



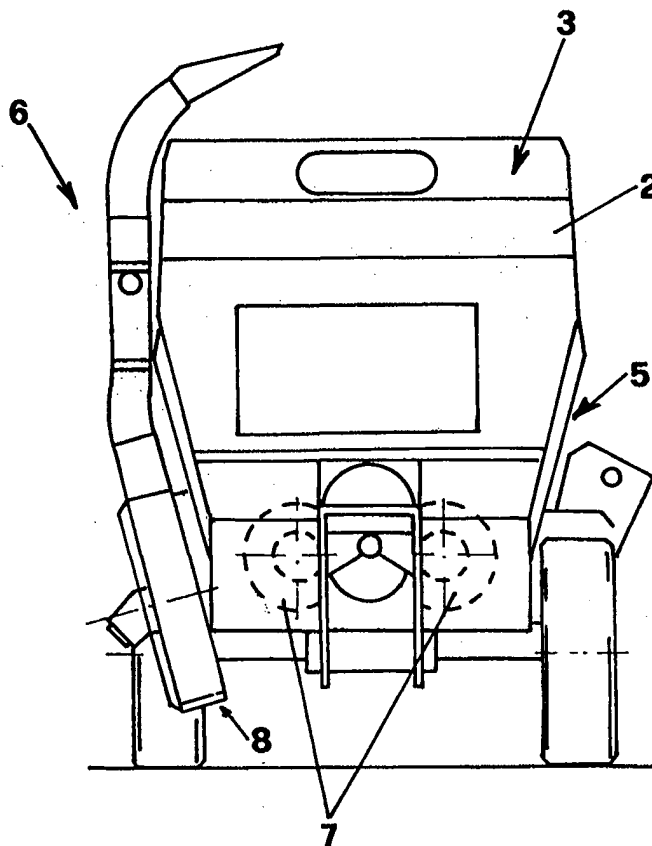
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(54) Title: CUTTER-MIXER AND BED-STRAW SPREADER WAGON PROVIDED OF A PERFECTED GROUP FOR THE DISTRIBUTION OF THE STRAW OUTSIDE THE WAGON

(57) Abstract

The invention realises a cutter-mixer and bed-straw spreader wagon (1) for fibrous products comprising a container (2) provided inside of at least a rotating screw feeder (7) and outwardly of at least a distribution group (6) suited to convey the cut and mixed material outside said container (2). Said distribution group (6) comprises a fan (8) which volute (13) is fixed to a side of said wagon (2) and presents internally an impeller (14) provided of blades (18) having a plane surface (180). Said blades (18) are in number of four and are located orthogonally among them.



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CUTTER-MIXER AND BED-STRAW SPREADER WAGON PROVIDED OF A PERFECTED GROUP FOR THE DISTRIBUTION OF THE STRAW OUTSIDE THE WAGON.

5 The invention concerns a cutter-mixer and bed-straw spreader wagon, suitable for effecting the cutting and the mixing of fibrous products such as fodder, grass or straw silages, provided of a perfected group for the distribution of the straw outside the wagon for making litters.

10 It is known that for making litters are used special cutter - mixer wagons which are supplied of a distribution group suitable for tossing the straw outside the wagon are used.

In particular the cutter-mixer and bed-straw spreader wagon which is object of the deposit N° VI94A000047 named by the same inventor of the present patent, which is able to cut and mix every product for a zootechnical use and is also provided of a group for the distribution of the straw outside the wagon for realising litters is known.

20 The distribution group which equips the car that is object of the said patent, is substantially formed of a conduct which by a fan conveys the cut straw from the screw feeders of said wagon to an adjustable delivery opening, connected to the end of said conduct which directs the throwing of the straw towards the zones where the litters will be realised.

In particular the fan presents the volute applied laterally on one side of the wagon, inside which is arranged an impeller supplied of blades with a curved outline which is started by a hydraulic engine. Therefore it is substantially a centrifugal fan of the known kind.

25 One of the inconvenient which the distribution group, which equips the wagon that is object of the said patent, presents is that the throwing distance which this distribution group realises is rather limited.

30 The present patent intends to overcome such a limitation realising a cutter-mixer and bed-straw spreader wagon which is supplied of a perfected distribution group for the straw suitable for realising throwing distances much greater than the cutter-mixer and bed-straw spreader wagons of the known kind in general and particularly in comparison with the cutter-mixer and bed-straw spreader wagon that is object of the said patent.

35 It is another purpose that the distribution group for the straw presents the delivery opening, adjustable by a rotation group started by an electrical engine.

The said purposes are achieved with the realisation of a cutter-mixer and bed-straw spreader wagon for fibrous products that, according to the main claim comprises:

- a container supplied of at least one inlet opening for the introduction of the material to treat;
- at least one rotating screw feeder arranged on the bottom of said container, supplied of at least one couple of spirals with an opposite winding direction in order to convey the treated material in an intermediate zone of said at least one screw feeder;
- at least one distribution group suitable for conveying the treated material outside said container and comprising a delivery conduct which presents an end connected to a fan which sucks up the material inside said container and the opposite end supplied of at least one delivery opening suitable for directing outside the jet of said treated material and is characterised in that said fan comprises a volute that is fixed to a side of said wagon and communicating with the inside of the wagon itself by a suction opening which is arranged in correspondence of said intermediate zone of said at least one screw feeder, inside said volute an impeller formed of a circular disk keyed to motorization means suitable for starting it and supplied of a plurality of blades, each of which presents at least a plane surface having an outline which radially diverts towards said volute beginning from the central zone of said circular disk which is keyed to said motorization means being present.

According to a preferred embodiment said impeller is provided of four orthogonal blades and said delivery opening is connected to said delivery conduct by a rotation junction suited to put it into rotation so to convey the used material for example straw, in the desired direction.

Advantageously such constructive form of the fan allows to through out some cut and mixed straw to bigger distances than those reachable with the known type fan.

So advantageously though the turning delivery opening is fixed in end position to said delivery opening, it is of a contained length and so quite lighter. In this way it can be put in rotation by kinematic mechanisms coupled to the rotating joint which are actioned by an electric engine of low power so without the help of heavy and expensive hydraulic actuators.

The said purposes and the advantages will be better stressed during the description of a preferred embodiment given as an indicative but not as a limitative title where:

- fig. 1 shows the wagon of the invention in side view;
- 5 - fig. 2 shows the wagon of fig. 1 in frontal view;
- fig. 3 shows schematically and according a radial plane, the impeller detail and the detail of the motorization of the fan which equips the wagon of the invention
- fig 4 shows an outside frontal view the of distribution group which equips the
- 10 wagon of the invention;
- fig. 5 shows the distribution group of fig. 4 represented in an exploited view;
- fig. 6 shows the distribution group of fig. 4, represented in an upper view and with the regulation shutter of the intaken air completely opened;
- fig. 7 shows the distribution group of fig. 4 represented in upper view and with
- 15 the regulation shutter of the air located in close position;
- fig. 8 shows in axionometric representation and outwardly the fan detail which equips the distribution group of the wagon of the invention, in an inner view of the wagon itself and from the impeller side;
- fig. 10 shows part of the impeller of the fan which equips the distribution
- 20 group belonging to the wagon of the invention, in axionometric view and seen through the delivery opening realised in the volute of the fan.

As it can be observed in figs. 1 and 2 the wagon of the invention, on the whole pointed out with 1, comprises a container 2, insisting on wheels 4, that in the upper part presents a charging opening 3 of the material to treat.

- 25 The container 2 is preferably realised with a sheet and in correspondence of its bottom is arranged a couple of screw feeders 7 which realise the cutting and the mixing of the material present inside.

On the side of the wagon and in correspondence of the side walls of the container 2, on one side a door 5, through which the cut and mixed product is

30 unloaded outside, is present, while a distribution group, on the whole pointed out with 6, suitable for conveying outside the material that is treated inside the container two itself, is arranged on the opposite part.

It can be observed in particular that in the figs. 4 and 5 said distribution group 6 comprises:

- 35 - a fan 8 fixed to a side wall of the container 2, arranged in an inclined and

opposite position to said door 5;

- a delivery conduct 9 of the treated material, which by said fan 8 is taken from the inside of said container 2 and sent outside;

- a delivery opening 10 arranged at one end of said delivery conduct 9, suitable for sending the material in the wanted direction;

- a rotation group, on the whole pointed out with 11, suitable for rotatingly connecting said delivery opening 10 to said delivery conduct 9.

Regarding said fan 8 which is visible also in detail in figs. 3, 8, 9 and 10, it can be observed that it is formed of a volute 13 which is fixed to the wall of the container 2, inside which an impeller 14 formed of a disk 15 that presents the central zone 150 fixed to motorization means formed of an hydraulic engine 17 suitable for starting it and is supplied of four radial blades 18 arranged orthogonally among them, is located.

Regarding said blades 18 it can be observed, particularly in fig. 9, that each of them is formed of a metallic sheet with a constant thickness which presents a plane surface 180 having an outline 19 diverging towards the volute 13 beginning from the central zone 150 of the disk 15 where the hydraulic engine 17 is keyed.

In particular it can be observed that said outline 19 of each blade 18 is shaped in order that the central zone 118 of the blade 18 fixed to the shaft 16 of the engine 17 presents a shape substantially rectangular and is connected to an intermediate zone 218 having a substantially trapezoidal form whose smaller base is connected to said central zone 118 and whose greater base is connected to the terminal zone 318 of the blade 18 itself that like said central zone 118 presents a substantially rectangular form.

According to different executive forms, each of the blades 18 could even present a different outline from that one described, though radially divergent towards the volute 13 beginning from the shaft 16 of the engine 17.

Further in another executive variant the number of the blades 18 which form said impeller 14 could be different from four and said blades could be placed with different angulations among them.

It can be observed in figs. 6 and 7 that the volute 13 of the fan 8 is fixed to the wall of the wagon in order to define a clear span 190 through which the outside air can be sucked up by the inlet opening 20, realised in the volute 13 which, as it can be observed in detail in fig. 9, communicates with the inside of

the wagon in the opposite part of the discharge door 5, in correspondence of the intermediate zone 21 of each of the screw feeders 7, in which the spirals 71 and 72, which form it, joint themselves.

At the volute 13 of the fan 8 is fixed the delivery conduct 9 and to it, through
5 the interposition of a rotation group on the whole pointed out with 11 which, as it can be observed, comprises a rotating joint 111 which is put in rotation by an electric engine 120 by a chain 121, a delivery opening 10 is connected.

When the screw feeders 7 and by the hydraulic engine 17 the impeller 14 of the fan 8 are put in rotation, the cut and mixed product, for example straw,
10 whose throwing speed and capacity are regulated changing the position of a suitable shutter 30 visible in the figs. 6 and 7 sliding connected to said volute 13, which chokes the span 190 through which the suction opening 20 of the fan sucks up air from the outside.

The regulation of the air which is sucked up is extremely important because it
15 is such a flow which allows to convey outside the cut material, according to the well known principles which rule the transport processes of the materials by aerial gas.

In detail it can be observed in fig. 9 and in fig. 10 that the diverging conformation towards the volute 13 of each blade 18 and of the reciprocal
20 disposition of the blades which define the diverging conducts 40 unitedly to the fact that the surface 180 of said blades 18 in contact with the material, is plane, contribute to realise from the delivery opening 10 a particularly elevated exit speed of the material which allows to reach throwing distances much superior compared to those reachable using distribution groups of the known
25 kind where centrifugal fans having curved blades are used.

It can be observed even, in particular in fig. 3 and in fig. 9, that in order to help the convey of the material through the suction opening of the volute 13, the central area 118 of the blades 18 is provided with an ogive 50 of conveying the
30 flow 200 of the material. Eventually in order to improve the winding up of the flow of the entering material, the ogive 50 can be provided of cutters 51.

The cutter-mixer wagon of the invention maintain obviously all the characteristics of a normal cutter-mixer wagon and can be used even to execute only the cutting and the mixing of silages and other zoothechnical products which can be discharged according to the normal technique of use
35 through the side door 5.

Further it has been seen that the delivery opening 10 being connected to the delivery conduct 9 in its upper part, presents a length quite reduced and therefore a limited weight, such to be rotated using an electric engine 120 rather than hydraulic actuators as it happens in the applications of the known type.

According to what it has been said it is possible to comprehend that the wagon of the invention, supplied of the perfected distribution group, achieves all the prefixed purposes.

In an executive phase some modifications that as it has been said can regard for example the shape, the number and the dimension of the blades that form the impeller of the fan, can be introduced to the wagon of the invention and particularly to the distribution group that equips it.

The rotation devices of the impeller itself can be eventually changed.

Other variants can be for example different shapes of the delivery opening or different outward configurations of the volute of the fan and of the delivery conduct or other different structures of the choking grid of the intaken air.

An executive variant not represented can contemplate that the wagon of the invention is not supplied of the discharge side door in order that it can be used only for executing the bed-straw spreader operations with . previously cut and mixed straw inside the wagon by the action of the screw feeders.

All said variants and others are all protected by the present invention.

CLAIMS

1) Cutter-mixer and bed-straw spreader wagon (1) for fibrous products comprising:

- a container (2) provided with at least one opening (3) for the introduction of the material to treat;
- at least one rotating screw feeder (7) arranged on the bottom of said container (2), supplied of at least one couple of spirals (71, 72) with an opposite winding direction in order to convey the treated material in an intermediate zone (21) of said at least one screw feeder (7);
- at least one distribution group (6) suitable for conveying the treated material outside said container (2) comprising a delivery conduct (9) which presents an end connected to a fan (8) which sucks up the material inside said container (2) and the opposite end supplied of at least one delivery opening (10) suitable for directing outside the jet of said treated material and is **characterised in that** said fan comprises a volute (13) that is fixed to a side of said wagon (2) and communicating with the inside of the wagon by a suction opening (20) which is arranged in correspondence of said intermediate zone (21) of the said at least one screw feeder (7), inside said volute (13) an impeller (14) formed of a circular disk (15) keyed to motorization means (17) suitable for starting it and supplied of a plurality of blades (18), each of which presents at least one plane surface (180) having an outline (19) which radially diverts towards said volute (13) beginning from the central zone (150) of said circular disk (15) which is keyed to said motorization means (17) being present.

2) Cutter-mixer and bed-straw spreader wagon (1) according to claim 1) **characterised in that** said container (2) is supplied of at least one door (5) for the discharge of the treated material, arranged in correspondence of said intermediate zone (21) of said at least one screw feeder (7) is opposite to said suction opening (20) realised in said volute (13) of said fan (8).

3) Cutter-mixer and bed-straw spreader wagon (1) according to claim 1) **characterised in that** said delivery opening (10) is connected at one end of said delivery conduct (9) by the interposition of a rotation group (11) comprising a rotating joint (111) which connects said delivery conduct (9) to said delivery opening (10) and that is started by a chain (121) mechanically connected to an engine (120).

4) Cutter-mixer and bed-straw spreader wagon (1) according to claim 3)

characterised in that said engine (120) is an electric one.

5) Cutter-mixer and bed-straw spreader wagon (1) according to claim 1)
characterised in that each of said blades (18) is realised with a plane sheet
whose outline (19), according to the radial direction, is shaped in order to
5 present:

- a central zone (118) of a shape substantially rectangular, fixed to the shaft
(16) which connects said motorization means (17) to said circular disk (15);
- a terminal zone (318) arranged next to said volute (13) and presenting a
shape substantially rectangular;
- 10 - an intermediate zone (218) of a substantially trapezoidal shape whose
smaller base is connected to said central zone (118) and whose greater base
is connected to said terminal zone (318).

6) Cutter-mixer and bed-straw spreader wagon (1) according to claim 1)
characterised in that said impeller (14) presents an ogive (50) fixed to said
15 blades (18) in correspondence of the central zone (118) of each of them, said
ogive (50) being suitable for conveying the flow (200) of material through said
suction opening (20) of said volute (13) of said fan (8).

7) Cutter-mixer and bed-straw spreader wagon (1) according to claim 6)
characterised in that said ogive (50) is provided with on the outward
20 periphery of cutters (51) suitable for winding said flow (200) of material
entering in said volute (13) of said fan (8).

8) Cutter-mixer and bed-straw spreader wagon (1) according to claim 1)
characterised in that said volute (13) of said fan (8) is fixed spaced out from
the wall of the container (2) of said wagon to which is connected, in order to
25 define a clear span (190) of conveying of the outward air to said suction
opening (20) of the volute (13) itself, said free light (190) being intercepted by
a shutter (30) sliding connected to said volute (13).

9) Cutter-mixer and bed-straw spreader wagon (1) according to claim 1)
characterised in that said motorization means of said impeller (14) are
30 formed of an hydraulic engine (17).

10) Cutter-mixer and bed-straw spreader wagon (1) according to claim
1) **characterised in that** said blades (18) are four and are arranged
orthogonally among them.

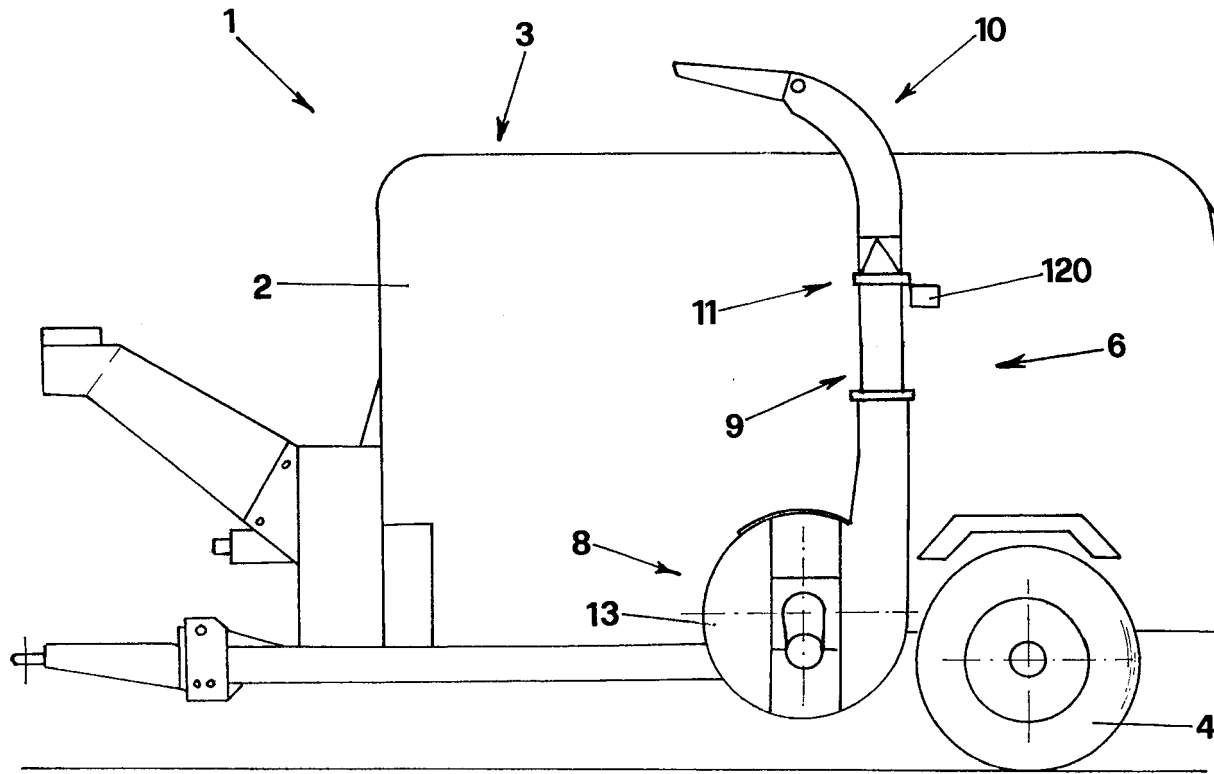


FIG. 1

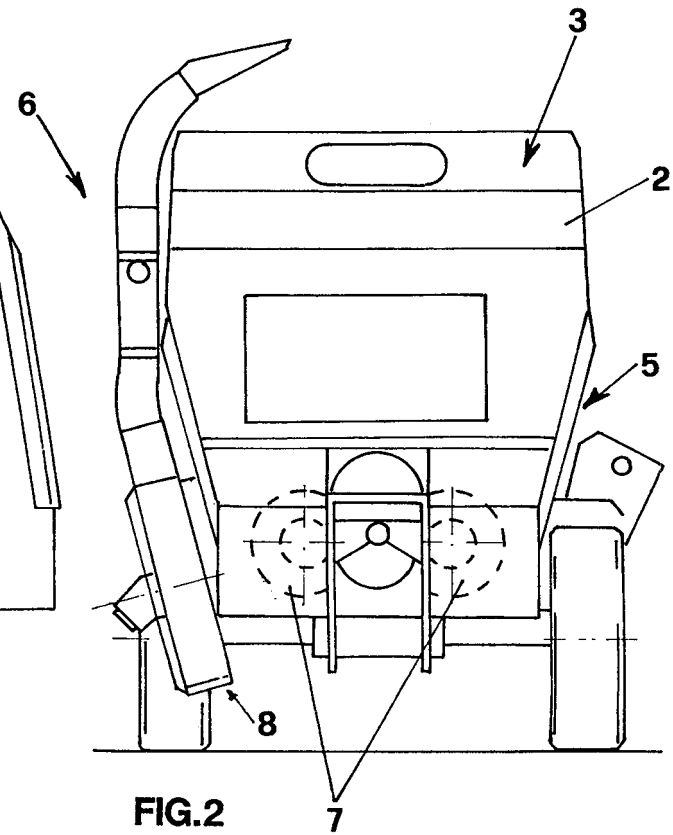


FIG. 2

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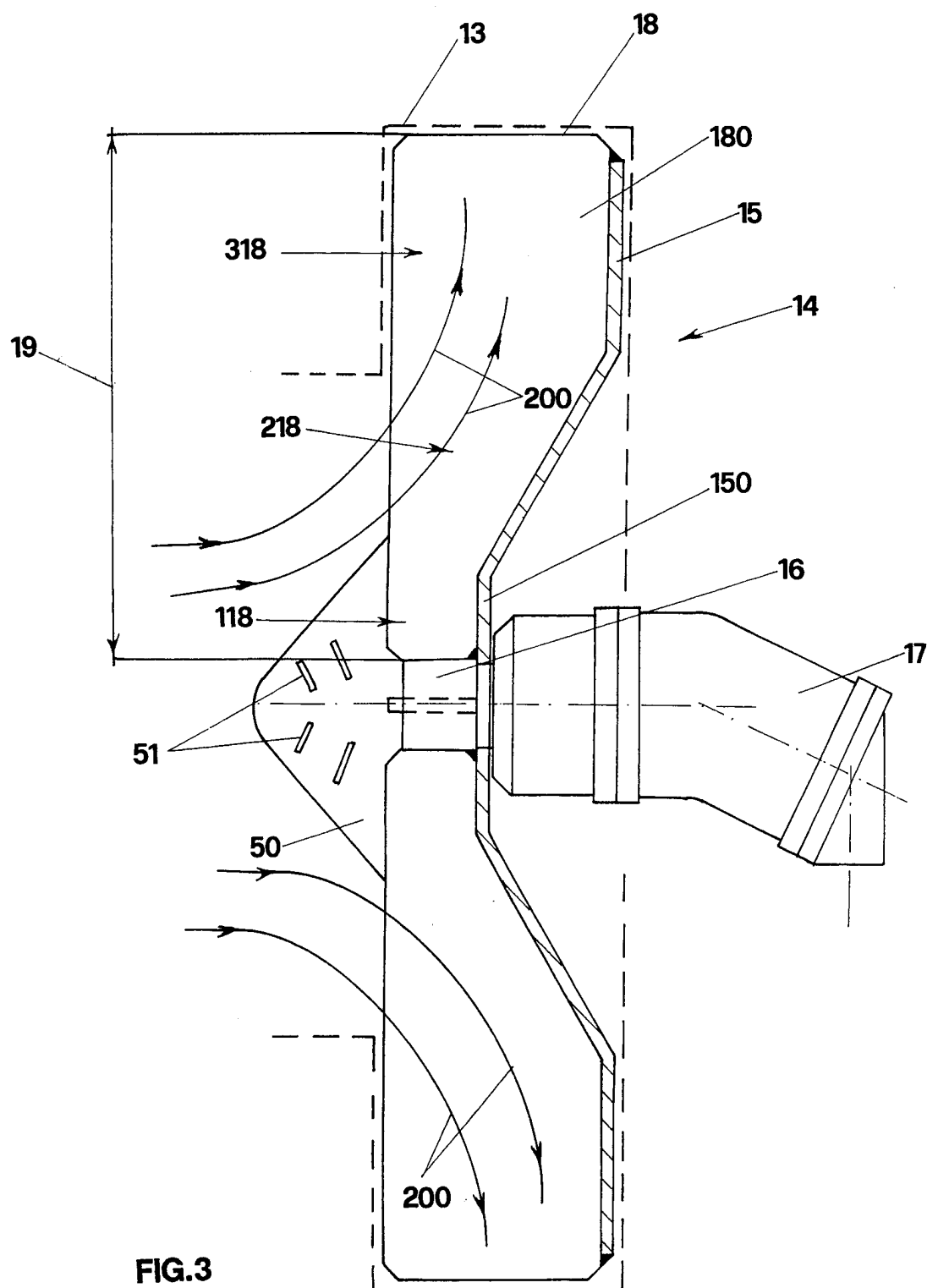


FIG. 3

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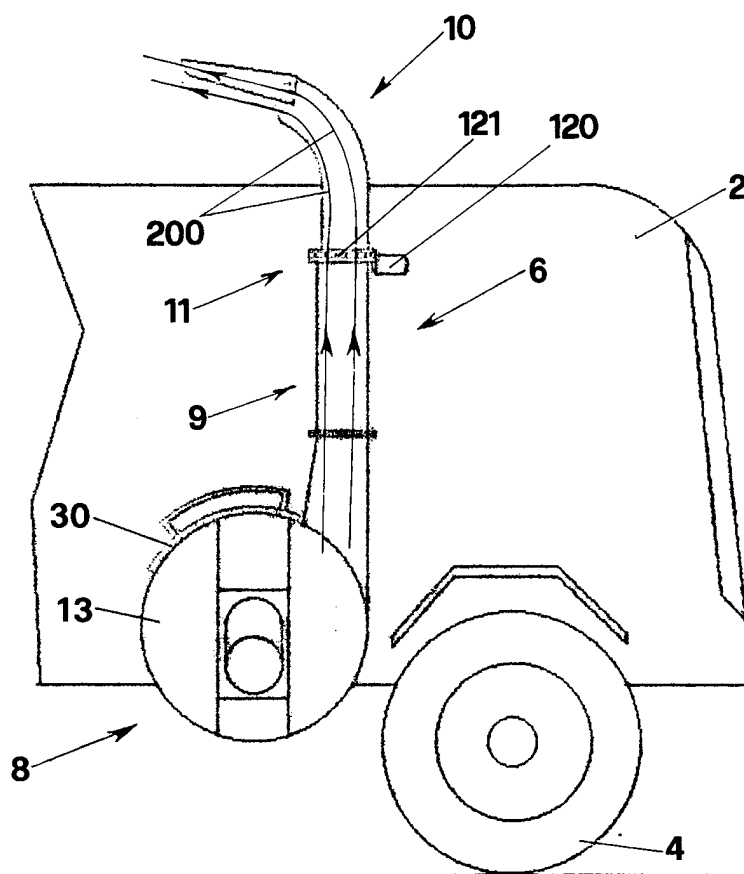


FIG. 4

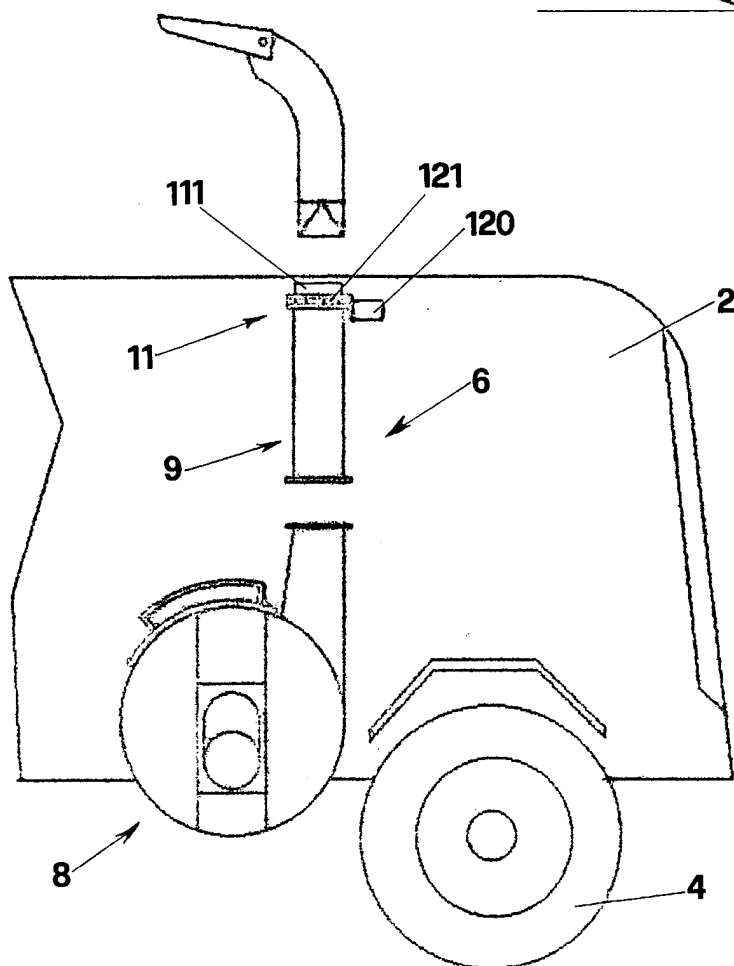


FIG. 5

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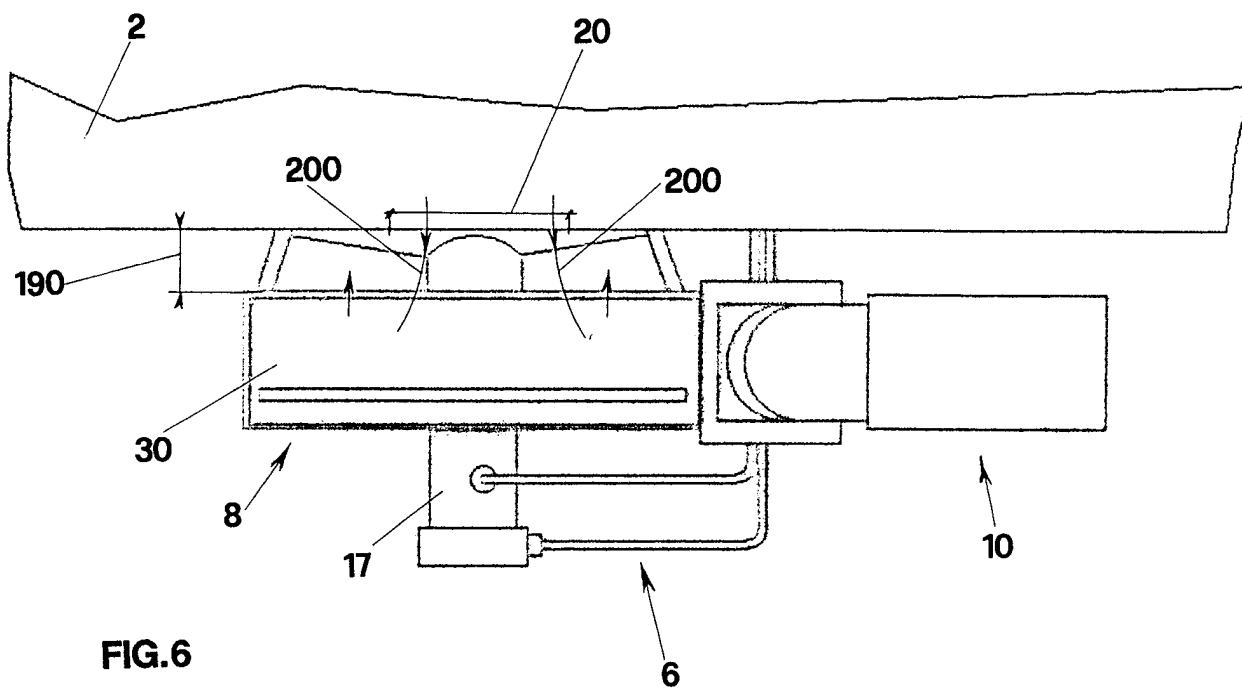


FIG. 6

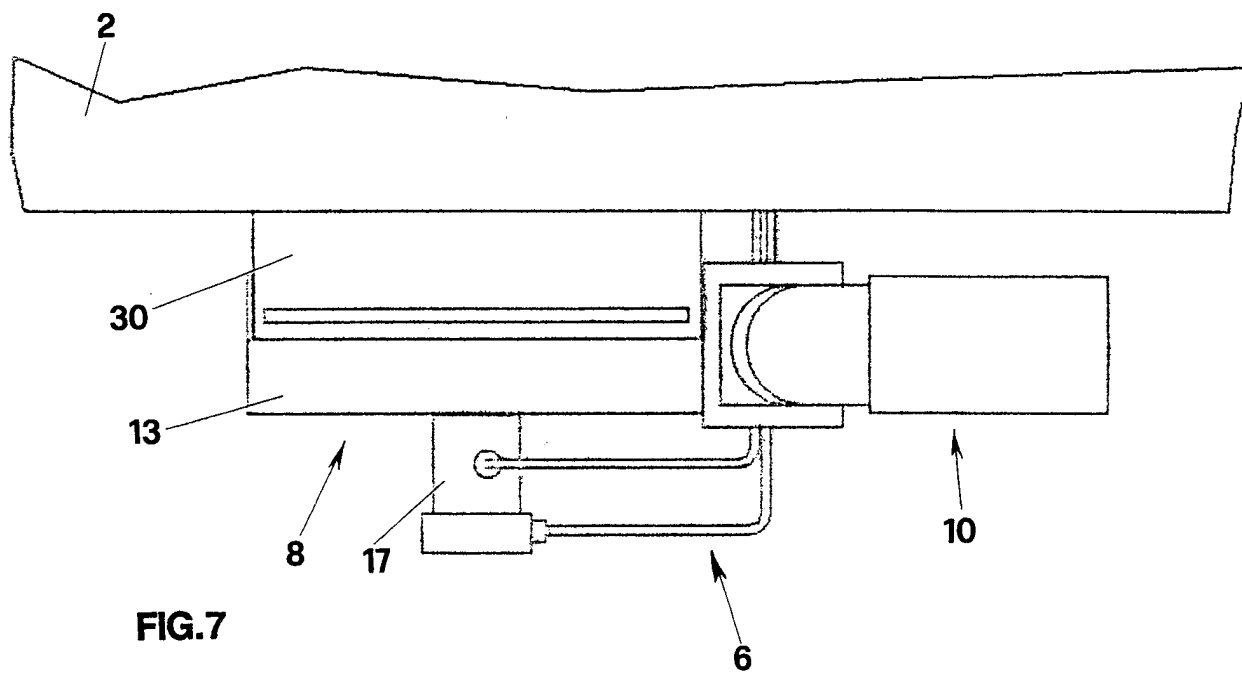
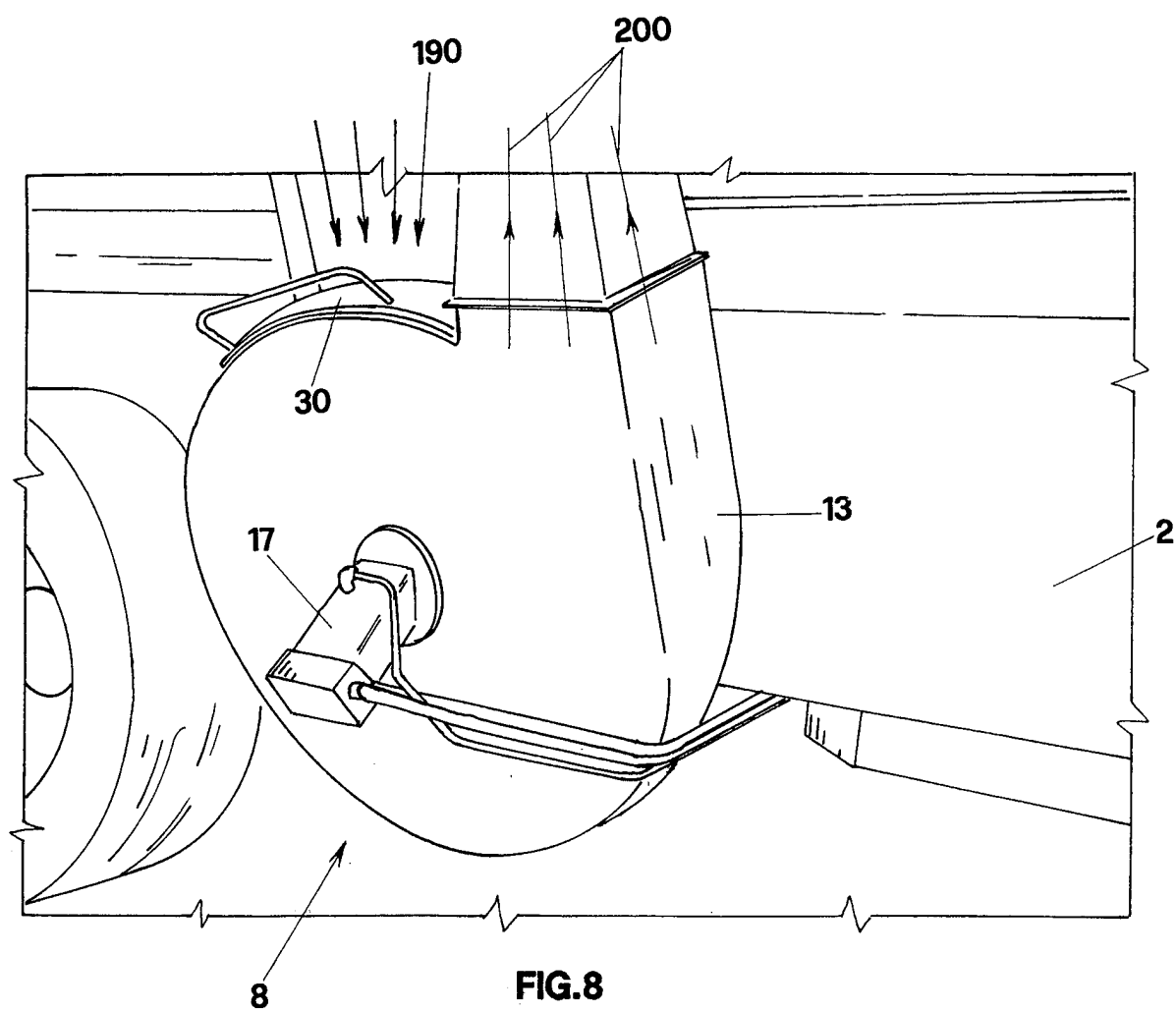


FIG. 7

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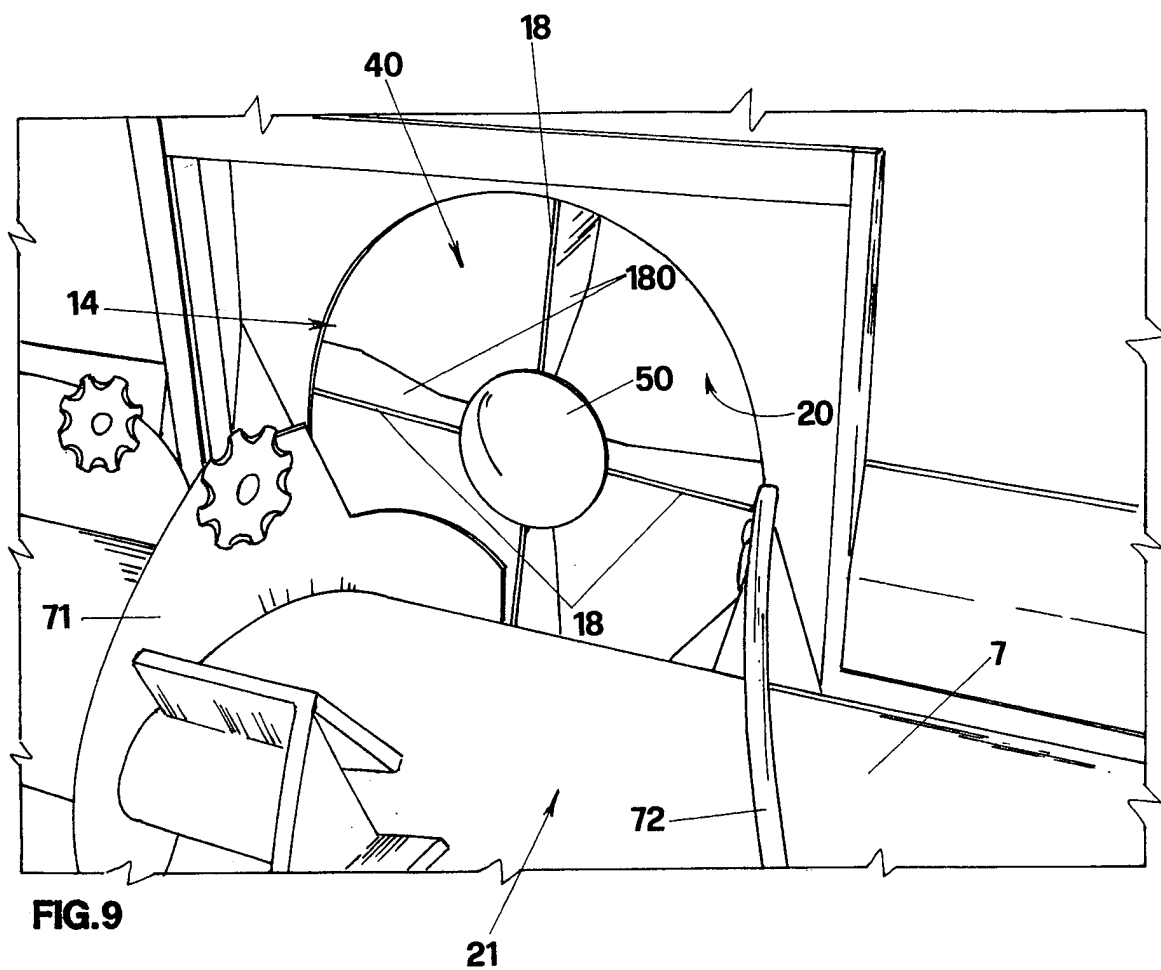


FIG. 10

