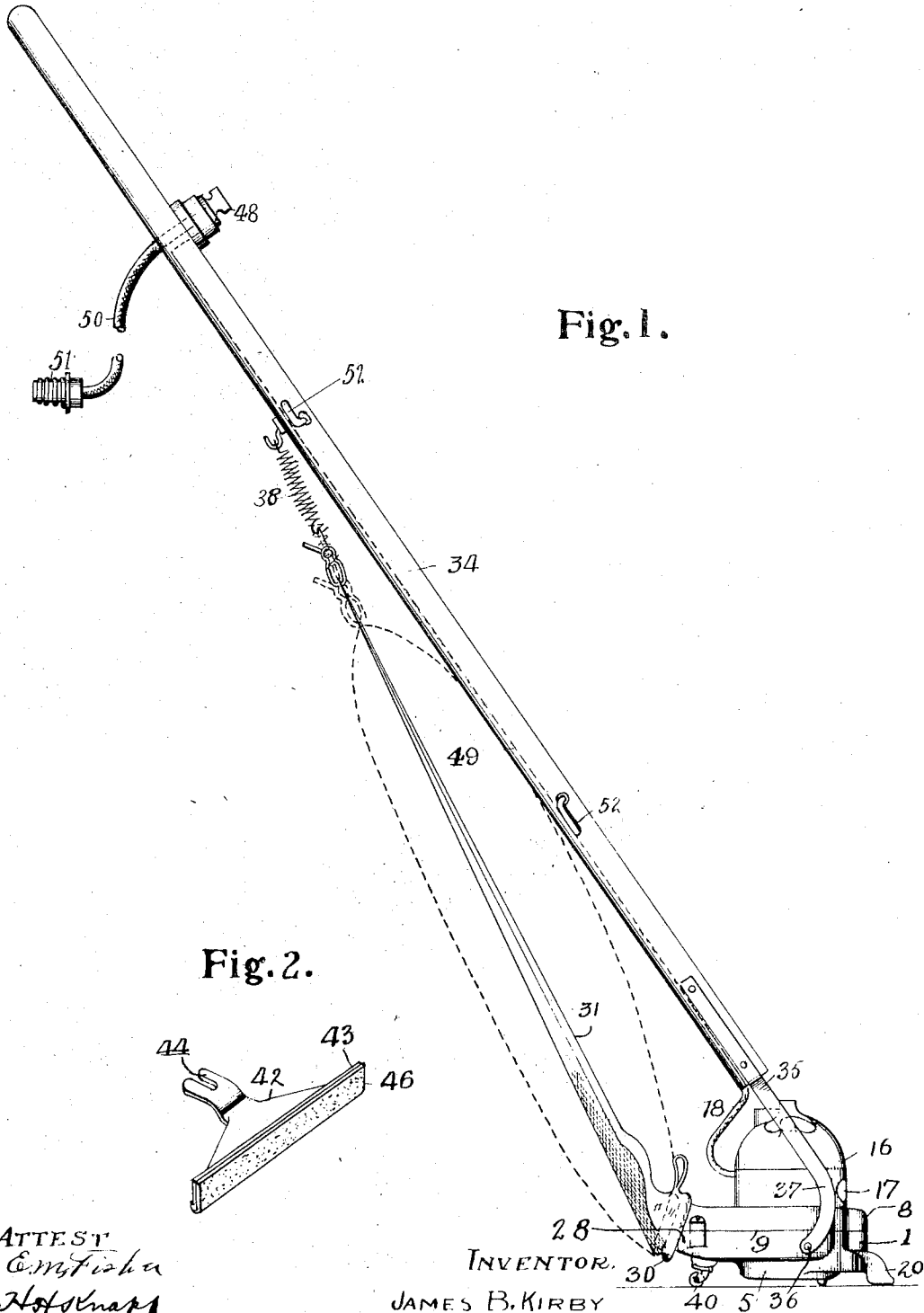


J. B. KIRBY.
VACUUM CLEANING MACHINE.
APPLICATION FILED DEC. 7, 1914.

1,184,458.

Patented May 23, 1916.
2 SHEETS—SHEET 1.



ATTEST
C. M. Fisher
Notary.

INVENTOR.
JAMES B. KIRBY
BY Fisher & Moser ATTYS.

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Fig. 3.

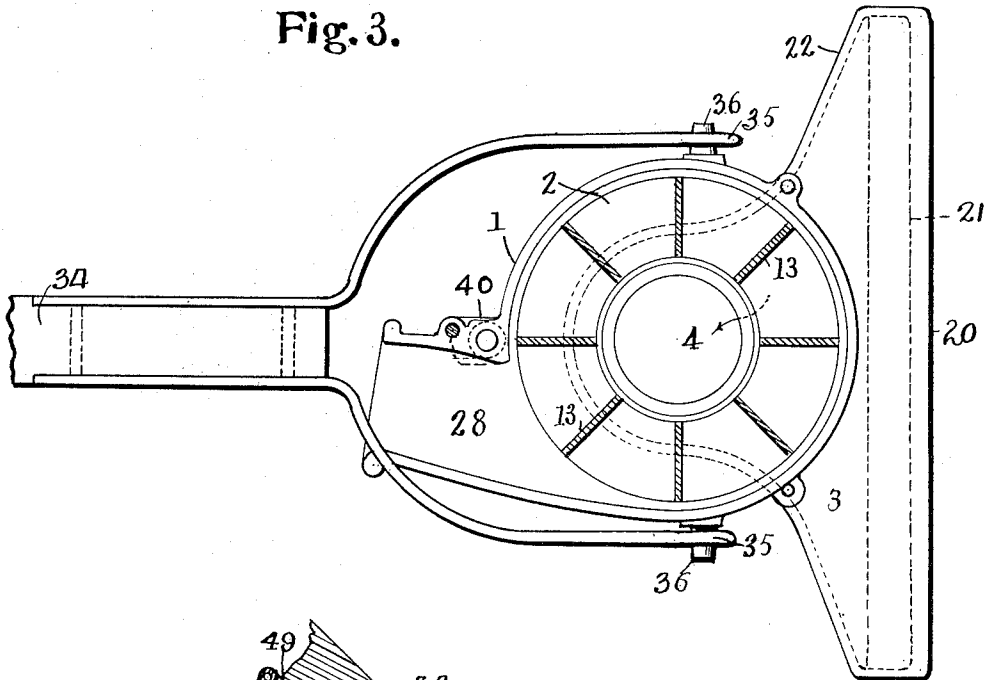
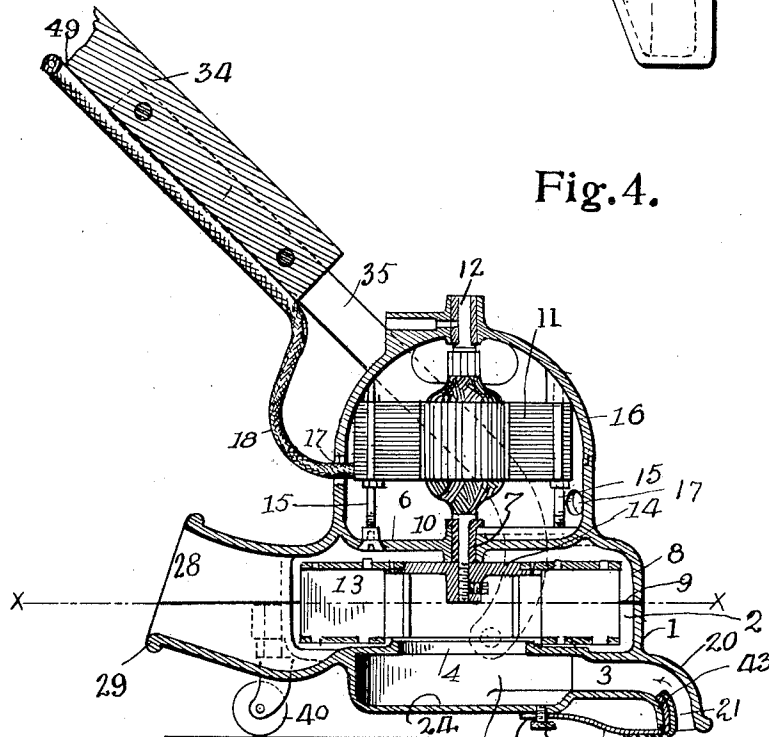


Fig. 4.



ATTEST

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UNITED STATES PATENT OFFICE.

JAMES B. KIRBY, OF CLEVELAND, OHIO.

VACUUM CLEANING-MACHINE.

1,184,458.

Specification of Letters Patent.

Patented May 23, 1916.

Continuation of application Serial No. 590,276, filed November 2, 1910. This application filed December 7, 1914. Serial No. 876,642.

To all whom it may concern:

Be it known that I, JAMES B. KIRBY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Vacuum Cleaning-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

10 This invention relates to vacuum cleaning machines of the type particularly applicable to indoor domestic use and designed primarily for use upon floors, floor coverings, stairs, and the like.

15 Among the objects of the invention may be stated the provision of a compact, low-down type of machine of particularly light weight so as to be adapted for women's use and of small size so as to pass readily beneath articles of furniture; the provision of a suction cleaner which shall be easily controlled by the operating handle and free from danger of overturning; the provision of new and improved expedients for supporting a machine of this character whereby the suction mouth is maintained properly elevated above the floor and whereby its operation is facilitated; the provision of an improved handle arrangement whereby the operation of the cleaner is facilitated; the provision of a new and improved mode of securing and accommodating the dust bag; the provision of a construction of cleaner permitting operation close to walls, corners and sides of the room and around the legs of furniture; the provision of a construction and arrangement of cleaner casing and associated parts whereby the same is rendered compact, reliable, and safe in the hands of unskilled persons; while further objects and advantages of my invention will become apparent as the description proceeds.

45 This application is filed as a proper continuation of my former application filed November 2, 1910, Serial No. 590,276, the same drawings being employed that were filed with the former case.

In the drawings accompanying and forming a part of this application I have illustrated one embodiment of my said invention, although it will be understood that this embodiment is only one of many whereby the advantages above enumerated may be attained.

55 In these drawings Figure 1 represents a

side elevation of a complete cleaner made in accordance with my invention; Fig. 2 is a perspective view of a detachable floor support adapted for use therewith; Fig. 3 is a horizontal view taken upon the line $x-x$ of Fig. 4 and looking downwardly; and Fig. 4 is a central transverse sectional elevation of the machine, the dust bag being omitted.

Describing the parts by reference characters, 1 represents a casing, preferably of cast metal as aluminum, and having therein a substantially cylindrical chamber 2 whose axis is substantially upright and whose horizontal dimension is preferably materially greater than its vertical dimension. The bottom wall of this chamber is shown at 3 and is provided with a substantially central aperture 4 communicating with a collecting chamber 5 formed beneath the chamber 2. The top of the chamber 2 is covered with a plate 6 suitably secured to the casing walls and provided at its center with an opening 7 substantially in line with the opening 4. In the present embodiment the top plate 6 is provided with a downturned flange 8 which joins the wall of the chamber 2 along the line 9 as shown in Figs. 1 and 4, being secured thereto by suitable bolts. Above the plate 6 is formed a third chamber 10 in which is mounted an electric motor 11 having a substantially vertical shaft 12 which projects through the opening 7 into the chamber 2 where it is connected to a centrifugal fan 13 of any suitable type or construction. The hub 14 of this fan is preferably detachably connected to the shaft 12 (as shown in Fig. 4) to allow for proper dismounting, and the upper part of the chamber 10 is preferably formed by a separate casing-section 16 secured by suitable bolts 15 to the plate 6. The walls of the chamber 10 are preferably formed with suitable openings 17 to permit the passage of the electric conduit 18 and to afford the necessary ventilation of the motor. At its forward side this casing is formed with a substantially straight, laterally-extending, collecting nozzle 20, arranged substantially tangentially of the casing and forward of the casing wall and having a longitudinal extent greater than the greatest width of the casing, as shown in Fig. 3. The forward portion of this nozzle is formed with a narrow, elongated, downwardly-facing inlet mouth 21 extending from end to end of said nozzle,

while the rearward part of said nozzle is narrower in a horizontal sense than the forward part as shown at 22 so as to permit it to be passed around the back of chair legs and the like. The interior of this nozzle member is hollow and provides an unobstructed passageway 23 similar in shape to the nozzle exterior and connecting the inlet mouth 21 with the aperture 4. Simultaneously with the lateral narrowing of the passageway 23 a vertical deepening of the same may also be effected as shown at 24 so as not to choke the air passage.

Projecting from the casing at the side opposite the nozzle 20 is a hollow discharge neck 28 arranged in the same horizontal plane with the chamber and preferably tangentially thereof as shown in Fig. 3, the end of said neck being preferably upturned slightly as shown in Fig. 4 and provided with a rim or lip 29 arranged to receive the mouth 30 of the dust bag 31. With this construction it will be seen that the center of gravity of the machine will fall substantially along the vertical line defined by the center of the fan chamber 2.

For guiding the machine I provide an elongated handle 34 whose forward end is forked, in effect, by being provided with the spreading arms 35 whose extremities are pivoted upon opposite sides of the casing, as shown at 36—36. This pivot axis is arranged substantially horizontal and substantially parallel with the mouth 21 and transverse to the handle 34 and is preferably forward of and beneath the center of gravity of the machine for a purpose hereafter stated. In addition the arms 35—35 are preferably curved downwardly through a wide arc as shown at 37, so as to afford room for the dust bag 31 when the handle is lowered. The upper end of the bag 31 is secured to the handle by means of a spiral spring 38, or like elastic device, so as to maintain the bag in taut position at all times irrespective of the angle of the handle or the condition of inflation of the bag. Considering that the handle and bag are secured at spaced portions of the casing it will be seen that a pivotal movement of the handle will necessitate a yielding connection in case the bag is to be kept taut at all times and is to be prevented from dragging on the floor. Also it is obvious that the length of the bag will decrease when the same is inflated, as shown in dotted lines in Fig. 1, this being easily permitted by extension of the spring.

The rear end of the casing is supported by means of a roller 40 here shown as pivoted upon a vertical axis at the rear of the machine so as to exhibit a trailing or caster action. This roller is preferably located substantially on the center line of the machine and directly underneath the handle 34. The forward end of the machine may

be supported directly by the nozzle 20, and will frequently be so supported when operating upon thick and porous floor coverings or the like. However for the purpose of raising this nozzle slightly above the floor so as the better to permit a flow of air therein whereby the dust may be lifted and swept into the dust bag, I have shown a supporting device secured to the casing in the rear of the mouth 21 and adapted to run along the floor. In the present embodiment this device consists of a metal plate 42 having its forward edge upturned as at 43 and arranged, in the present embodiment, to fit within the mouth 21. The rearward end of this plate is formed with a slotted projection 44 adapted to be engaged by a screw 54 carried by the casing. In the present embodiment the bend of this attachment is shown as covered with an anti-scratching material 46 such as felt, which not only prevents marring of polished surfaces but also produces a wiping action which tends to disturb the dust thereon and to permit it to be picked up by the air stream. So far as this wiping and disturbing action is concerned, it is to be noted that the same occurs directly at and partially within the area of the mouth 21, where the suction is greatest. So far as the supporting effect is concerned, it is apparent that the same is developed rearwardly of said mouth and also sufficiently to the lateral sides of the machine to render the same stable as against upsetting. It will be obvious that other expedients might be adopted for effecting this supporting and performing this wiping.

Attention has heretofore been called to the fact that the pivotal axis of the handle lies below and forward of the center of gravity of the casing. It will also be noted that this axis falls below a straight line drawn between the nozzle support and the free end of the handle when the latter is in its ordinary operating position. Of course the angle of the handle varies to some extent with the height of the user, though the pivots are set low enough to cause this relation to be obtained in all ordinary cases. This arrangement of the handle pivots minimizes the danger of upsetting of the machine, either in a sidewise direction when rounding a corner or in a forward direction in case the nozzle 20 should meet with any obstruction or catch in the carpet. The location of this axis forward of the center of gravity causes the cleaner casing to become tilted slightly rearwardly when it is lifted from the floor and this is true notwithstanding the pull of the spring 38 which tends to tilt it in the opposite direction. Accordingly it is necessary to balance these actions against each other to some degree, with the advantage sufficiently on the side of the pivots to prevent the machine from tipping

forwardly when lifted, since this renders it less convenient to restore to operating position.

The employment of merely a single roller at the rear of the machine, especially taken in connection with the laterally elongated suction nozzle, enables the casing to be tilted sidewise merely by giving the handle a slight twist, thus raising one end of the nozzle and permitting a sudden strong inrush of air as is often desired for picking up lint, thread, etc. This can easily be done with one hand and does not involve the lifting of the machine from the floor.

The pivotal connection between the handle and casing preferably produces a certain amount of friction, this friction being obtained in the present case by springing the handle extensions 35—35 over the tapered bosses 36—36 formed on the casing so that the elasticity of the fork may cause a binding action. This prevents the casing from swinging loosely on the handle and coöperates with the balance of weight and spring to insure its remaining substantially in operating position when lifted off the floor. However the particular method of securing the handle to the casing herein shown is not important but is merely illustrative.

The electric conduit 18 is carried along the handle, preferably in a groove as shown at 49, to a switch 48 of suitable or any convenient type carried by the handle above the end of the dust bag. From this switch extends a cable 50 provided at its end with the usual attaching plug 51 whereby it can be connected to any electric outlet. The side of the handle is preferably provided with a pair of oppositely turned hooks 52—52 on which the cable 50 can be coiled when the machine is not in use.

While I have described my invention in detail it will be apparent that many features of construction herein illustrated and suggested can be modified without losing the advantages of my invention or departing from the scope of my inventive idea. Wherefore my invention is limited, not by the specific features here illustrated, but only by the terms of the claims hereto annexed and by the prior state of the art.

Having thus described my invention, what I claim is:

1. In a suction cleaner, a casing having therein three chambers arranged one above the other and forming a motor chamber at the top, a fan chamber in the middle, and a collecting chamber at the bottom, septa between said chambers having aligned openings therein, an electric motor in the upper chamber and having its shaft projecting into the middle chamber, a centrifugal fan secured to the shaft in the middle chamber and receiving air from the bottom chamber, a hollow neck carried by said casing

and communicating with said middle chamber, an operating handle pivoted to said casing upon a substantially horizontal axis below the center of the fan chamber, and a collecting work engaging nozzle carried by said casing and communicating with said bottom chamber, said nozzle having a downwardly-facing mouth extending laterally to both sides of said fan chamber and whose largest dimension is substantially perpendicular to said handle and substantially parallel to said handle pivot.

2. In a suction cleaner, the combination, with a casing having at one side a discharge neck and at the other side a collecting nozzle, said nozzle having a downwardly-facing inlet mouth laterally elongated to both sides of the casing and whose major dimension is substantially transverse to the direction of said neck, of an operating handle having at its forward end a pair of forked extensions, each of said extensions being downwardly curved, means pivotally securing said extensions to said casing at a point between said neck and nozzle upon a substantially horizontal axis transverse to said handle and substantially parallel with said mouth, said pivots being located in the lower half of said casing, a motor-operated fan in said casing and having its intake communicating with said inlet mouth and its discharge connected with said neck, and an elongated dust bag having one end connected to said neck, and the other end connected to said handle and arranged when inflated to occupy the space defined by said curved extensions when the handle is lowered.

3. In a suction cleaner, a casing having a downwardly-facing inlet mouth, an operating handle secured to said casing, the securing means being arranged so as to permit free movement of said handle about a substantially horizontal axis transverse thereto, a hollow neck carried by said casing at a point below said handle and spaced rearwardly from such axis, an elongated, dust-collecting bag having its lower end secured to said neck and the other end attached to said handle, the attachment to the handle including an extensible elastic member, and a motor-operated suction device located in said casing and adapted to draw air in through said inlet mouth and discharge the same into said bag.

4. In a suction cleaner, the combination, with a casing having at its forward side a transversely extending collecting nozzle, said nozzle having a downwardly-facing, laterally-elongated inlet mouth, of an operating handle having its forward end forked, means pivotally securing the arms of such fork to opposite sides of said casing upon a substantially horizontal axis transverse to said handle and substantially parallel to said inlet mouth, the pivot axis intersecting

said casing at a point forward of the center of gravity of the same, a hollow neck carried by said casing at a point below said handle and spaced rearwardly from the handle pivots, and a dust collecting bag having its lower end secured to said neck and the other end attached to said handle, said last attachment including an extensible elastic member.

10 5. In a suction cleaner, a casing having a downwardly-facing inlet mouth, a hollow neck carried by said casing, an operating handle secured to said casing, an elongated dust collecting bag having one end connected to said neck and the other end attached to said handle, the attachment to the handle including an elastic member, and a motor-operated fan located in said casing and adapted to draw air in through said inlet mouth and discharge the same into said bag.

25 6. In a suction cleaner, a casing having at its rearward part a supporting roller and at its forward part a collecting nozzle, said nozzle having a downwardly-facing, transversely arranged elongated inlet mouth, an operating handle having at its forward end a pair of spaced extensions, means pivotally securing the lower part of said extensions to said casing at a point between said roller and nozzle upon a substantially horizontal axis transverse to said handle and substantially parallel with said mouth, the pivot axis intersecting said casing at a point below its center of gravity and said pivoting means including friction devices whereby the freedom of movement of said casing with regard to said handle is curtailed, and a motor operated fan in said casing having its intake communicating with said inlet mouth.

40 7. In a suction cleaner, a casing having a downwardly facing inlet mouth and a discharge neck, a pumping device located in said casing and adapted to draw air in through said mouth and eject it through said neck, an operating handle pivoted to said casing at a distance from said neck, an elongated dust bag having one end connected to said neck and the other end attached to said handle, the attachment to the handle including an elastic member.

55 8. In a suction cleaner, the combination, with a casing having at its forward side a transversely extending collecting nozzle, said nozzle having a downwardly facing inlet mouth, of a suction device located in said casing and adapted to draw air in through said mouth, an electric motor located above said suction device and arranged to drive the same, floor engaging supporting devices carried by said casing and located wholly within its peripheral limits, an operating handle having its forward end forked, and means pivotally securing the fork arms to opposite sides of said casing upon a sub-

stantially horizontal axis transverse to said handle and substantially parallel to said inlet mouth, said axis intersecting said casing at a point below and in front of the center of gravity thereof.

70 9. In a suction cleaner, the combination with a casing having at its forward side a collecting nozzle formed with a downwardly facing inlet mouth whose major dimension is transverse to the path of movement of the cleaner, of a suction device located in said casing and adapted to inspire air through said mouth, an operating handle pivotally secured to said casing upon a substantially horizontal axis transverse to said handle and parallel to said inlet mouth, supporting devices located between said mouth and the center of gravity of the casing and engaging the floor upon opposite sides of said path of movement and a single centrally located roller secured at the rearward side of said casing substantially beneath said handle.

10. In a suction cleaning machine for floors and the like, a hollow, collecting nozzle member having a narrow, elongated, downwardly-facing inlet mouth, said nozzle being progressively narrowed in a horizontal direction from said mouth rearwardly, a hollow chambered member integral with said nozzle and adapted to receive a fan, the narrowest part of said nozzle being in communication with the center of the fan chamber, a centrifugal fan in said chamber, a motor carried by said chambered member and arranged to drive said fan, said nozzle member, chambered member and motor constituting a single rigid structure, floor engaging means carried by said structure at a point between said mouth and the center of gravity of said structure and adapted to maintain said mouth above and parallel to the floor while permitting free movement of the same in a horizontal direction, a roller carried by a part of said structure removed from said nozzle and upon the opposite side of said center of gravity, and an operating handle pivoted to said structure upon a horizontal transverse axis at a point between said mouth and said roller.

11. In a suction cleaner, a casing having at its forward part a substantially straight, transversely extending collecting nozzle, the length of said nozzle being greater than the width of any other part of said casing, the forward portion of said nozzle being formed with a narrow, elongated, downwardly-facing inlet mouth extending from end to end of said nozzle and the rearward part of said nozzle being narrowed laterally and increased vertically, there being a fan chamber in said casing communicating with the rearward portion of the nozzle chamber, a fan in said fan chamber, a motor carried by said casing and arranged to drive said fan, floor engaging means carried by said

casing and adapted to support said nozzle with its mouth spaced above the floor, said means being disposed between said inlet mouth and the center of gravity of said casing and also confined wholly within the lateral extent of said nozzle, a roller pivoted to a part of said casing removed from said nozzle and upon the opposite side of the center of gravity thereof, and an operating handle pivoted to said casing at a point between said mouth and said roller.

12. In a suction cleaner for floors, a casing having a single roller substantially at the center of its rear end and a transverse, work-

engaging dust receiving mouth at its front, and a handle freely pivoted to said casing on a transverse axis parallel to the floor in advance of the center of gravity of the casing, said roller lying substantially in the plane of movement of said handle.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

JAMES B. KIRBY.

Witnesses:

BRENNAN B. WEST,
HAROLD E. SMITH.