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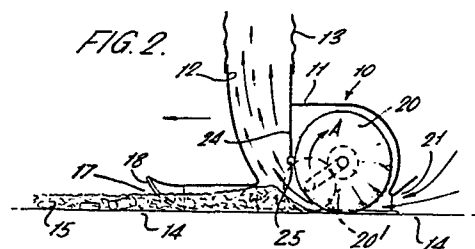
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54 **Suction nozzles for suction refuse collecting vehicles.**

57 A suction nozzle (10,40) has an opening (16,46) facing the ground, a front refuse inlet (17,47), a suction outlet (12,42) through which air is sucked and a rear air inlet (21,51). Sealing means (18,56) restrict air entry into the nozzle from the sides thereof. A rotary brush (20,50) for assisting passage of refuse to the outlet is mounted in the nozzle and rotated such that air from the air inlet travelling to the outlet passes through the brush harmoniously with its rotational direction.



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SUCTION NOZZLES FOR SUCTION
REFUSE COLLECTING VEHICLES

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
5 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
10 for rotating the brush.

The invention provides a nozzle of the said type characterised by an air inlet aperture of predetermined size at a rear end of the nozzle to allow passage of air through the air inlet aperture
15 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

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through the brush harmoniously with the rotation thereof.

The nozzle may optionally be shaped upwardly and forwardly around the material inlet so that in
5 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
10 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
15 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
20 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
5 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
10 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
15 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
20 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

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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

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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

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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
5 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;
10 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
15 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
20 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

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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 yee
5 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
10 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
15 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
20 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
5 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
10 on a cross bar 39 secured to the housing 41, articulation of the wheels being accepted by the modified shape of the housing permitted by the omission of supporting skids, as shown in Figure 7. The trailing wheel 49 is rotatably mounted on the
15 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
20 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

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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
5 (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
10 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
15 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
20 brushes.

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CLAIMS

1. A nozzle of the said type characterised
by an air inlet aperture of predetermined size at a
rear end of the nozzle to allow passage of air
5 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
10 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 so that in
15 use the material inlet faces forwardly and
downwardly.

3. A nozzle as claimed in either preceding
claim wherein the brush is adjustable generally
20 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
25 claim, further having a brush contact member

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mounted in the nozzle so as to contact the brush while it rotates to clean it.

5. A nozzle as claimed in claim 4
5 wherein the contact member is an intermediate
transverse wall located in the nozzle generally
between the brush and the suction outlet.

6. A nozzle as claimed in either of
10 claims 4 and 5 wherein the brush and contact
member are adjustable relative to one another to
compensate for wear of the brush.

7. A nozzle as claimed in any preceding
15 claim, characterised by at least one guide 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.

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

25 9. A nozzle as claimed in either claim

7 or claim 8 wherein the or each guide is located so as to contact the ground in use or so as to be spaced therefrom by a small clearance.

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

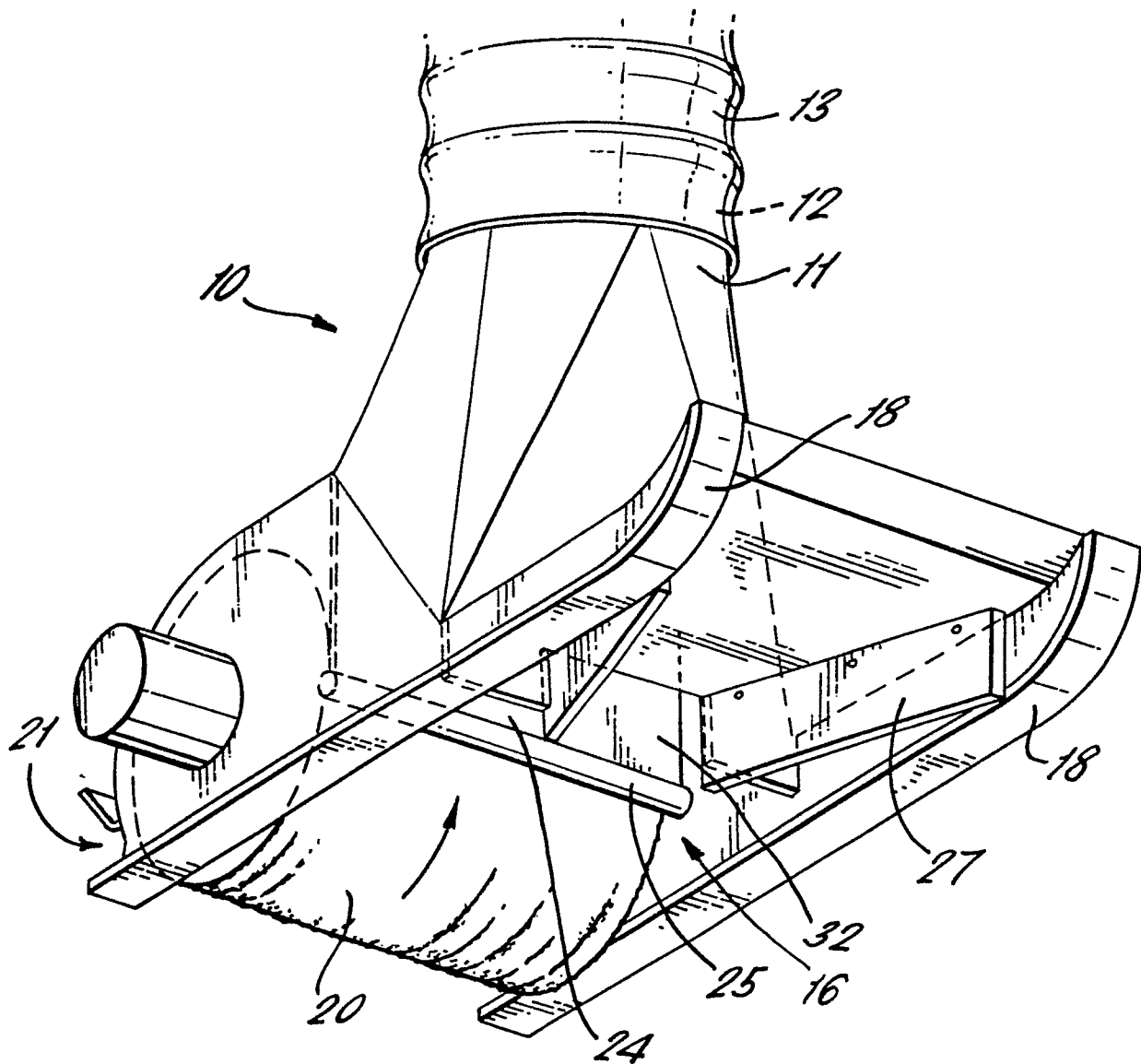
10 11. A nozzle as claimed in any one of claims 7 to 10 wherein the or each guide terminates below the suction outlet.

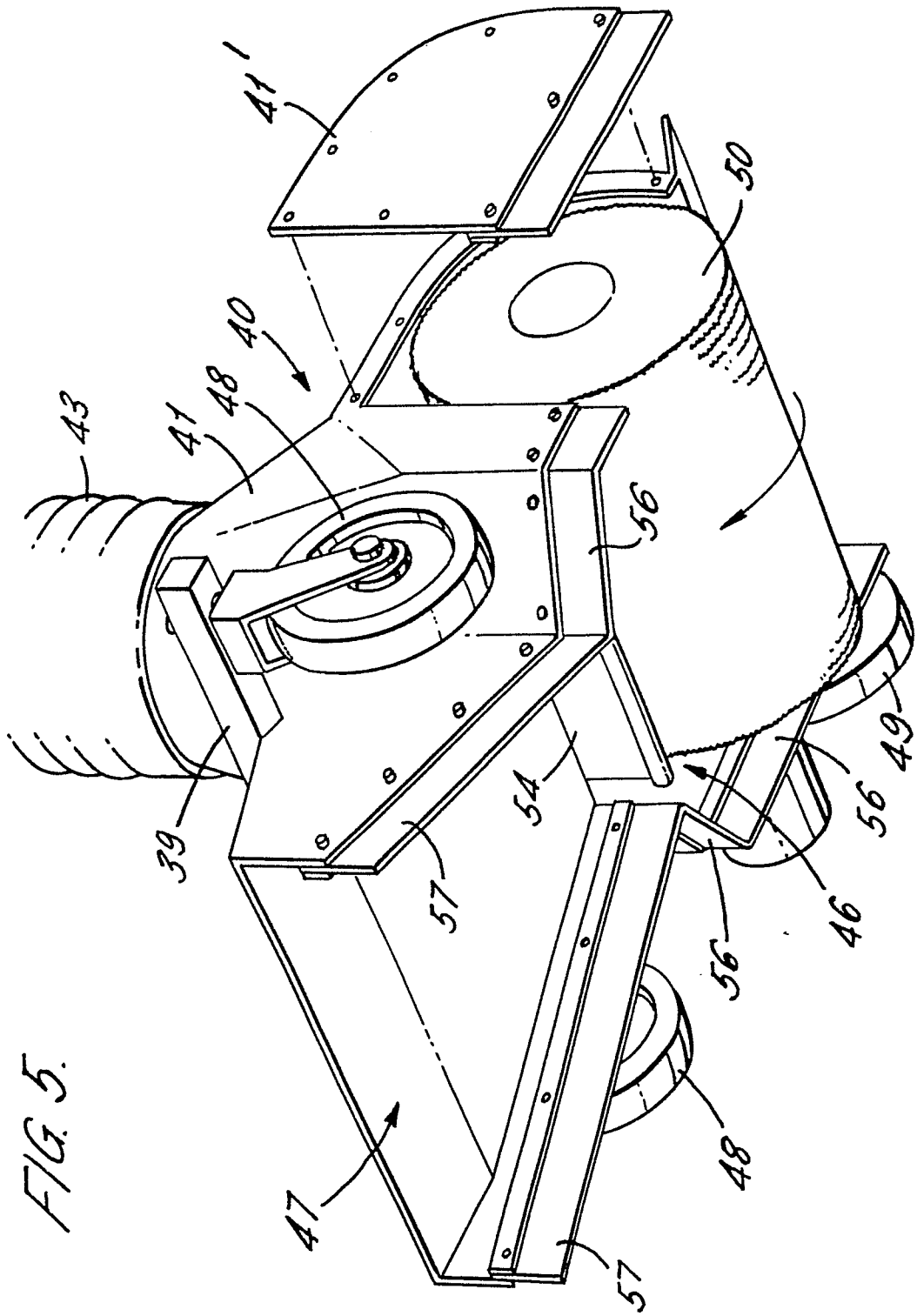
15 12. A nozzle as claimed in any one of claims 7 to 11 wherein the or each guide forms part of a sealing skirt adapted to prevent or restrict air entry into the nozzle from the sides thereof.

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

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FIG. 1.





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FIG. 6.

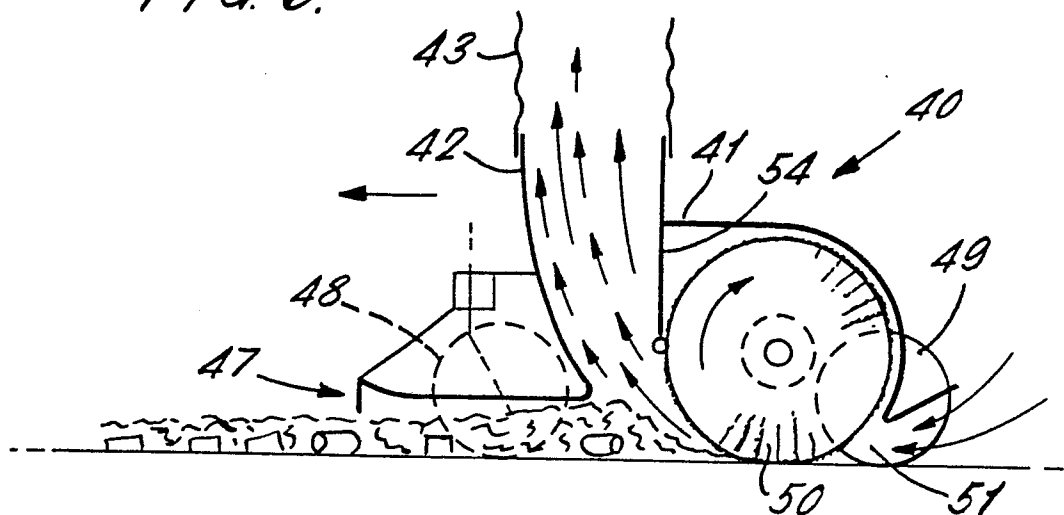


FIG. 7.

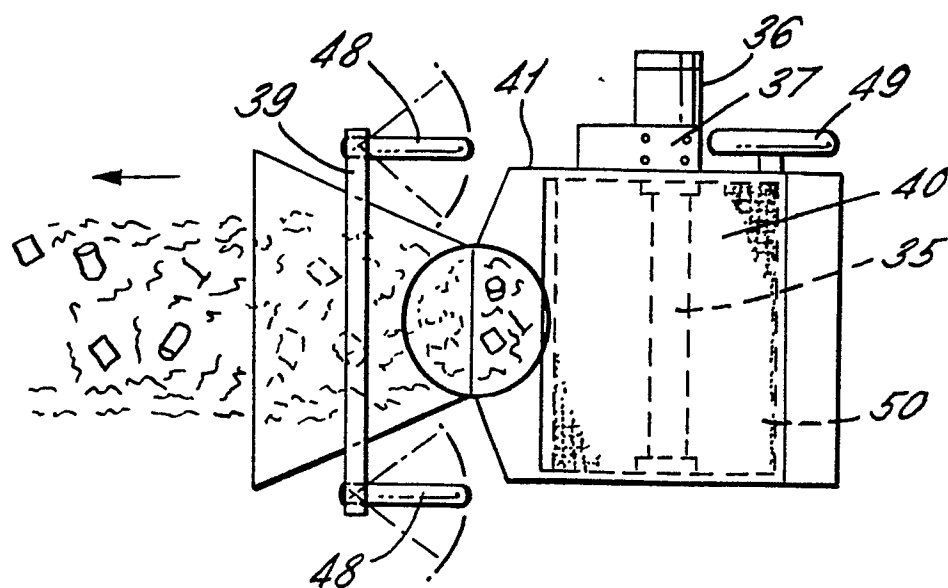
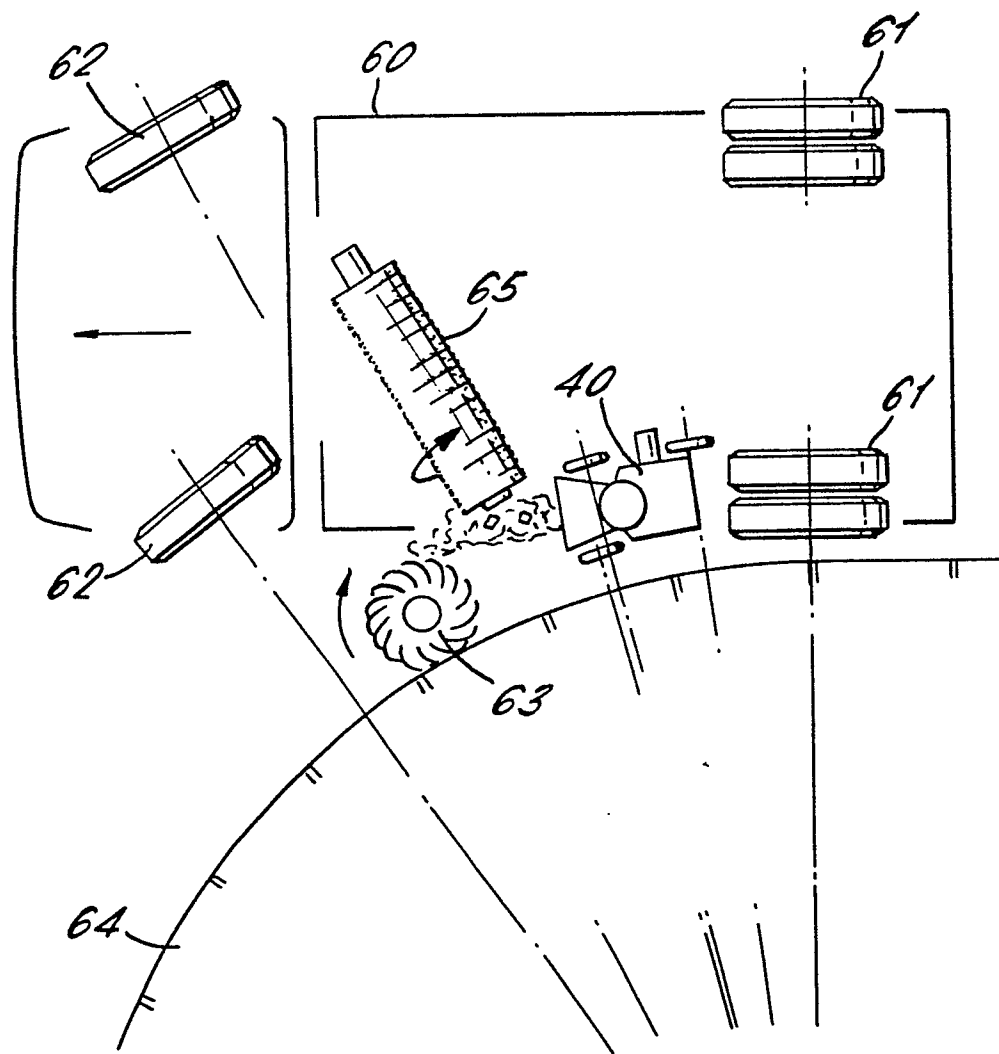


FIG. 8.



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European Patent
Office

EUROPEAN SEARCH REPORT

Application number

EP 82 30 6396

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	GB-A-1 184 795 (JOHNSTON BROS.) * Figure 1 *	1	E 01 H 1/08
A	AT-B- 211 861 (SCHORLING)		
A	US-A-3 605 170 (HANK et al.)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			E 01 H 1/08
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 16-02-1983	Examiner KLITSCH G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			