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54 **Suction nozzles for suction refuse collecting vehicles.**

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**AT-B- 211 861
GB-A-1 184 795
US-A-3 605 170**

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Courier Press, Leamington Spa, England.

Description

This invention relates to suction nozzles which are mounted in use on suction refuse collecting vehicles and which are of the type having an opening which in use is downwardly facing and adjacent to the ground, a refuse material inlet at a front end of the nozzle, a suction outlet for connection by a suction conduit to a low pressure zone on the vehicle, a brush rotatably mounted in the nozzle for assisting passage of refuse material to the outlet, and means for rotating the brush.

Such a suction nozzle is known from GB—A—1 184 795.

The invention further improves the effectiveness of sweeping of the known nozzle by providing an air inlet aperture of predetermined size at a rear end of the nozzle to allow passage of air through the air inlet aperture to the suction outlet, the brush being positioned between the air inlet aperture and the suction outlet so that the air travelling from the air inlet aperture to the suction outlet passes generally through the brush harmoniously with the rotation thereof.

The nozzle may optionally be shaped upwardly and forwardly around the material inlet so that in use the material inlet faces forwardly and downwardly.

The brush is preferably adjustable generally inwardly and outwardly of the nozzle so as to be adjustable in use relative to the ground to compensate for wear of the brush.

A brush contact member may be mounted in the nozzle so as to contact the brush while it rotates to clean it. This contact member may be an intermediate transverse wall located in the nozzle generally between the brush and the suction outlet. Preferably, the brush and contact member are adjustable relative to one another to compensate for wear of the brush.

Preferably, at least one guide is located in the nozzle so as to guide refuse material which has entered the material inlet towards a zone which is central of the suction outlet. A second guide may advantageously be similarly located in the nozzle, the two guides being mutually convergent towards the said zone.

The guide or guides may be located to contact the ground in use or so as to be spaced therefrom by a small clearance. Typically, the or each guide may be formed of resilient material such as rubber. It is desirable but not essential for the or each guide to terminate below the suction outlet. The or each guide may form part of a sealing skirt adapted to prevent or restrict air entry into the nozzle from the sides thereof.

The invention further provides a suction refuse collector vehicle comprising a nozzle as above.

Two embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a front perspective view from below of a suction nozzle embodying the invention;

Figure 2 is a sectional side elevation of the nozzle of Figure 1;

Figure 3 is a plan view of the nozzle of Figure 1;

Figure 4 shows the nozzle of Figure 1 in combination with two cylindrical rotating brushes as may be fitted to a suction refuse collecting vehicle in order to give a wide sweeping swathe;

Figure 5 is a front perspective view from below of a second suction nozzle embodying the invention;

Figures 6 and 7 are views corresponding to Figures 2 and 3 of the second nozzle; and

Figure 8 is a schematic plan view of a street sweeping vehicle fitted with the second nozzle.

A suction nozzle 10 comprises a housing 11 having a downwardly facing opening 16 for juxtaposition with the ground 14 to be swept, and a suction outlet 12 which is connected by a flexible suction conduit 13 to a low pressure refuse chamber on the vehicle on which the nozzle is mounted. The housing 11 is curved upwardly and forwardly at the front of the nozzle to provide an inlet 17 to the nozzle for refuse material encountered as the nozzle is moved forwardly along the ground.

The nozzle rides in operation on replaceable wear resistant skids or runners 18 secured to the housing 11. These skids 18 can ride over obstructions up to a certain height and also serve as means to seal as much as possible the interior of the nozzle along the sides thereof from the ambient air. A cylindrical brush 20 is rotatably mounted in the housing 11 to the rear thereof so as to assist passage of refuse material which has entered the refuse inlet 17 to the suction outlet 12; the brush 20 is rotated in the direction of the arrow A while contacting the ground so as to flick generally forwardly and upwardly refuse material which has reached the brush without having been sucked up through the outlet 12. The housing 11 is formed at the rear with an air inlet 21 of substantial and predetermined size, the air inlet being continuous with the opening 16. The brush 20 is positioned between the inlet 21 and outlet 12 so that air entering the nozzle from the inlet 21 will pass through the brush 20 in sympathy with the rotation thereof and cooperating therewith to urge refuse material to the suction outlet, as shown by arrows in Figure 2. A brush contact member in the form of an intermediate dividing wall 24 of the nozzle is formed in the housing 11 so as to contact the brush 20 and therefore clean it as it rotates. The wall 24 is provided at its lower edge with a scraper or comb 25 for contact with the brush 20. Thus air flowing from the inlet 21 to the outlet 12 passes under the wall 24.

The brush 20 together with the wall 24 effectively provide a rear wall of the nozzle opening presented to the ground.

As may be seen from Figure 2, the brush 20 is adjustable relative to the housing 11 along a direction diagonally forwards and downwards; this gives adjustment of the cylindrical brush 20 both (a) inwardly and outwardly of the nozzle towards and away from the ground, and (b) towards and away from the wall 24, in order to compensate for wear of the cylindrical brush 20.

The brush in a worn state is shown in broken lines at 20'.

Mounted in the housing 11 are a pair of mutually convergent guides 27 of rubber which guide refuse material which has entered the material inlet 17 towards a zone which is roughly centrally below the suction outlet 12 and therefore of maximum suction concentration. The rubber guides 27 are arranged with a small clearance at their lower edges with the ground and due to their resilient nature will flex if they meet with an obstruction so as not to disturb the ride of the nozzle over the ground.

The nozzle 10 may be arranged with two cylindrical rotating brushes 30 arranged in vee formation in advance of the nozzle and in contact with the ground so as to windrow refuse material into a narrow column 15 in the path of the nozzle. Figure 4 shows this arrangement in plan view. The column of refuse material is further reduced in width by the guide 27 and in extreme conditions the refuse material can completely block the window 32 at the rear end of the guides 27. Despite this blockage, which could stem the flow of air entering the inlet 17, the refuse material continues to be drawn up through the outlet 12 by the air entering the inlet 21, the brush 20 assisting if necessary. This allows the nozzle to be used at higher ground speeds than normal suction nozzles. The passage of air through the revolving brush 20 in harmony with its rotation produces maximum material lift-off.

Figures 5 to 7 show a modified suction nozzle 40 which is supported by two castoring wheels 48 and a rear fixed trailing wheel 49 instead of by skids as in the first embodiment. The nozzle 40 is basically similar to the nozzle 10, comprising a housing 41 having a downwardly facing opening 46 adjacent to the ground and a suction outlet 42 connected by a flexible suction conduit 43 to the low pressure refuse chamber on the vehicle on which the nozzle is mounted. The interior of the housing is shaped upwardly at the front towards a refuse material inlet 47 to the nozzle 40.

The castoring wheels 48 are swivel mounted on a cross bar 39 secured to the housing 41, articulation of the wheels being accepted by the omission of supporting skids, as shown in Figure 7. The trailing wheel 49 is rotatably mounted on the housing 41.

A cylindrical brush 50 assists passage of refuse material to the outlet 42 in the same manner as brush 20. The brush 50 is carried by an arbor 38 rotatably mounted in bearings 37 attached to the housing 41, the arbor being driven to rotate by a hydraulic motor 36. A portion 41' of the housing 41 is removable to allow access to and removal of the brush 50. A brush contact member 54 is provided in exactly the same manner as in the first embodiment and the brush 50 is again mounted adjustably so that it can still contact the member 54 and the ground when worn.

To restrict air entry into the nozzle from the sides, sealing means in the form of resilient close ground clearance skirts 56 are secured to the

housing 41 on each side thereof, the skirts being made of wear resistant rubber. At the front the skirts are shaped to provide convergent guides 57 which perform the same function as the guides 27.

An air inlet 51 like the inlet 21 is provided at the rear of the housing and air similarly flows through this inlet and through the brush consonantly with the rotation thereof.

With the bearings 37 and motor 36 offset as shown, the portions of the weight carried by the three wheels 48, 49 are almost equal, giving good stability.

The nozzle 40 may be fitted to a street sweeping vehicle 60 which is shown schematically in plan in Figure 8. The rear wheels are designated 61 and the front wheels 62 are shown turned to negotiate a tight corner. The nozzle is towed beneath the vehicle 60 by dragbar means (not shown) and the fixed trailing wheel 49 causes the nozzle to "track" correctly round the corner. The turning radii of the various wheels relative to the centre of turning are shown in chain-dot lines. The usual channel brush 63 (which sweeps the kerb 64) and wide sweep brush 65 of the vehicle sweep the refuse into a windrow 66 to be sucked up by the nozzle.

The nozzle 40 has similar advantages to the nozzle 20; the preferential air flow from the rear air inlet 51 through the brush 50 in harmony with the rotation thereof provides an extremely effective sweeping of the refuse material up through the outlet 52.

The above nozzles may be used for conventional suction road sweepers and also for vehicles for sweeping large paved areas such as aircraft parking and maintenance areas and for airport runways, when they would be used typically in conjunction with the vee formation brushes.

Claims

1. A nozzle which is mounted in use on a suction refuse collecting vehicle, the nozzle having an opening (16, 46) which in use is downwardly facing and adjacent to the ground, a refuse material inlet (17, 47) at a front end of the nozzle, a suction outlet (12) for connection by a suction conduit (13, 43) to a low pressure zone on the vehicle, a brush (20, 50) rotatably mounted in the nozzle for assisting passage of refuse material to the outlet, and means for rotating the brush, characterised by an air inlet aperture (21, 51) of predetermined size at a rear end of the nozzle to allow passage of air through the air inlet aperture to the suction outlet (12), the brush (20, 50) being positioned between the air inlet aperture (21, 51) and the suction outlet (12) so that the air travelling from the air inlet aperture to the suction outlet passes generally through the brush (20, 50) harmoniously with the rotation thereof.

2. A nozzle as claimed in claim 1 wherein the nozzle is shaped upwardly and forwardly around the material inlet (17, 47) so that in use the material inlet faces forwardly and downwardly.

3. A nozzle as claimed in either preceding claim wherein the brush (20, 50) is adjustable generally inwardly and outwardly of the nozzle so as to be adjustable in use relative to the ground to compensate for wear of the brush.

4. A nozzle as claimed in any preceding claim, further having a brush contact member (24, 25) mounted in the nozzle so as to contact the brush while it rotates to clean it.

5. A nozzle as claimed in claim 4 wherein the contact member (24, 25) is an intermediate transverse wall located in the nozzle generally between the brush (20) and the suction outlet (12).

6. A nozzle as claimed in either of claims 4 and 5 wherein the brush (20) and contact member (24, 25) are adjustable relative to one another to compensate for wear of the brush.

7. A nozzle as claimed in any preceding claim, characterised by at least one guide (27) located in the nozzle so as to guide refuse material which has entered the material inlet (17) towards a zone which is central of the suction outlet (12).

8. A nozzle as claimed in claim 7 characterised by a second guide (27) similarly located in the nozzle, the two guides being mutually convergent towards the said zone.

9. A nozzle as claimed in either claim 7 or claim 8 wherein the or each guide (27) is located so as to contact the ground in use or so as to be spaced therefrom by a small clearance.

10. A nozzle as claimed in any one of claims 7 to 9 wherein the or each guide (27) is formed of resilient material.

11. A nozzle as claimed in any one of claims 7 to 10 wherein the or each guide (27) terminates below the suction outlet.

12. A nozzle as claimed in any one of claims 7 to 11 wherein the or each guide (27) forms part of a sealing skirt (56) adapted to prevent or restrict air entry into the nozzle from the sides thereof.

13. A suction refuse collector vehicle comprising a nozzle as claimed in any preceding claim.

Revendications

1. Tuyère, qui est montée en cours d'utilisation sur un véhicule de collecte de déchets par aspiration et qui comporte une ouverture (16, 46) qui, en cours d'utilisation, est tournée vers le bas et est au voisinage du sol, une entrée (17, 47) des déchets ménagée dans une extrémité avant de la tuyère, et une sortie d'aspiration (12) destinée à être raccordée par un conduit d'aspiration (13, 43) à une zone à basse pression du véhicule, une brosse (20, 50) montée rotative dans la tuyère pour faciliter l'entraînement des déchets en direction de la sortie, et des moyens servant à entraîner la brosse, caractérisée par une ouverture d'admission de l'air (21, 51) de dimensions prédéterminées, située à une extrémité arrière de la tuyère de manière à permettre le passage de l'air dans l'ouverture d'admission de l'air en direction de la sortie d'aspiration (12), la brosse (20, 50)

étant disposée entre l'ouverture d'admission de l'air (21, 51) et la sortie d'aspiration (12) de sorte que l'air circulant depuis l'ouverture d'admission de l'air jusqu'à la sortie d'aspiration traverse d'une manière générale la brosse (20, 50) de concert avec la rotation de cette dernière.

2. Tuyère selon la revendication 1, dans laquelle la tuyère est conformée de manière à s'étendre vers le haut et vers l'avant autour de l'entrée (17, 47) des déchets de telle sorte qu'en cours d'utilisation, l'entrée des déchets est tournée vers l'avant et vers le bas.

3. Tuyère selon l'une des revendications précédentes, dans laquelle la brosse (20, 50) est réglable d'une manière générale vers l'intérieur et vers l'extérieur de la tuyère de manière à être réglable en cours d'utilisation par rapport au sol afin de compenser l'usure de la brosse.

4. Tuyère selon l'une quelconque des revendications précédentes, comportant en outre un organe (24, 25) de contact de la brosse qui est monté dans la tuyère de manière à contacter la brosse quand elle tourne, afin de la nettoyer.

5. Tuyère selon la revendication 4, dans laquelle l'organe de contact (24, 25) est une paroi transversale intercalaire située dans la tuyère, d'une manière générale entre la brosse (20) et la sortie d'aspiration (12).

6. Tuyère selon l'une ou l'autre des revendications 4 et 5, dans laquelle la brosse (20) et l'organe de contact (24, 25) sont réglables l'un par rapport à l'autre afin de compenser l'usure du balai.

7. Tuyère selon l'une quelconque des revendications précédentes, caractérisée par au moins un guide (27) situé dans la tuyère de manière à guider les déchets qui ont pénétré dans l'entrée (17) des déchets en direction d'une zone qui est au centre de la sortie d'aspiration (12).

8. Tuyère selon la revendication 7, caractérisée par un second guide (27) disposé d'une manière semblable dans la tuyère, les deux guides convergeant mutuellement vers ladite zone.

9. Tuyère selon l'une ou l'autre des revendications 7 et 8, dans laquelle le ou chaque guide (27) est disposé de manière à contacter le sol en cours d'utilisation ou de manière à être écarté de ce dernier, d'un faible espacement.

10. Tuyère selon l'une quelconque des revendications 7 à 9, dans laquelle le ou chaque guide (27) est constitué en un matériau élastique.

11. Tuyère selon l'une quelconque des revendications 7 à 10 et dans laquelle le ou chaque guide (27) se termine au-dessous de la sortie d'aspiration.

12. Tuyère selon l'une quelconque des revendications 7 à 11, dans laquelle le ou chaque guide (27) fait partie d'une jupe (56) de fermeture étanche apte à empêcher ou à limiter l'entrée de l'air dans la tuyère à partir des côtés de cette dernière.

13. Véhicule de collecte à aspiration incluant une tuyère telle que revendiquée selon l'une quelconque des revendications précédentes.

Patentansprüche

1. An einem Müllfahrzeug angeordnetes Saugmundstück mit einer Öffnung (16, 46), die im Betrieb nach unten weist und nahe dem Boden angeordnet ist, mit einem Mülleinlaß (17, 47) an der Stirnseite des Mundstücks, einem Saugluftaustritt (12), der mittels einer Saugleitung (13, 43) an einem Unterdruckbereich des Fahrzeugs angeschlossen ist, einer in dem Mundstück drehbar angeordneten Bürste (20, 50), die den Transport des Mülls zu dem Austritt unterstützt, und einem Drehantrieb für die Bürste, gekennzeichnet durch eine vorbestimmte Abmessungen aufweisende Lufteintrittsöffnung (21, 51) an der Rückseite des Mundstücks, durch die Luft zu dem Saugluftaustritt (12) strömen kann, wobei die Bürste (20, 50) zwischen der Lufteintrittsöffnung (21, 51) und dem Saugluftaustritt (12) angeordnet ist, so daß die von der Lufteintrittsöffnung zu dem Saugluftaustritt wandernde Luft im wesentlichen durch die Bürste (20, 50) entsprechend ihrer Drehrichtung hindurchstreicht.

2. Saugmundstück nach Anspruch 1, dadurch gekennzeichnet, daß das Mundstück nach oben und nach vorn um den Mülleinlaß (17, 47) herum geformt ist, so daß der Mülleinlaß während des Betriebs nach vorn und unten weist.

3. Saugmundstück nach den Ansprüchen 1 und 2, dadurch gekennzeichnet, daß die Bürste (20, 50) innerhalb des Saugmundstücks im wesentlichen nach innen und nach außen verstellbar ist, so daß sie im Betrieb gegenüber dem Boden einstellbar ist, um Verschleiß der Bürste auszugleichen.

4. Saugmundstück nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß in dem Mundstück ein mit der Bürste in Eingriff stehendes Organ (24, 25) angeordnet ist, das die Bürste beim Drehen säubert.

5. Saugmundstück nach Anspruch 4, dadurch gekennzeichnet, daß das mit der Bürste in Eingriff stehende Organ (24, 25) eine mittlere, sich quer erstreckende Wand aufweist, die innerhalb des

Saugmundstücks im wesentlichen zwischen der Bürste (20) und dem Saugluftaustritt (12) angeordnet ist.

6. Saugmundstück nach den Ansprüchen 4 und 5, dadurch gekennzeichnet, daß die Bürste (20) und das mit der Bürste in Eingriff stehende Organ (24, 25) gegenüber einander verstellbar sind, um Verschleiß der Bürste auszugleichen.

7. Saugmundstück nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß mindestens ein Führungselement (27) in dem Saugmundstück angeordnet ist, um den durch den Einlaß (17) eintretenden Müll in eine im Zentrum des Saugluftaustritts (12) liegende Zone zu leiten.

8. Saugmundstück nach Anspruch 7, dadurch gekennzeichnet, daß innerhalb des Saugmundstücks ein zweites Führungselement (27) in ähnlicher Weise angeordnet ist, wobei die beiden Führungselemente gegeneinander in Richtung der zentralen Zone konvergieren.

9. Saugmundstück nach den Ansprüchen 7 und 8, dadurch gekennzeichnet, daß das oder beide Führungselemente (27) derart angeordnet sind, daß sie im Betrieb mit dem Boden in Eingriff stehen oder von diesem nur einen geringen Abstand haben.

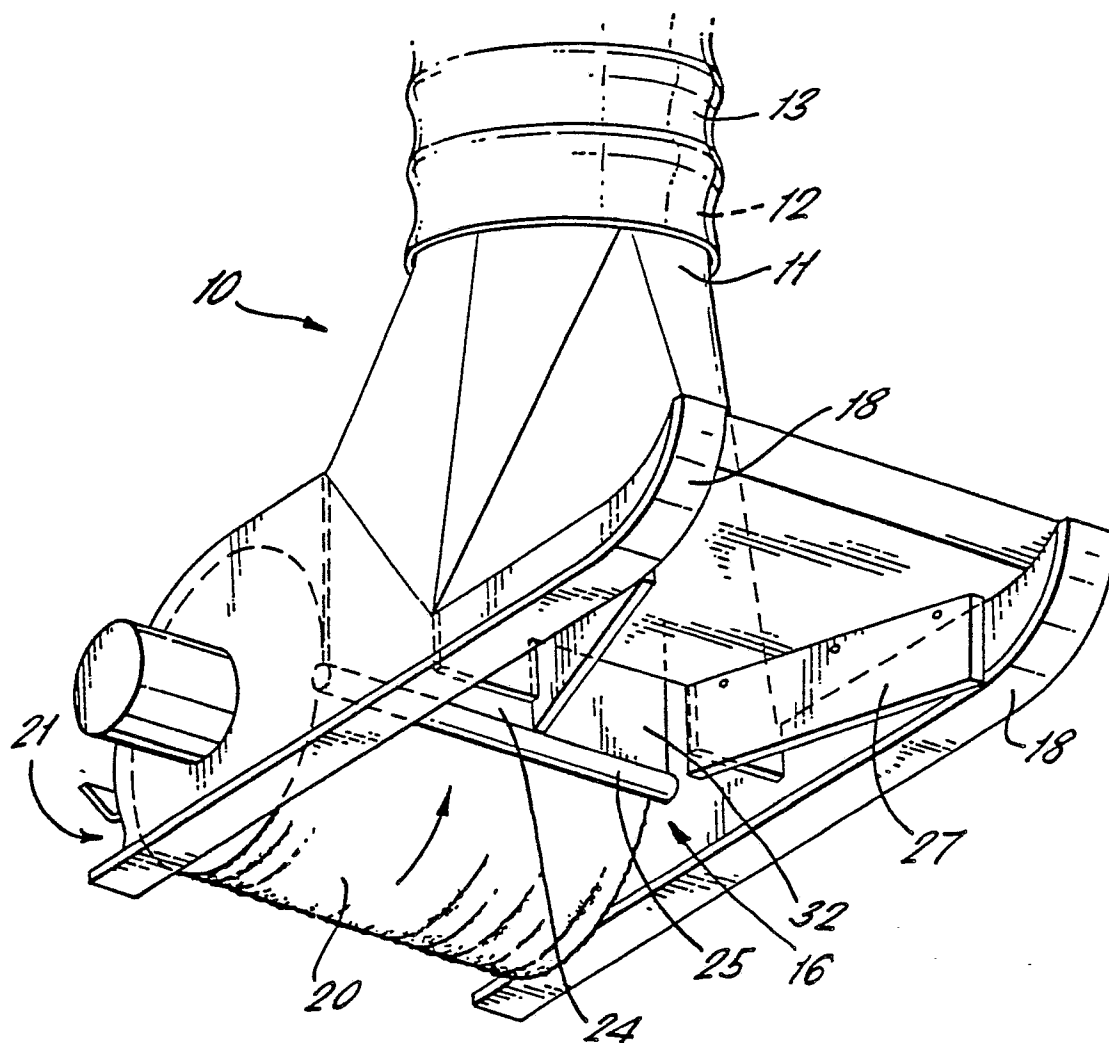
10. Saugmundstück nach einem der Ansprüche 7 bis 9, dadurch gekennzeichnet, daß das oder beide Führungselemente (27) aus federnd nachgiebigem Material hergestellt sind.

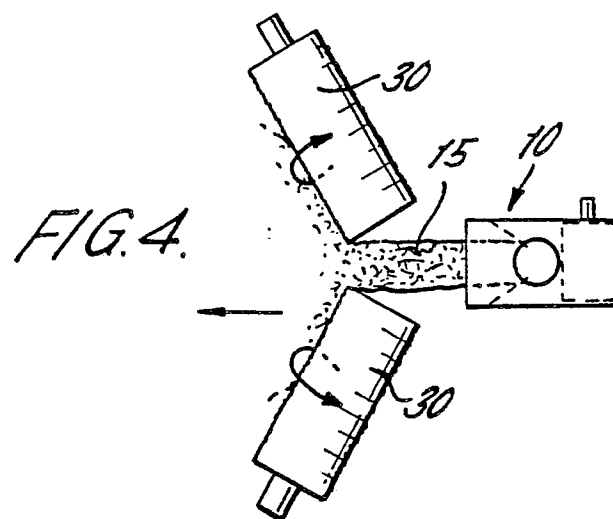
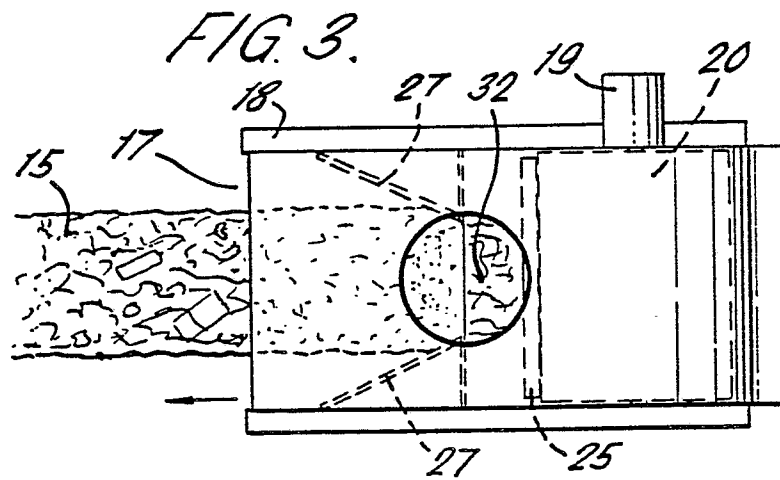
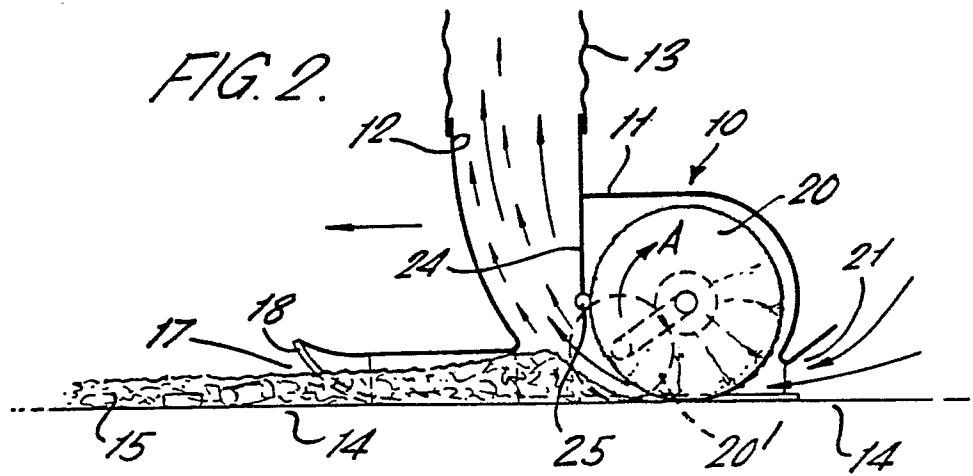
11. Saugmundstück nach einem der Ansprüche 7 bis 10, dadurch gekennzeichnet, daß das oder beide Führungselemente (27) unterhalb des Saugluftaustritts enden.

12. Saugmundstück nach einem der Ansprüche 7 bis 11, dadurch gekennzeichnet, daß das oder beide Führungselemente (27) Teile einer Schürze (56) sind, die derart ausgebildet ist, daß sie den Eintritt von Luft in das Saugmundstück von den Seiten her verhindert oder drosselt.

13. Müllfahrzeug mit einem Saugmundstück nach einem der vorhergehenden Ansprüche.

FIG. 1.





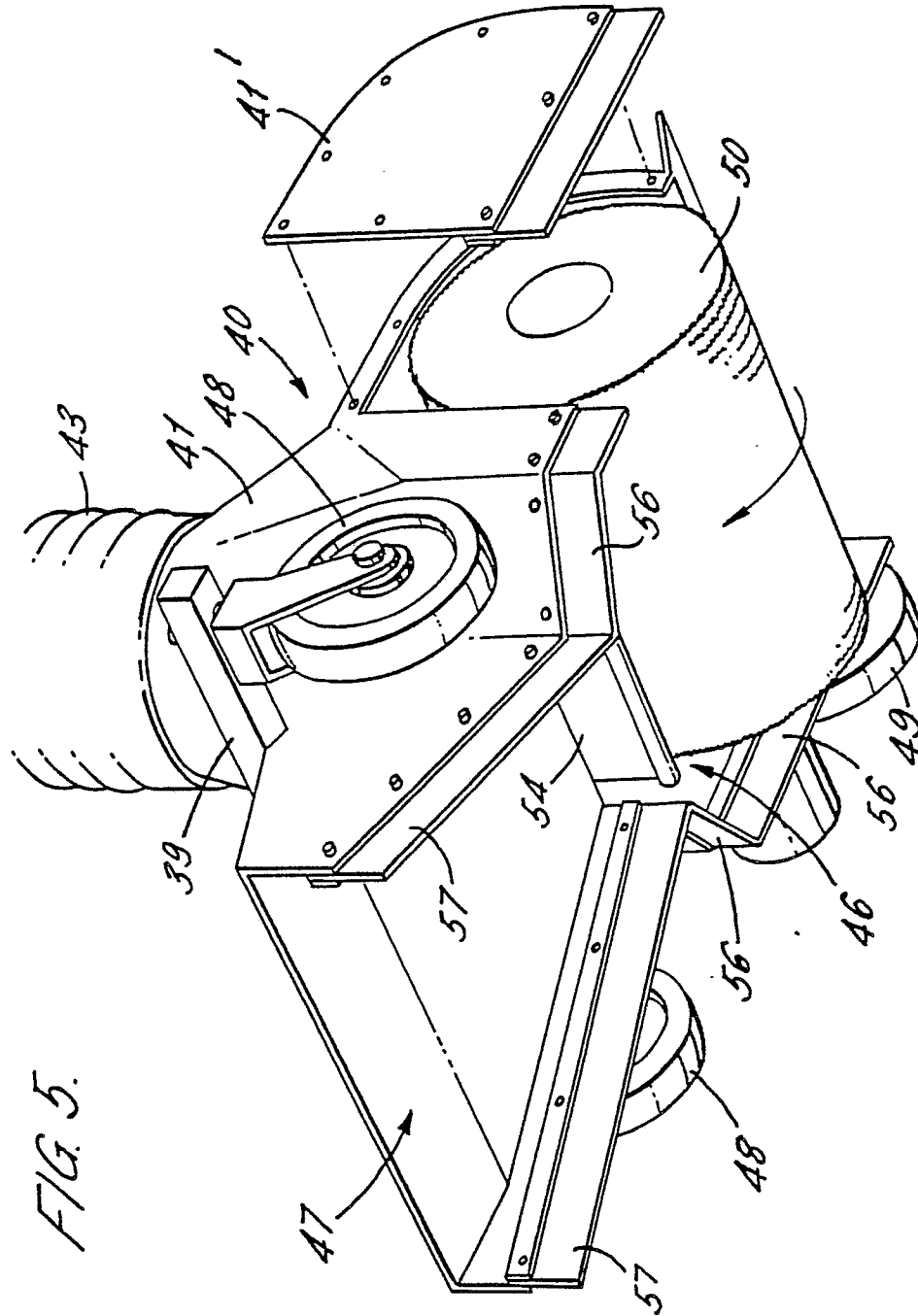


FIG. 6.

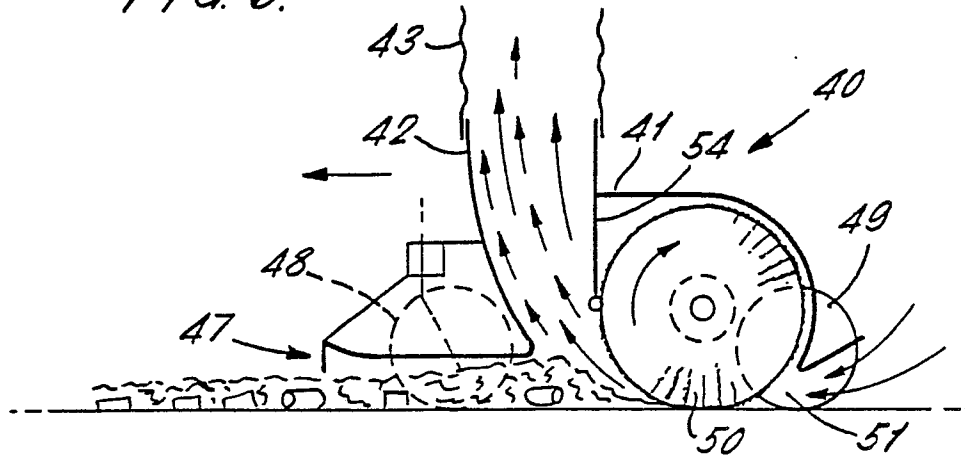


FIG. 7.

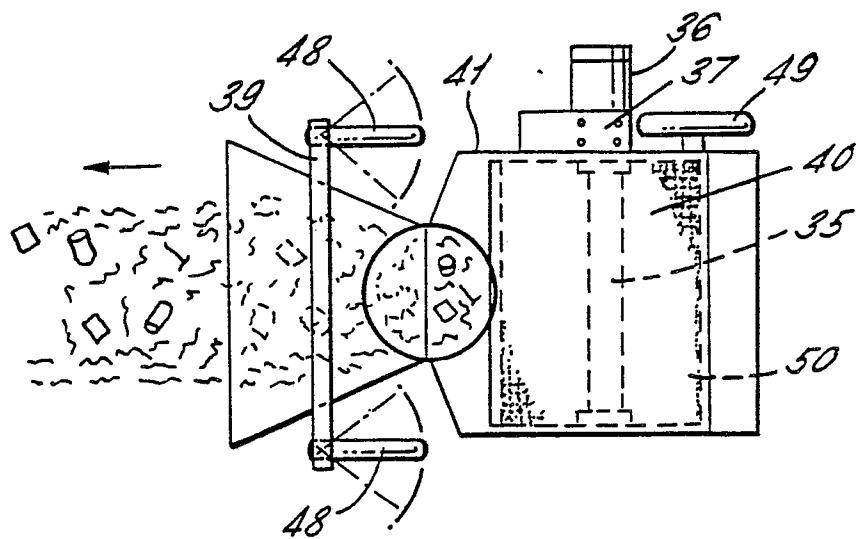


FIG. 8.

