(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 302 037**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **88850257.2**

(22) Date of filing: **26.07.88**

(51) Int. Cl.[4]: **A 63 C 19/08**
E 01 F 9/08

(30) Priority: **27.07.87 DK 3917/87**

(43) Date of publication of application:
01.02.89 Bulletin 89/05

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(71) Applicant: **TRAFIK OCH FRITID AB**
Produktvägen 7
S-240 21 Löddeköpinge (SE)

(72) Inventor: **Höjberg, Svend**
Merkurvej 4
DK-6600 Vejen (DK)

(74) Representative: **Lenz, Franz et al**
AWAPATENT AB Box 5117
S-200 71 Malmö (SE)

(54) **Vehicle for continuous application of a stripe to a surface.**

(57) The invention provides a vehicle for applying a stripe to a surface such as a stripe for marking areas in a sports ground or lines on a road, said vehicle having a spray nozzle (6, 7) for discharging the material, a container (9) for the material, a conduit (8, 8a) between the container (9) and the nozzle (6, 7) and a pump (8a, 10, 11, 12) designed to be driven by at least one wheel (3, 4) situated on the frame (2) of the vehicle and to supply material to the nozzle (6, 7) in an amount relative to the capacity of the nozzle.

The pump is designed as a hose pump (8a, 10, 11, 12) where some rollers (12) being rotated by one of the wheels (3, 4) in a forward motion can compress the elastomer conduit (8, 8a) in such a manner that a suction/pressure effect is created in the hose (8, 8a) carrying the material to the nozzle (6, 7) for discharge through this (6, 7).

EP 0 302 037 A2

Description

VEHICLE FOR CONTINUOUS APPLICATION OF A STRIPE TO A SURFACE.

The invention relates to a vehicle for continuous application of a stripe to a surface, such as a stripe for marking areas in a sports ground or applying lines to a roadway, said material being liquid while being applied, and said vehicle comprising a frame with a handle, travelling wheels mounted rotatably on the frame, a container for the material, and a nozzle facing downwards in the position of use of the vehicle designed to emit the material onto the underlying surface of the vehicle.

A device of this type is known from NO published specification no. 152,459. This known device uses an aerosol sprayer as container and nozzle, said aerosol sprayer being attached to the device with the nozzle facing downwards. Means are provided in the device in order that an operator, who pushes the device by holding the handle, from the handle can actuate the valve of the aerosol sprayer in order that the liquid material is dispensed through the nozzle and down onto the surface.

This known device is encumbered with certain drawbacks. Aerosol sprayers are expensive to produce and use, and they are often a danger to the environment when freon is used as propellant gas. Their capacity is often limited, and consequently a large number of aerosol sprayers must be used when paint stripes are to be applied to a sports ground where areas are to be marked by means of the said stripes.

Moreover, it is not possible to adjust the emitted amount of material, because the position of the valve of the aerosol sprayer will either be completely open or completely shut. This is an obvious disadvantage when applying stripes to a sports ground where the device must be pushed very slowly forward in order to make the stripes in the correct places. This means that the use of this known device causes too much material to be dispensed per meter.

It is the object of the invention to provide a vehicle of the mentioned type said vehicle being able to economize with the used spay material in a simple manner, and where such types of spray paint can be used that it will be considerably cheaper than using aerosol sprayers.

This object is achieved by a vehicle according to the invention being characteristic in that the vehicle has a conduit between the container and the nozzle, a pump inserted in the conduit designed for pumping material to the nozzle in an amount relative to the capacity of the nozzle dependent on the immediate speed and travelling direction of the vehicle.

If the nozzle and container are two separate parts it becomes possible to use containers of any size in order to hold large quantities of spray material in the vehicle so that the quantity can be adapted to the expected consumption of spray material before it solidifies or dries. This large material capacity also allows bulk purchasing of spray material. By connecting the container and nozzle by the said conduit it becomes possible to insert a pump in the connection whose capacity can be adapted partly to the discharge capacity of the nozzle and partly to the travelling speed of the vehicle.

In connection with a vehicle of the mentioned type where front as well as rear travelling wheels are used due to the weight of the vehicle in order that the vehicle is positioned in a stable and exact manner in relation to the surface, it is expedient that the pump is driven by the rear pair of wheels, and that the nozzle is positioned near the front pair of wheels, as related to in claim 2. Consequently, the space-requiring pump and the container for the spray material can be placed as close as possible to the operator of the vehicle, whereby the operator is able to look across the pump and container and have an unobstructed view to the nozzle which is situated low near the front pair of wheels, this being important in order to obtain a careful and exact application or spraying of the material.

Furthermore, it is expedient to design the pump as described in claim 3 since such a hose pump is exceptionally dependable, easy to clean for spray material after use and also very inexpensive to buy and to maintain. The hose pump can also pump spray material to the nozzle when the vehicle is pushed in the preselected travelling direction, when the connection between the hose pump and the travelling wheel is only established in the direction of rotation corresponding to the preselected travelling direction. This connection can for instance be established by a generally known one-way coupling.

Without such a one-way coupling the spray material would be pumped back into the container, and the conduit be emptied of spray material if the vehicle is moved in the opposite direction so that spraying could not be resumed until the vehicle had been pushed a distance in the preselected travelling direction. The operator can therefore move the vehicle from one place to another merely by pulling the vehicle after him which would hardly be possible with other types of pumps.

The means according to claim 4 facilitate a simple altering of the capacity of the hose pump by adjustment of the tension of the adjustable spring if this should be required due to the viscosity of the spray material and the quality of the surface.

When a pressure vessel is inserted between the pump and the nozzle, as related to in claim 5, this will partly absorb pressure differences in the pump and partly facilitate a brief painting at such places where the vehicle is not moved.

By the positioning of the container on top of the rear pair of travelling wheels, as related to in claim 6, the above unobstructed view to the nozzle on the front travelling wheels is obtained, but an additional advantage is that the weight of the container and spray material will rest on the rear travelling wheels. This increases the normal power on the rear wheels so that these do not slide relative to a perhaps slippery surface as a consequence of the braking effect of the hose pump on the wheel axle fixedly

connected to the rear wheels.

In the following the vehicle according to the invention will be described in closer detail with reference to the drawing showing a preferred embodiment.

A vehicle for continuous application of a stripe of spray material to a surface 1 comprises a frame 2 provided with a front pair 3 and a rear pair of travelling wheels 4, said wheels 3, 4 being distanced in the longitudinal direction of the vehicle and at the four corners of the frame of the vehicle.

At the rear end of the vehicle the frame 2 is provided with a handle 5 extending to the rear/upwards from the vehicle, said handle 5 being vertically adjustable in a manner which is not shown, so that it can be adjusted to a position which is convenient for the operator.

A downwards turned nozzle 6 is situated by the front wheels 3 which nozzle can be adjusted upwards and downwards in a manner which is not shown so that the mouth 7 of the nozzle 6 can be adjusted in a position suitable for its particular purpose.

By means of a conduit 8 the nozzle 6 is connected with a container 9 which is designed to hold a suitable quantity of liquid spray material which conduit 8 travels up along the side of the container 9 and down into it from above so that liquid spray material cannot by its own force under the influence of the force of gravity flow to the nozzle 6 and out of its mouth 7.

The conduit 8 is a hose of an elastomer, such as rubber or a similar plastic material.

At the rear pair of wheels 4 the conduit 8 describes a circular arc 8a of approximately 180° around the rear wheel axle 10 having this as its centre and at a preselected radial distance from the said wheel axle 10.

By means of a one-way coupling the rear wheel axle 10 is connected stationarily to at least one of the rear wheels 4, and between the wheels 4 the wheel axle 10 has radially projecting arms 11 which on their free ends carry rotary rollers 12 whose axes extend parallel to the wheel axle 10, whereby the rollers 12 extend axially opposite the conduit 8.

The radial distance of the rollers 12 is adapted to the radial distance of the circular arc 8a from the rearmost wheel axle 10 in such a manner that the rollers 12 can compress the elastomer conduit 8 at least partially.

When the operator pushes the vehicle by means of the handle 5 across the surface 1 to which the stripe is to be applied, the rear pair of wheels 4 will roll across the surface 1, whereby the rear wheel axle 10, the arms 11 and the rollers 12 are brought to rotate.

The rollers 12 will then compress the conduit 8 in the semi-circle 8a in a sliding movement from the rearmost point of said semi-circle 8a of the conduit 8 to the frontmost point, whereby a forwardly pro gressing suction effect is created in the conduit 8 so that spray material is sucked from the container 9 and from the described hose pump 8a, 10, 11, 12 pressed out through the mouth 7 of the nozzle 6 and down onto the surface 1.

Furthermore, a yoke 13 is arranged in the frame 2 said yoke being pivotably mounted in the upwards and downwards direction about a horizontal axle 14 mounted in the frame 2 so that the yoke 13 describing a substantially semi-circular longitudinal section is designed for its semi-circular part to rest on that side of the semi-circular part 8a of the conduit 8 turning away from the wheel axle 10.

At the free end 15 of the yoke 13 this is designed with a seat 16 for the lower end of a rod 17 extending substantially vertically between the seat 16 and a bushing 18 fixed to the frame 2.

Between the seat 16 and the bushing 18 the rod 17 is surrounded by a pressure spring 19 in such a manner that it can press the free end 15 of the yoke 13 downwards, whereby the semi-circular part of the yoke 13 can press the conduit 8a to a more or less intimate interaction depending on the tension of the pressure spring 19.

The tension of the pressure spring 19 is adjustable in a manner (not shown) which may for instance consist of a number of recesses along the rod 17 of which one may optionally be brought in mesh with a tooth or ratchet of the bushing 18 so that the rod 17 can be held fixedly in the bushing 18.

Between the hose pump 8a, 10, 11, 12 and the nozzle 6 a pressure vessel 20 is inserted in the conduit B said pressure vessel having such a size that it will partly serve to balance any pressure fluctuations in the hose pump and partly will enable a brief discharge of paint even though the vehicle is not being moved forwards.

This could be relevant if the forward motion of the vehicle is stopped in order to mark a particular point of a stripe when the front wheels 3 are lifted slightly above the surface 1 and the nozzle is swung from side to side in relation to the stripe by turning the vehicle around the rear wheels.

If the pump is constructed as a piston pump, a membrane pump or a third known kind of pump, its dimensions should be chosen in acccordance with the required capacity.

If a given pump size is used its capacity can be adjusted by adapting its working speed by means of a gear.

The gearing may take place by means of a toothed gear or by a belt drive where optional gear ratios are available.

If the pump is constructed as a hose pump of the above described type, its capacity can be adapted to the required capacity by changing the diameter of the hose, the pressure of the rollers on the hose, the number of rollers or by designing the conduit as se veral parallel hoses.

Claims

1. Vehicle for continuous application of a stripe to a surface, such as a stripe for marking areas in a sports ground or applying lines to a roadway, said material being liquid while being applied, and said vehicle comprising a frame (2) with a handle (5)

travelling wheels (3, 4) mounted rotatably on the frame (2), a container (9) for the material, and a nozzle (6, 7) facing downwards in the position of use of the vehicle designed to emit the material onto the underlying surface (1) of the vehicle, **characterized** in that the vehicle, has a conduit (8, 8a) between the container (9) and the nozzle (6, 7), a pump (8a, 10, 11, 12) inserted in the conduit (8) designed for pumping the material to the nozzle (6, 7) in an amount relative to the capacity of the nozzle (6, 7) dependent on the immediate speed and travelling direction of the vehicle.

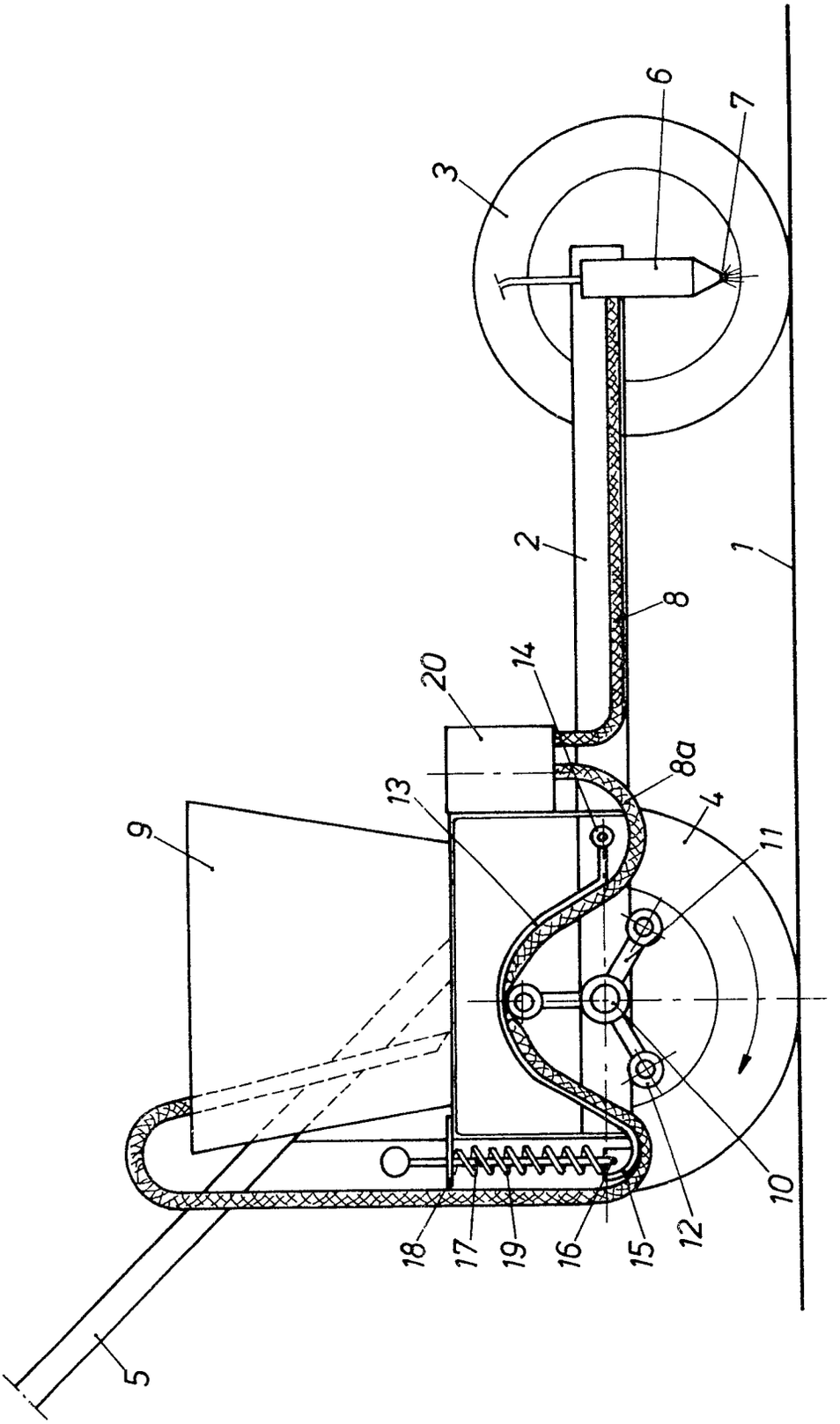
2. Vehicle according to claim 1, said vehicle having a front (3) and a rear (4) pair of travelling wheels, **characterized** in that the pump (8a, 10, 11, 12) is designed to be driven by the rear (4) pair of wheels, and that the nozzle (6, 7) is situated near the front (3) wheels.

3. Vehicle according to claims 1 and 2, **characterized** in that the conduit is an elastomer hose (8, 8a) extending substantially in the preselected travelling direction of the vehicle and describing a semi-circle (8a) having its centre in a wheel axle (10) being fixedly connected to at least one of the rear wheels (4) in at least one direction of rotation corresponding to the travelling direction. said wheel axle (10) having a number of radially projecting arms (11) with rollers (12) being rotatably mounted on the free ends of the arms (11), the axes of said rollers extending parallel to the wheel axle (10) and at a radial distance therefrom which allows interaction between the rollers (12) and the semi-circular part (8a) of the hose (8, 8a) in such a manner that the semi-circular part (8a) can be compressed at least partially by the rollers (12).

4. Vehicle according to claims 1-3, **characterized** in that the vehicle has a pivotably mounted yoke (13) being loaded by an adjustable spring (19) at the side of the semi-circular part (8a) of the hose turning away from the rollers (12), said yoke (13) being designed to be able to force the mentioned semi-circular part (8a) towards the rollers (12).

5. Vehicle according to claim 1, **characterized** in that the vehicle has a pressure vessel (20) inserted in the conduit (8) between the pump (8a, 10, 11, 12) and the nozzle (6, 7).

6. Vehicle according to claims 1-2, **characterized** in that the container (9) is placed above the rear (4) pair of wheels.


6
7
3
2
1
8
20
14
8a
13
4
9
11
10
18
17
19
16
15
12
5