Oct. 22, 1968 R. C. RUSH 3,406,424

LAWN AND PARKING LOT CLEANER

Filed Aug. 1, 1966 4 Sheets-Sheet 1

FIG. 2

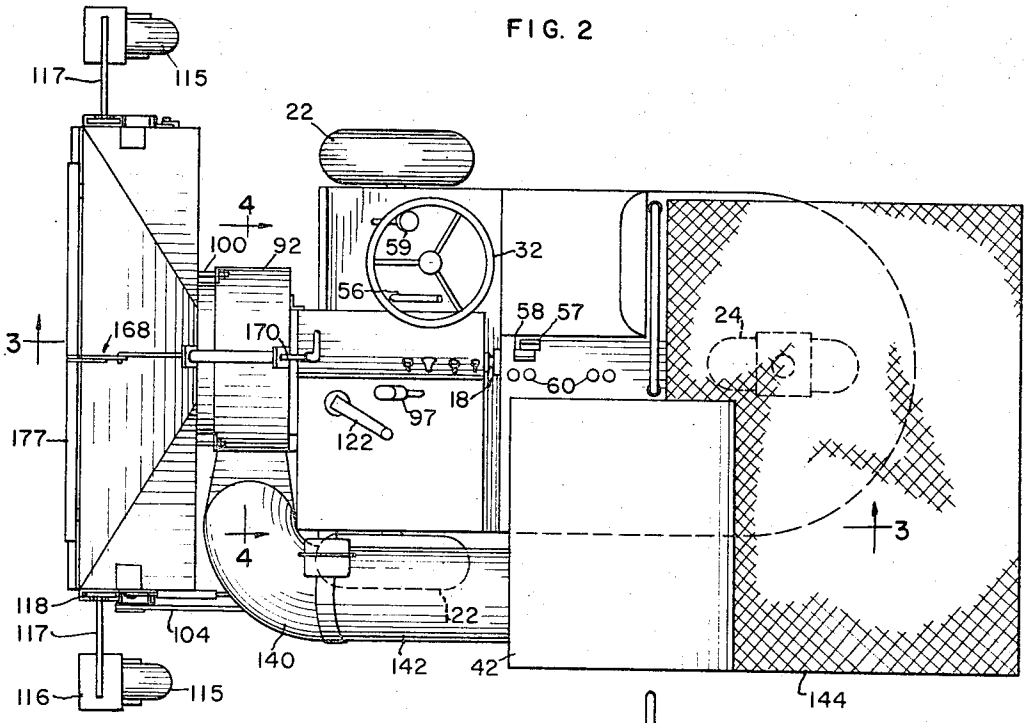
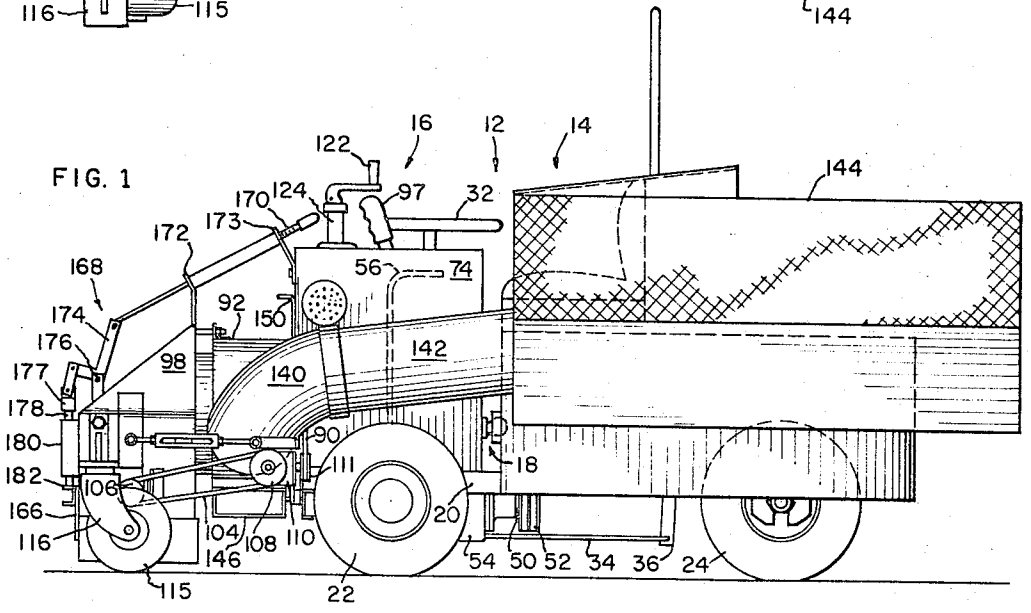


FIG. 1



ROY C. RUSH
INVENTOR

BY
BUCKHORN, BLORE, KLARQUIST & SPARKMAN
ATTORNEYS

Oct. 22, 1968 R. C. RUSH 3,406,424

LAWN AND PARKING LOT CLEANER

Filed Aug. 1, 1966 4 Sheets-Sheet 2

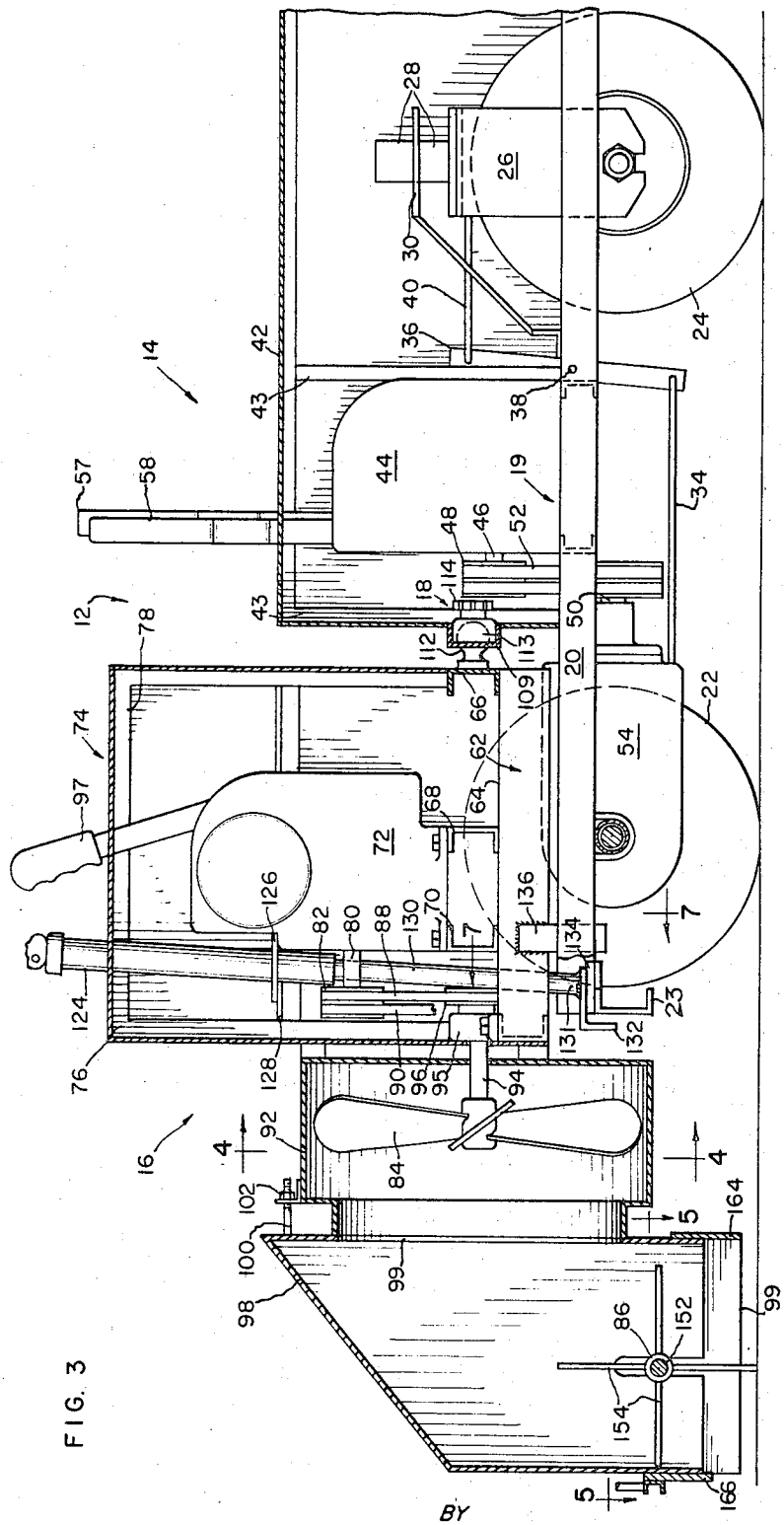


FIG. 3

ROY C. RUSH
INVENTOR

BY
BUCKHORN, BLORE, KLARQUIST & SPARKMAN
ATTORNEYS

Oct. 22, 1968 R. C. RUSH 3,406,424

LAWN AND PARKING LOT CLEANER

Filed Aug. 1, 1966 4 Sheets-Sheet 3

FIG. 4

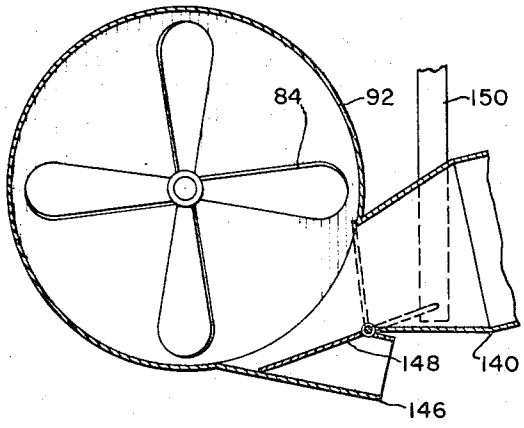


FIG. 5

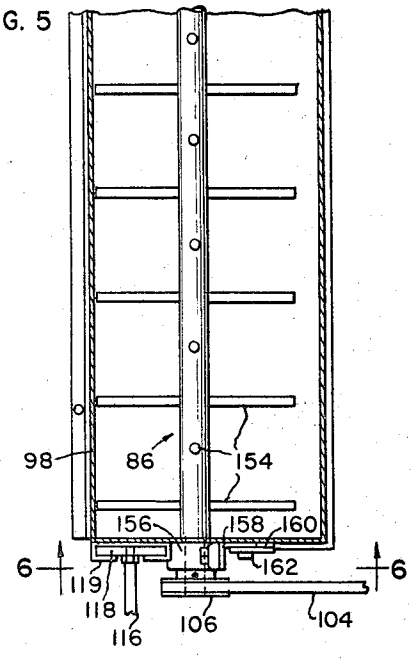


FIG. 8

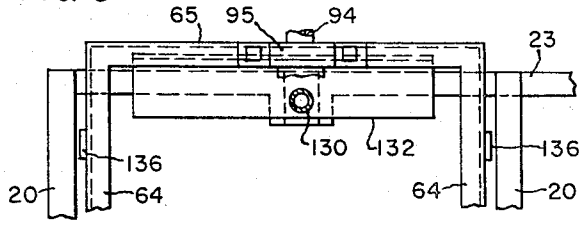


FIG. 7

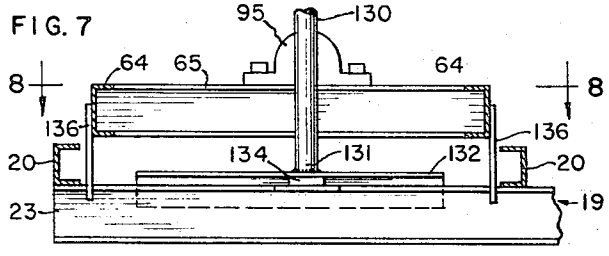
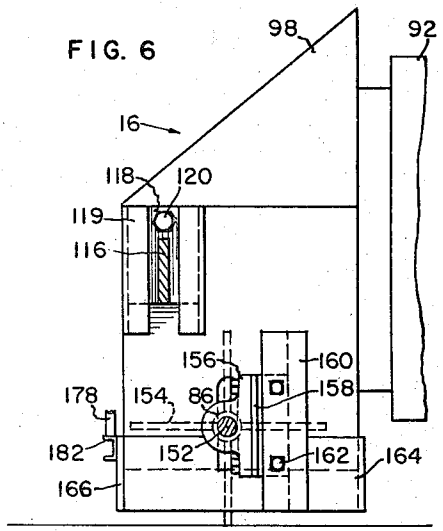


FIG. 6



ROY C. RUSH
INVENTOR

BY
BUCKHORN, BLORE, KLARQUIST & SPARKMAN
ATTORNEYS

Oct. 22, 1968 R. C. RUSH 3,406,424

LAWN AND PARKING LOT CLEANER

Filed Aug. 1, 1966 4 Sheets-Sheet 4

FIG. 9

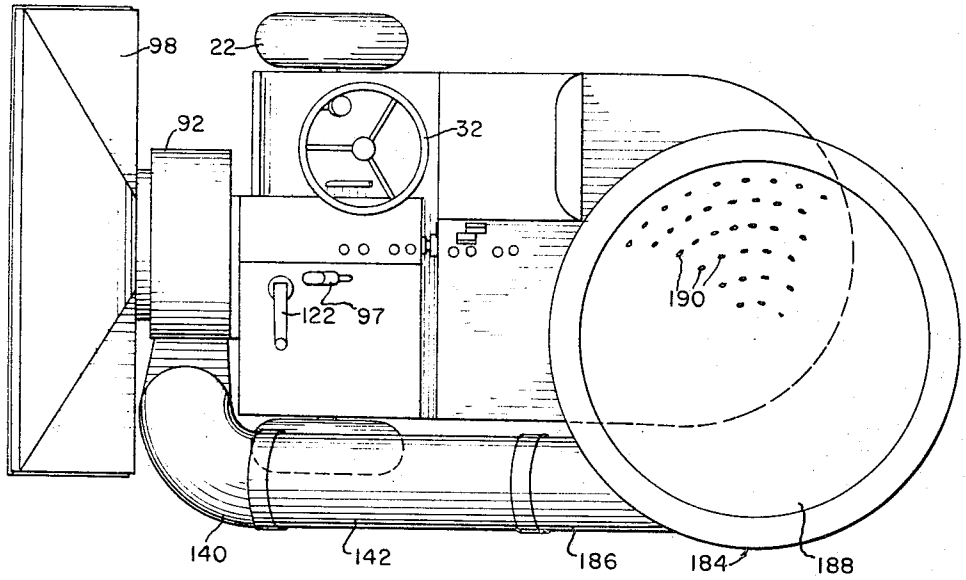
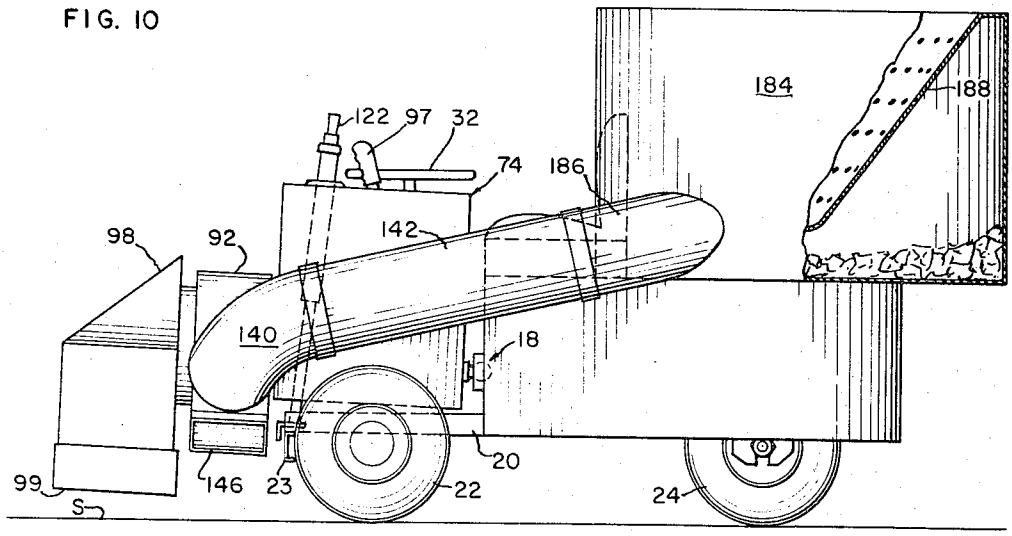


FIG. 10



ROY C. RUSH
INVENTOR

BY
BUCKHORN, BLORE, KLARQUIST & SPARKMAN
ATTORNEYS

United States Patent Office 3,406,424 Patented Oct. 22, 1968

3,406,424

LAWN AND PARKING LOT CLEANER

Roy C. Rush, 6129 NE. Skidmore,
Portland, Oreg. 97218

Filed Aug. 1, 1966, Ser. No. 569,254
3 Claims. (Cl. 15—340)

ABSTRACT OF THE DISCLOSURE

A lawn and parking lot cleaner having a propelling or driving vehicle and a cleaning vehicle, which latter includes beating and suction equipment. The driving vehicle and the cleaning vehicle are joined together by a universal joint which permits the suction and beating vehicle to move independently in the vertical and transverse directions or "float" with respect to the driving vehicle. The method of attachment disclosed wherein the cleaning vehicle is articulated to the driving vehicle permits the cleaning vehicle to adjust to a continuously varying ground contour as the apparatus is driven along.

This invention relates to machinery for cleaning large areas and, more particularly, to apparatus for cleaning such areas as parking lots, cemeteries, parks and golf courses.

Many different kinds of apparatus have been developed in the past to clean large surface areas, such as parking lots, cemeteries, golf courses, parks and athletic fields. These have not been fully satisfactory, however, especially for those areas having varying surface contours, because the sweeping or suction portion of the apparatus has failed to adapt and adjust itself to the ground, thereby imperfectly to clean the same. Furthermore, the presently existing apparatus has not been able efficiently to clean large lawn areas having numerous obstructions, such as shrubs, trees, or cemetery markers, since it has not been possible to exert maximum cleaning power while driving the appartus slowly around the impediments.

It is thus the primary object of the present invention to provide a lawn and parking lot cleaner that will be able to clean efficiently large areas characterized by a continuously varying ground contour.

It is a further object of the present invention to provide a cleaning apparatus of the class described that will make it possible to clean efficiently and at full power around obstructions in lawn areas such as trees, shrubs and cemetery markers, around which the apparatus, of course must be driven very slowly.

The apparatus of the present invention achieves these and other objects and advantages by providing separate cleaning and propelling or driving units which are universally mounted together, thereby to accommodate continuous variations in ground contour. The cleaning and driving units are joined together by a universal ball joint which permits the cleaning unit to rotate, pitch and yaw, or "float," with respect to the driving unit, thereby to permit the cleaner to adjust to variations in terrain as the apparatus is driven along. Each of the cleaning and driving units is separately housed and powered, while universally joined together as above described, so that even if the apparatus is driven very slowly as, for example, around trees or shrubs, the cleaning unit can still function at full power.

The invention will be more clearly understood from the following detailed description thereof and from the drawings, wherein

FIG. 1 is a side elevational view of a lawn and parking lot cleaner constructed in accordance with the present invention;

FIG. 2 is a plan view of the cleaner shown in FIG. 1;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a sectional view taken along line 5—5 of FIG. 3;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 5;

FIG. 7 is a sectional view taken along line 7—7 of FIG. 3;

FIG. 8 is a sectional view taken along line 8—8 of FIG. 7;

FIG. 9 is a plan view of a cleaner constructed in accordance with a different embodiment of the present invention; and

FIG. 10 is a side elevational view of the cleaner shown in FIG. 9.

Referring to the drawings and particularly to FIGS. 1, 2 and 3, my lawn and parking lot cleaner **12** consists of two main parts: a propelling or driving vehicle **14** and a cleaning vehicle **16**, which latter includes beating and suction equipment. The driving vehicle **14** and the cleaning vehicle **16** are joined together by a universal joint **18** which permits the suction and beating vehicle **16** to move independently in the vertical and transverse directions or "float" with respect to the driving vehicle **14**. This method of attachment, wherein the cleaning vehicle **16** is articulated to the driving vehicle **14**, permits the cleaner to adjust to a continuously varying ground contour as the apparatus is driven along.

Considering first the driving vehicle **14**, it is seen to comprise a main chassis **19** formed of longitudinally-extending channels **20**, from which are journaled front driving wheels **22**, one on either side of the vehicle. A cross beam **23** joins the channels **20** at the front of the vehicle. A rear wheel **24** for steering the vehicle is journaled from a fork **26** which rotates in a bearing **28** welded to a bracket **30** supported from the chassis **19**, as shown in FIG. 3. Rotation of the rear wheel **24** in the bearing **28** is accomplished by means of a steering wheel **32** which is joined by conventional means to a control rod **34** attached to a lever **36** which is pivotally attached to the chassis **19** at **38**. The lever **36** actuates a connecting rod **40** which is attached to the fork **26**, thereby to rotate the wheel **24**.

A housing **42** with vertical supports **43** and mounted on the chassis **19** contains a motor **44** having a drive shaft **46** attached to a pulley **48** for transmitting power to a transmission shaft **50** by means of belts **52**. The shaft **50** in turn furnishes power through a conventional transmission and differential **54** to the wheels **22**, thereby to drive the vehicle **14**. A clutch lever **56**, forward and reverse gear shift levers **57** and **58**, brake pedal **59** and engine controls **60** are provided as shown.

Considering next the cleaning vehicle **16**, it is seen to comprise a main chassis **62** formed of longitudinally extending steel channels **64** welded to transversely extending channel-section cross beams **65**, **66**, **68** and **70**, the latter two serving as supports for a motor **72** for supplying

power for the suction and beating means. (See FIGS. 3, 7 and 8.) A housing **74** (for the motor **72**) having vertical and horizontal supports **76** and **78**, respectively, is mounted on the chassis **62** as shown. A drive shaft **80** attached to a pulley **82** furnishes power for a fan **84** and beater **86** by means of belts **88** and **90**, respectively. (See FIG. 3.)

The fan **84** is enclosed in a housing **92** and is supported on a shaft **94** which is rotated in a bearing **95** by a pulley **96** driven by the belt **88** operated from a clutch (not shown) and actuated by a clutch lever **97**. The beater **86** is enclosed in a housing **98** which is in communication with the housing **92** and is attached thereto by means of a tie rod **100** and nut **102**. The beater **86** is rotated by a belt **104** supported on pulleys **106** and **108**, power being furnished through a gear box **110** by a pulley **111** driven by the belt **90**. (See FIGS. 1 and 5.)

The chassis **62** for the cleaning vehicle **16** is attached to the chassis **19** of the driving vehicle **14** by a universal ball joint **112** attached to the cross beam **66** at the rear of the cleaning vehicle. The ball joint **112** is received in a socket **113** attached to a horizontal support **109** attached to the vertical supports **43** at the front of the driving vehicle chassis **19** and is retained in position by a lever (not shown) tightened by a knurled set screw **114**. The front of the cleaning vehicle is supported on two outrigger wheels **115** which rotate in forks **116** attached to outrigger bars **117** welded to plates **118** which slide within channels **119** welded to the sides of the housing **98**, the plates **118** being retained in position within the channels **119** by set screws **120**. (See FIGS. 1, 2, 5 and 6.)

Means are also provided to adjust the height of the front of the cleaning vehicle **16** with respect to the driving vehicle **14**. A crank **122** is attached to the top of an internally threaded sleeve **124**, which is attached to a vertical support **76** by a flange **126** attached to a cross beam **128**. Rotation of a nut (not shown) within the sleeve **124** moves the cleaning vehicle chassis **62** vertically upon a threaded shaft **130**, the lower end **131** of which is welded to a stabilizing angle **132** supported on a plate **134** on the driving vehicle chassis cross beam **23**. (See FIGS. 3, 7 and 8.) The plate **134** serves to reduce the friction between the angle **132** and the cross beam **23**. The angle **132** limits the amount of rotation of the cleaning vehicle chassis **62** about the lower end **131** of the shaft **130** which would otherwise occur due to the point support provided.

A guide plate **136** is welded to each of the channels **64** to limit the amount of sidewise movement of the cleaning vehicle chassis **62** about the universal joint **18** by their contact with the channels **20** of the driving vehicle chassis **19**.

The fan **84** is adapted to draw air through the opening **99** of the beater housing **98**, thereby to reduce the air pressure in the region of the opening **99**. The fan **84** exhausts the air through a duct **140** into a flexible conduit **142** and thence into a screen-covered receptacle **144** for rubbish mounted on the rear of the driving vehicle **14**. (See FIGS. 1 and 2.) A bypass **146** controlled by a flap **148** and control rod **150** permits the fan **84** to exhaust directly to the atmosphere bypassing the receptacle **144**, should this be desired. (See FIGS. 1 and 4.)

The beater **86** consists of a central shaft **152** to which are attached cylinders or "fingers" **154** of flexible rubber as shown in FIGS. 3 and 5. The shaft **152** rotates in a bearing **156** attached to a support angle **158**, the height of which is vertically adjustable with respect to the housing **98** by being adjustably attached to a guide plate **160** by bolts **162**. (See FIGS. 5 and 6.) The bottom of the housing **98** is provided with a skirt **164**, the front piece **166** of which is also vertically adjustable. A linkage **168** consisting of an actuating rod **170** supported by brackets **172**, **173** attached to the housings **98** and **74**, respectively, rotates a bell crank **174** about a pivot point **176** to lift a horizontal cross member **177** attached to rods **178** disposed within cylindrical guides **180**. The rods **178** are attached to a channel **182** affixed to the front skirt **166**, thereby to permit adjustments in height as desired.

FIGS. 9 and 10 show a cleaner constructed in accordance with a different embodiment of the present invention. Where the cleaner is to be used to clean flat level areas exclusively, such as parking lots, the outrigger wheels **115** and their supports can be eliminated entirely. FIGS. 9 and 10 show the height of the front of the cleaning vehicle **16** adjusted by the crank **122** to a position such that the opening **99** of the housing **98** clears the surface S by a fixed amount. The opening **99** is then maintained in this fixed position with respect to the driving vehicle **14**, which position will be adequate for completely level areas. The embodiment shown in FIGS. 9 and 10 is also provided with a cyclone type of receptacle **184**. Debris drawn through the opening **99** by the fan **84** is transmitted through the duct **140** into the conduit **142**, through a duct **186** and thence under a perforated cone **188** disposed within the cyclone receptacle **184**. Rubbish, leaves and other debris remain in the bottom of the receptacle, the air exhausting through the perforations **190** into the atmosphere.

In the foregoing description, the invention has been described with reference to certain particular preferred embodiments, although it is to be understood that the specific details shown are merely illustrative and that the invention may be carried out in other ways without departing from the true spirit and scope of the following appended claims.

I claim:

1. A cleaning apparatus, comprising a driving vehicle; a beam extending longitudinally of said driving vehicle; a cross beam attached to said longitudinally extending beam, said longitudinally extending beam and said cross beam forming a chassis for said driving vehicle; a pair of driving wheels journaled one one each side of said driving vehicle chassis at the front thereof; a bracket attached to said driving vehicle chassis at the rear thereof; a fork rotatably attached to said bracket; a wheel journaled in said fork for steering said driving vehicle; a housing mounted on said driving vehicle chassis; a motor mounted on said driving vehicle chassis within said driving vehicle housing and connected to drive at least one of said driving wheels; means attached to said driving vehicle chassis connected to said fork for rotating the same to steer said driving vehicle; a cleaning vehicle positioned in front of said driving vehicle, said cleaning vehicle having a chassis separate from said driving vehicle chassis; a ball attached to the rear of said cleaning vehicle chassis; a socket attached to the front of said driving vehicle chassis; means to retain said ball rotatably within said socket to articulate said cleaning vehicle chassis to said driving vehicle chassis to permit said cleaning vehicle to rotate, pitch and yaw with respect to said driving vehicle; a housing mounted on said cleaning vehicle chassis having a lower opening therein disposed substantially parallel to the surface to be cleaned; a fan disposed in said cleaning vehicle housing for reducing the air pressure in the region of said lower opening; a rotatable shaft mounted within said cleaning vehicle housing, the axis of said shaft being parallel to said lower opening, said shaft being vertically adjustable with respect to said lower opening; a plurality of flexible fingers attached to said shaft and adapted to contact said surface to be cleaned; a motor mounted on said cleaning vehicle chassis within said cleaning vehicle housing and connected to drive said fan and rotate said shaft; a pair of outrigger wheels journaled one on each side of said cleaning vehicle chassis at the front thereof for supporting the same above said surface to be cleaned, said outrigger wheels being vertically adjustable with respect to said surface; a skirt disposed about said lower opening in said cleaning vehicle housing, said skirt having a front piece, said front piece being vertically adjustable with respect to said lower opening; a receptacle for rubbish mounted on said driving vehicle; and a flexible conduit connecting said receptacle with the interior of said cleaning vehicle housing, whereby rubbish agitated by said flexible fingers and drawn into said cleaning vehicle housing by said re-

duced air pressure caused by said fan is transferred to said receptacle.

2. A cleaning apparatus as described in claim 1, further comprising a bypass duct in communication with said cleaning vehicle housing, and means to close off said flexible conduit to permit said fan to exhaust directly to the atmosphere.

3. A cleaning apparatus as described in claim 1 in which said flexible fingers are rubber fingers.

References Cited

UNITED STATES PATENTS

2,248,012	7/1941	Phillips.	
2,663,894	12/1953	Elliotte	15—340
2,700,863	2/1955	Etem.	
2,945,254	7/1960	Boissonnault	15—340 XR
3,087,187	4/1963	Hank et al.	15—340
3,186,021	6/1965	Krier et al.	15—340

ROBERT W. MICHELL, *Primary Examiner.*