

(19) **DANMARK**

(10) **DK/EP 3081694 T3**



Patent- og
Varemærkestyrelsen

(12) Oversættelse af
europæisk patentskrift

-
- (51) Int.Cl.: **E 01 C 19/17 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2018-01-22**
- (80) Dato for Den Europæiske Patentmyndigheds
bekendtgørelse om meddelelse af patentet: **2017-10-25**
- (86) Europæisk ansøgning nr.: **16159499.9**
- (86) Europæisk indleveringsdag: **2016-03-09**
- (87) Den europæiske ansøgnings publiceringsdag: **2016-10-19**
- (30) Prioritet: **2015-03-10 US 201562130918 P** **2016-03-02 US 201662302338 P**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV
MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **HERITAGE RESEARCH GROUP, 7901 W. Morris Street, Indianapolis, IN 46231-3301, USA**
- (72) Opfinder: **CUNNINGHAM, James Joseph, 105 Joyce Drive, Greensburg, PA Pennsylvania 15601, USA
KRIECH, Anthony J., 9029 Shetland Lane, Indianapolis, IN Indiana 46278, USA
EXLINE, Marvin Keller, 931 S. 7th Street, Terre Haute, 47807, USA**
- (74) Fuldmægtig i Danmark: **Plougmann Vingtoft A/S, Rued Langgaards Vej 8, 2300 København S, Danmark**
- (54) Benævnelse: **APPARAT OG FREMGANGSMÅDE TIL AT PÅFØRE ASFALTBINDEMIDDELSSAMMENSÆTNINGER
INKLUDERENDE HULRUMSREDUCERENDE ASFALTMEMBRANSAMMENSÆTNINGER TIL
VEJBELÆGNINGSANVENDELSER**
- (56) Fremdragne publikationer:
DE-A1- 1 534 429
FR-A- 818 518
FR-A- 843 987
GB-A- 2 420 144

DESCRIPTION

Technical Field

[0001] The present invention relates to the installation and repair of paved surfaces. More particularly the present invention relates equipment/apparatus and methods for applying asphalt binder compositions including void reducing asphalt membrane compositions for asphalt paving and repair applications.

Background Art

[0002] The present inventors have developed a void reducing asphalt membrane composition for asphalt paving applications which void reducing asphalt membrane composition is placed down beneath edge portions of asphalt paving passes and or between adjacent asphalt paving passes during the construction of an asphalt pavement. This void reducing asphalt membrane composition is the subject matter of a copending application which describes the void reducing asphalt membrane composition and discloses how it can be applied to a surface by using various methods such as coating, rolling, spraying, etc.

[0003] Longitudinal asphalt pavement construction joints are difficult to compact properly, usually resulting in a high void content that is susceptible to water and air intrusion. With time, the effects of water related damage, results in premature deterioration of the joint area. Maintenance can be very labor intensive, using multiple personnel using pour pots to apply cold or hot joint sealant/crackfiller materials. Hot kettles with hand wands are also used for application of hot sealants/crackfillers. Asphalt distributors can also apply hot or warm bituminous products, either through a wand or a single nozzle spraying on the spray bar. The spray bar nozzle is the fastest application method, but lacks ability to apply a heavier application in the direct area of the longitudinal joint or crack. Instead, it applies a uniform fan of material over the general longitudinal joint/crack area. FR 818 518 A discloses a means for applying pulverized materials on roads.

[0004] DE 15 34 429 A1 discloses a system for applying color to roads with a nozzle system and a color line, leading into the nozzle opening.

[0005] FR 843 987 A discloses a truck for applying liquids to a road, a nozzle system being provided in the back of the truck.

[0006] GB 2 420 144 A discloses a road repair material dispensing system to be driven by hand.

[0007] The present inventors propose applying a heavy application of an asphalt binder

composition including a void reducing asphalt membrane composition comprising an asphaltic binder in a strip or band in the area where a longitudinal asphalt pavement joint will be constructed and/or in the area where side edges of a paving pass will be laid. Ideally the strip or band of the void reducing asphalt membrane composition has a thickness of 1.5875 mm to 9.525 mm (1/16 to 3/8 inches) or greater so as to provide a sufficient amount of the composition that allows the composition to migrate upward into the overlaying asphalt mixture.

[0008] In initial testing the void reducing asphalt membrane composition has been applied using similar techniques used to apply joint/crackfiller materials to an existing aged pavement joint; however, these techniques are too labor intensive.

[0009] The present invention is directed equipment/apparatus and methods for applying an asphalt binder composition including a void reducing asphalt membrane composition for asphalt paving applications.

Disclosure of the Invention

[0010] According to various features, characteristics and embodiments of the present invention which will become apparent as the description thereof proceeds, the present invention provides an apparatus for applying an asphalt binder composition to a roadway during construction or repair of an asphalt pavement as defined in claim 1. The present invention further provides a method of applying an asphalt binder composition to a roadway during construction or repair of an asphalt pavement using the apparatus any of claims 1 to 8.

Brief Description of Drawings

[0011] The present invention will be described with reference to the attached drawings which are given as non-limiting examples only, in which:

Figure 1 is a perspective view of an application vehicle according to one embodiment of the present invention.

Figure 2a is a schematic side elevational view of the tank of an application vehicle according to one embodiment of the present invention.

Figure 2b is cross sectional view of the tank of Fig. 2a taken along section lines B-B.

Figure 2c is a cross sectional view of the tank of Fig. 2a taken alone section lines C-C.

Figure 2d is a schematic side view of the front end of the tank of Fig. 2a.

Figure 3 schematic top view of an application vehicle according to one embodiment of the present invention depicting embodiments of guidance systems.

Figure 4 is a schematic side elevational view of vehicle guidance system.

Figure 5 is a schematic cross-sectional view of an air knife used with a spray bar according to one embodiment of the present invention.

Best Mode for Carrying out the Invention

[0012] The present invention is directed to equipment/apparatus and methods for applying asphalt binder compositions including void reducing asphalt membrane compositions for asphalt paving and repair applications.

[0013] The invention involves the use of a mobile application vehicle such as a trailer or a self-propelled truck having a tank for storing an asphalt binder composition and a pump system capable of delivering the asphalt binder composition to a spraying system that includes a plurality of spray nozzles that are coupled to a spray bar.

[0014] Asphalt distributor trucks have been in existence since they were horse drawn; however, to date all asphalt distributor trucks involve the use of spray systems that are positioned transverse to the direction of travel in order to apply a film of asphaltic binder such as a tack coat across a width of a roadway.

[0015] According to the present invention application equipment/apparatus to apply a strip or band of an asphalt binder composition including a void reducing asphalt membrane composition involves the use of a spray bar that is aligned parallel to the direction of travel of an application vehicle. According to the invention, one or more spray application nozzles may be provided on the spray bar. The use of multiple nozzles allows the desired thickness of a strip or band of the asphalt binder composition to be built up over a narrow area by successive application from each nozzle. The nozzles may be selected to provide differing widths of application of the void reducing asphalt membrane composition over the area to be covered. According to one embodiment of the present invention the use of different spray pattern widths or nozzle sizes falling in line with each can create a cross section of an asphalt binder composition such as a void reducing asphalt membrane composition that is thicker in the center than along the outer edges. This can be preferential when trying to apply a void reducing asphalt membrane composition in an existing roadway crack or on a roadway where the intended area of the longitudinal construction pavement joint will be placed from a new application of asphalt paving mixture material. Such a parallel spray bar may be provided on either or both sides of the application vehicle. In further embodiments two or more aligned spray bars could be provided on either or both sides of the application vehicle. In even further embodiments two or more independent substantially linearly or parallel aligned spray nozzles could be used that are not connected directly to a common spray bar.

[0016] In addition to the parallel spray bar that is provided to lay down a strip or band of the asphalt binder composition of the present invention, the application vehicle may also include a traditional transverse spray bar for purposes of applying an asphalt composition such as a tack layer for a subsequent asphaltic overlay. The parallel spray bar and the transverse spray bar may be used simultaneous or separately to apply different or similar or the same asphalt binder composition.

[0017] According to non-limiting embodiments of the present invention the application vehicle may have one compartment that can apply the same asphaltic binder composition transversely as a tack coat and longitudinally as a longitudinal construction joint asphalt binder composition including a void reducing asphalt membrane. According to different embodiments the application vehicle may have more than one compartment and may contain an asphaltic binder composition for the tack coat application that is delivered to a transverse spray bar and a different asphaltic binder composition for the intended area of the longitudinal asphalt pavement construction joint application that is delivered to the parallel application spray bar.

[0018] During the course of the present invention it was discovered that when an asphalt binder composition including a void reducing asphalt membrane is applied through a parallel spray bar an airborne, thin-strand, asphalt webbing can be created when the asphalt binder contacts the pavement surface. The airborne asphalt webbing can create several issues. The airborne asphalt webbing results in loss of application amount on the intended application area. In addition, the airborne asphalt webbing may drift onto vehicles travelling near this application. The airborne asphalt webbing may also collect on the application vehicle and paver sensor equipment. The present inventors have developed a method to address the airborne asphalt webbing which method involves the use of an air knife that is parallel spray bar. A curtain of air provided by the air knife will force the webbing to the pavement in the area of the intended application. The air knives may be adjusted to approximate the angle of the edge of the spray coming from the nozzles on the parallel bar.

[0019] A guidance system for applying longitudinal strips or bands of the void reducing asphalt membrane composition in the correct location prior to paving may be employed. One example of such a guidance system comprises a laser guidance system that can project a target for the application vehicle or driver to follow. The guidance system may be used on one or both sides of the application vehicle to allow accurate application of a void reducing asphalt membrane composition to a centerline construction paving joint area and/or along the edge line construction joint area. It is also within the scope of the present invention to incorporate a GPS guidance system onto the application vehicle.

[0020] In further embodiments of the invention the application vehicle can comprise an asphalt paving machine which is provided with a leading parallel spray bar or nozzle system that applies a strip or band of void reducing asphalt membrane composition prior to or after an overlay or pass of asphalt pavement.

[0021] Figure 1 is a perspective view of an application vehicle according to one embodiment

of the present invention. The application vehicle includes a chassis 1 that is supported by a plurality of axles 2 in a conventional manner. The chassis 1 supports a cab 3 that can house an engine and provides a cabin for a driver. The chassis 1 of the application vehicle also supports a tank 4 for storing various asphalt binder compositions under agitation and heating.

[0022] A spray bar 5 extends from one side of the application vehicle which includes a plurality of nozzles 6 for spraying the asphalt composition stored in the tank 4 onto a surface to be paved. In Fig. 1 a strip or band of the asphalt composition that is sprayed on a roadway is identified by reference numeral 7. As shown the nozzles 6 are aligned so as to build up a thickness of the strip or band of asphalt composition 7.

[0023] While Fig. 1 depicts two nozzles 6 on spray bar 5 it is to be understood that any number of spray nozzles can be used and separate or plural spray bars can be included on one of both sides of the application vehicle. Alternatively a plurality of individual substantially linearly aligned spray nozzles that are not supported by a common spray bar can be used.

[0024] Figure 2a is a schematic side elevational view of the tank of an application vehicle according to one embodiment of the present invention. Figure 2b is cross sectional view of the tank of Fig. 2a taken along section lines B-B. Figure 2c is a cross sectional view of the tank of Fig. 2a taken along section lines C-C. Figure 2d is a schematic side view of the front end of the tank of Fig. 2a.

[0025] The tank 4 is of conventional design and includes means for agitating and heating asphalt binder compositions contained therein. A reversible mixing auger 8 is provided in the tank 4 which provides agitation of the asphalt binder composition within the tank 4. Also provided are a number of heating pipes 9 through which air heated by a diesel or propane burner (not shown) is passed within the tank 4 to maintain the asphalt binder composition at a desired temperature. In an alternative embodiment heated oil could be circulated through the heating pipes 9.

[0026] A reversible flow auger 10 is provided in the tank 4 to direct the asphalt binder composition toward a drain port and/or a port that transfers the asphalt binder composition to the spraying assembly including spray bars 5 and nozzles 6.

[0027] Figure 3 schematic top view of an application vehicle according to one embodiment of the present invention depicting embodiments of guidance systems. The application vehicle of the present invention can be used together with known guidance systems, including laser guidance systems and GPS guidance systems.

[0028] Figure 3 depicts an embodiment of the present invention in which a front guidance system can be used to direct the steering of the application vehicle and a spray bar guidance system which monitors and controls the alignment of the parallel spray bar so as to ensure the asphalt binder composition is applied in a desired location.

[0029] Figure 4 is a schematic side elevational view of vehicle guidance system. The vehicle guidance system is mounted on a forward part of the application vehicle and can comprise any conventional laser guidance system or GPS guidance system. The laser guidance system depicted in Fig. 4 includes a first laser 11 that is aimed to project an illuminated spot 12 at middle area of a surface to be paved whereat an intended area of a longitudinal pavement construction joint will be developed and where a strip or band of void reducing asphalt membrane compound needs to be applied. A second laser 13 can also be included that is aligned to project an illuminated spot 14 along the side edge of the surface to be paved. The illuminated laser beam spots 12 and 14 can be captured by an imaging camera which in turn can automatically control and correct the steering of the application vehicle as needed.

[0030] In an alternative embodiment the application vehicle operator/driver could use a reference mark or sighting device to manually control or adjust the steering of the application vehicle to move in proper alignment with the illuminated laser beam spots 12 and 14.

[0031] A spray bar guidance system can be mounted on a side the application vehicle and can comprise any conventional laser guidance system or GPS guidance system. When a laser guidance system is used it can a laser that projects an illuminated spot a short distance ahead of the parallel spray bar which can be captured by an imaging camera and used to adjust the position of the spray bar which can be coupled to the application vehicle by an adjustable bracket or support assembly.

[0032] The use of a guidance system in conjunction with the application vehicle will aid in accurate placement of asphalt binder composition through the parallel spray bar in the intended area of a longitudinal asphalt pavement construction joint area prior to placement of an asphalt overlay mixture. The guidance system may be used from either or both sides of the application vehicle or can be used simultaneously with parallel spray bars that apply asphalt binder compositions on both sides of the application vehicle at the same time.

[0033] Figure 5 is a schematic cross-sectional view of an air knife used in conjunction with a spray bar according to one embodiment of the present invention. The spray bar 5 is shown with one of the nozzles 6 ejecting a spray pattern of asphalt binder composition 17 onto a roadway to form a strip or band of the asphalt binder composition 7. An air knife 18 is provided which extends along a length of the spray bar 5 which directs a curtain of air 19 that will force any webbing to the pavement where the strip or band of the asphalt composition 7 is being laid down. Figure 5 depicts air knife 18 as creating air curtains on either side of the spray pattern of the asphalt composition 17. As discussed above air knives can be adjusted so that the angle of the air curtains approximate the angle of the edge(s) of the spray pattern of the asphalt composition 17, or any angle that is determined to contain asphalt webbing. In Fig. 5 the center of the spray pattern of the asphalt composition 17 is substantially perpendicular to the roadway surface (not shown). If this angle is increased, for example so that the spray pattern 17 is angled outward from the spray bar 5 and so that the so that asphalt webbing is produced only on the outer side of the spray pattern, an air knife 18 could be provided that directs an air curtain 19 on only the outer side of the spray pattern 17. The length of the air knives and their

position along the spray bar 5 can be increased or adjusted as necessary to contain asphalt webbing. Likewise the number and angular orientation of the air knives can also be adjusted. Furthermore a common air knife can be provided along the length of the spray bar 5 or separate air knives can be provided for individual ones or two or more of the nozzles 6. In further embodiments the air curtain(s) can comprise heated air.

[0034] Reference herein and through to asphalt binder composition or asphaltic binder is to be understood as encompassing a void reducing asphalt membrane composition, a tack coating composition as well as any asphalt based composition or sealing composition that can be used in conjunction with asphalt pavement construction or repair.

[0035] In a typical application of a void reducing asphalt membrane composition the spray nozzles are of a size to apply a strip or band of void reducing asphalt membrane composition having a width of between about 101.6 mm to 609.6 mm (4 to 24 inches) and at a thickness of between from about 1.5875 mm to about 9.525 mm (1/16 to about 3/8 of an inch). These widths and thickness ranges are exemplary of typical applications; however, it is to be understood that other widths and thicknesses and combinations thereof could be used.

[0036] The spray nozzles may be the same size or have different sizes to provide different application rates and/or application widths. In this regard the transverse cross section of the spray application from the spray nozzles may be uniform. Otherwise the spray distribution can be thicker and/or wider in one area than another along a laid down strip or band of material. According to one embodiment of the present invention the heaviest application of a laid down strip or band of material will be near the center of the application width.

[0037] The distance between adjacent spray nozzles may be the same or may be different. In this regard a greater distance provided between a pair of adjacent spray nozzles will allow a sprayed asphalt binder composition to cure or cool to some extent before the next nozzle applies material over the same area.

[0038] In addition to applying a strip or band of asphalt binder composition the present invention a further embodiment of the present invention provides for a spray nozzles for purposes of accelerating cooling and/or curing of the asphalt binder composition.

[0039] As discussed above a transverse spray bar may be used on an application vehicle in conjunction with a parallel spray bar. The transverse bar may be used for applying an asphaltic binder as in a tack coat application. The parallel bar may be used to apply an asphaltic binder in the intended area of the longitudinal asphalt pavement construction joints. The spray bars may be used simultaneously or separately. As can be understood the application vehicle may have more than one compartment to hold asphaltic materials for spray application. The compartments may contain the same asphaltic materials or may hold different asphaltic materials. Further the compartment may each include agitators and heating systems to maintain the asphaltic materials desired temperatures.

[0040] Although the present invention has been described with reference to particular means, materials and embodiments, from the foregoing description, one skilled in the art can easily ascertain the essential characteristics of the present invention and various changes and modifications can be made to adapt the various uses and characteristics without departing from the scope of the present invention as described above and encompassed by the attached claims.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- FR818518A **[0003]**
- DE1534429A1 **[0004]**
- FR843987A **[0005]**
- GB2420144A **[0006]**

Patentkrav

1. Apparat til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning, hvilket omfatter:

- 5 et mobilt køretøj med en chassis (1), der strækker sig i en langsgående retning, hvilken langsgående retning er på linje med en fremad-/bagudgående bevægelsesretning af nævnte mobile køretøj;
- mindst én opbevaringstank (4) båret på chassissen (1), der indeholder en asfaltbindemiddelssammensætning; og
- 10 mindst én sprøjtedyse (6) tilvejebragt på en sprøjtestang (5) konfigureret til at dispensere asfaltbindemiddelssammensætningen fra den mindst ene opbevaringstank (4) i en langsgående strimmel eller bånd (7), der har en bredde, der ikke er større end en bredde af påføring af
- 15 asfaltbindemiddelssammensætningen dispenseret af en af den mindst ene sprøjtedyse (6), hvor den mindst ene sprøjtedyse (6) omfatter en flerhed af sprøjtedyser (6), der er i alt væsentligt lineært opstillede langs nævnte langsgående retning af køretøjet, hvor flerheden af sprøjtedyser (6) er koblet til en fælles sprøjtestang (5) **kendetegnet ved at** den fælles sprøjtestang (5) strækker sig langs en side af det mobile køretøj i nævnte
- 20 langsgående retning deraf.

2. Apparat til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 1, hvor sprøjtedyserne (6) er individuelt konfigureret, således at de ikke alle dispenserer

25 den samme mængde af asfaltbindemiddelssammensætning.

3. Apparat til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 2, hvor sprøjtedyserne (6) ikke alle dispenserer asfaltbindemiddelssammensætningen i

30 den samme bredde.

- 4.** Apparat til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 1, omfattende to sprøjtestænger (5), der har en flerhed af sprøjtedyser (6) koblet dertil, hvor en af sprøjtestængerne (5) strækker sig langs en side af det mobile køretøj og den anden sprøjtestang (5) strækker sig langs en anden side af det mobile køretøj.
- 5.** Apparat til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 1, yderligere omfattende mindst et luftknivssystem til at indeholde luftbåren asfaltbane.
- 6.** Apparat til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 1, yderligere omfattende mindst ét styresystem til at styre bevægelsen af det mobile køretøj eller at styre positionen af den mindst ene sprøjtedyse (6), hvor det mindst ene styresystem fortrinsvis omfatter et laserstyresystem eller et GPS-styresystem.
- 7.** Apparat til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 1, yderligere omfattende en tværgående sprøjtestang (5), der har en flerhed af dyser (6), der er monteret til chassissen (1) for at udstrække sig i en tværgående retning, der er ortogonal på den langsgående retning.
- 8.** Apparat til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 1, hvor den mindst ene opbevaringstank (4) inkluderer organ til at varme og ryste asfaltbindemiddelssammensætningen.
- 9.** Fremgangsmåde til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning under anvendelse af apparatet ifølge krav 1, hvilken tilvejebringer:

at bevæge det mobile køretøj langs en vejbane, der skal repareres eller belægges med asfalt; og

at dispensere asfaltbindemidlet ved hjælp af den mindst ene sprøjtedyse (6) i nævnte langsgående strimmel eller bånd (7).

5

10. Fremgangsmåde til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 9, hvor den mindst ene sprøjtedyse (6) omfatter en flerhed af i alt væsentligt lineært opstillede sprøjtedyser (6), der sekventielt dispenserer

- 10 asfaltbindemiddelssammensætningen i nævnte langsgående strimmel eller bånd (7) for således at opbygge en tykkelse af strimlen eller båndet af asfaltbindemiddelssammensætning, hvor flerheden af sprøjtedyser (6) kobles til en fælles sprøjtestang (5), og/eller hvor den opbyggede tykkelse af strimlen eller båndet (7) af asfaltbindemiddelssammensætning er fortrinsvis ikke ensartet over
- 15 bredden deraf, og/eller hvor den opbyggede tykkelse af strimlen eller båndet (7) af asfaltbindemiddelssammensætning er tykkere i en midte af bredden deraf.

11. Fremgangsmåde til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning ifølge krav 9,

20 hvor asfaltbindemiddelssammensætningen omfatter en hulrumsreducerende asfaltmembransammensætning, der fortrinsvis dispenseres mellem tilstødende passager af asfaltbelægningsstrimler, hvor strimlen eller båndet (7) af den hulrumsreducerende asfaltmembransammensætning fortrinsvis nedlægges mellem tilstødende asfaltbelægningspassager.

25

- 12.** Fremgangsmåde til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning, ifølge krav 10, hvor en gas eller væske, der accelererer køling eller hærdning af asfaltbindemidlet ledes på den langsgående strimmel eller bånd (7) mellem et tilstødende par af
- 30 nævnte flerhed af sprøjtedyser (6).

13. Fremgangsmåde til at påføre en asfaltbindemiddelssammensætning på en vejbane under konstruktion eller reparation af en asfaltbelægning, ifølge krav 9, yderligere omfattende:

at tilvejebringe mindst ét luftknivssystem (18); og

5 under anvendelse af den mindst ene luftknivssystem (18) at indeholde luftbåren asfaltbane.

DRAWINGS

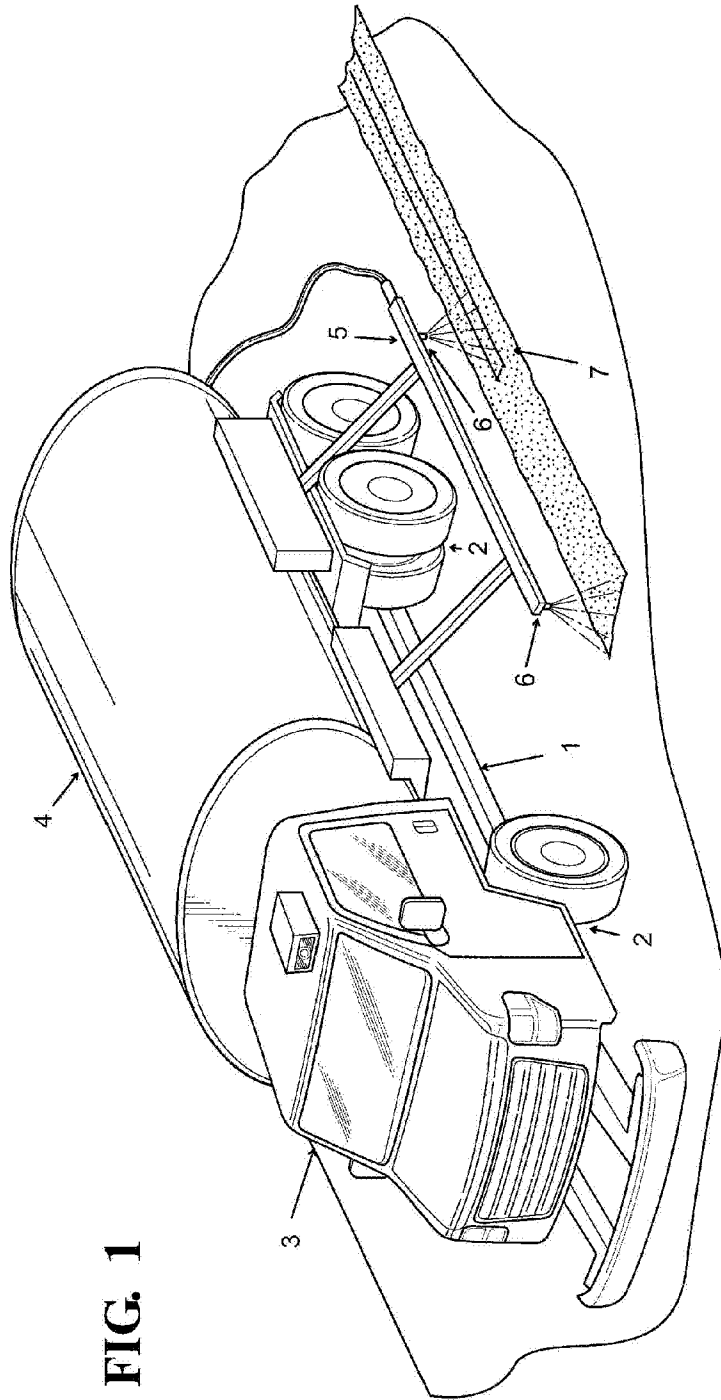


FIG. -2a

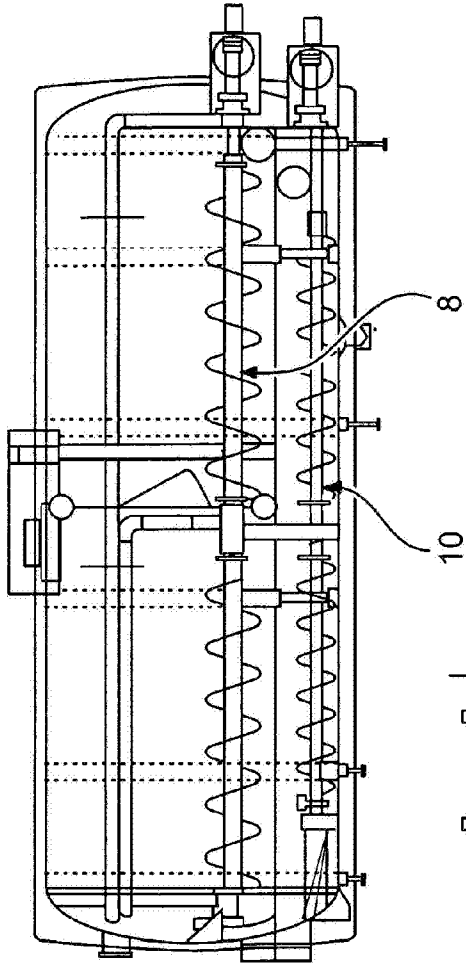


FIG. -2b

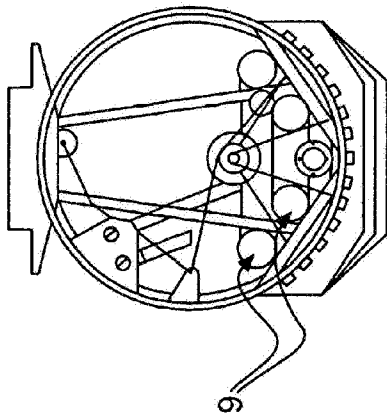


FIG. -2d

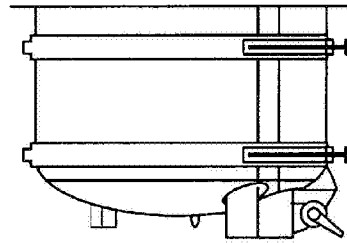
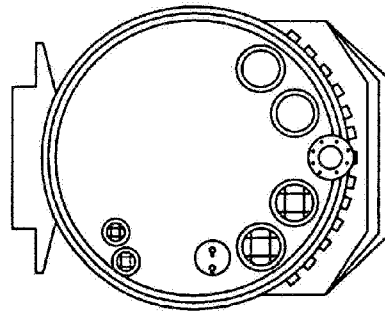


FIG. -2c



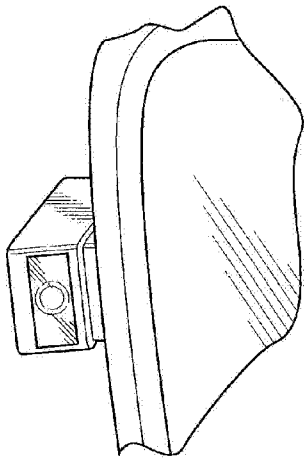
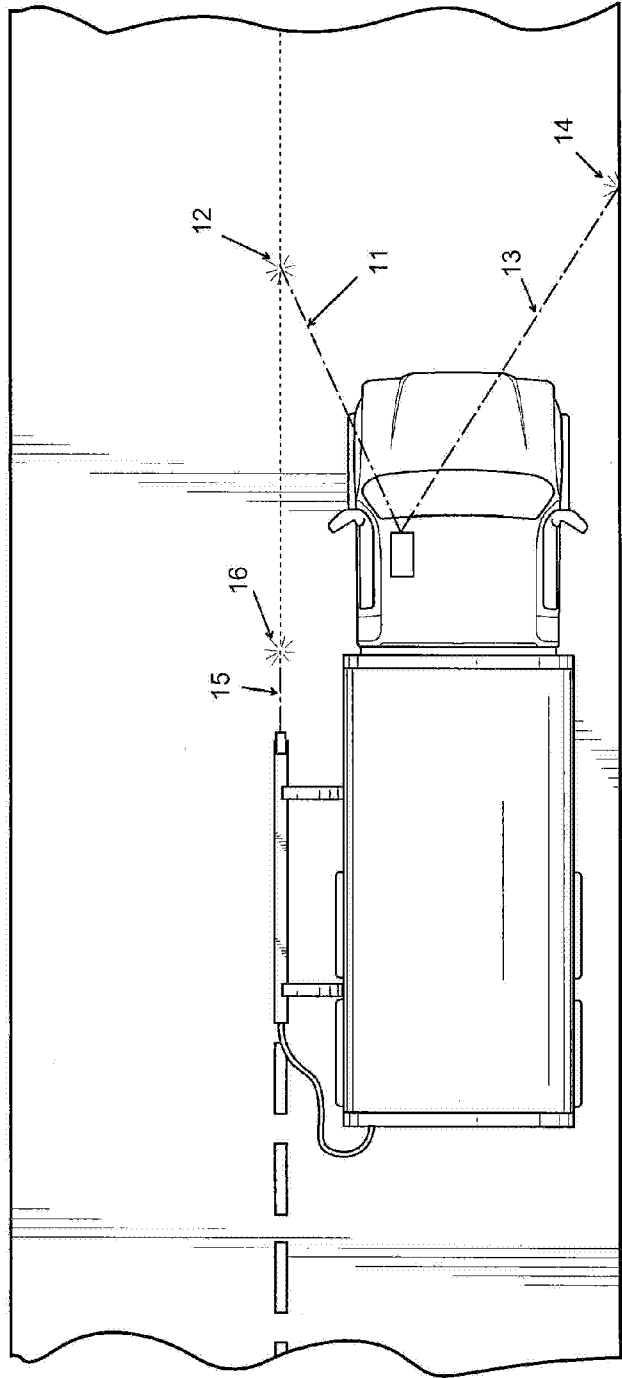


FIG. 4

FIG. 3



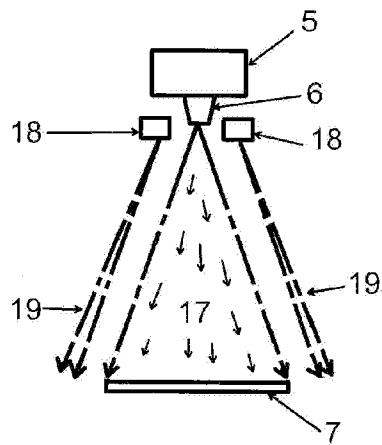


FIG. - 5