United States Patent [19]

Gledhill

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[54] LEAF COLLECTOR

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[52] **U.S. Cl.** **15/340,** 15/359

[51] **Int. Cl.** **A47l 5/00**

[58] **Field of Search** ..... 15/318 R, 312 A, 319, 340, 15/359

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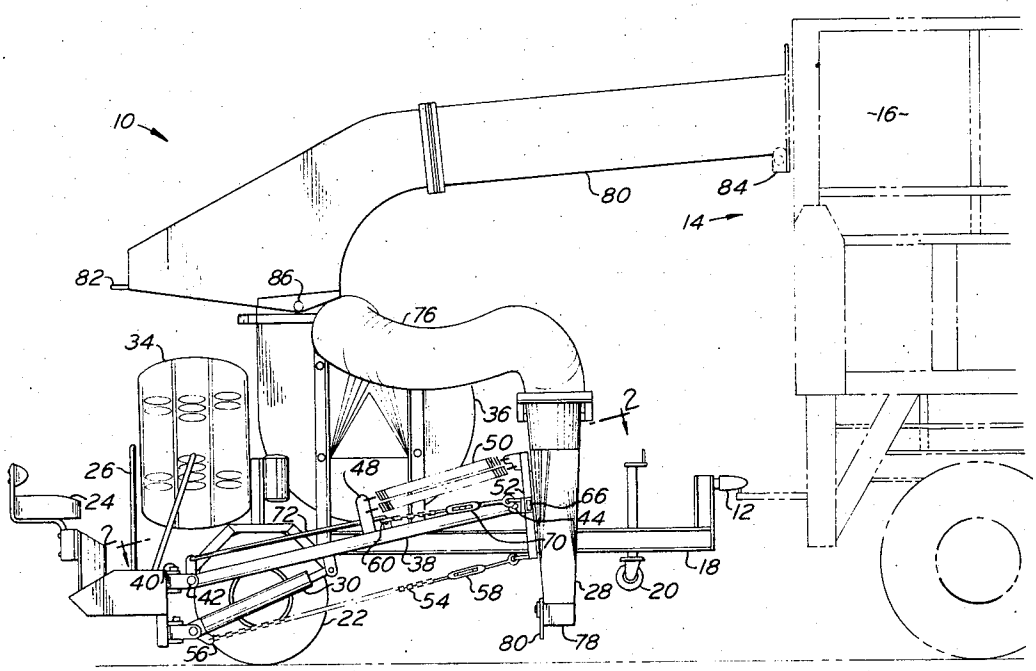
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[57] **ABSTRACT**

Leaf collecting apparatus including a nozzle positioned close to the ground to serve as an inlet for leaves which are conducted through appropriate ducting to a refuse container. A conventional blower is used to apply a vacuum for sucking the leaves into the nozzle. Hydraulically actuated piston and cylinder combinations are used for adjusting the location of the nozzle both vertically and horizontally to position it for effective operation. Means are also provided for allowing the nozzle to pivot about both a horizontal and vertical axis when said nozzle encounters an obstruction. Biasing means are provided for automatically returning the nozzle to its adjusted position after the nozzle moves away from the obstruction.

10 Claims, 5 Drawing Figures



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SHEET 1 OF 3

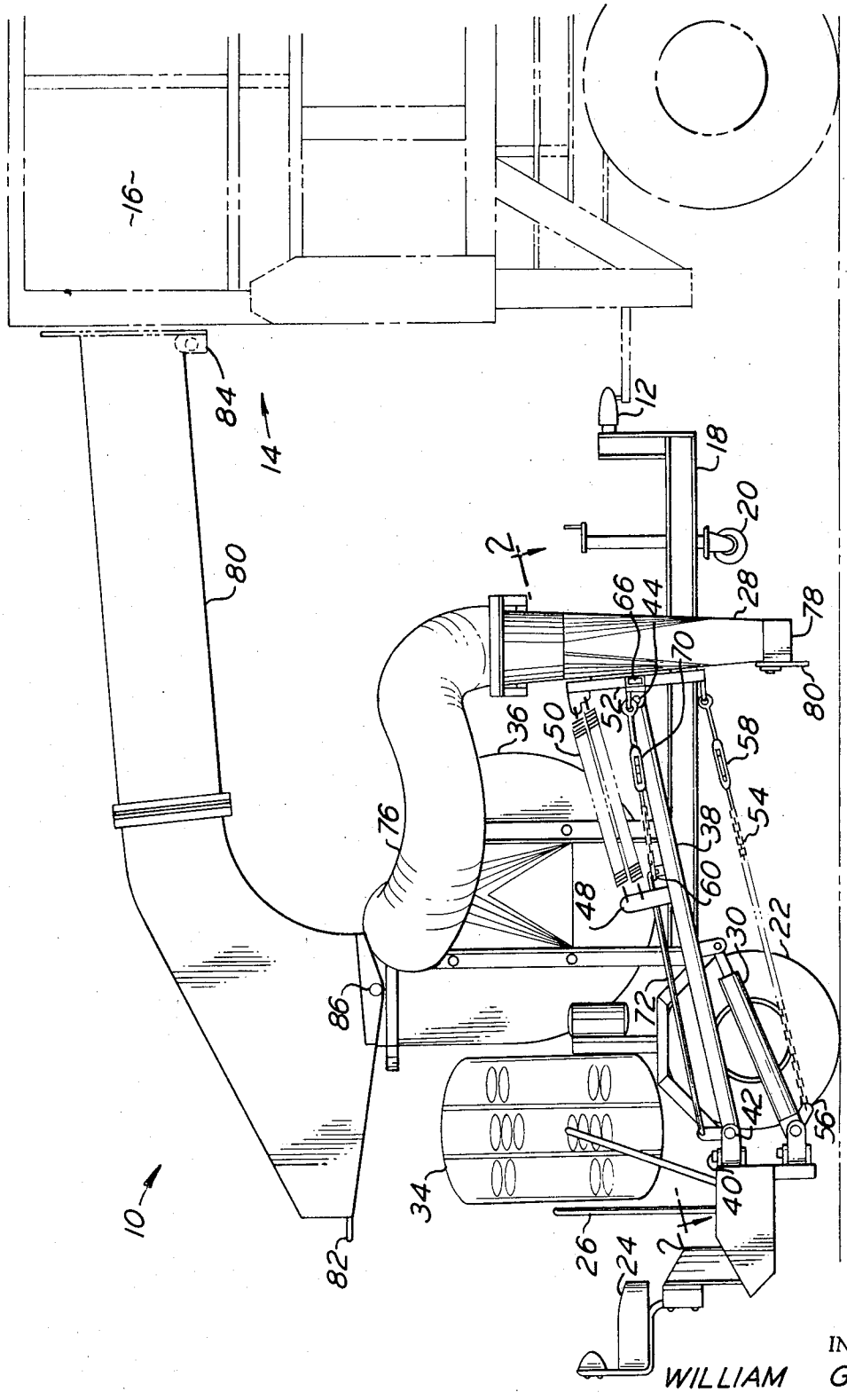


FIG. 1

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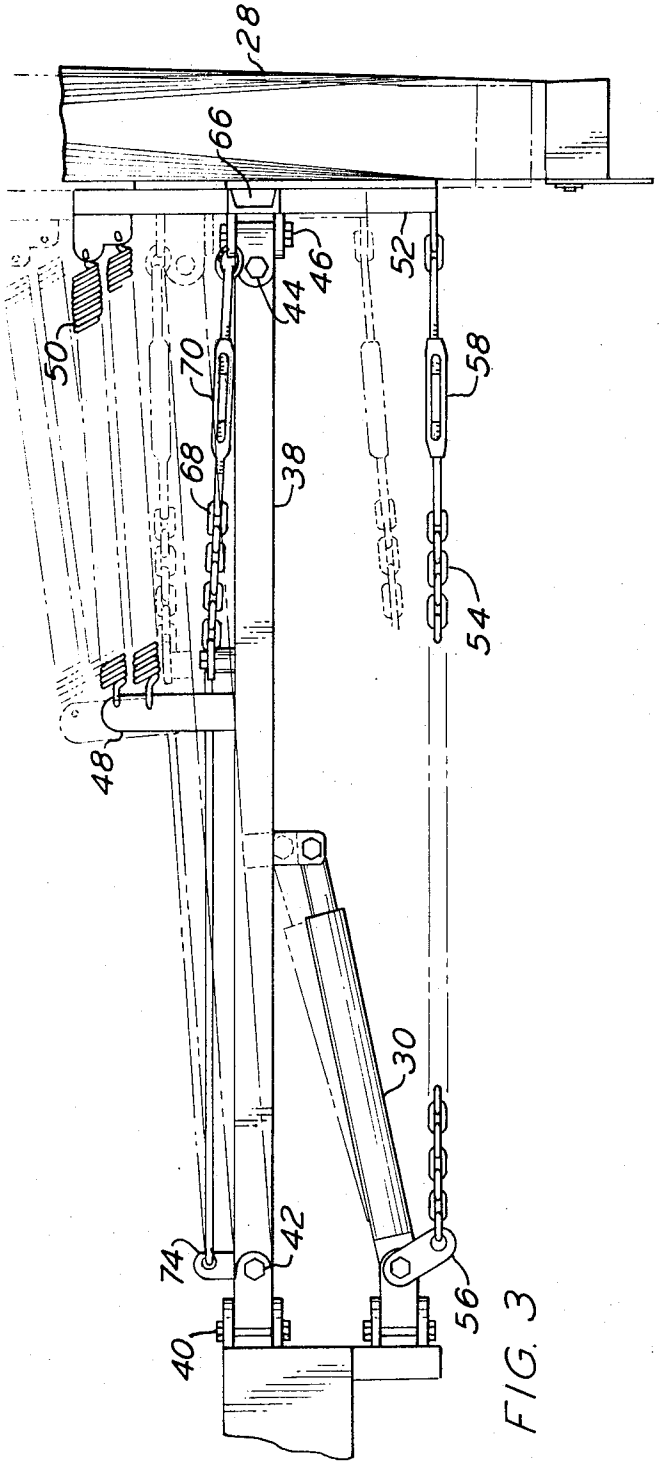


FIG. 3

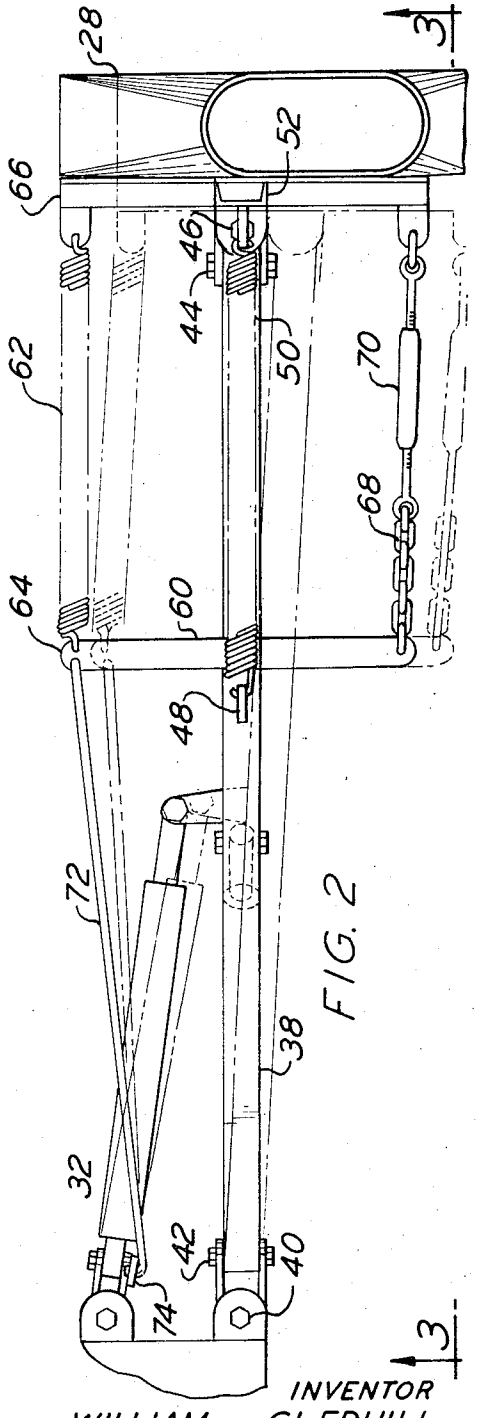


FIG. 2

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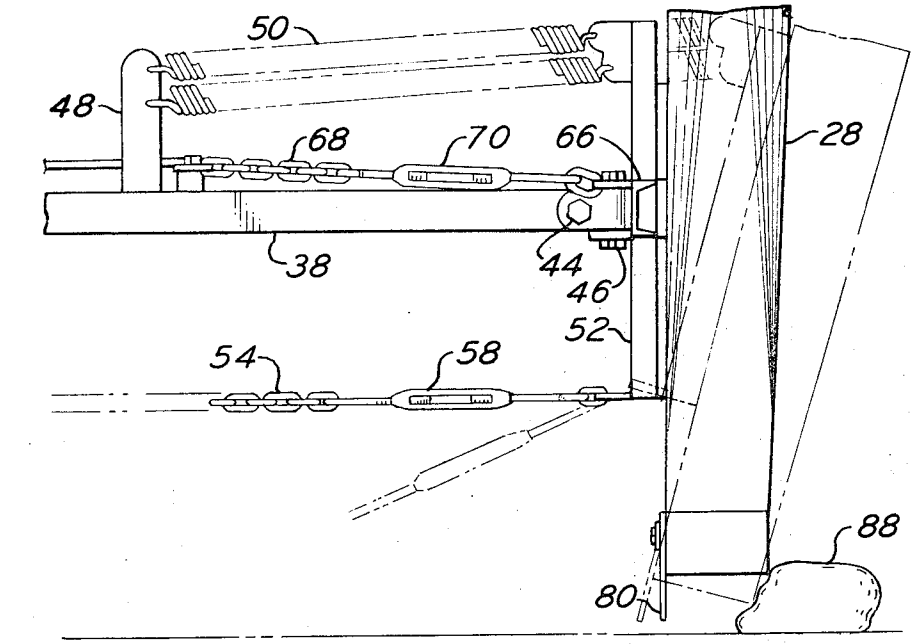


FIG. 4

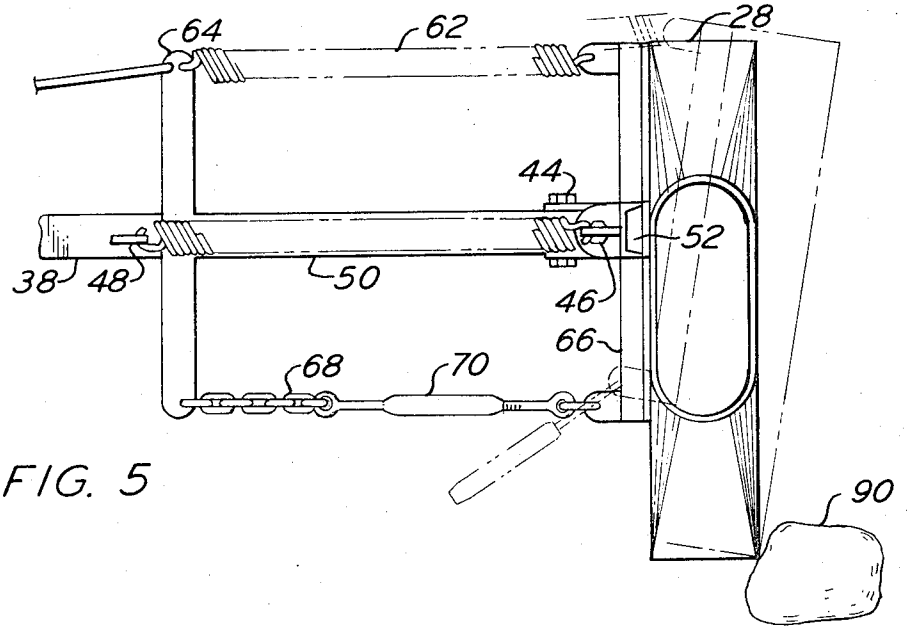


FIG. 5

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LEAF COLLECTOR

BACKGROUND OF THE INVENTION

In the fall of the year, leaves falling from trees collect on the streets of a city and particularly in the gutters. Commercial means for picking up such leaves and other debris include a combination of rotating brushes and/or a blower to draw a vacuum within a nozzle positioned to pick up the leaves. These devices are effective in certain locations and under certain specified circumstances. However, they often use more power than necessary for an efficient collection of leaves and other debris and in addition, they are often constructed so rigidly that when they encounter obstructions such as fences, curbs, trees, telephone poles and stones in the road, both the equipment and the obstruction are damaged.

The need in the art is for a lightweight piece of equipment which may be attached to or mounted on a standard dump truck body, which may be adjusted vertically and horizontally to provide more efficient pick up of the leaves and which is sufficiently flexibly mounted that it will not damage either the equipment or such obstructions as may be encountered in the roadway.

BRIEF DESCRIPTION OF THE INVENTION

A mobile unit or trailer is mounted behind a conventional dump truck or trash collection truck as will be found in most municipalities. Mounted on the mobile unit is a blower and motor unit with the blower connected to ducting means.

A nozzle is adjustably supported with its inlet close to the ground for receiving fallen leaves. The blower is indirectly connected to the nozzle and serves the purpose of drawing a vacuum to suck leaves in through the nozzle and the ducting. Downstream of the blower is additional ducting which conducts leaves from the blower to a container mounted on the truck bed.

The nozzle is mounted on a pivotable arm connected to the mobile unit. Piston-cylinder combinations connected to both the arm and the mobile unit may be actuated hydraulically to control the position of the nozzle causing it to raise or lower or move right or left. For convenience, the hydraulic actuation is controlled by an operator riding on the mobile unit who has access to airplane type stick controls for directing the movement of the nozzle.

The connection between the nozzle and the support arm is designed to allow the nozzle to pivot both vertically and horizontally with respect to said arm. Such pivoting is caused only by the nozzle encountering obstructions in the roadway or alongside the roadway. An example of this might be a large stone, a tree or a telephone pole. The pivotable connection is arranged whereby an obstruction such as a rock encountered by the nozzle will cause the nozzle to pivot rearwardly at its lower end and rise up over the rock at which time spring means will automatically pull the nozzle back into its original operative position. Obstructions encountered such as trees alongside the road will cause the nozzle to pivot to the side about a vertical axis whereby the side encountering the obstruction will twist rearwardly out of line and allow the obstruction to pass. Then, as before, spring means will pull the nozzle back into its original operative position.

Unique spring-chain combinations used in this invention allow vertical and horizontal adjustment of the nozzle while always maintaining the nozzle in a plane substantially perpendicular to the direction of motion of the mobile unit to keep the widest portion of the nozzle exposed to the road bed to collect the largest portion of leaves possible.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevational view of the mobile unit connected to a truck and showing the leaf collecting apparatus generally in operative position.

FIG. **2** is a plan view of the horizontal adjusting apparatus for the nozzle.

FIG. **3** is an elevational view taken along line 3—3 of FIG. **1** and showing the vertical adjusting apparatus for the nozzle.

FIG. **4** is an elevational view of the nozzle as it strikes an obstruction in the road and showing in phantom the pivotable movement of the nozzle.

FIG. **5** is a plan view of the nozzle striking an obstruction in the road and in phantom pivoting out of the way of said obstruction.

PREFERRED EMBODIMENT

Referring to FIG. **1**, a trailer or mobile unit **10** is attached by a conventional hitch **12** to the rear of a truck **14**. The truck may be a conventional dump truck or trash collecting truck as are used by many municipalities. In this case, a container **16** is mounted on the rear of the truck for receiving leaves as will be explained subsequently.

The mobile unit or trailer includes a frame **18**, a retractible balance wheel **20**, two support wheels **22** and a seat **24** for the operator of the leaf collecting equipment. An operator on seat **24** will have a single airplane type control stick **26** which will allow him to control the position of leaf collecting nozzle **28**. The stick **26** controls the flow of hydraulic fluid both to and from a pair of pistons **30** and **32**. One piston-cylinder combination **30** is designed to control the vertical location of the nozzle **28**. The second piston-cylinder combination **32** is designed to control the location of nozzle **28** in a horizontal direction.

Certain conventional equipment is also mounted on the mobile unit **10** such as a drive motor **34** and a blower **36**. Motor **34** drives the blower apparatus **36** by means of conventional pulleys and V-belts. No particular showing of this conventional mechanical device appears necessary as it forms no part of the invention.

A support arm **38** is connected at one end to the trailer **10** and at its other end to the nozzle **28**. The connection at the mobile unit **10** is designed to allow the arm **38** to pivot about a vertical axis in the form of a pin **40** and at the same time about a horizontal axis in the form of a pin **42**.

Similarly, the connection between the arm **38** and the nozzle **28** allows the nozzle to pivot relative to the arm both about a horizontal axis in the form of a pin **44** and about a vertical axis in the form of a pin **46**. The reason for the two unique connections at the ends of the support arm **38** will be explained subsequently.

Intermediate the end of the support arm **38** is a vertically extending bar **48**. Two springs **50** have one end attached to the bar **48** and their other ends attached to a

channel 52 rigidly connected to the nozzle 28. Thus connected, the springs 50 bias the nozzle toward rotation in a counterclockwise direction as viewed in FIG. 1. A limitation on the counterclockwise rotation is provided by a chain 54 which is connected both to the channel 52 and the mobile unit at 56. As can be seen, the springs 50 pull the nozzle 28 such that it pivots about the pin 44 until the slack is taken up in chain 54. At that point the rotation ceases and the turnbuckle 58 is manually adjusted until the nozzle 28 is substantially in a vertical position.

Similar structure is provided for the biasing of the nozzle 28 when pivoted about the vertical pin 46. Bar 60 is connected to extend substantially horizontal with respect to the ground and perpendicular to the support arm 38. A spring 62 is connected to one end of the bar 60 at 64 and the other end of the spring is connected to another bar 66 which is rigidly affixed to the nozzle 28. A chain 68 and turnbuckle 70 are connected to the opposite end of the bar 60 at 66 to form substantially a parallelogram.

The bar 60 is pivotable with respect to the support arm 38 and a rod 72 is connected to bar 60 at 64. The rod 72 is also connected to the mobile unit at 74 for maintaining the nozzle 28 substantially perpendicular to the line of movement of said nozzle when it is collecting leaves.

Prior art devices have not had the adjustability in vertical and horizontal directions to the extent allowed by the described invention.

OPERATION

In the collection of grass, leaves or other debris which may be lying in the gutters or alongside the road, a conventional truck 14 is provided with a container 16 on its bed for the collection of leaves. A motor 34 and blower 36 combine to draw a vacuum in flexible ducting 76 which sucks the debris through the mouth 78 of the nozzle 28. A flange 80 may be used as a scraper to a certain extent to dislodge leaves from the ground. It will be understood, however, that very little scraping can be done with flange 80 because of the tilting factor built into the nozzle. Of the more important functions of flange 80, one is to direct the flow of leaves as they leave the ground and another is to enhance the vacuum forward of the nozzle mouth 78. Leaves drawn in through mouth 78 of the nozzle pass through the ducting 76 to the blower 36 and subsequently to ducting 80 connected to the rear of container 16.

This mobile unit is particularly designed for quick connection and disconnection to the truck 14. This allows a single leaf collecting unit to serve two or more trucks. While one truck is towing the leaf collecting unit, the other is traveling to a refuse dump to discharge the collected materials from container 16 and return to the leaf collecting street. After one truck returns the other can be disconnected and the sequence continued. To accelerate the disconnecting process, a conventional quick connect hitch is located at 12 and the ducting 80 may be disconnected by simply pulling handle 82. The ducting 80 will rise out of a channel 84 without additional locking or unlocking operations. Since the speed of the operation is important, the ducting 80 is designed to be mechanically balanced about a pivot point 86. This eases the work necessary by the operator.

Because the ground is uneven alongside roads and because it is desirable to run the bottom of flange 80 as close to the ground as possible, it will be understood that continually adjusting the height of the nozzle 28 is important to the maximum efficiency of the equipment. An operator at seat 24 can use the hydraulic control lever 26 to move the nozzle 28 up or down or right or left as may be needed as the mobile unit moves. The particular hydraulic control mechanism including the pumps and valves for proper operation have not been shown and will not be described as they are conventional in operation.

Observing FIG. 1, should it be desirable to lower the nozzle 28, the handle 26 would be pushed forward. The pumps and valve combinations would actuate the piston-cylinder combination 30 to shorten its length, thereby pivoting support arm 38 downwardly about pin 42. This is illustrated in FIG. 3 in phantom. Because this pivoting tends to shorten the distance between the nozzle and the point of connection 56 for the chain 54, the chain will tend to go slack. The slack will be taken up by the springs 50 which will pivot the nozzle in a counterclockwise direction about pin 44. This slight automatic adjustment will maintain the nozzle substantially vertical and enhance leaf collection. It is obvious that without the pivot pin 44 and the particular cooperative relationship between the chain 54, its connection point 56 and the springs 50 that the nozzle would be inclined slightly backward and the efficiency of the apparatus would not be quite so great as it is with the described automatic adjustment.

Because the mechanical operation and cooperative relationships for maintaining the mouth 78 of the nozzle 28 substantially perpendicular to the direction of movement of the mobile unit is substantially the same as described in the paragraph immediately above, the cooperative relationships between the connection point 74, the rod 72, the spring 62 and the chain 68 will not be described in detail.

FIG. 4 illustrates the reaction of the apparatus upon striking an obstruction in the road, for example, a stone 88. When the stone 88 is encountered the nozzle 28 pivots about the pin 44 while the springs 50 stretch. The chain 54 goes slack as the mobile unit moves forward, the nozzle 28 will ride up and over the stone and when it passes the stone, it will be pulled back into place by the springs 50; and as previously stated, it will be limited in its forward pivoting by the chain 54. This particular mechanism for allowing pivoting of the nozzle prevents damage to the same. It is obvious that if the nozzle 28 were rigid and the stone 88 sufficiently large, as for example might be found in a large pile of leaves, the mouth 78 of the nozzle might be deformed and partially closed. The impaired efficiency of the nozzle might require replacement or repair.

FIG. 5 illustrates the operation of the unit when an obstruction is encountered along the right side of the nozzle. The obstruction in this case is numbered 90 and might be a stone, tree, telephone pole or fence. Upon striking the obstruction 90, the nozzle 28 rotates about a vertical axis, namely, pin 46 while the spring 62 stretches and chain 68 goes slack. When the mobile unit is past the obstruction 90, the spring 62 rotates the nozzle back into place and the rotation is limited by the chain 68.

While FIGS. 1 and 5 show the only allowable rotation about a vertical axis 46 to be from the right side as viewed by an operator on seat 24, it is clear that this is the only side that would logically have obstructions in its path. Clearly, if the obstruction were on the left side, it would be encountered by the truck 14 before the nozzle 28 ever arrived at the obstruction. The operating mechanism is easily reversible to the left side of the mobile unit 10, if desired, but the same concepts outlined above would be operable.

While the inventor has limited his description to a single embodiment, it is to be understood that the terminology employed in describing the invention is not intended to be limited as modifications would be obvious to those having ordinary skill in the art. It is intended that the only limitations on this invention be set out in the language of the claims.

I claim:

1. In leaf collecting apparatus including in combination, a duct connected to a nozzle, said nozzle having its inlet positioned close to the ground when in operative position,

means for causing the formation of a vacuum in said duct to suck leaves into said nozzle and through the duct for discharge at a specified location,

said nozzle and at least a portion of said duct being supported on a mobile unit, the improvement comprising:

hydraulically actuated means for adjusting the location of the nozzle vertically and horizontally into operative position,

said nozzle being supported on said mobile unit by means for allowing it to pivot about both a horizontal axis and a vertical axis when it encounters an obstruction,

spring biasing means for automatically returning the nozzle to its adjusted operative position after the nozzle moves away from the obstruction either by rotation about said horizontal axis, said vertical axis or both.

2. The leaf collecting apparatus of claim 1 wherein the spring biasing means for said vertical axis comprises a spring with its first end connected to one side of the nozzle and its second end connected to the mobile unit.

3. The leaf collecting apparatus of claim 1 wherein the spring biasing means for said horizontal axis comprises a spring with its first end attached to the nozzle and its second end attached to said mobile unit.

4. The leaf collecting apparatus of claim 2 wherein the spring biasing means for said horizontal axis comprises a spring with its first end attached to the nozzle and its second end attached to said mobile unit.

5. The leaf collecting apparatus of claim 4 wherein the nozzle is supported on a support arm connected to the mobile unit,

the connection between the mobile unit and the support arm including means for allowing the arm to pivot from said connection about both horizontal and vertical axes in response to the hydraulically actuated means.

6. The leaf collecting apparatus of claim 5 wherein the hydraulically actuated means comprises,

1. a first telescoped piston and cylinder combination, an end of one of the piston and cylinder combination being connected to the mobile unit and an end of the other being connected to the support arm between the mobile unit and the nozzle, and

2. a second telescoped piston and cylinder combination, an end of one of the second piston and cylinder combination being connected to the mobile unit and an end of the other being connected to the support arm,

said first and second combinations operating together to locate the nozzle in operative position.

7. The leaf collecting apparatus of claim 1 wherein the nozzle is supported on a support arm connected to the mobile unit,

the connection between the mobile unit and the support arm including means for allowing the arm to pivot from said connection about both horizontal and vertical axes in response to the hydraulically actuated means.

8. The leaf collecting apparatus of claim 7 wherein the hydraulically actuated means comprises,

1. a first telescoped piston and cylinder combination, an end of one of the piston and cylinder combination being connected to the mobile unit and an end of the other being connected to the support arm between the mobile unit and the nozzle, and

2. a second telescoped piston and cylinder combination, an end of one of the second piston and cylinder combination being connected to the mobile unit and an end of the other being connected to the support arm,

said first and second combinations operating together to locate the nozzle in operative position.

9. The leaf collecting apparatus of claim 1 wherein at least part of the duct is formed of flexible material.

10. The leaf collecting apparatus of claim 1 wherein the mobile unit comprises a trailer fixed to the rear of a truck,

said truck including a container to receive leaves,

the outlet end of said duct being positioned to discharge leaves into said container.

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