May 19, 1970 I. G. ETTRIDGE 3,512,207

SUCTION CLEANER

Filed Oct. 25, 1967 3 Sheets-Sheet 1

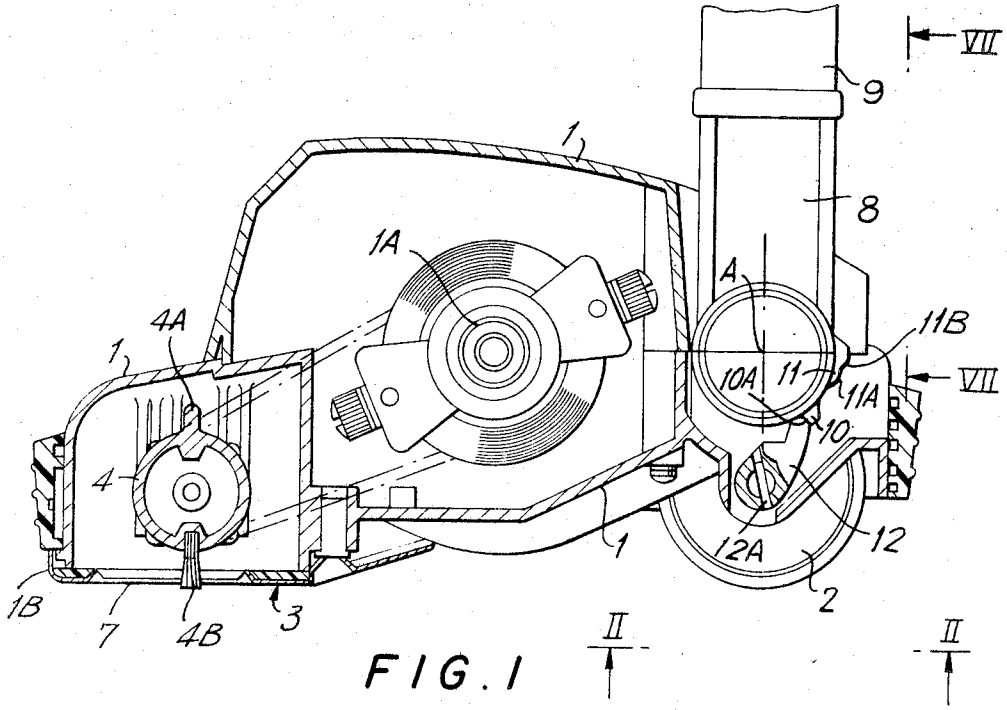


FIG. 1

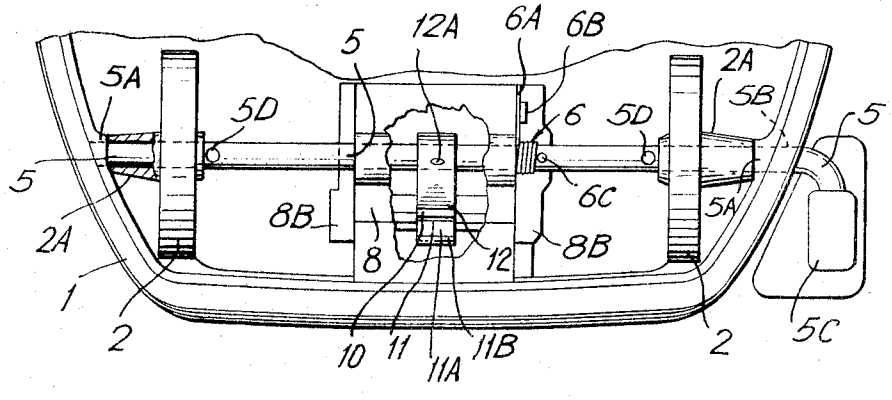


FIG. 2

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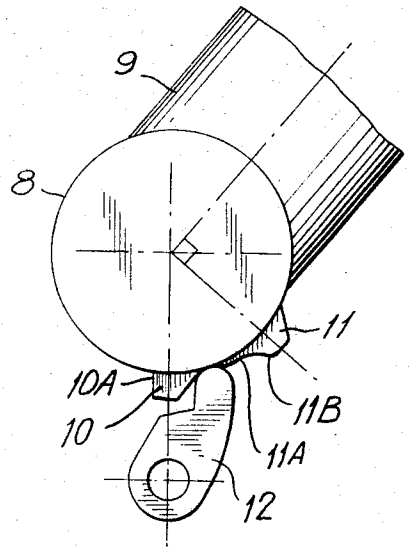


FIG. 3

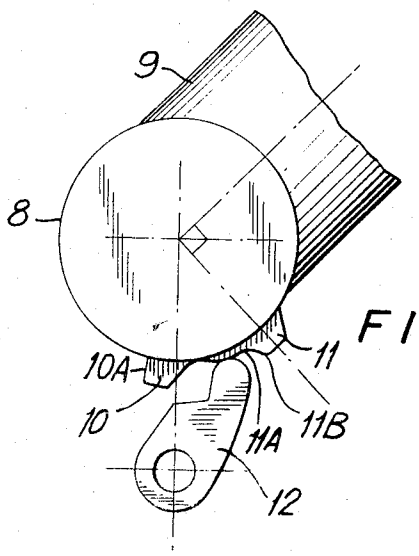


FIG. 4

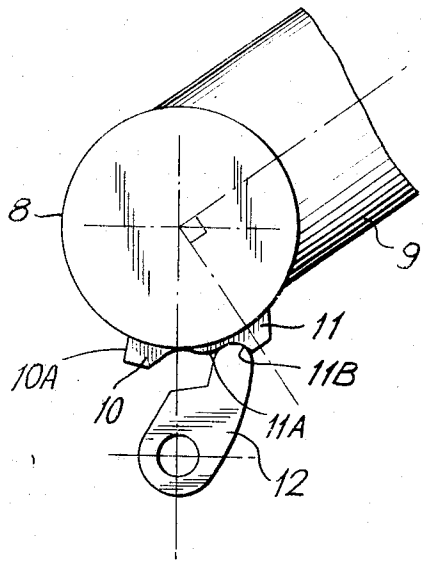


FIG. 5

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FIG. 6

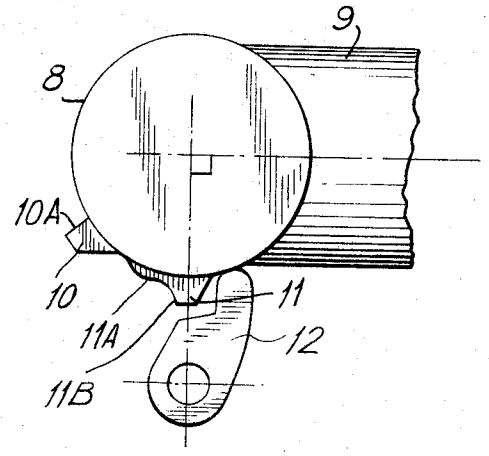
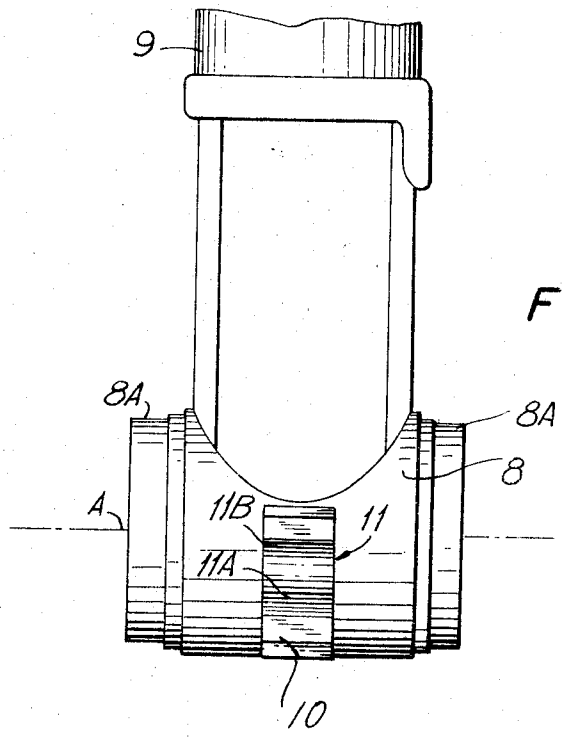


FIG. 7



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3,512,207

SUCTION CLEANER

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Claims priority, application Sweden, Oct. 26, 1966, 14,734/66
Int. Cl. A47l 5/34
U.S. Cl. 15—361 1 Claim

ABSTRACT OF THE DISCLOSURE

A suction cleaner having a casing and a pivotally connected upright handle for manipulating the casing over a surface to be cleaned, the casing having a motor-driven brush at the vicinity of an air inlet and a motor-fan unit for moving air through the casing from the air inlet to an outlet from which air is discharged by the motor-fan unit and flows to a dust collector. First and second parts respectively carried by the handle and the casing cooperate with one another and function to lift the front end of the casing when the handle is manually moved downward from a vertical position about its axis. The first part carried by the handle is formed with a sloping cam surface and the second part carried by the casing comprises a cam which is mounted for movement thereon and operable to ride on the sloping cam surface with downward manual movement of the handle from its vertical position. The sloping cam surface resists movement of the cam riding thereon and develops sufficient resistance to lift the front end of the casing when the handle is moved vertically downward about its axis through a predetermined angle. The resistance developed by the cooperation of the sloping cam surface and the cam is of such magnitude that it is insufficient to stop downward manual movement of the handle about its axis past the predetermined angle.

BRIEF SUMMARY OF THE INVENTION

My invention relates to a suction cleaner of the type having a casing movable over a surface to be cleaned and an elongated and upstanding handle pivotally connected to the casing. In a suction cleaner of this type the casing contains a motor-fan unit which draws in air and dust through an inlet opening at the bottom of the casing and discharges the air and dust from the casing to a dust collector.

It is well known to provide a pivotal connection for the elongated handle in which the latter is locked in a vertical position on the casing by a catch which, when released, permits the handle to be angularly moved about its axis between vertical and horizontal positions during movement of the casing over a surface to be cleaned, such as, for example, a carpet.

A problem which occurs in manipulating a suction cleaner of this type is the difficulty encountered in moving the suction cleaner over the edge of a raised surface. For example, this occurs when the suction cleaner is moved from a bare floor onto a carpet. The front end of the suction cleaner often pushes against the edge of a carpet and adversely affects the desired manipulation and efficient and smooth operation of the suction cleaner.

It is an object of my invention to overcome this problem and, according to my invention, I provide an improved suction cleaner of this kind in which the front end of the suction cleaner casing is lifted responsive to downward manual movement of the elongated handle about its axis. In accordance with my invention the elongated handle and casing respectively include first and second parts which cooperate with one another to develop resistance to downward manual movement of the handle which effects lifting of the front end of the casing, such resistance developing when the handle is moved about its axis through a predetermined angle. Further, the resistance developed by the cooperation of the first and second parts, while capable of effecting lifting of the front end of the casing, is of such magnitude that it is insufficient to stop downward manual movement of the handle about its axis past the predetermined angle.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

In the drawing, FIG. 1 is a vertical sectional view of a suction cleaner embodying the invention;

FIG. 2 is a fragmentary bottom plan view taken at line II—II of FIG. 1, a part being broken away to illustrate details more clearly;

FIG. 3 is a fragmentary elevational view illustrating parts in different positions from the positions shown in FIG. 1;

FIGS. 4, 5 and 6 are fragmentary elevational views similar to FIG. 3 illustrating the parts seen in FIGS. 1 and 3 in other different positions that they can assume; and

FIG. 7 is a fragmentary rear elevational view taken at line VII—VII of FIG. 1.

DETAILED DESCRIPTION

Referring to the drawing, a suction cleaner includes a casing **1** movable over a surface to be cleaned with the aid of a pair of wheels **2** and a smooth bottom portion **3** which glides over the surface. Within the casing **1** are disposed a motor-fan unit **1A** and a rotatable roller **4** driven by the motor, the roller **4** having a dust dislodging bar **4A** and a row of bristles **4B** at diametrically opposing sides thereof.

The wheels **2** are rotatably mounted on hollow bushings **2A** fixed to the rear of the casing **1** and immovable thereon. A shaft **5** is journaled at **5A** in the hollow bushings **2A** and is provided with pins **5D** to prevent axial movement thereof. One end of the shaft **5** extends through an opening **5B** in the casing, such end being bent and provided with a foot-operated pedal **5C**. When the pedal **5C** is depressed the shaft **5** can be angularly moved through an angle of 30° against the biasing action of a spring **6** which is coiled about the shaft, one end of the spring being fixed to the shaft at **6C** and the other end **6A** acting against a projection **6B** formed on a wall of the casing **1**, so that the spring will bias and urge the pedal **5C** to its raised or upper position when it is released.

Air and dust are drawn into the casing **1** through an air inlet **7** at the bottom **3** and are discharged by the motor-fan unit **1A** from the casing **1** through an outlet formed by a hollow T-shaped member **8** for flow through a hollow handle tube **9** to a dust collector (not shown). The motor-fan unit **1A** is disposed in the casing **1** between the rotatable cleaning member **4** and the wheels **2**. The hollow T-shaped member **8** includes a horizontal part having lateral arms of tubular form, each lateral arm having a reduced end portion **8A** rotatably mounted in a bearing **8B**, so that the handle tube **9** and the T-shaped member **8** are angularly movable about the horizontal axis of the arms, as indicated at A in FIGS. 1 and 7.

The outer surface of the horizontal part of the T-shaped member **8** is provided with two projections **10** and **11**, the projection **10** having a radially extending abutment face or stop **10A** and the projection **11** having a first sloping portion **11A** and a second sloping portion **11B** which is steeper than the first portion **11A**. The first portion or part **11A** and second portion or part **11B** to-

gether define a sloping cam surface. A cam **2** is mounted on the shaft **5** and is fixed thereto by a pin **12A**.

The cam **12** is biased and urged to the position shown in FIG. 1 by the biasing action of the spring **6** on the shaft **5**. Hence, the cam **12** always is urged toward the outer tubular surface of the T-shaped member **8** when the pedal **5C** is released. The elongated handle **9** is held in its vertical cleaner carrying position when the cam **12** engages the stop **10A**, as seen in FIG. 1. To release the elongated handle **9** so that it can be moved downward manually about its horizontal axis A, the foot-operated pedal **5C** is depressed momentarily so that the cam **12** will be moved from the projection **10**. When the cam **12** is out of the path of movement of the projection **10**, the handle **9** can be moved manually downward a first inclined position, as shown in FIG. 3. In FIG. 3 it will be seen that the cam **12** again is biased againstt he outer tubular surface of the T-shaped member **8** by the biasing action of the spring **6** when the pedal **5C** is released.

Continued downward movement of the handle **9** from its vertical position causes the cam **12** to ride on the first portion **11A** of the sloping cam surface, as seen in FIG. 4, prior to riding on the second portion **11B** of the sloping cam surface. Further continued downward movement of the handle **9** causes the cam **12** to ride on the second portion **11B** of the sloping cam surface, as seen in FIG. 5. In this position the elongated handle **9** will have been moved downward to an angle which is approximately 45° to the vertical.

The slope of the second portion **11B** of the cam surface is sufficiently steep to develop resistance to continued downward manual movement of the handle **9** through a predetermined angle or arc which substantially corresponds to the circumferential extent of the second portion **11B** of the cam surface. The manual effort required to move the handle **9** through the aforementioned predetermined angle or arc is greater than the effort required to move the handle through the positoins illustrated in FIGS. 3 and 4. The resistance developed by the second portion **11B** of the cam surface when the cam **12** engages the portion **11B** is sufficient to fulcrum the casing **1** on the wheels **2** and cause the front end **1B** of the casing **1** to be lifted about the axis of the wheels **2**. When an operator has moved the handle **9** to the position illustrated in FIG. 5, the handle can be employed, depending upon the downward force exerted or applied to the handle, either to lift or tilt the front end **1B** of the casing **1** upward against gravity to clear an obstacle, such as the edge of a carpet, for example, or to cause the cam **12** to ride on the second portion **11B** of the cam surface to the extreme outer surface of the projection **11**. When the cam **12** reaches the extreme outer surface of the projection **11**, the downward manual movement of the handle can be continued to its horizontal position, as shown in FIG 6, when the cam **12** once again acts against the outer tubular surface of the T-shaped member **8**.

In view of the foregoing, it will be seen that the invention provides a simple arrangement to develop resistance to downward manual movement of the handle through a predetermined angle or arc, the resistance developed being sufficient to lift or raise the front end of the suction cleaner casing and also being of such magnitude that it is insufficient to stop continued downward movement of the handle through the predetermined angle or arc at which lifting of the front end of the suction cleaner casing can be effected.

I claim:

1. A suction cleaner comprising

(a) a casing movable over a surface to be cleaned,

(b) a horizontal rotatable cleaning member at the front end of said casing,

(c) said casing having an air inlet at the bottom thereof at the vicinity of said rotatable cleaning member and an air outlet,

(d) a pair of wheels for supporting said casing for movement on the surface, means including a pair of immovable hollow bushings fixed to said casing for mounting said wheels for rotation on said casing at the rear thereof,

(e) a shaft journaled in said hollow bushings and turnable thereon about a first horizontal axis, resilient means for biasing said shaft for turning movement in a first direction,

(f) a foot-operated pedal on said shaft for turning the latter about its axis in a second opposite direction against said biasing means, said pedal being accessible at the exterior of said casing,

(g) an elongated upstanding handle, means pivotally connecting the lower end of said handle to said casing at the rear thereof for angularly moving said handle about a second horizontal axis about the first horizontal axis,

(h) a motor-fan unit for flowing air from the inlet to the outlet,

(i) a first part carried by said handle which is formed with a stop and a sloping cam surface having first and second portions,

(j) a second part comprising a cam which is fixed to said shaft and turnable therewith with movement of said shaft in said first and second directions,

(k) said cam, when said pedal is released, engaging said stop to hold said handle in a vertical cleaner carrying position responsive to turning movement of said shaft in said first direction by said resilient biasing means,

(l) said cam being rendered inoperable to engage said stop to enable said handle to be manually movable downward from its vertical position to a first inclined position responsive to turning movement of said shaft by said foot-operated pedal in said second direction against said resilient biasing means,

(m) said cam, when said handle is in its first inclined position and said pedal is released, engaging the first portion of said sloping cam surface of said first part responsive to turning movement of said shaft in said first direction by said resilient biasing means,

(n) said cam, while said casing is supported for movement on the surface, being operable to ride successively on the first and second portions of said sloping cam surface with downward manual movement of said handle from said first inclined position,

(o) said second portion, which has a steeper slope than that of said first portion, developing sufficient resistance to movement of said cam riding thereon to tilt said casing in its entirety about said first horizontal axis of said shaft responsive to downward manual movement of said handle from said first inclined position through a predetermined angle and raise the front end of said casing upward against gravity, and

(p) said resistance developed between said cam and said second steeper portion of said sloping cam surface being of such magnitude that it is insufficient to stop downward manual movement of said handle about the second horizontal axis theerof past said predetermined angle.

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U.S. Cl. X.R.

15—410