

May 14, 1963

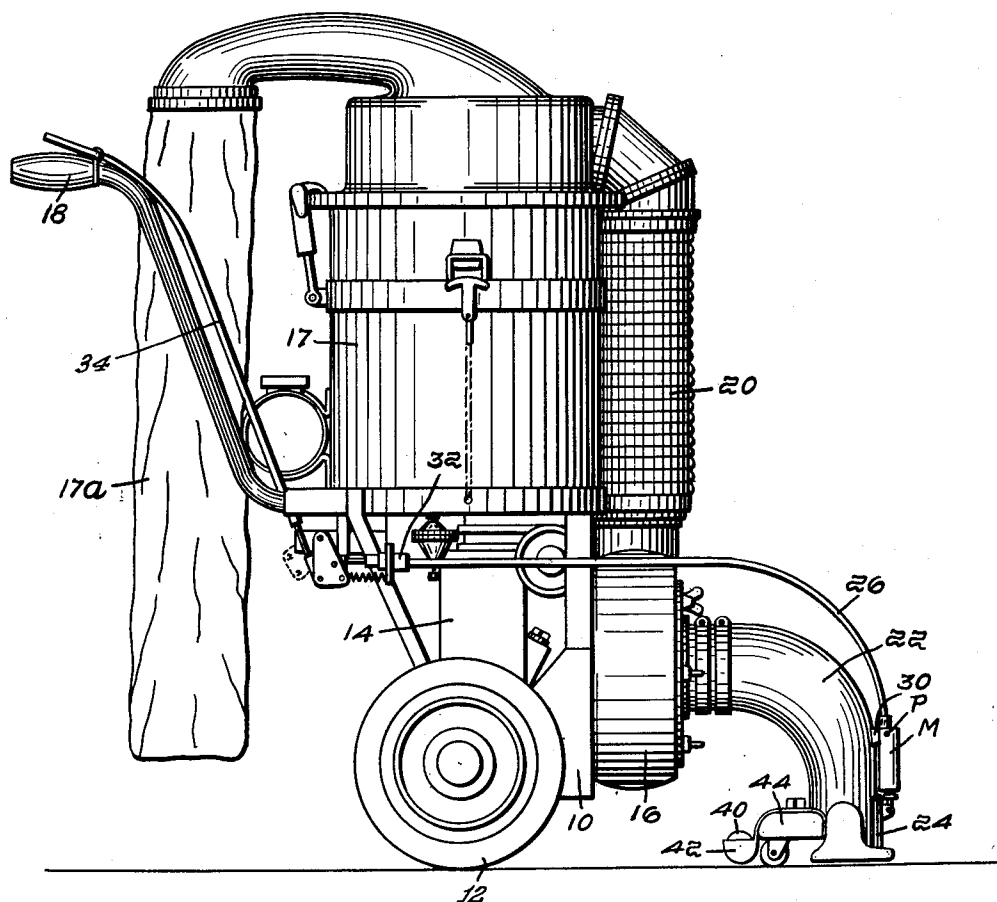
J. F. SHERMAN, JR.
MOBILE SUCTION FLOOR CLEANER WITH ADJUSTABLE
NOZZLE CLOSURE MEANS

3,089,178

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Fig. 1.



Inventor:
John F. Sherman, Jr.
by *Harmon H. Hamilton*
Attorney

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Fig. 2.

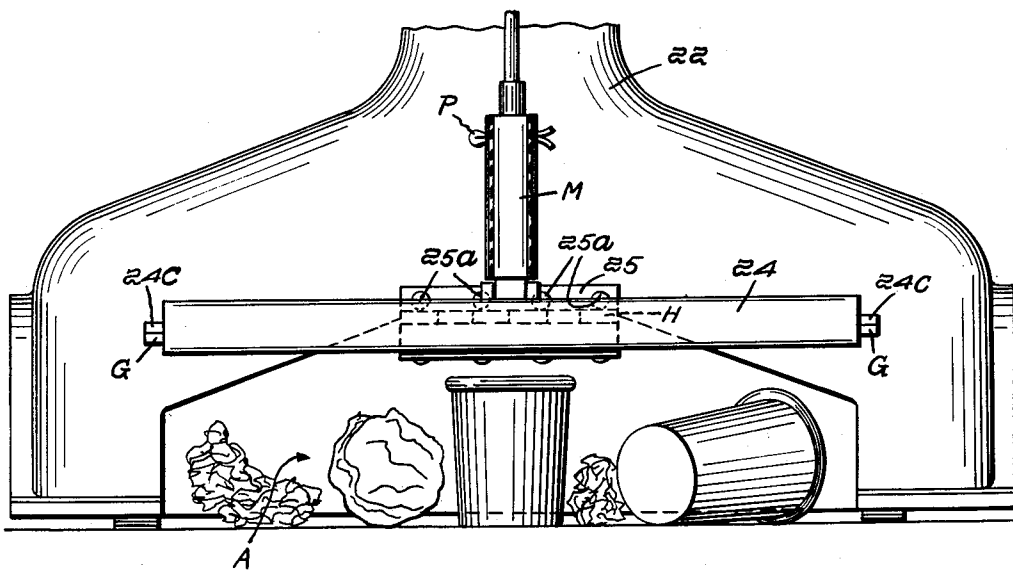
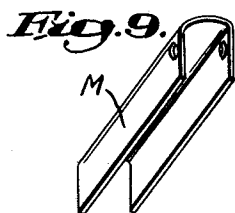
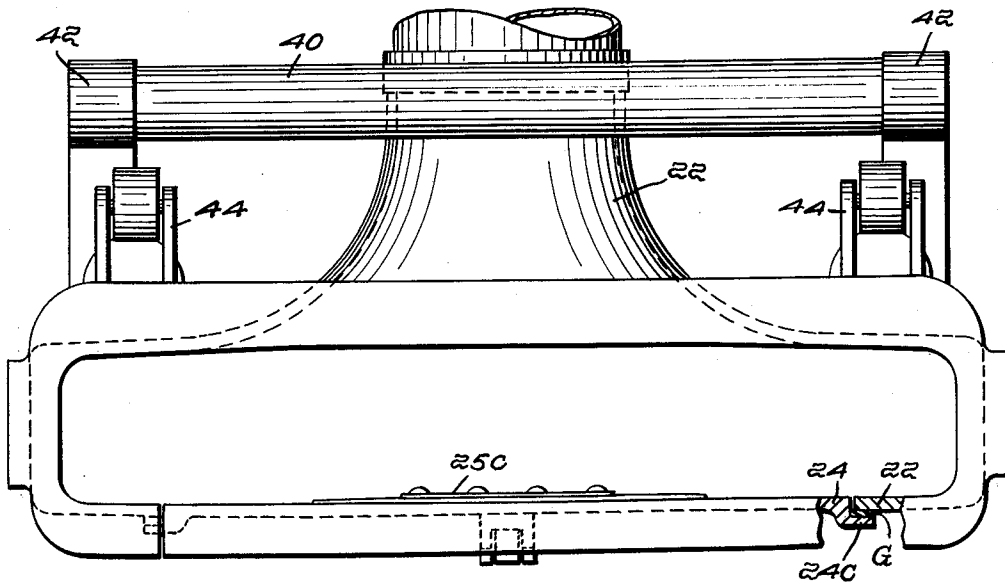


Fig. 3.



Inventor:
John F. Sherman, Jr.
by *Munroe V. Hamilton*
Attorney

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Fig. 4.

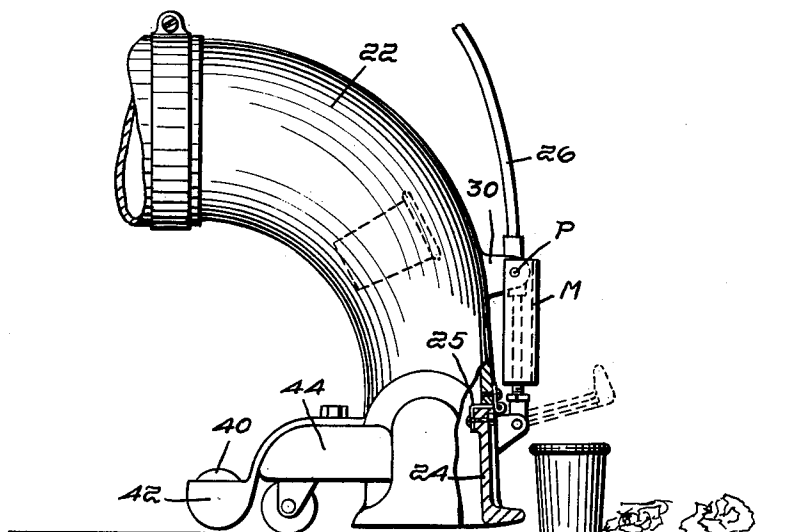


Fig. 5.

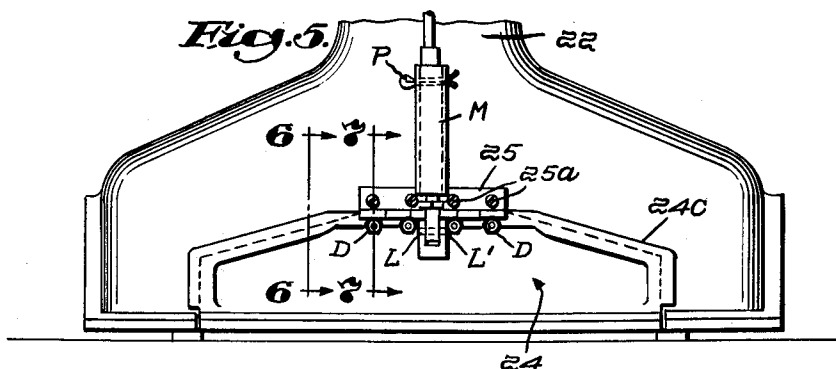


Fig. 6.

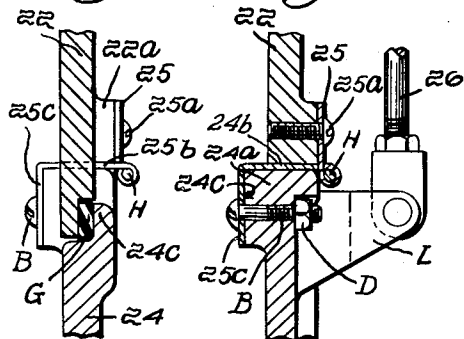
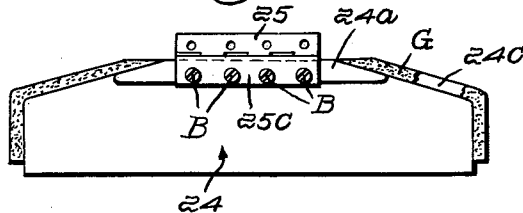


Fig. 7.

Fig. 8.



Inventor:
John F. Sherman, Jr.
by *Monroe A. Hamilton*
Attorney

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3,089,178

MOBILE SUCTION FLOOR CLEANER WITH ADJUSTABLE NOZZLE CLOSURE MEANS

John F. Sherman, Jr., Waban, Mass., assignor to Handling Devices Company, Inc., Cambridge, Mass., a corporation of Massachusetts

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2 Claims. (Cl. 15—347)

This invention relates to floor cleaning machines, and in particular to a mobile power actuated machine of the type described and claimed in Patent No. 2,824,335, issued February 25, 1958, and owned by the assignee of the application. The present application is a continuation-in-part of my copending application Serial No. 782,209, filed December 22, 1958, and now abandoned.

Floor cleaning in plants, factories, offices and the like where relatively large floor areas are to be serviced may be efficiently carried out with respect to dust, waste particles and similar small pieces of trash by the use of a machine of the class having an elongated suction nozzle such as has been described in the above noted patent. However, in many plants and factories there may be encountered large pieces of trash or waste such as for example, paper drinking cups, crumpled masses of paper, waste, and other disposable paper items which cannot be picked up by the conventional nozzle. In order to provide a nozzle of sufficiently large size to pick up paper drinking cups and similarly sized articles, it is found necessary to modify the size of the nozzle aperture undesirably to a point where less efficient suction effects are realized having regard for nozzle width and size of the waste conduit into which waste is delivered by the suction nozzle.

In my co-pending application, I have disclosed an attachment for use with the type of floor cleaning machine of the patent noted. This attachment is particularly characterized by a special nozzle unit which includes a relatively large door adapted to be hinged and controlled by a pull cable so that it may be periodically opened to define an aperture suitable for admitting coffee cups and similar articles, and then allowed to drop down into a closed position.

In thus providing a door of substantially larger size and in hinging it so that it can be raised by means of a pull cable certain difficulties are present. Increasing the size of the nozzle aperture tends to reduce the suction efficiency of a given power driven suction unit especially if the enlarged opening is not properly closed by the hinged door when the latter member is not in an operative position. Since the pull cable has to exert its lifting action at one point only on the door, a considerable strain is exerted and ordinary conventional hinging arrangements are found to be unsatisfactory. Moreover, the connection of the cable with the door is necessarily in a forward exposed position where it is subject to damage from being wheeled against obstructions and very little change in the position of the cable will cause it to jam and become inoperative.

It is a principal object of the invention, therefore, to deal with the problems indicated and to devise a nozzle attachment which can be efficiently and conveniently operated to collect relatively large sized waste articles. Specifically, it is an object of the invention to devise a special nozzle, hinged door, and guard unit for increasing the capacity of the floor cleaning machine so as to take disposable items of the paper drinking cup and waste class. Another object of the invention is to provide a magnet type collector device in combination with a suction nozzle floor cleaning machine with the magnet collector device arranged in a position such that ferrous metal objects may

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be picked up from a floor area which has already been subjected to a suction cleaning action.

These and other objects and novel features will be more fully understood and appreciated from the following description of a preferred embodiment of the invention selected for purposes of illustration and shown in the accompanying drawings, in which:

FIG. 1 is an elevational view showing the floor cleaner machine of the invention in one preferred position;

FIG. 2 is a front elevational view illustrating the nozzle attachment of the invention with the door in a raised position and further including a paper drinking cup in position to be picked up;

FIG. 3 is a bottom plan view of the nozzle and door structure in a fully closed position;

FIG. 4 is a side elevational view partly in cross section and indicating the hinged door in dotted lines in a raised position;

FIG. 5 is a front elevational view showing the door in a fully closed position and consisting on a larger scale details of hinging;

FIG. 6 is a cross section taken on the line 6—6 of FIG. 5;

FIG. 7 is a cross section taken on the line 7—7 of FIG. 5;

FIG. 8 is a detail elevational view of the door and sealing means; and

FIG. 9 is a detail perspective view of a guard element.

In accordance with the invention I employ a floor cleaning mechanism of the same general type as that disclosed in Patent No. 2,824,335 and I attach thereto a special nozzle structure which is formed with an enlarged front portion and waste aperture specifically designed to pick up and conduct away a paper drinking cup. I further combine with this nozzle structure a rigid cast metal door member in which are included unique sealing and hinging means described below in greater detail.

In FIG. 1, I have illustrated one suitable form of floor cleaning mechanism with which my nozzle and door structure may be employed. As shown, FIG. 10 denotes a base supported on wheels as 12. A motor 14, which may be of either electric or gasoline type, is mounted on the base in a position to drive a fan whose blades are enclosed within a fan casing 16, also secured to the base. Located on the base 10, immediately above the motor 14, is a vertical cylindrical waste receptacle 17 and extending rearwardly and upwardly from the base are a pair of handles 18 by means of which an operator is enabled to move the machine about a desired floor area to be cleaned. A vertical waste conduit 20 connects one side of the fan casing 16 with the upper end of the cylindrical waste receptacle 17.

The nozzle attachment of the invention is adapted to be secured at the front end of the fan casing 16, and comprises a tubular nozzle 22 which flares outwardly and downwardly as shown in the drawings to provide at the under side thereof an elongated nozzle mouth supported in very close proximity to the floor as, for example, a 1/8" opening. It has been found, that for suitable operating efficiency, this bottom nozzle aperture, or mouth, must be correctly sized and a nozzle aperture of 21" x 1 1/2" is suitable for the type of nozzle mouth employed in an industrial floor cleaning machine of the class described. This nozzle size is designed to communicate with an inner nozzle orifice of approximately 4 1/2" in diameter and a similar diameter for the conduit 20 is required.

In designing the nozzle structure 22, its shape and size is chosen so as to maintain a bottom nozzle aperture of roughly 21" x 1 1/2" for normal floor cleaning operations in picking up dust, dirt and small particles. However, in order to provide for picking up paper drinking cups it is necessary to further adapt the nozzle shape to the

dimensions of the usual size of drinking cup, particularly when standing in an upright position. With these limiting factors in mind, I form the nozzle structure 22 with an enlarged central conduit portion having a passageway whose dimensions are chosen to exceed slightly the dimension of the usual drinking cup so that the enlarged conduit constitutes a drinking cup passageway communicating with the vertical waste conduit 20.

In addition, I form a forward skirt portion of the nozzle with a central paper drinking cup aperture A (FIG. 1) which, in an open state, is adapted to receive a paper drinking cup in an erect position and guide it directly into the enlarged conduit portion. In ordinary use I further provide for closing this aperture with a special closure plate or litter door 24 so that the bottom dimensions noted above are maintained at all times except when the paper drinking cup is being picked up and drawn into the conduit.

The litter door 24 may be operated in any desired manner as by a pull cable 26 which is attached to the litter door 24 and slidably guided in a bracket or holding member 30. The retractor extends rearwardly over the base 10 and is slidably received in a collar 32, supported on a frame portion of the machine. A resiliently mounted extension piece 34 connects with one end of the retractor part 26 and is attached near one extremity of handle 18 as shown in FIG. 1. An operator may retract the cable by forcing it against the handle and when released gravity causes the door to drop into a vertical position.

The litter door 24, in order to close the cup opening, is constructed and arranged on the nozzle in a special manner so as to do several different jobs. One of these jobs is to properly engage against the front aperture edge of the nozzle in sealing relationship therewith; another function is to properly support and position a door hinge member; and a third function is to provide for satisfactory attachment of the retractor pull cable.

Considering the litter door construction in greater detail, this member is formed of a non-ferrous metal which will avoid any danger of causing sparks and preferably an aluminum casting is employed. As shown in FIGS. 4, 5, 6, 7 and 8, the litter door is constructed with a relatively thin body portion 24 which, at its upper central edge, is formed of increased thickness to provide a special hinge retaining body 24a.

It is found that with the leverage of forces present in lifting a litter door of this type into a raised position and then allowing it to fall back rather heavily there develops a wear which, when repeated many times, tends to render the door and pull cable inoperative.

To prevent this, I provide the thickened upper central hinge retaining body 24a, with a top bearing surface 24b and a vertical bearing surface 24d and against these bearing surfaces I locate a special elongated hinge 25. The latter member, as may be more clearly seen in FIGS. 6 and 7, includes an upright section adapted to be secured by bolts 25a to a central thickened reinforced edge portion 22a of the nozzle body 22.

Pivotaly pinned to the upright section of the hinge described is a second hinge section which includes a flat hinge part 25b adapted to be solidly received on the bearing surface 24b. The hinge also includes a right angularly extending vertical part 25c which abuts the rear side of the thickened nozzle body portion 24a, as best shown in FIG. 8. Bolts B rigidly lock this hinge part against the body portion 24a and are tightly held by nuts D which are located in recessed relation just below the reinforced edge of the litter door.

On the front side of the door 24 is a pair of spaced apart holding lugs L and L' in which is pinned the extremity of the retractor cable 26, as shown in FIG. 7. By means of this lug arrangement described, it will be observed that the axis of hinge H for the door is brought very close to those points at which the lifting force of the pull cable is

extended and wear forces on the hinge mounting is greatly reduced while the door may readily be raised when desired.

A further problem, found to arise in constantly raising the litter door and allowing it to fall back by the force of gravity, has to do with the matter of closing the door tightly against the nozzle cup opening in order to maintain the suction efficiency of the machine at a high level. To deal with this problem I have provided the sealing arrangement referred to at an earlier point in the specification.

Essentially, this sealing arrangement consists in forming the litter door with a recessed inner surface to thereby define a relatively thin sealing edge 24c which is shaped to conform to and overlies the edge of the nozzle cup opening, as may be seen in FIG. 6. With the door constructed in this manner, it is pointed out that a part of the door thickness is adapted to extend well into the nozzle opening and closes this opening tightly.

In addition, I provide a resilient sealing gasket G which is secured around the inner surface of sealing edge 24c and is adapted to be pressed against the edge of the nozzle cup opening when the door is in a lowered position so as to provide a substantial sealing effect. In this way the suction efficiency may, I find, be adequately maintained. It should also be observed that the resilient sealing member functions as a cushion to prevent excessive shock and injury to the door when it drops down against the nozzle.

I have still further devised means for protecting the pull cable connection with the door. It is found that in use the forwardly located arrangement of the cable and the door lugs tend to support the connection in a position where it constantly comes into contact with obstacles with consequent damage to the cable part. To avoid this difficulty, I provide a U-shaped guard M which, as shown in FIG. 4, is loosely pinned at P to the pull cable in a position to overlie and protect both the cable and the lugs L and L'. When thus attached the guard acts as a buffer to protect the cable when the machine is accidentally moved against a wall surface, article of furniture, or the like.

It will be observed that an operator may, by means of the litter door arrangement described, temporarily increase the size of the nozzle aperture independently of operation of the nozzle driven fan and at any point in the travel of the machine over a floor surface. The operator may, therefore, conveniently open the door to pick up drinking cups or similar items and almost instantly allow the closure plate to drop by gravity into a lowered position, with the door sweeping the cups and other articles of a heavier nature into the nozzle as gravity returns the door to a closed position. In this closed position the sealing means presents air from being drawn through the cup opening and the normal machine efficiency may be realized.

I may also desire to incorporate with the nozzle structure 22 magnet collector means for picking up ferrous metal particles which may resist the suction drag of the fan and fail to enter the nozzle. In one preferred form the magnet collector comprises a bar magnet element 40 which as best shown in FIGS. 2 and 3 is supported in a suspended position directly in back of the nozzle aperture on brackets as 42 bolted to caster arms 44. These brackets 42 are formed with U-shaped extremities in which opposite ends of the magnet bar 40 are loosely cradled so that the bar may from time to time be raised out of the brackets to facilitate removal of objects collected along the surface of the bar.

It is pointed out that by locating the bar in spaced parallel relation to the longitudinal axis of the nozzle aperture, it is possible to remove ferrous metal objects from a surface lying in the path of travel of the nozzle, either before or after the nozzle passes over the surface. It will be appreciated that in some types of waste collection it may be important to remove ferrous metal particles before the suction cleaning is carried out and this

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may be accomplished by moving the machine rearwardly. In other cases it may be desired to pick up metal pieces which have not been picked up or have been lifted up only part of the distance from floor to nozzle.

From the foregoing description, it will be apparent that I have disclosed a preferred embodiment of the invention and it is intended that changes and modifications may be resorted to within the scope of the appended claims:

What is claimed is:

1. In combination, a mobile power actuated floor cleaning machine, including a frame, handling means extending outwardly from one side of the frame, a pair of wheels mounted for rotation at the underside of the frame, a waste receptacle mounted at the upper side of the frame, a motor driven fan unit including a casing secured to the frame and having a waste conduit connecting the fan casing with the waste receptacle, a relatively wide transversely extending nozzle positioned centrally at the front of the cleaning machine, said nozzle having an upper restricted portion connected with a tubular duct communicating with and fixed to the fan casing, said nozzle including a front wall portion, said front wall portion being formed with a relatively wide bottom recess defined by a central thickened horizontal wall portion and marginal recessed portions extending laterally from each side of said central thickened horizontal wall portion, said marginal recessed portions terminating at the bottom edge of said front wall, a gravity actuated litter door for closing the relatively wide bottom recess in the front wall of said nozzle, said litter door comprising a plate having a flat horizontal thickened upper central portion for abutting association with the bottom surface of said central thickened horizontal wall portion of said front wall portion and laterally projecting marginal edges at each side of the horizontal thickened upper central portion of said plate for association with the marginal

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recessed portions of the front wall portion, a hinge portion including a front vertically extending plate fixed to the front thickened wall portion defining the recess and a second hinge portion pivoted to the first hinge portion and including a plate overlying the thickened upper central portion of the litter door and projecting to the inner face of the door, means for fixing the hinge portions to the front wall of the nozzle and to the inner face of the litter door, a lug projecting from the outer face of the litter door centrally thereof, an operating member for opening said door pivoted to the outer end portion of said lug and extending vertically of said nozzle structure and terminating at the rear portion of said floor cleaning machine for operation of said door, bracket means fixed to the upper restricted portion of said nozzle, and a hinged guard pivoted to said bracket means, said hinged guard being U-shaped in cross-section and swinging downwardly to enclose the operating member therebelow to provide a buffer for the nozzle.

2. The structure of claim 1 characterized in that cushioning means are arranged between the marginal edges of the litter door and the marginal edges of the recess to cushion and seal the parts.

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