# United States Patent [19]

**Bell**

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[54] **STREET AND PARKING LOT CLEANER ATTACHMENT FOR VEHICLES**


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[52] **U.S. Cl.** ..... **15/340,** 15/354

[51] **Int. Cl.** ..... **A47l 9/00**

[58] **Field of Search** ..... 15/340, 354



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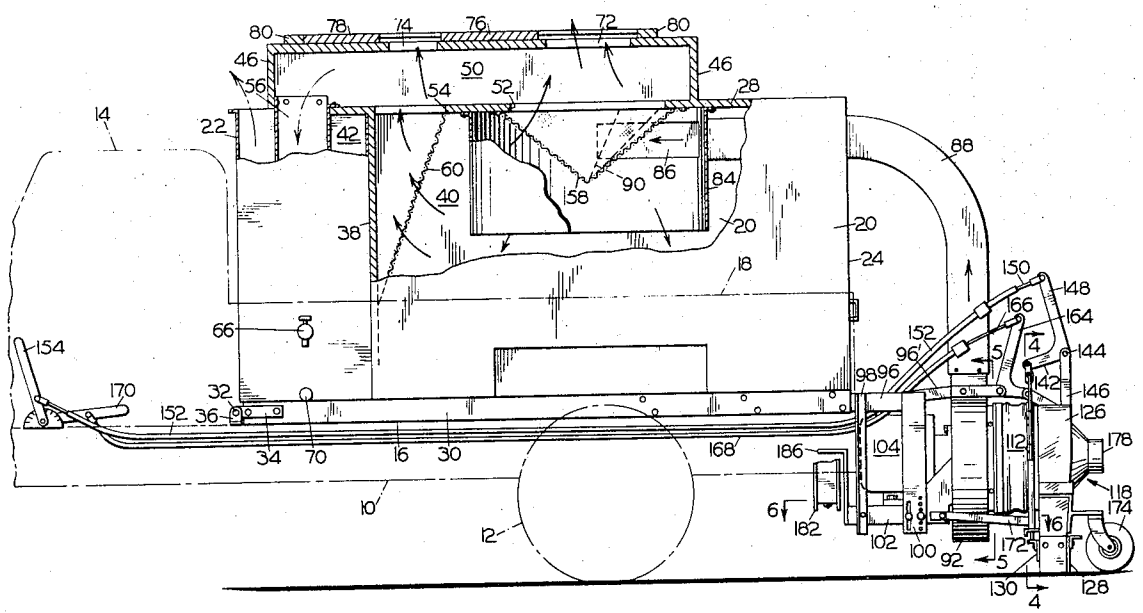
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[57] **ABSTRACT**

The bed of a pickup truck supports a refuse container having an inlet conduit from the outlet of a suction fan mounted rearward of the container. The screened air outlet of the container includes a scrubbing chamber adapted to contain water for removing dust from the exhaust air. The fan inlet communicates with a suction head which is vertically adjustable relative to a street or parking lot to be cleaned, by controls operable from the driver's compartment of the truck.


**3 Claims, 9 Drawing Figures**



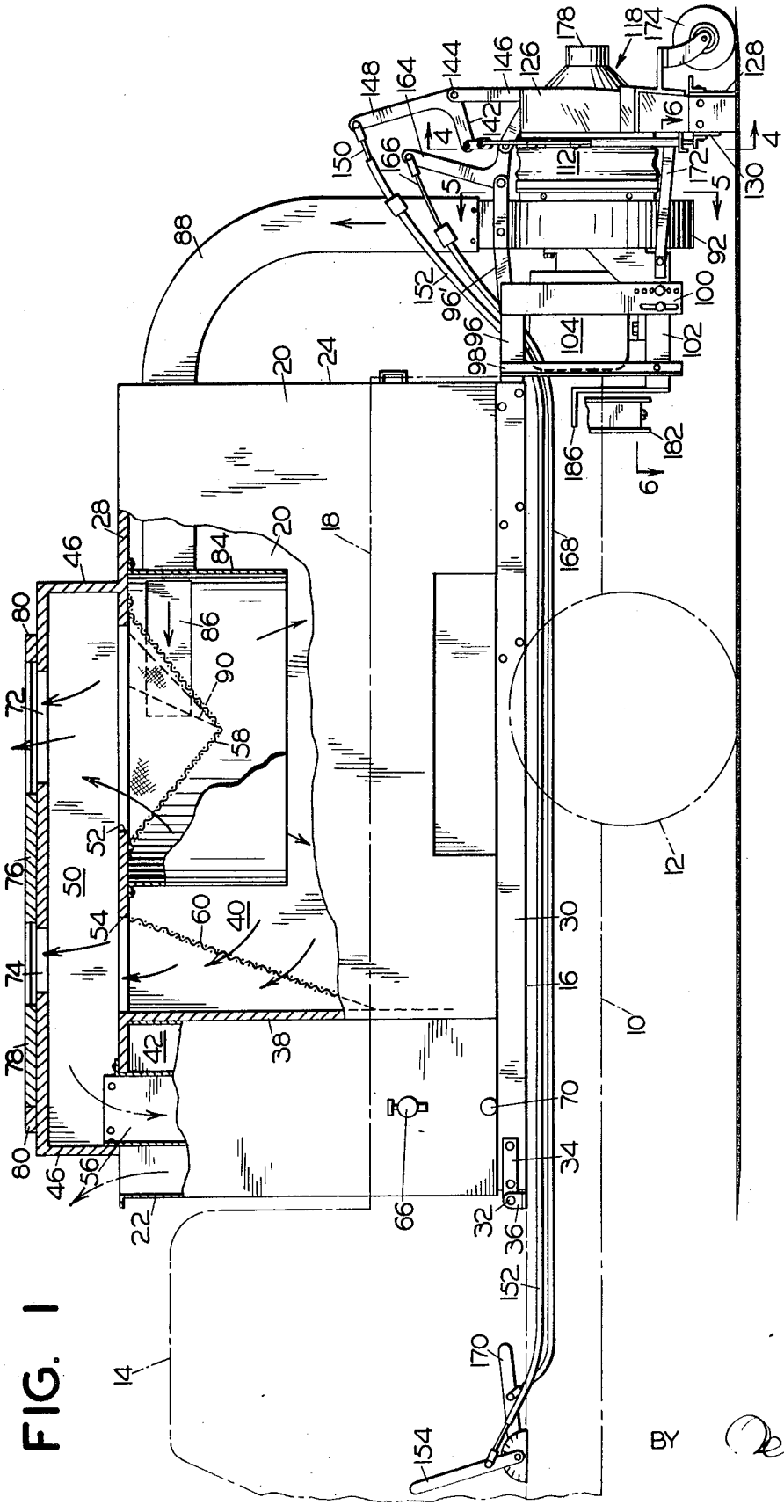


FIG. 1

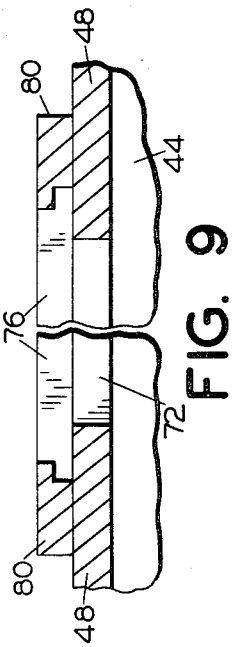


FIG. 9

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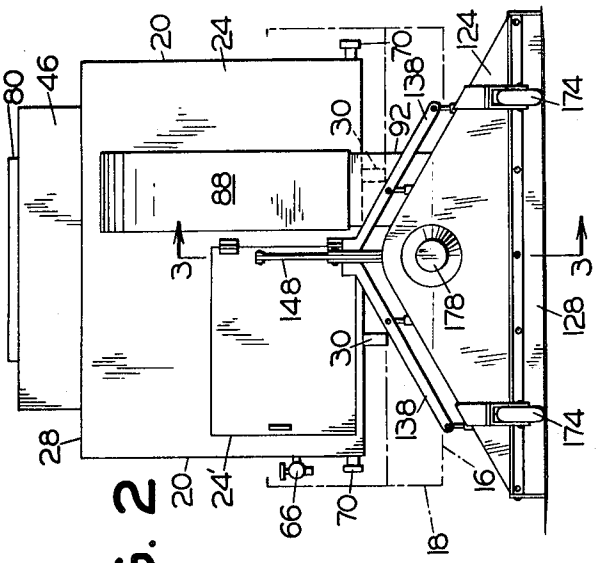



FIG. 2

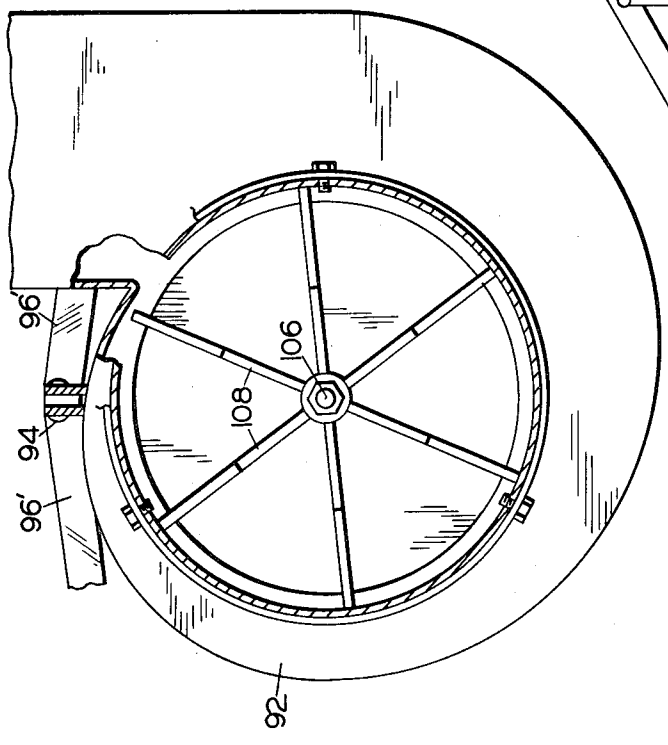



FIG. 5

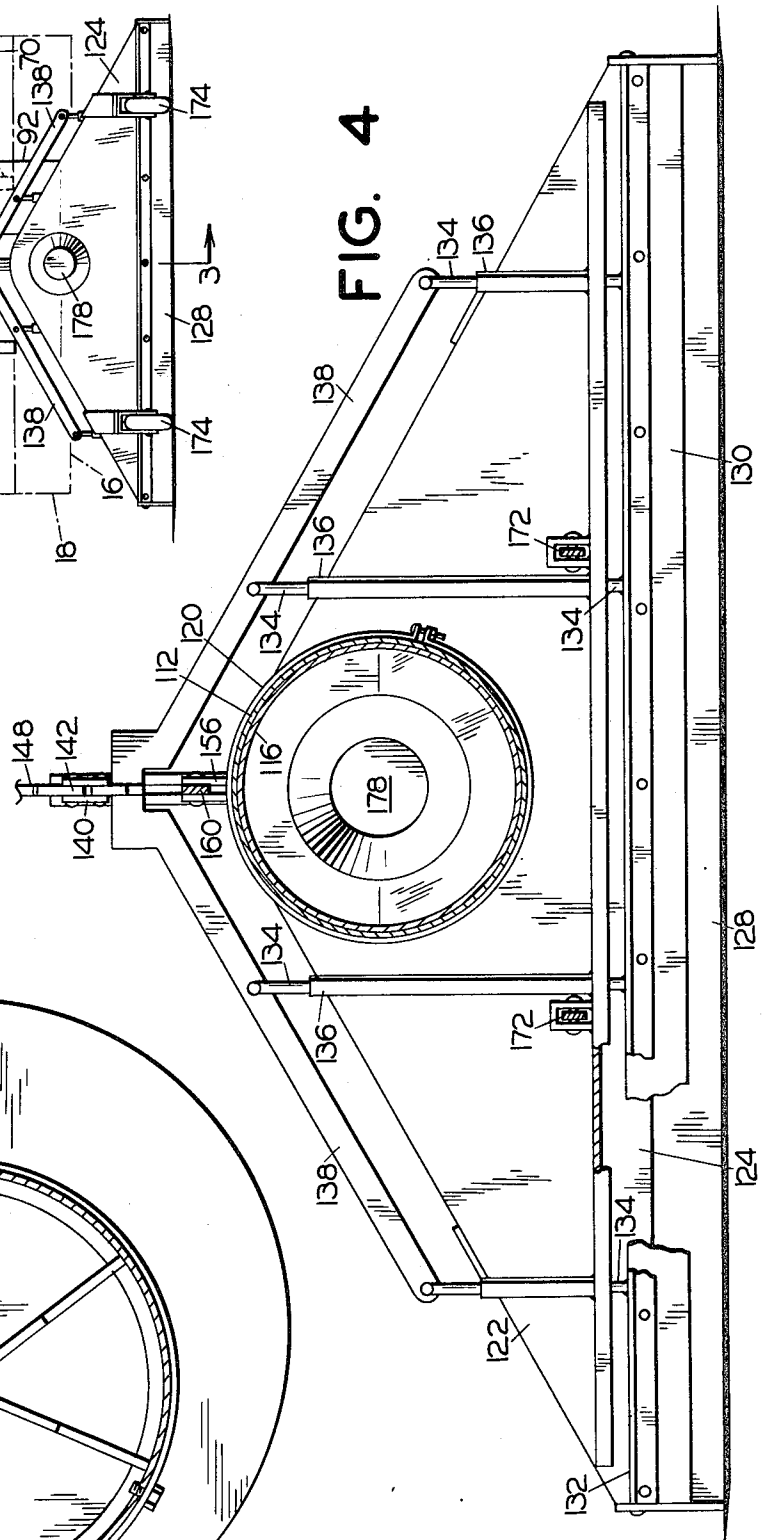



FIG. 4

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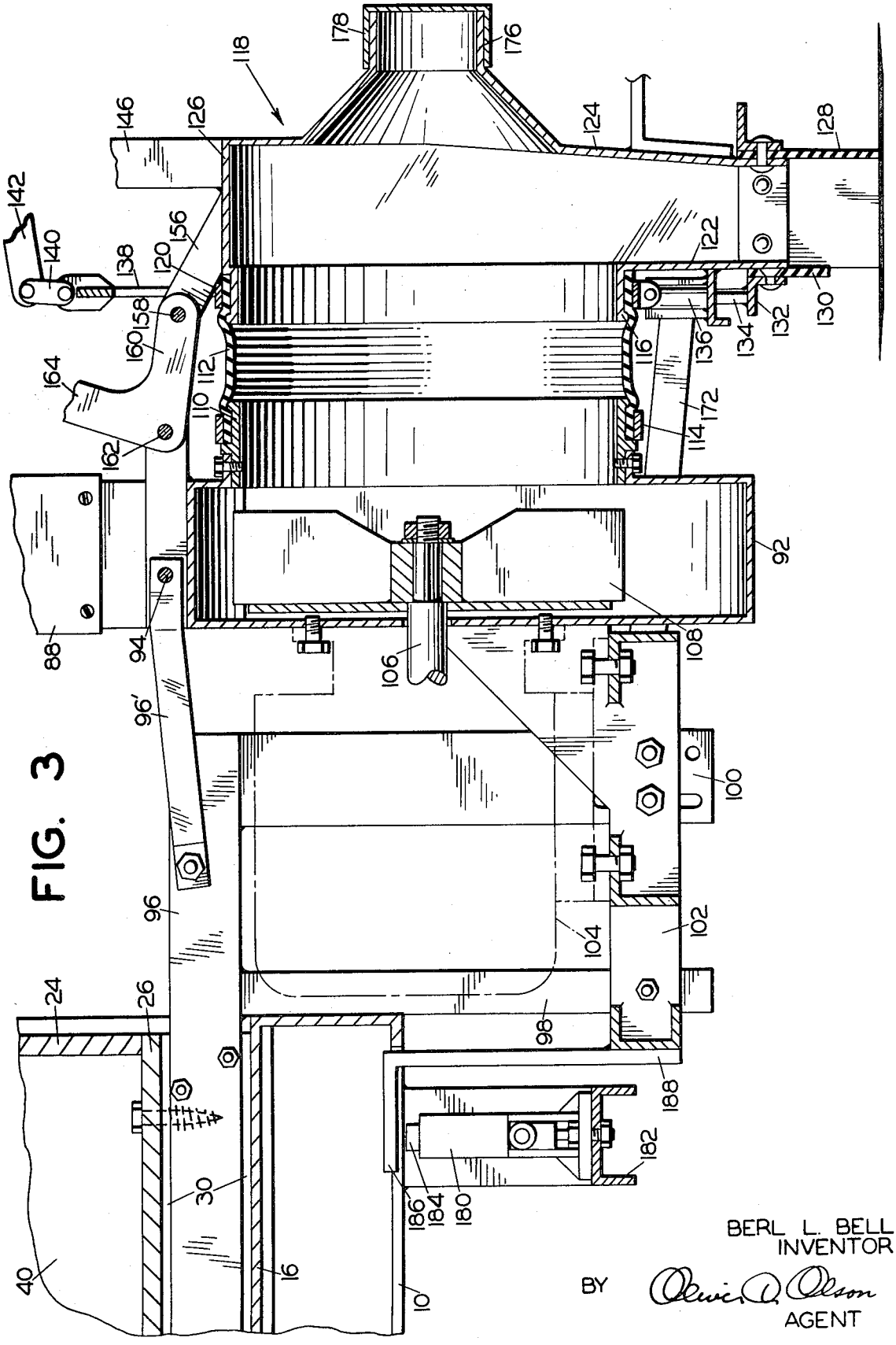



FIG. 3

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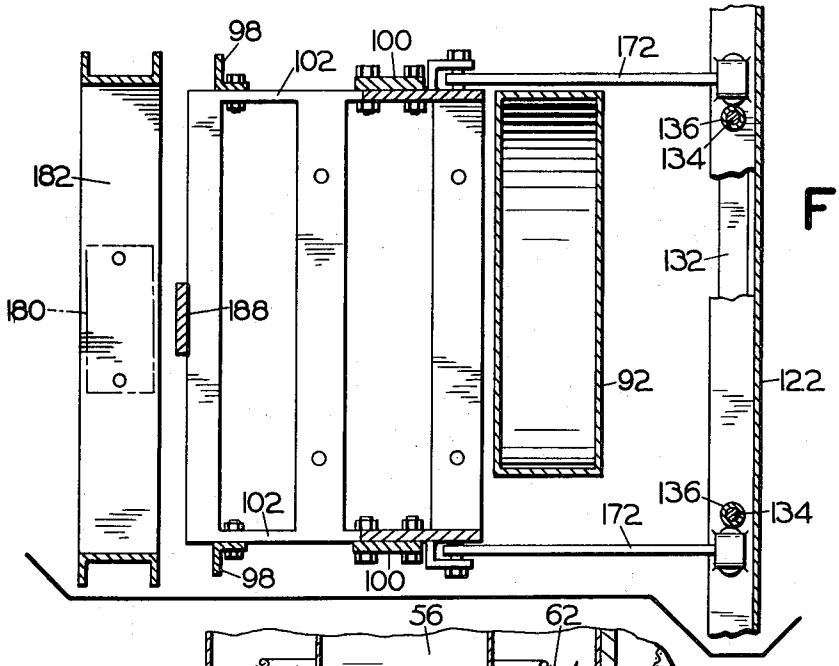



FIG. 6

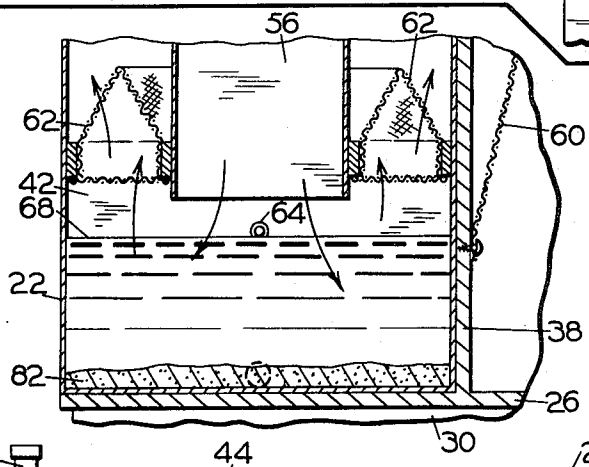
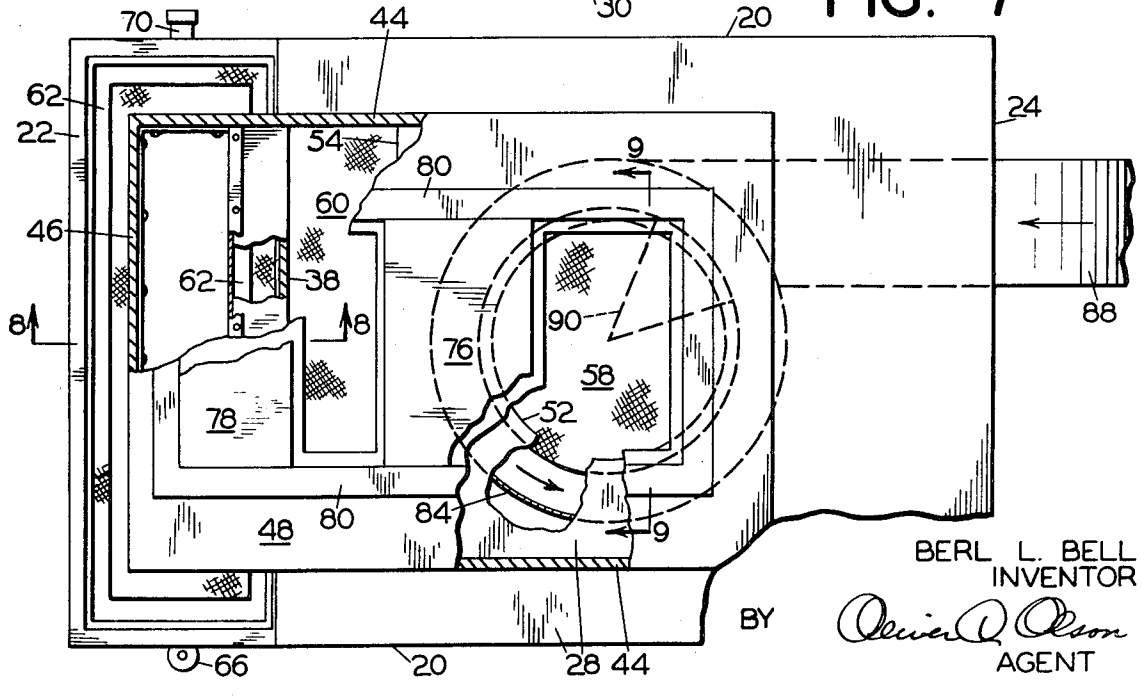



FIG. 8

FIG. 7




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# STREET AND PARKING LOT CLEANER ATTACHMENT FOR VEHICLES

## BACKGROUND OF THE INVENTION

This invention relates to street cleaning apparatus, and more particularly to street and parking lot cleaning apparatus which is intended for removable attachment to a small truck.

Street and parking lot cleaning equipment provided heretofore includes as an integral component a vehicle designed specifically for use only with the cleaner. The high cost of such equipment makes their purchase economically unfeasible for operators of parking lots, supermarkets, etc. Moreover, their high cost, limited maneuverability and slowness of operation are reflected in high service charges to such operators by the companies which offer such cleaning services.

## SUMMARY OF THE INVENTION

In its basic concept the present invention provides a street and parking lot cleaning attachment for removable mounting on a small truck, which attachment includes an integrated assembly of a source of vacuum, an adjustable vacuum head for lifting debris from streets and the like, and a refuse container for the collected debris.

It is by virtue of the foregoing basic concept that the principal objective of the present invention is achieved, namely to overcome the disadvantages of prior equipment, as enumerated hereinbefore.

Another important object of this invention is the provision of street and parking lot cleaning apparatus capable of being mounted removably on a truck whereby the latter may be used for other purposes when the attachment is removed.

Still another important object of the present invention is the provision of street and parking lot cleaning apparatus capable of being mounted upon a small truck for maximum maneuverability for effective cleaning of small and irregular areas as well as large areas.

A further important object of this invention is the provision of street and parking lot cleaning apparatus for removable mounting on a truck, which apparatus includes adjustment means by which the apparatus may be elevated with respect to a street when not in use, to accommodate easy and rapid movement of the truck.

The foregoing and other objects and advantages of this invention will appear from the following detailed description taken in connection with the accompanying drawings of the preferred embodiment.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary view in side elevation, partly in section, of street and parking lot cleaning apparatus embodying the features of the present invention, the same being shown mounted upon a pickup truck illustrated in broken lines.

FIG. 2 is an end elevation as viewed from the right in FIG. 1.

FIG. 3 is a fragmentary sectional view taken on the line 3—3 in FIG. 2.

FIG. 4 is a fragmentary sectional view taken on the line 4—4 in FIG. 1.

FIG. 5 is a fragmentary sectional view taken on the line 5—5 in FIG. 1.



FIG. 6 is a fragmentary sectional view taken on the line 6—6 in FIG. 1.

FIG. 7 is a fragmentary plan view, partly in section, as viewed from the top in FIG. 1.

FIG. 8 is a fragmentary sectional view taken on the line 8—8 in FIG. 7.

FIG. 9 is a fragmentary sectional view taken on the line 9—9 in FIG. 7.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

For purposes merely of illustration there is shown in broken lines in FIG. 1 a pickup truck which includes a frame 10 mounted on rear wheels 12, as well as front wheels (not shown), and which supports a forward driver's compartment 14 and a rear load carrying compartment defined by the bed 16 and side walls 18.

Supported removably on the bed of the load carrying compartment of the truck is a hollow housing defined by the side walls 20, front wall 22, rear wall 24, bottom 26 and top 28. A hinged door 24' is provided in the rear wall to gain access to the interior of the housing. A base frame 30 is interposed between the bottom and the truck bed. The base frame is secured to the truck bed removably by such means as the anchor bolts 32 which extend through aligned openings in the lapping ends of brackets 34 and 36 secured to the base frame 30 and truck frame 10, respectively, preferably adjacent the front ends of the opposite lateral sides of said frames.

An intermediate transverse wall 38 in the housing divides the latter into two longitudinally spaced compartments, namely a rear refuse collecting compartment 40 and a front dust scrubber compartment 42. Communication between these compartments is provided by an auxiliary housing defined by the side walls 44 (FIG. 7), end walls 46 and top 48. The side and end walls are sealed to the top wall 28 of the main housing, whereby the auxiliary housing provides a passageway 50 (FIG. 1). This passageway communicates with the collecting chamber 40 through the openings 52 and 54 in the top 28, and with the scrubbing chamber 42 through the hollow duct 56. This duct terminates at its open lower end a spaced distance above the bottom 26, for purposes explained more fully hereinafter.

The opening 52 in the top is covered with the conical screen 58. The other opening 54 in the top is protected by the sheet screen 60 which extends angularly upward from adjacent the bottom of the intermediate wall 38 to the rearward edge of the opening. These screens serve to prevent particles of debris from being blown through the openings, and the arrangements of the screens are such as to inhibit collection of debris on the screens.

An annular screen 62 (FIG. 8) is interposed between the duct 56 and the walls of the scrubbing chamber 42. This screen is of smaller mesh than the first mentioned screens 58 and 60 and serves to prevent smaller particles of debris which have passed through the latter screens from being blown into the atmosphere.

Water may be introduced into the scrubbing chamber through its open top by a garden hose connected to a source of water. A conduit 64 extends through the wall of the scrubbing chamber 42 and is provided at its outer end with a shut off valve 66. The valve serves to drain water from the chamber to the level of the conduit which defines the preferred max-

imum level 68 (FIG. 8) of water in the chamber. One or more drain conduits 70 communicate with the bottom of the chamber and extend outwardly therefrom for draining the chamber.

Openings 72 and 74 in the auxiliary housing top wall 48 are removably closed by doors 76 and 78 slidable in the overlying frame 80. Adjustment of the openings serve to vary the amount of air delivered to the scrubber chamber 42. Thus, if the street to be cleaned is very dusty, the openings 72 and 74 are closed to direct all of the exhaust air through the scrubbing chamber. Dust 82 (FIG. 8) is collected in the water bath and is removed periodically by agitating the water to disperse the dust therein and then draining the mixture through the drain conduit 70.

Depending from the top wall 28 within the refuse collecting chamber is a hollow cyclone separator defined by the cylindrical wall 84. An elongated opening 86 in the cylinder communicates with the outlet end of a duct 88 which is arranged tangential to the cylinder (FIG. 7). As is well known, this arrangement provides for the centrifugal separation of particles of debris entrained in the air stream emitted from the duct, whereby the particles of debris drop downward from the cylinder into the collecting chamber. An arcuate protector plate 90 covers the portion of the screen 58 facing the opening 86 to prevent damage to the screen by solid particles of debris ejected into the cylinder 84.

The duct 88 extends rearward through the housing and thence downward for connection of its inlet end to the outlet of a suction fan housing 92. The fan housing is supported at its upper end by the pin 94 (FIG. 3) supported between the laterally spaced links 96' extending from the frame members 96 projecting rearwardly from the base frame 30. Downwardly extending frame members 98 and 100 on the members 96 support a motor mount 102 for vertical adjustment relative thereto. A drive motor 104, such as a small internal combustion engine, is supported on the motor mount and preferably also is secured to the fan housing. The adjustability of the motor mount accommodates the support of motors of various types and sizes and also affords vertical adjustment of the fan housing 92. The output shaft 106 of the motor extends through an opening in the fan housing and mounts a blade fan assembly 108 for rotation therewith.

The rearward end of the fan housing is provided with an inlet opening, concentric with the drive shaft. A cylindrical collar 110 extends rearward from the inlet opening and receives thereover the front end portion of a length of flexible tubing 112 of rubber, synthetic plastic, or other suitable material. A clamping ring 114 secures the tubing to the collar.

The rearward end of the flexible tubing is fitted over a forwardly extending collar 116 of a hollow vacuum head housing 118, and is secured releasably to the collar by a similar clamping ring 120. The collar defines the outlet opening of the vacuum head housing. The latter is of substantially triangular shape in end view (FIG. 4), being defined by front wall 122, rear wall 124 and angular top wall 126. The wide, laterally extending bottom of the housing is open.

Extending downward from the rear wall 124 of the vacuum head housing is a laterally elongated flexible blade 128 of rubber, leather, belting, or other suitable material. The lower edge of this blade is arranged to terminate closely adjacent the street or parking lot surface, in the operative position of the vacuum head housing illustrated in FIG. 1. A laterally elongated adjustable blade 130 of similarly flexible material is positioned adjacent the front wall 122 of the vacuum head housing and is secured to a laterally elongated mounting bar 132. Extending upwardly from this bar are a plurality of elongated rods 134 which are guided slidably in guide tubes 136 (FIG. 4) secured to the front wall 122 of the housing. The upper ends of the rods are connected to the operating bar 138 which, in turn, is centrally connected through the link 140 pivotally to one arm 142 of the bell crank lever. The bell crank lever is mounted pivotally intermediate its ends on the pivot pin 144 (FIG. 1) carried by the bracket 146 projecting from the vacuum head housing 118. The terminal end of the other arm 148 of the bell crank lever is connected to one end of the control cable 150. This cable extends slidably through the guide sheath 152 and its opposite end is connected to the operating lever 154 located in the driver's compartment of the vehicle.

Thus, by rotating the operating lever counterclockwise about its pivot pin, the bell crank lever also is rotated counterclockwise to move the blade 130 downward from the position illustrated in FIG. 1. This downward movement reduces the inlet opening to the vacuum head housing and effectively increases the suction of the vacuum head. By rotating the operating lever clockwise about its pivot pin, the bell crank lever also is rotated clockwise to raise the blade from the position illustrated in FIG. 1 and thus effectively reduce the suction at the inlet of the vacuum head. The magnitude of suction thus may be varied to achieve best cleaning results, which are dependent upon such factors as the types of debris to be collected, the wetness or dryness of the road, the speed of movement of the equipment, and others.

The vacuum head housing 118 is supported at its upper end by a bracket 156 (FIG. 3) which pivotally connects, at the pivot pin 158, one arm 160 of a bell crank lever. This lever is mounted pivotally intermediate its ends on the pivot pin 162 supported by brackets extending rearward from the fan housing 92. Adjacent the terminal end of the other arm 164 of the bell crank lever there is connected one end of a flexible control cable 166 (FIG. 1). The cable extends slidably through a flexible guide sheath 168, and its opposite end is connected to an operating lever 170 mounted in the driver's compartment of the truck adjacent the operating lever 154.

Thus, by rotating the operating lever counterclockwise about its mounting pin, the bell crank lever also is rotated counterclockwise to elevate the vacuum head housing from the position illustrated in FIG. 1. This movement of the vacuum head housing is accommodated by the flexible tubing 112, as will be apparent.

The lower end of the vacuum head housing is supported for vertical adjustment by means of the pair of laterally spaced links 172 connected pivotally at one end to the housing and at the opposite end to the motor mounting base 102.

Secured to the lower end of the rear wall 124 of the vacuum head housing is a pair of laterally spaced caster

wheels 174. In the operative position illustrated in FIG. 1, these caster wheels engage the surface of the street to support the vacuum head housing and position the blade 128 in properly spaced relation with respect to the street.

The rear wall 124 of the housing is provided with an opening defined by a rearwardly projecting collar 176, the opening being normally closed by the removable cap 178. The collar serves as an attachment for an elongated flexible hose (not shown) fitted at its outer end with a vacuum cleaner head, for manual use in cleaning very small and confined areas.

Means is provided for adjusting the fan and vacuum head assembly vertically between the operative position in which the supporting caster wheels engage the street, and a retracted position upward therefrom to facilitate rapid transport of the assembly with the vehicle. In the embodiment illustrated, such means is provided by the hydraulic jack 180 (FIG. 3). The base of the jack is secured to a frame 182 projecting downward from the vehicle frame 10. The projecting end of the piston rod 184 of the jack is arranged during extension to engage the overlying section 186 of the bracket 188, secured to the motor mount 102, whereby to elevate the rearward end of the main housing together with the supported fan and vacuum head assembly to the retracted position for transport. It will be understood that the vacuum head assembly also may be fully retracted by rotating the operator lever 170 counterclockwise to elevate the vacuum head assembly relative to the fan housing 92.

Having mounted the apparatus upon a vehicle, it is adjusted to proper operating position as follows: With the jack 180 lowered and the operating lever 170 rotated fully clockwise so that the caster wheels 174 engage the street (FIG. 1) the bolts connecting the opposite ends of the links 96′ and the bolts connecting the motor mount 102 are loosened sufficiently to adjust the fan housing 92 and motor 104 in proper vertical position relative to the vehicle. The bolts then are tightened.

To transport the apparatus to an area to be cleaned, the operating lever 170 is rotated fully counterclockwise to elevate the vacuum head assembly, and the jack 180 is operated to extend its piston rod 184 to elevate the entire apparatus to give maximum road clearance.

Having arrived at the site to be cleaned, the jack 180 is lowered and the operating lever 170 is rotated fully clockwise to bring the caster wheels 174 into engagement with the street or other area to be cleaned. The operating lever 154 then is rotated in the appropriate direction to adjust the blade 130 to proper position above the street for optimum cleaning action. As indicated hereinbefore this adjustment depends upon the type of material to be removed from the street, the wetness or dryness of the street and the speed of movement of the vehicle. The motor 104 then is activated to drive the fan assembly 108.

As the vehicle moves over the surface to be cleaned, the vacuum created at the inlet of the fan housing 126 (between the blade 130 and the street) causes the debris to be drawn inward through the vacuum head housing, thence through the flexible tubing 112 and into the fan housing 92. From here the debris is ejected upwardly into the duct 88 and carried with the air stream to the entrance 86 of the cyclone separator cylinder 84. Hard particles of gravel and other debris which may tend to be ejected toward the conical screen 58 strike the protective plate 90 and are diverted from the screen. By centrifugal action in the cylinder 84, the entrained solids are forced radially outward to the inner surface of the cylinder 84 from whence they drop by gravity into the collecting chamber 40.

Air and entrained small particles of debris that pass through the conical screen 58 and through the sheet screen 60, enter the passageway 50 and thence are ejected either wholly or partially to the atmosphere through one or both of the openings 72, 74, by appropriate adjustment of the doors 76, 78, respectively. All air and entrained debris not passing through the openings 72, 74 are directed downward through the duct 56 and into the scrubber compartment 42. Dust and other small particles are collected in the water bath. Lighter particles, not trapped in the water, are caught by the screen 62, while the air is exhausted to the atmosphere.

The debris collected in the chamber 40 may be removed at a suitable dump site through the door 24′. As explained hereinbefore, the debris collected in the water bath in chamber 42 is discharged with the water through the drain conduit 70.

From the foregoing it will be appreciated that the present invention provides simplified and therefore economical street and parking lot cleaning apparatus adaptable for removable mounting upon a small truck for efficient and therefore economical cleaning of streets, parking lots and other areas. When not in use, the apparatus may be removed from the truck, thereby allowing the latter to be used for other purposes. Since the apparatus is capable of mounting upon a small truck, it is highly effective in cleaning small areas as well as large areas. Moreover, because of the provision of the scrubber chamber 42, the apparatus is capable of cleaning dusty surfaces without ejecting the dust back into the atmosphere.

If desired, the fan and vacuum head assembly may be mounted at the front end of a truck, with the duct 88 extending rearward to the refuse collecting housing on the truck bed. In such event, the fan and vacuum head assembly is supported by a frame, corresponding to frame members 96, secured to the truck. The fan motor 104 may be replaced by appropriate belt or other drive connection between the fan and the crank shaft projecting from the front end of the conventional truck engine.

It will be apparent to those skilled in the art that various changes in the size, shape, number and arrangement of parts described hereinbefore may be made without departing from the spirit of this invention.

Having now described my invention and the manner in which it may be used, I claim:

1. Street and parking lot cleaning apparatus, comprising

a. a frame removably supported on a vehicle and having a portion extending rearwardly beyond the end of the vehicle,

b. a hollow housing defining a refuse collecting chamber mounted on the portion of the frame overlying the vehicle,

c. a fan housing supported by the rearward portion of the frame and having a vacuum inlet and an air outlet,
d. a rotary fan in the fan housing,
e. drive means supported by the frame and connected to the fan for rotating the latter,
f. duct means communicating the air outlet with the collecting chamber,
g. a vacuum head housing having an inlet facing downward and an outlet facing the inlet of the fan housing,
h. means operatively connecting the vacuum head housing to the rearward portion of the frame for vertical adjustment,
i. flexible conduit means communicating the vacuum head housing outlet with the fan housing inlet, and
j. support means on the vacuum head housing adapted to engage a street or the like to be cleaned for positioning the vacuum head housing inlet in operative position adjacent the street.

2. The apparatus of claim 1 wherein the hollow housing also defines a dust scrubbing chamber separated from the refuse collecting chamber, and passageway means communicates the refuse collecting chamber with the dust scrubbing chamber, the passageway means including a duct in the dust scrubbing chamber extending downward from the top thereof and terminating above the bottom thereof, the dust scrubbing chamber being adapted to contain water to a level below said duct.

3. The apparatus of claim 1 including extensible jack means, jack mounting bracket means adapted to be attached to a vehicle, and jack engaging bracket means operatively secured to the frame and arranged for engagement by the jack means during extension of the latter for elevating the entire rearward portion of the apparatus relative to the vehicle.

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