May 20, 1969 B. DANEMAN 3,444,581

DEBRIS COLLECTOR SUCTION PIPE

Filed Dec. 6, 1967 Sheet 1 of 3

Fig 1

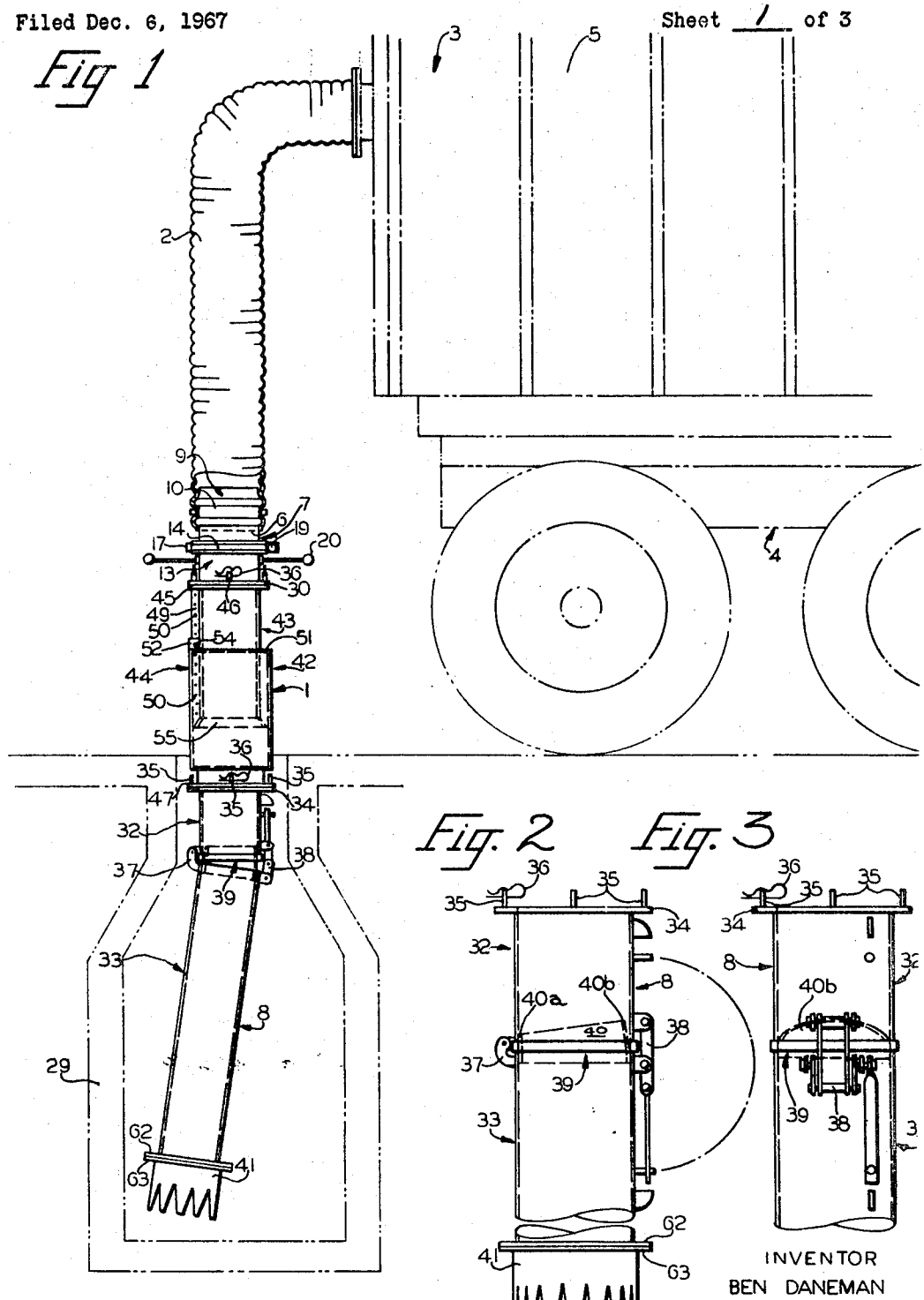


Fig. 2

Fig. 3

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Fig 4

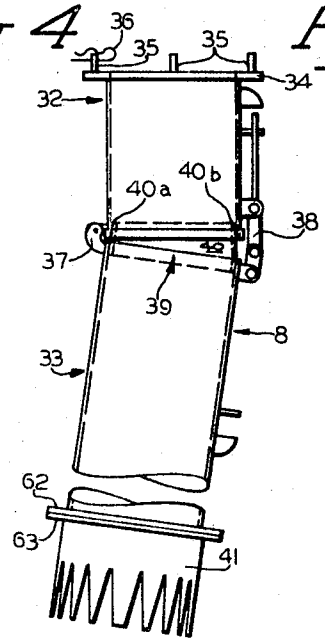


Fig 5

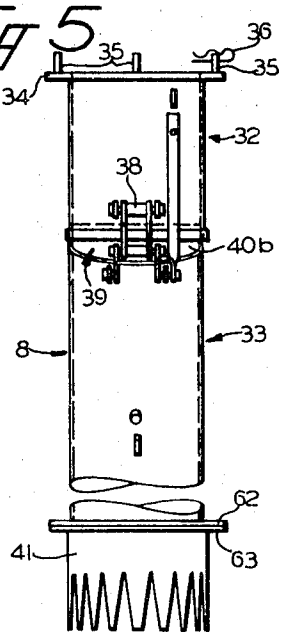


Fig 6

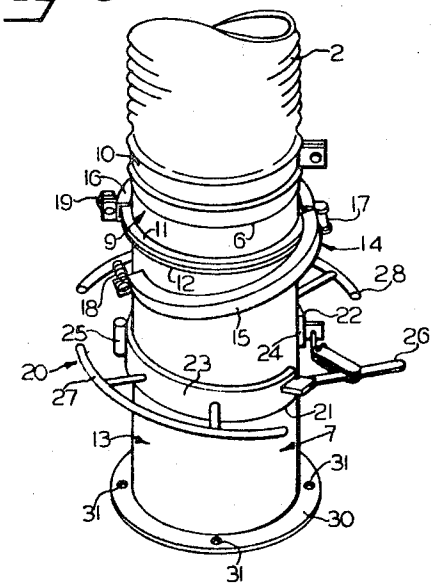
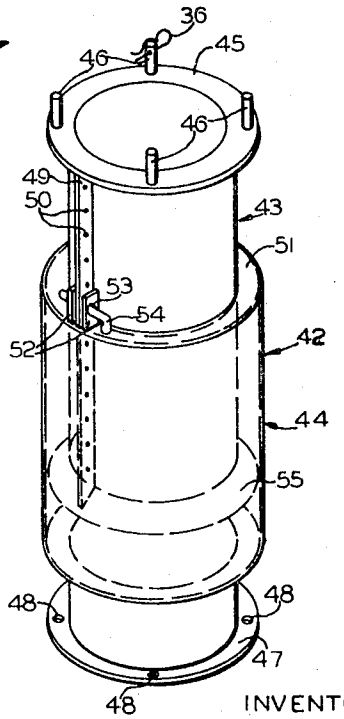


Fig 7



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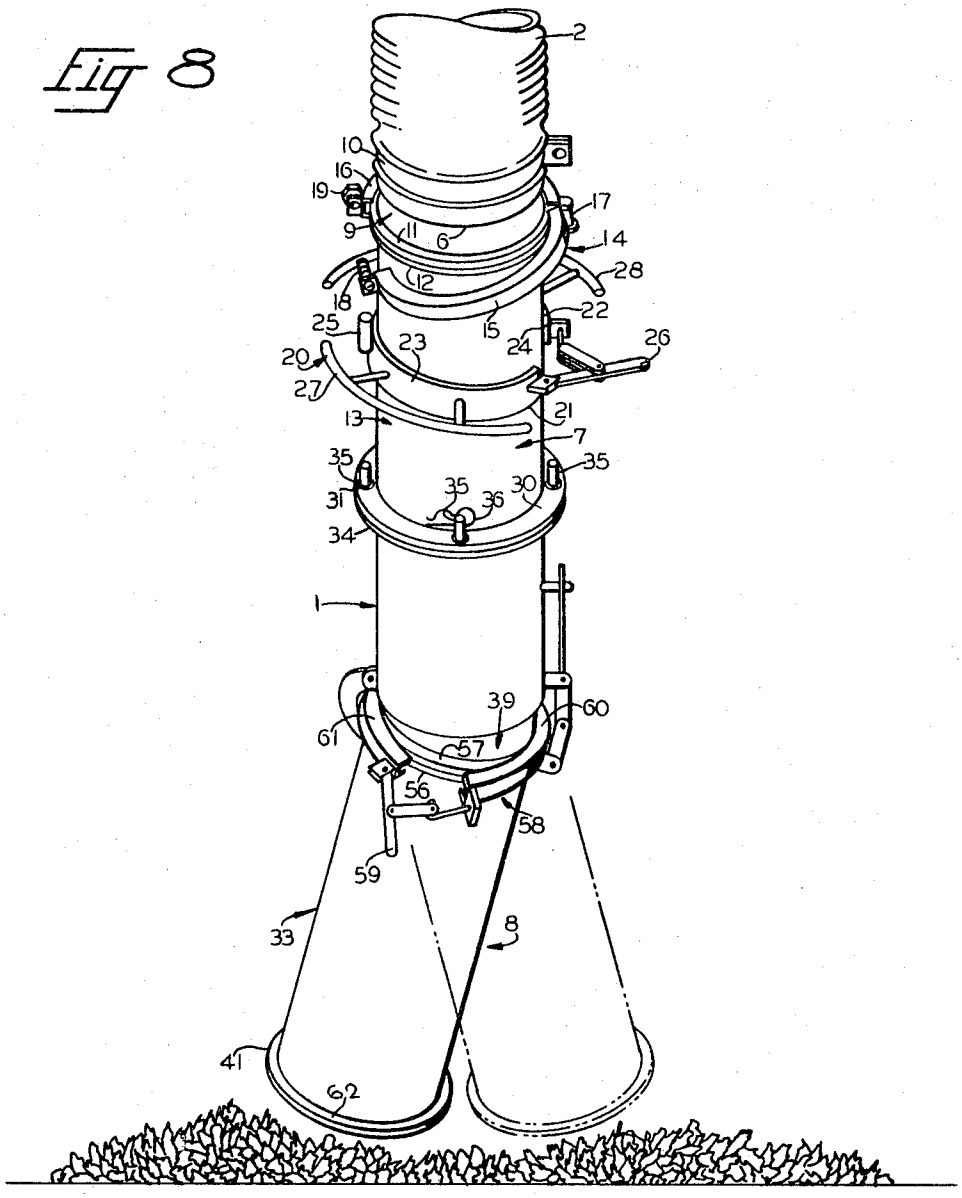
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Fig 8



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3,444,581

DEBRIS COLLECTOR SUCTION PIPE

Ben Daneman, Milwaukee, Wis., assignor to Central Engineering Company, Inc., Milwaukee, Wis., a corporation of Wisconsin

Filed Dec. 6, 1967, Ser. No. 688,499
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U.S. Cl. 15—314 7 Claims

ABSTRACT OF THE DISCLOSURE

A suction pipe for attachment to the flexible nozzle of a vacuum-type debris collector and for vacuuming debris from a catch basin or the like, including an angulation section having a substantially airtight joint whereby the pipe may be angled so that the suction end thereof can reach the walls of the catch basin; a rotation section whereby the angled pipe may be rotated so that the suction end may be directed to all portions of the outer edges of the catch basin to vacuum debris therefrom; and an extension section whereby the length of the pipe may be extended so that the suction end may reach the bottom of the catch basin.

The use of vacuum-type debris collectors to remove trash, litter and debris from roads, streets and catch basins is known in the art. One type of collector is shown in Patent No. 3,052,908 issued Sept. 11, 1962, to the inventor and includes an enclosed vacuum tank mounted on a truck chassis. A flexible nozzle may be selectively connected to openings in the sides and the rear of the tank and a high vacuum drawn and maintained in the tank by a high pressure vacuum-inducing blower. Suction thereby is provided at the lower or suction end of the flexible nozzle, which may be used to vacuum-clean a street or road by moving the lower end of the nozzle back and forth over the debris to be collected. If it is desired to remove debris from a catch basin, a large rigid pipe is attached to the lower end of the nozzle and inserted in the catch basin by an operator standing alongside the nozzle. The air and debris which is sucked from the catch basin into the suction end of the pipe passes through the pipe and the nozzle into the vacuum tank.

Ordinarily, the diameter of the street level opening of the catch basin through which the pipe must be inserted is substantially smaller than the diameter of the bottom of the catch basin. As a consequence, it is virtually impossible for the operator to direct the suction end of the rigid pipe to the outer edges of the bottom of the catch basin to vacuum debris therefrom, with the result that the catch basin may not be completely cleaned. Also, because the depths of catch basins may vary substantially, the length of the conventional rigid pipe attachment may not be sufficient to enable the operator to direct the suction end of the pipe completely to the bottom of the catch basin.

The present invention provides an improved debris collector suction pipe, including an angulation section which includes a substantially air tight joint and has a suction end. A rotation section is provided for mounting between the nozzle and the angulation section; and an extension section may be mounted between the rotation section and the angulation section and is adjustably extendable to various extended lengths.

When the improved suction pipe is to be used to clean a catch basin, the operator may insert the suction end of the suction pipe through the catch basin opening and into the catch basin; angle the angulation section at the joint thereof so that the suction end reaches the walls of the catch basin; and rotate the rotation section (and, therefore, the angulation section and the suction end) around the center line of the rotation section, and thereby direct the suction end to all portions of the outside walls of the catch basin to vacuum debris therefrom. If necessary because of the depth of the catch basin, the extension section may be adjustably extended to lower the suction end to a preselected fixed position adjacent the bottom of the catch basin. The operator then may rotate the suction pipe to direct the suction end to all portions of the bottom of the catch basin to thoroughly clean the same.

The suction pipe also may be employed to extend the debris-collecting range of the nozzle to vacuum street-level piles of debris, such as leaves, and to eliminate the rather substantial manual effort involved in moving the lower end of the nozzle back and forth over such debris. The operator may position the nozzle and suction pipe above the center of the debris pile, angle the angulation section so as to position the suction end of the pipe above the edges of the pile, and rotate the rotation section so as to cause the suction end to revolve above the pile while vacuuming the same.

The best mode presently contemplated of carrying out the invention is illustrated in the accompanying drawings in which

FIGURE 1 is a fragmentary side elevational view of a debris collector suction pipe embodying the present invention inserted in a catch basin, with the angulation section angled and the extension section extended.

FIGURE 2 is an enlarged fragmentary side elevational view of the angulation section shown in FIGURE 1 in its generally tubular configuration.

FIGURE 3 is a fragmentary front elevational view of the angulation section shown in FIGURE 2.

FIGURE 4 is an enlarged fragmentary side elevational view of the angled angulation section shown in FIGURE 1.

FIGURE 5 is a fragmentary front elevational view of the angulation section shown in FIGURE 4.

FIGURE 6 is an enlarged perspective view of the rotation section shown in FIGURE 1, illustrating the attachment of the rotation section to the nozzle, and with the swivel collar and control handle opened to illustrate their respective relationships with the rotation section.

FIGURE 7 is an enlarged fragmentary perspective view of the extension section shown in FIGURE 1.

FIGURE 8 is an enlarged perspective view of a debris collector suction pipe embodying the present invention, as employed to vacuum a street-level pile of debris, including the rotation section shown in FIGURE 6.

The debris collector suction pipe **1** is attached to the flexible nozzle **2** of a vacuum-type debris collector **3**. The collector **3** is mounted on a self-propelled truck or like vehicle **4** and includes a fully enclosed and self-contained vacuum tank **5**, which may be of any suitable type. As illustrated herein, the tank **5** is of the type described in Patent No. 3,052,908 issued Sept. 11, 1962, to the inventor; and the nozzle **2**, the connection thereof to the tank **5**, and the means of drawing and maintaining a high vacuum in the tank **5** are as described in such patent. Thus, when a vacuum is drawn from the tank **5** by such means, suction is provided at the lower or suction end **6** of the nozzle **2** in the known manner.

Debris collector suction pipe

The debris collector suction pipe **1** is comprised, generally, of tubular sections, including a first or rotation section **7** adapted to be attached to the lower end **6** of the nozzle **2**, and a second or angulation section **8**, which may be attached to the rotation section **7**.

Although it would be possible to attach the angulation section **8** directly to the lower end **6** of the nozzle **2**,

the construction and composition of the nozzle 2 would not permit any substantial degree of rotation of the angulation section 8. Accordingly, it is preferred to provide rotation means for rotatably attaching the angulation section 8 to the lower end 6 of the nozzle 2, whereby the angulation section 8 may be rotated through a complete 360 degrees of rotation about the center line thereof. As shown, the rotation means comprise a rotation section 7 which includes an upper or attachment portion 9. In order to attach the suction pipe 1 to the nozzle 2, the upper end of the attachment portion 9 is inserted in the lower end 6 of the nozzle 2, which is secured therearound by means of a split-ring and bolt assembly 10. The other or lower end of the attachment portion 9 defines an outwardly extending flange 11, which slidably abuts a corresponding outwardly extending flange 12 on the upper end of the lower or rotatable portion 13 of the rotation section 7. The two flanges 11 and 12 are held in such slidably abutting relationship by a swivel collar 14, of generally U-shaped cross-section, which loosely surrounds the flanges 11 and 12. The swivel collar 14 is comprised of two generally semi-circular sections 15 and 16. One section 15 is hingedly connected at one end thereof to a corresponding end of the other section 16 by a hinge 17 between such ends; and the other ends of the two sections 15 and 16 are bolted to each other by a bolt 18 and a nut 19 threaded thereon. When the nut 19 is threaded home on the bolt 18, the two sections 15 and 16 are drawn toward each other and into loose surrounding relationship with the flanges 11 and 12, thereby holding flanges 11 and 12 in slidably abutting relationship and permitting the rotatable portion 13 of the rotation section 7 to be rotated about its center line without inducing any corresponding rotation of the attachment portion 9 thereof or the nozzle 2.

To enable the operator to easily direct and rotate the suction pipe 1, a control handle 20 is provided for removable mounting around the rotatable portion 13 of the rotation section 7. The handle 20 comprises two virtually identical sections 21 and 22, having semi-circular bases 23 and 24. One base 23 is hingedly connected at one end thereof to a corresponding end of the other base 24 by a hinge 25; and the other ends of the two bases 23 and 24 are connected by a cam latch 26. When the rotatable portion 13 of the rotation section 7 is inserted in the space between the two bases 23 and 24 and the cam latch 26 is moved to its closed position, the two bases 23 and 24 are drawn toward each other and into tight surrounding relationship with the exterior surface of the rotatable portion 13. Identical handle bar assemblies 27 and 28 are welded to and extend outwardly from, respectively, the two bases 23 and 24. A convenient control handle 20 thereby is provided for gripping by the operator of the suction pipe 1 when rotating the suction pipe 1 and when directing the suction pipe 1 into a catch basin 29.

The other or lower end of the rotatable portion 13 of the rotation section 7 defines an outwardly extending flange 30 having spaced holes 31 therein. The angulation section 8 is comprised of two tubular portions: an upper or fixed portion 32, and a lower or jointed portion 33. The upper end of the fixed portion 32 defines an outwardly extending flange 34 having upwardly extending, spaced, pierced pins 35 mounted thereon and adapted for insertion through the holes 31 of the flange 30 of the rotation section 7, if it is desired to attach the angulation section 8 directly to the rotation section 7. When so inserted, cotter pins 36 may be inserted through the pins 35 and the flanges 30 and 34 thereby held in close abutting relationship to each other.

A substantially airtight joint, which is capable of being angled, is provided in the angulation section 8 between the upper or fixed portion 32 and the lower or jointed portion 33 for angling the angulation section 8. The joint includes angling means which, as illustrated in the drawings, comprise a pivot or hinge 37 at one side of the exterior surface of the angulation section 8 pivotally connecting the jointed portion 33 to the fixed portion 32, and a cam latch 38 at the other side thereof and connected to the jointed portion 33 and the fixed portion 32 for angling the angulation section 8 about the pivot or hinge 37 in the vertical plane which is perpendicular to the horizontal axis of the hinge 37 and which extends through the center lines of the fixed portion 32 and the jointed portion 33. The angling means are mounted on the angulation section 8 disposed in close proximity to the exterior surface of the angulation section 8 in both its tubular and angled configurations, so that neither the hinge 37 nor the cam latch 38 (notwithstanding that the cam latch 38 may have been opened, as shown in FIGURE 1, to angle the angulation section 8) is likely to interfere with the insertion of the fixed portion 32 through the relatively narrow street level opening of the catch basin 29. The joint also includes seal means for effecting a substantially airtight seal between the fixed portion 32 and the jointed portion 33 when the angulation section 8 is angled. Although it is contemplated that other seal means (such as flexible tubing) are within the scope of this invention, in the illustrated preferred embodiment a joint filler 39 is mounted on the upper end of the jointed portion 33. As is shown in FIGURES 2 and 4, the joint filler 39 is in the shape of a frustum of a cone, the lower base diameter of which is equal to the inside diameter of the fixed portion 32. When the cam latch 38 is in its closed position and the angulation section 8 is in its tubular configuration, as shown in FIGURES 2 and 3, the wall 40 of the joint filler 39 is fully enclosed within the interior of the fixed portion 32, with the wall portion 40*a* adjacent the hinge 37 abutting the interior surface of the fixed portion 32. When the cam latch 38 is opened to its open position as shown in FIGURES 4 and 5, and the angulation section 8 thereby angled about the hinge 37 to its angled configuration shown in such figures, the joint filler 39 is partially withdrawn from the interior of the fixed portion 32 until the portion 40*b* of the wall 40 thereof adjacent the cam latch 38 abuts the interior surface of the fixed portion 32, forming a substantially airtight seal therebetween. Because the suction end 41 is generally below the hinge 37, during rotation of the suction pipe 1 the operator may refer to the positions of either the hinge 37 or the cam latch 38 relative to the circumference of the street level opening of the catch basin 29 as guide means to quickly and accurately ascertain the position of the unseen suction end 41 relative to the circumference of the bottom of the catch basin 29 in order to ensure complete cleaning thereof.

It has been found that, in order that the lower or suction end 41 of the angulation section 8 may reach the outer edges of the bottoms of most catch basins, the angulation section 8 should be susceptible of angling through an angulation angle of not less than eight degrees. Accordingly, in the angled configuration shown in the FIGURES 1 and 4, the included angulation angle between the lower end of the fixed portion 32 and lower base of the joint filler 39 is eight degrees. Efficient vacuuming of debris requires that the wall portions 40*a* and 40*b* of the joint filler 39 intrude to the least extent possible into the interior of the fixed portion 32 and into the flow of air and debris therethrough when the suction pipe 1 is used for catch basin cleaning, in either its angled or nonangled configurations. Efficient vacuuming also requires that there be substantially airtight communication between the wall 40 of the joint filler 39 and the interior surface of the fixed portion 32, when the angulation section 8 is angled. To accomplish the foregoing, the joint filler 39, as shown, has a lower base diameter equal to the inside diameter of the fixed portion 32; the cone, of which the joint filler 39 is a frustum, has an altitude equal to the result of multiplying that lower base diameter by the natural cotangent of the angulation angle (as shown, eight degrees); the angle between the wall portion 40*b* and the lower base

is the complement of the angulation angle (or, as shown, eighty-two degrees); the angle between the wall portion **40***a* and the upper base is an obtuse angle which is the supplement of such complementary angle (or, as shown, ninety-eight degrees); the angles between the lower base and the wall portion **40***a*, and between the upper base and the wall portion **40***b*, each are right angles; and the height of the wall portion **40***a* is in excess of one-half of an inch so that, when the angulation section **8** is angled, approximately one-half inch of the wall portion **40***a* will intrude into the interior of the fixed portion **32**. In the catch basin cleaning embodiment shown in FIGURES 1–5, the slant height of wall portion **40***a* is 1.85 inches because the pivot point of hinge **37** is distant from the exterior surface of the angulation section **8**.

The slant height of wall portion **40***b* depends on the diameter of the lower base of the joint filler **39**, which, in turn, is equal to the interior diameter of the fixed portion **32**. The slant height of wall portion **40***b* is determined by dividing the slant height of wall portion **40***a* by the natural tangent of the angulation angle, adding the lower base diameter (in inches) to the result of such division, and multiplying that sum by the natural sine of the angulation angle. Thus, if the angulation angle is eight degrees, as illustrated, the lower base diameter of the joint filler **39** is twelve inches and the slant height of the wall portion **40***a* is 1.85 inches, the slant height of the wall portion **40***b* will be 3.5 inches.

The lower or suction end **41** of the angulation section **8** may be merely circular (as shown in FIGURE 8) and, therefore, comparable to the lower end **6** of the nozzle **2**. However, it is preferred that the lower edge of the suction end **41** be serrated, as shown in FIGURES 1, 2, 4 and 5, when the suction pipe **1** is used for cleaning catch basins in order that the catch basin debris (which usually is in a water-sodden condition) may be sucked into the suction pipe **1** at the sides, as well as the bottom of the suction end **41**, and to avoid the creation of an absolute vacuum in the suction pipe **1** when the suction end **41** is immersed in the debris.

An extension section **42** may be employed to enable the suction end **41** of the angulation section **8** to reach the bottom of a catch basin **29** having a depth greater than the overall length of the angulation section **8**. Although the extension section **42** could be inserted in the suction pipe **1** between the nozzle **2** and the rotation section **7**, it is preferred that the extension section **42** be inserted between the rotation section **7** and the angulation section **8** in order that the rotation section **7** (and, particularly, its control handle **20**) may remain above street level notwithstanding the length of extension of the extension section **42**. In the preferred embodiment shown in FIGURES 1 and 7, the extension section **42** is comprised of an inner or stationary tube **43** and an outer or extendable tube **44**. The upper end of the stationary tube **43** defines an outwardly extending flange **45** virtually identical in design and construction to the flange **34** of the fixed portion **32** of the angulation section **8** in that it has upwardly extending, spaced, pierced pins **46** mounted thereon adapted for insertion through the holes **31** of the flange **30** of the rotation section **7**, so that, when so inserted, the cotter pins **36** may be inserted through the pins **46** and the flanges **30** and **45** thereby may be held in close abutting relationship to each other and the extension section **42** thereby attached to the rotation section **7**. The lower end of the extendable tube **44** defines an outwardly extending flange **47** virtually identical in design and construction to outwardly extending flange **30** of the rotation section **7** in that it has spaced holes **48** therein adapted for receiving the insertion of the pins **35** of the flange **34** of the angulation section **8**. When so inserted, cotter pins **36** may be inserted through the pins **35** and the flanges **47** and **34** thereby held in close abutting relationship to each other, and the angulation section **8** thereby attached to the extension section **42**.

A slide bar **49** is welded to the exterior surface of the stationary tube **43** and extends the length of the stationary tube **43** from the flange **45** to a point adjacent the lower end of the stationary tube **43**. The slide bar **49** includes a plurality of spaced adjustment holes **50** therethrough. The extendable tube **44** of the extension section **42** has an inside diameter slightly greater than the sum of the outside diameter of the stationary tube **43** plus twice the height of the slide bar **49** measured from the exterior surface of the stationary tube **43** to the exterior surface of the slide bar **49**. The upper end of the extendable tube **44** defines an inwardly extending flange **51** which slidably abuts the exterior surface of the stationary tube **43**. A pair of parallel, upstanding slide guides **52** are welded on the flange **51**. The inner surfaces of the slide guides **52** are distant from each other a distance slightly greater than the width of the slide bar **49**, and the portion of flange **51** between the slide guides **52** is cut away so that the slide guides **52** slidably abut opposite sides of the slide bar **49** and the slide bar **49** may freely slide between the slide guides **52**, but the slide bar **49** and the slide guide **52** combine to act as locking means to prevent the rotation of either of the tubes **43** and **44** relative to the other. The operator, during rotation of the extension section **42** and the angulation section **8**, may refer to the position of the slide bar **49** relative to the circumference of the street level opening of the catch basin **29** as guide means (the hinge **37** and the cam latch **38** being within the interior of the catch basin **29**) to readily ascertain the position of the unseen suction end **41** relative to the circumference of the bottom of the catch basin **29**. The slide guides **52** include diametrically opposed holes **53**; and a pin **54** may be inserted to pass through the holes **53** and a preselected adjustment hole **50** of the slide bar **49** to hold the extendable tube **44** in a preselected, fixed extended relationship with the stationary tube **43**, and whereby the operator thereby may adjust the length of the extension section **42** to any of a plurality of fixed extended lengths.

The lower end of the stationary tube **43** defines a flared truncated flange **55**, the outer edge of which slidably abuts the interior surface of the extendable tube **44** to form a substantially material-tight seal between the flange **55** and the interior surface of the extendable tube **44** to prevent vacuumed debris from passing into the space between the exterior surface of the stationary tube **43** and the interior surface of the extendable tube **44**. If the extendable tube **44** is lowered to a fully extended position (in which the holes **53** of the slide guides **52** are below the bottom adjusment hole **50** of the slide bar **49**), its inwardly extending flange **51** will encounter the flared flange **55**. The extendable tube **44** thereby will be prevented from slipping off of the stationary tube **43**.

The debris collector suction pipe **1** also has utility to extend the debris collecting range of the nozzle **2** when the debris collector **3** is used to vacuum-clean streets and roads. When the debris collector **3** is used to vacuum large piles of leaves and the like, the requirement which previously existed that the operator constantly reposition the lower end **6** of the nozzle **2** over portions of the pile is obviated. In the modified form of the invention illustrated in FIGURE 8, the suction pipe **1** is adapted to such use by attaching the rotation section **7** to the lower end **6** of the nozzle **2**, and attaching the angulation section **8** to the rotation section **7** in the manner heretofore described.

In the modified form illustrated in FIGURE 8, the joint filler **39** is removably mounted on the upper end of the jointed portion **33** of the angulation section **8**. The removable mounting permits a variety of sizes of joint fillers **39** to be selectively mounted on the jointed portion **33** to obtain a variety of angulation angles. For example, in the leaf-pile vacuuming configuration illustrated in FIGURE

8, an angulation angle of approximately fifteen degrees is obtained, which extends the diameter of the vacuumable circular area of the suction end **41** beyond that vacuumable when the angulation angle is the eight degrees employed for catch basin cleaning. As shown, the upper end of the jointed portion **33** defines an outwardly extending flange **56**, and the lower base of the joint filler **39** also defines an outwardly extending flange **57**. The two flanges **56** and **57** are held in close abutting relationship with each other by a mounting collar **58**, which is substantially similar in design, construction and function to the swivel collar **14** except that an over-center clamp **59**, rather than the bolt **18** and nut **19** of the swivel collar **14**, is employed to draw the two sections **60** and **61** of the mounting collar **58** into tight surrounding relationship with the flanges **56** and **57**. Such a mounting collar **58** also may be employed in lieu of the pin and cotter pin mounting means heretofore described, for attaching the several sections **7**, **8** and **42** of the suction pipe **1** to each other.

It has been found that, whereas the serrated suction end **41** shown in FIGURES 1, 2, 4 and 5 has particular advantages when the suction pipe **1** is used for cleaning a catch basin **29**, a plain, unserrated suction end **41** provides more efficient vacuuming when the suction pipe **1** is used to vacuum street-level piles of light materials, such as leaves. Accordingly, in the modified form of the invention shown in FIGURE 8, the suction end **41** does not include any serrations. Rather, the lower end of the jointed portion **33** defines an outwardly extending flange **62**. In order to permit a serrated suction end **41** to be attached to the lower end of the jointed portion **33**, the upper end of the serrated suction end **41** also defines an outwardly extending flange **63** which (in the embodiments in FIGURES 1, 2, 4 and 5) is removably held in tight abutting relationship with the flange **62** by a mounting collar **58** (not shown).

Operation of apparatus

The following is a brief summary of the use and operation of the debris collector suction pipe **1** to clean a catch basin **29**.

After the truck **4** has been driven to the catch basin **29** and the nozzle **2** has been mounted on the tank **5** of the vacuum-type debris collector **3**, if the debris collector suction pipe **1** has not already been assembled and attached to the nozzle **2**, the operator inserts the upper end of the attachment portion **9** of the rotation section **7** in the lower end **6** of the nozzle **2** and secures the lower end **6** therearound by means of the split-ring and the bolt assembly **10**. If the flange **11** of the attachment portion **9** has not theretofore been placed in abutting relationship with flange **12** of the rotatable portion **13**, the operator places the two flanges **11** and **12** in abutting relationship with each other. He then places the open swivel collar **14** around the flanges **11** and **12**, closes the swivel collar **14** around the flanges **11** and **12**, bolts the two sections **15** and **16** to each other by means of bolt **18**, and threads nut **19** home on bolt **18**, thereby drawing the two sections **15** and **16** together and into loose surrounding relationship with flanges **11** and **12**. The operator (if the control handle **20** is not already mounted around the rotatable portion **13**) inserts the lower end of the rotatable portion **13** in the space between the two open semi-circular bases **23** and **24** and moves the cam latch **26** to its closed position, thereby drawing the two bases **23** and **24** toward each other and into tight surrounding relationship with the exterior surface of the rotatable portion **13**.

Assuming that the depth of the catch basin to be cleaned is substantially in excess of the overall length of the angulation section **8**, making it advisable to employ the extension section **42**, the operator then inserts the pins **46** mounted on the flange **45** of the upper end of the stationary tube **43** through the holes **31** of the flange **30** of the lower end of the rotation section **7** and inserts cotter pins **36** through the pins **46**, thereby attaching the stationary tube **43** to the rotation section **7**. The operator then similarly inserts the pins **35** of the flange **34** of the angulation section **8** through the holes **48** in the flange **47** of the lower end of the extendable tube **44** of the extension section **42** and inserts cotter pins **36** through the pins **35**, thereby attaching the angulation section **8** to the extension section **42**.

After the suction pipe **1** has been assembled and connected to the nozzle **2**, the operator grasps the control handle **20** and guides the suction end **41** of the angulation section **8** into the opening of the catch basin **29** and lowers the debris collector suction pipe **1** into the catch basin **29** until the cam latch **38** is slightly above the plane of the level of the street. The operator then moves the cam latch **38** to its open position, as shown in FIGURES 1, 4, and 5, thereby angling the angulation section **8** about the hinge **37** in the vertical plane which is perpendicular to the axis of the hinge **37** and extends through the center lines of the fixed portion **32** and the jointed portion **33**, thereby disposing the suction end **41** generally below the hinge **37**. The joint filler **39** is caused to be partially withdrawn from the interior of the fixed portion **32** until the wall portion **40***b* of the joint filler **39** abuts the interior of the fixed portion **32**. The operator then withdraws the pin **54** from the adjustment hole **50** in the slide bar **49** and from the holes **53** in the slide guides **52** and lowers the extendable tube **44** until the suction end **41** of the angulation section **8** is adjacent the bottom of the catch basin and the holes **53** of the slide guides **52** are opposite an adjustment hole **50** in the slide bar **49**. By inserting the pin **54** through the holes **53** and the adjustment hole **50** in the slide bar **49**, the extended relationship between the extendable tube **44** and the stationary tube **43** is fixed by the operator.

The operator then may activate the means of drawing and maintaining the vacuum in the tank **5** and, by rotating the control handle **20**, rotate the rotatable portion **13** of the rotation section **7**, the extension section **42**, the angulation section **8** and the suction end **41** around the center line of the attachment portion **9** and (by from time to time referring to the slide bar **49** as guide means) direct the suction end **41** to the outside edges of the bottom of the catch basin **29** to vacuum debris therefrom. After such debris has been collected, the operator may cause the debris collector suction pipe **1** to be withdrawn from the catch basin **29** until the cam latch **38** again is slightly above the plane of the level of the street, close the cam latch **38** (and thereby cause the angulation section **8** to assume the straight, tubular, nonangled configuration shown in FIGURES 2 and 3) and lower the suction end **41** to the center of the catch basin **29** to vacuum debris therefrom.

After the catch basin cleaning operation has been completed, the debris collector suction pipe **1** may be withdrawn from the catch basin **29** and disassembled in reverse order of the assembly thereof.

When the suction pipe **1** is to be used for vacuuming a street-level pile of debris, the rotation section **7** is attached to the lower end **6** of the nozzle **2** in the manner heretofore described. The angulation section **8** is attached to the lower end of the rotation section **7** by inserting the pins **35** of the flange **34** of the angulation section **8** through the holes **31** in the flange **30** in the lower end of the rotatable portion **13** and by inserting cotter pins **36** through the pins **35**. The operator then selects the size of joint filler **39** required to provide a suitable circular vacuuming area, places the lower base flange **57** thereof in abutting relationship with the flange **56** on the upper end of the jointed portion **33**, and closes the mounting collar **58** therearound, thereby clamping the flanges **56** and **57** to each other. If the pile to be vacuumed is comprised of relatively heavy materials, warranting the use of the serrated suction end **41**, the operator similarly clamps the flange **63** of the suction end **41** to the flange **62** on the lower end of the jointed portion **33** by means of a mounting collar **58**.

The operator then may activate the means of drawing and maintaining the vacuum in the tank **5** and, by rotating the control handle **20**, rotate the rotatable portion **13** of the rotation section **7**, the angulation section **8** and the suction end **41** around the center line of the attachment portion **9** and vacuum the pile of debris.

I claim:

1. A suction pipe for attachment to the nozzle of a vehicle-mounted debris collector and insertion in a catch basin having a relatively narrow street-level opening and a relatively wide interior and having walls, to vacuum debris therefrom, comprising

a fixed portion,

a jointed portion having a suction end,

a substantially airtight joint between the fixed portion and the jointed portion, including

angling means comprising pivot means pivotally connecting the jointed portion to the fixed portion and cam latch means for adjustably angling the suction pipe in a vertical plane from a generally tubular configuration to an angled configuration to direct the suction end to a position adjacent the walls of the catch basin, with at least one of said means comprising guide means mounted on the exterior of the suction pipe, and

seal means for effecting a substantially airtight seal between the fixed portion and the jointed portion in both the tubular and the angled configurations of the suction pipe, and

rotation means for rotatably attaching the upper portion to the nozzle and for controllably rotating the suction pipe about the centerline of the nozzle to controllably direct, by referring to the guide means, the suction end to debris adjacent the entire periphery of the catch basin walls.

2. The apparatus of claim **1** in which the angling means are disposed in close proximity to the exterior surface of the suction pipe in both the tubular and angled configurations of the suction pipe.

3. The apparatus of claim **1** in which the fixed portion and the jointed portion each are rigid members.

4. The apparatus of claim **1** in which the rotation means define a rotation section comprising an attachment portion and a rotatable portion, with the rotatable portion rotatably attached to the attachment portion and rigidly atached to the fixed portion and having a rotation control handle mounted thereon for controllably rotating and directing the suction end, to debris adjacent the entire periphery of the catch basin walls.

5. The apparatus of claim **4**, in which the attachment portion of the rotation section has a lower end defining an outwardly extending attachment portion flange and the rotatable portion of the rotation section has an upper end defining an outwardly extending rotatable portion flange in slidably abutting relationship with the attachment portion flange, and the rotation means include a swivel collar comprising

channel members each having a generally U-shaped cross-section, an arcuate shape, a pivot end and an open end,

a pivot pivotally connecting the pivot ends of the channel members, and

means for drawing the open ends of the channel members together and into loose surrounding relationship with the slidably abutting attachment portion flange and rotatable portion flange.

6. In a suction pipe for attachment to the nozzle of a vehicle-mounted vacuum debris collector and insertion in a catch basin having a relatively narrow street-level opening and a relatively wide interior and having walls, to vacuum debris therefrom,

a rotation section adapted for rotatably attaching the suction pipe to the nozzle, whereby the suction pipe may be controllably rotated about the center line of the nozzle,

an angulation section having an upper end and a suction end and a substantially airtight joint intermediate the upper end and the suction end, with the joint including angling means for adjustably angling the angulation section in a vertical plane from a generally tubular configuration to an angled configuration in which the suction end is adjacent the walls of the catch basin, and

an extension section comprising

a stationary tube,

an extendable tube slidably mounted on the stationary tube in substantially airtight communication therewith,

attachment means for attaching one of the tubes to the rotation section and the other of the tubes to the upper end of the angulation section whereby the rotation section, when attached to the extension section, is above the extension section and the extension section, when attached to the angulation section, is above the angulation section, and

means on the extension section for adjustably extending the extendable tube to a plurality of preselected fixed extended positions with relation to the stationary tube and for preventing the rotation of either of the tubes relative to the other, whereby the extension section may be adjustably lengthened and the angulation section thereby adjustably lowered to a position in which the suction end is adjacent the bottom of the catch basin and may be rotated adjacent the bottom of the catch basin to vacuum debris therefrom.

7. The apparatus of claim **6** in which the means on the extension section are guide means mounted on the exterior of one of the tubes, to which reference may be made during rotation of the suction pipe to controllably direct the suction end to debris adjacent the entire periphery of the catch basin bottom.

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