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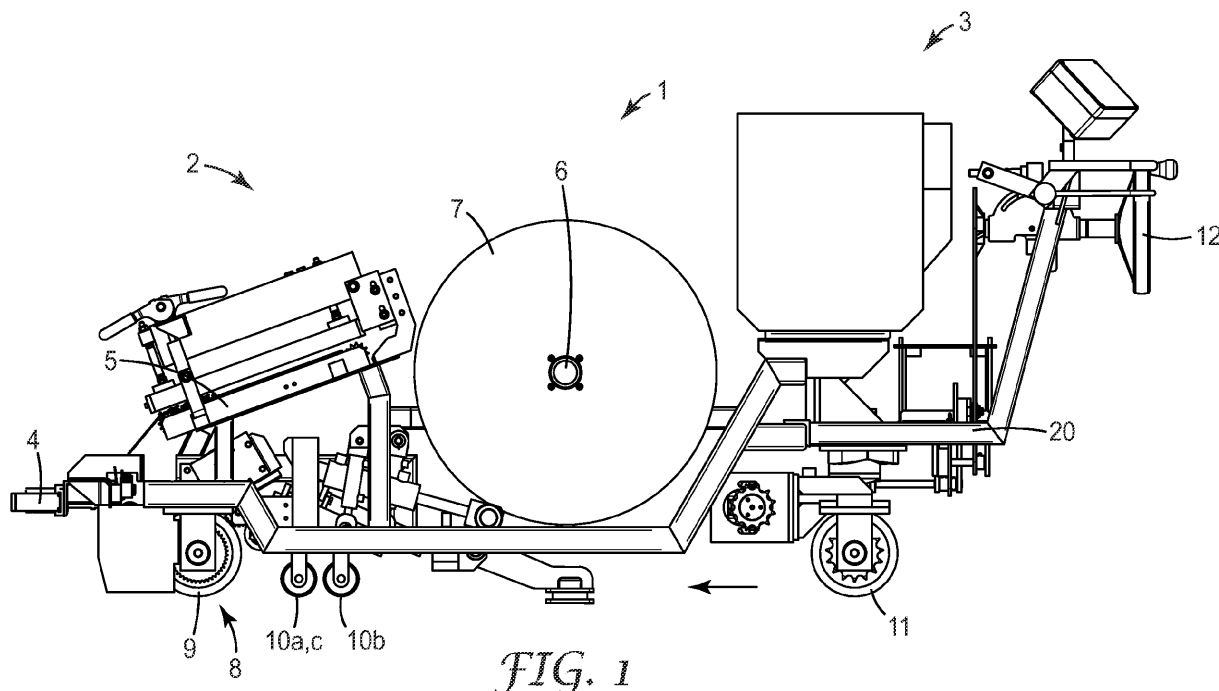
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(54) **A pavement marking tape applicator**

(57) A pavement marking tape applicator device is adapted for applying pavement marking tape on a surface along a longitudinal dimension. The device comprises a pressure roller adapted for rolling over the tape applied. Further the device has an actuator for biasing the

pressure roller toward the surface. The pressure roller is pivotally suspended at the device for pivoting about a skewing axis that is oriented generally parallel to the longitudinal dimension. The device may be movable at a relatively high directional stability and may help providing a good adhesion of the tape on an uneven surface.



Description

Field of the Invention

[0001] The invention relates to a tape applicator for applying a road marking tape on pavement, and in particular to a tape applicator having an applicator roller for applying tape on a surface and a pressure roller for depressing the tape applied.

Background Art

[0002] Pavement marking is often made by application of a pre-fabricated adhesive coated marking tape to the pavement of a road, for example. Such a marking tape is typically applied by use of mechanical devices which position the tape on the pavement. Some of those devices are designed for not only positioning the tape but also for pressing the tape with the adhesive side down on the pavement to establish a sufficient adhesion of the tape on the pavement.

[0003] For marking of relatively long distances self-propelled devices are often used. Such devices are typically motorized and relatively robust in design so that they can carry relatively heavy rolls holding a maximized length of tape.

[0004] For example US 6,413,013 B1 (Requena) discloses an autonomous strip laying device for marking ground. The device includes a rolling frame which supports a reel of strip to be unwound, a strip unwinding assembly, elements for applying the strip on the ground including an applicator roll, a device for sectioning the strip and an assembly driving the frame and actuating the different devices and the unwinding elements.

[0005] US 4,030,958 (Stenemann) discloses a pavement-striping apparatus for automatically feeding tape from a roll and pressing it into contact with a paved surface in continuous stripes or intermittent stripes of variable spacing, width, and length. The apparatus has an engagement roller for bringing the tape in engagement with the paved surface, and a pressure roller to more firmly adhere the tape to the roadway. The engagement roller is movable toward and can be retracted away from the paved surface. The movement for retracting the engagement roller is used in a cutting operation for cutting the tape. Although motorized devices for applying self-adhesive tapes overcome some difficulties associated with propelling the device over long distances and up hills, there is still a desire to provide a device which applies tape at relatively high reliability and accuracy, but which further is relatively inexpensive.

Summary of the Invention

[0006] In one aspect the invention relates to a pavement marking tape applicator device. The device is adapted for applying pavement marking tape on a surface along a longitudinal dimension. The device comprises

es:

- a pressure roller adapted for rolling over the tape applied;
- an actuator which is provided at the tape applicator device for biasing the pressure roller toward the surface at a predetermined depression force; and
- wherein the pressure roller is pivotally suspended at the device, for pivoting about a skewing axis that is oriented generally parallel to the longitudinal dimension.

[0007] The invention is advantageous in that it preferably provides a tape applicator device which is movable at a maximized directional stability, but which also allows for firmly depressing the tape on the surface to provide good adhesion of the tape on the surface. The invention further preferably provides a device that can apply and depress a marking tape on a surface in a single step. Therefore the invention may make a separate additional depression, for example by use of a road roller, unnecessary. The invention may be advantageous in that it may provide a device that can be used with various methods of applying marking tape on a road. The invention may also allow for marking soft pavement, for example fresh asphalt. Further a device of the invention may be relatively inexpensive and robust.

[0008] In one embodiment the tape applicator device, and optionally in particular the actuator of the applicator device, is adapted to resiliently bias the pressure roller toward the surface. Preferably the actuator has a first and a second end, wherein the first end is coupled with the pressure roller and the second end is coupled to a further part of the tape applicator device. The couplings are preferably provided via machine elements. Further the couplings may be provided directly or indirectly. For example the first end may be mounted to a lever carrying the pressure roller and the second end may be mounted directly or indirectly to a chassis of the tape applicator device. Thus device or the actuator is preferably adapted to bias the pressure roller to the surface with the required counterforce for the bias force being provided by at least part of the weight of the applicator device.

[0009] In a further embodiment the actuator is provided for displacing the pressure roller between a first and second position. Preferably in the first position the pressure roller is biased toward the surface and in the second position the pressure roller is urged away from the surface. For example in the first position the pressure roller may be in contact with the surface and/or the tape on the surface, whereas in the second position the pressure roller may be spaced from the surface and the tape. This may allow for application of tape without intense depression so that a removal of the tape may be facilitated. Further this may allow for lifting the pressure roller when the device is maneuvered, for example for transport purposes.

[0010] In another embodiment the actuator may be operable by at least one of spring load, gas pressure, liquid

pressure, and magnetic force. In a preferred embodiment the actuator is a pneumatic cylinder. Such a pneumatic cylinder may for example allow for both displacing and biasing the pressure roller.

[0011] In one embodiment the pressure roller is pivotally suspended about a displacement axis, for allowing the pressure roller to be displaced. Such a displacement axis may be offset relative to a rotation axis of the pressure roller. The skilled person will recognize other solutions for displaceably suspending the pressure roller at the device, for example by use of a linear guide, or by directly mounting the roller to an end of a pneumatic or hydraulic cylinder, for example.

[0012] In another embodiment the tape applicator device has a plurality of pressure rollers. Preferably the device has at least two, preferably three pressure rollers. Preferably such pressure rollers are radially and axially offset relative to one another, with the pressure rollers overlapping axially and being radially spaced from each other. Thus the pressure rollers may be distributed laterally to the longitudinal dimension. Therefore the device may be adapted for applying a tape of a certain width or several tapes over a certain width, and that width is covered by multiple pressure rollers.

[0013] In still another embodiment each of the pressure rollers is pivotally suspended about a skewing axis. Therefore although the multiple pressure rollers together span a certain width each of the rollers may individually conform to local conditions present in a narrower area of the surface. For example a bump at one area of the surface may not cause all of the pressure rollers to lift from the surface, but only one. Therefore one or more other pressure rollers may remain in engagement with the tape although one pressure roller is lifted away from the tape. This may help maximizing the area at which the tape is depressed and thus the adhesion of the tape on the surface. Further due to the pivotal suspension of the pressure rollers about the skewing axis even the roller or rollers rolling over a bump may not be entirely lifted outside the area of the bump, but may skew so that one end rests of the bump and another end on an area away from the bump. The rollers are thus further adapted to conform to inclined surface areas, for example as they may be particularly present at road sides.

[0014] In another embodiment an actuator is provided for at least two or more, and preferably for each of the pressure rollers. Thus the pressure rollers may be controlled independently, for example may be biased to the surface at different forces. Further for application of a relatively narrow tape one or more of the rollers may be lifted while one or more rollers may be used for depressing the tape on the road.

[0015] In one embodiment the tape applicator device has an applicator roller for positioning the tape on the surface. The applicator roller preferably has a width (which is the dimension of the roller along its rotation axis) allowing for application of differently wide tapes, or for application of two or more tapes side by side.

[0016] Preferably the applicator roller and the pressure roller(s) have an outer peripheral surface provided by a silicone rubber material. Thus the rollers deform when pressed on the tape or surface for providing a certain surface pressure rather than a narrow line contact pressure. The applicator roller is preferably greater in diameter than the pressure roller(s). Therefore the pressure roller is adapted to provide a higher surface pressure on the tape than the applicator roller when urged on the tape at the same force. Thus when the device is used for applying tape with the pressure rollers in operation the tape may be less firmly depressed on the surface than with operation of the pressure rollers. This may allow for using the device for a user-selectable preliminary or permanent application of tape.

[0017] In another embodiment the pressure roller or each of the pressure rollers are smaller in width than the applicator roller. Therefore the applicator roller may provide for a certain capacity of width which is covered by two or more pressure rollers. Preferably the pivotal suspension of the pressure roller(s) also enables for pivoting relative to the applicator roller. Therefore the pressure rollers may be adapted to better conform to the surface than the applicator roller.

[0018] In one embodiment the tape applicator device has a support roller for supporting the tape applicator on the surface. Therefore with the pressure rollers not in operation the applicator roller and the support roller may together carry the entire weight of the device. Preferably the pressure roller(s) are arranged between the applicator and the support roller. Thus the weight of the machine which preferably forms the capacity for the maximum depression force may be maximized. This is because the applicator roller and the support roller are preferably arranged at the device such that the center of gravity is between the applicator roller and the support roller. Therefore the pressure rollers arranged in the area between the applicator roller and the support roller may also be biased to the surface at a maximized force relative to the weight of the machine. The support roller may also have an outer peripheral surface provided by a silicone rubber material.

[0019] In one embodiment the support roller is rotatable about a steering axis which is oriented generally perpendicular to a rotation axis of the support roller and to the longitudinal dimension. Thus the device may be steerable and therefore easily maneuverable straight and along curves, and may allow for applying tape in a straight or curved manner.

[0020] In a further embodiment the tape applicator device is adapted for receiving a supply roll of marking tape. Preferably the tape applicator device is adapted for receiving a plurality of supply rolls side by side. This may allow for applying tape in a side by side fashion on the surface, or for holding one or more rolls available as spare rolls.

[0021] In another embodiment the tape applicator device has a tape feeding unit for feeding tape from the roll

towards the surface. The tape feeding unit may be driven by the applicator roller or a separate drive for example. The tape applicator device may further have a splicing table for splicing the ends of two tapes. Such a splicing table may be arranged within the path along which the tape is fed from the roll toward the applicator roller. Therefore once a tape supply roll empties the device may only be shortly stopped for splicing the end of a new tape to the tape still present on the splicing table. Thus a new insertion of tape in the feeding unit may be made unnecessary. The invention thus further is advantageous in that it may facilitate handling and may help to save down times of the device.

[0022] In one embodiment the tape applicator device has a cutting device for automatic cutting the tape. This may be used for applying intermittent segments of tape to a surface, for example. The tape applicator device may further comprise a clutch for suspending synchronization between a movement of the applicator device on the surface and the tape feeding unit. The synchronization may for example be established during application of tape on the surface, suspended after a cut of the tape, and established again to create a gap in the marking on the surface. Preferably the clutch can be triggered depending on cutting the tape. For example the synchronization may be suspended at pre-determined time before or after cutting.

[0023] In one embodiment the tape applicator device is motorized for automatic advancing the tape applicator at least during tape application. This preferably facilitates an operation of the device over long distances. The tape applicator device may for example have a combustion engine, or an electric engine. Further the tape applicator device may comprise at least one of an electric generator, a pneumatic compressor, and a hydraulic pump. Therefore the tape applicator device may operate entirely independent over a relative long time period. This may make the device advantageous particularly for long distance road marking.

Brief Description of the Figures

[0024]

- Fig. 1 is a side view of a tape applicator according to one embodiment of the invention;
- Fig. 2 is a schematic side view illustrating details of the tape applicator shown in Fig. 1
- Fig. 3 is a perspective view of showing pressure rollers of a tape applicator according to one embodiment of the invention; and
- Fig. 4 is a perspective view illustrating operation of a tape applicator according to a further embodiment of the invention.

Detailed Description of the Invention

[0025] Fig. 1 shows a tape applicator device 1 accord-

ing to an embodiment of the invention. The tape applicator device 1 is adapted to place a pre-manufactured, preferably self-adhesive, marking tape on a surface, for example a paved road surface. The tape applicator device 1 has a tape feeding unit 2, a drive unit 3, and an application unit 8. The tape feeding unit 2 basically provides for conveying tape from a supply toward the application unit 8 where it can be applied to the surface. In the example the feeding unit 2 further comprises a cutter 4 and a splicing table 5. Thus the tape feeding unit 2 allows for cutting individual stripes of a certain length from a longer tape, for example, for applying intermittent segments of marking tape. Further the feeding unit 2 via the splicing table 5 allows for splicing of the ends of two tapes, for example when the tape applicator device 1 has to be provided with a new supply of tape during application of a continuous marking.

[0026] The drive unit 3 preferably enables the tape applicator device 1 to be automatically advanced, for example for applying tape, in a direction (indicated by the arrow in the Figure) parallel to a longitudinal dimension of the device. Further the drive unit 3 may provide for driving further items in the tape applicator device 1, for example the cutter and/or other items of the feeding unit 2. The drive unit 3 may comprise a combustion engine or electric motor.

[0027] The device shown has a chassis 20 which carries the feeding unit 2 and the drive unit 3, and at which the application unit is arranged. The chassis 20 further provides a roll mounting 6 for receiving a tape supply roll 7. Typically such a tape supply roll holds a maximized length of tape, for example several hundred meters, to enable long time periods of continuous tape application. Therefore the tape supply roll 7 may weigh approximately 30 kg or more. Accordingly the tape applicator device 1 is sufficiently stable to carry at least one of such a tape supply roll. The tape applicator device 1 preferably is adapted to receive two or more tape supply rolls side by side. Thus once a roll is empty further tape may be supplied from another roll present in the device without the need to exchange the empty roll. Therefore the operation of the device may only be discontinued over a short time period required to feed the new tape toward the application unit 8. Further a side by side arrangement of the supply rolls preferable allows for application of two or more markings side by side on the surface. The position (s) of the tape supply roll(s) are preferably laterally adjustable so that, for example, two or more side by side markings spaced by a defined distance from each other may be created on the surface.

[0028] The application unit 8 in the example shown has an applicator roller 9 and a plurality of pressure rollers 10a, 10b, 10c (roller 10c not visible in this view). The applicator roller 9 is adapted to position the tape and preferably further to depress the tape onto a surface, for example on a road. The pressure rollers 10a, 10b, 10c are adapted to further depress the tape on the surface by exerting a force on the tape. In particular the pressure

rollers 10a, 10b, 10c are arranged at the tape applicator device 1 such that they trail the applicator roller 9 during tape application on a surface. The pressure rollers 10a, 10b, 10c each are pivotally suspended (not visible in this view but described in more detail further below) such that each pressure roller 10a/10b/10c can skew to automatically conform to different orientations of a surface it is forced upon. Thus each roller may be maintained with its roller rotation axis approximately parallel to the surface on which the roller it is forced upon. Therefore each roller can individually align to an uneven, for example partially inclined, surface so that the roller touches the surface over a maximized width (the roller size along the rotation axis) of the roller. Further this preferably enables the tape to be pressurized relatively uniformly on the surface over a maximized width of the tape (the tape size laterally to the direction in which the tape is applied on the surface), and therefore the adhesion of the tape on the surface may be maximized.

[0029] The tape applicator device 1 shown in the Figure further has a support roller 11. The applicator roller 9 and the support roller 11 preferably have a fixed position at the device in a height dimension (which is a dimension generally perpendicular to the surface to which tape may be applied). Thus also the applicator roller 9 and the support roller 11 preferably have a fixed position in a height dimension relative to each other. Therefore in contrast to the pressure rollers the position and orientation of the applicator roller 9 and the support roller 11 may not be influenced from an orientation of the surface. This preferably prevents skewing of the rollers 9, 11 relative to one another which may result in directional variations when the tape applicator device is moved. The applicator roller 9 and the support roller 11 in cooperation may thus provide for a relatively precise directional stability during advancement of the tape applicator device.

[0030] Further at least one of the support roller 11 and the applicator roller 9 may be steerable about a steering axis that is oriented generally parallel to the height dimension of the device. This preferably allows rotating of one or both of the applicator and the support rollers 9, 11 about the steering axis for moving the device along a curve. Therefore the device can preferably also be maneuvered during operation, for example for creating curved markings. In the example only the support roller 11 is steerable. Preferably the support roller 11 is steerable by a steering wheel 12. The steering wheel 12 preferably cooperates with the support roller 11 via a transmission to rotate the support roller 11 at a fixed transmission ratio about the steering axis. The transmission preferably provides for a reduction between a rotation of the steering wheel 12 and the support roller 11. Therefore a rotation of the steering wheel 12 by a first angle may provide for the support roller 11 to rotate about the steering axis by a second angle which is smaller than the first angle. Thus the direction in which the applicator device can be advanced may be controlled relatively precisely. Therefore the device may allow the application of rela-

tively precise curved markings.

[0031] Fig. 2 schematically only shows certain details of the tape applicator 1 placed on a surface 14 for better illustration. As described the applicator roller 9 and the support roller 11 may in cooperation provide a relatively precise directional stability of the device when moved. Further the applicator roller 9 is preferably arranged positionally fixed, although rotatable, relative to the feeding unit 2. Therefore the applicator roller 9 is preferably prevented from skewing relative to the feeding unit 2. This preferably provides for the tape to run directionally stable within the device. Therefore the tape applicator device 1 preferably is not only adapted to move directionally stable on a surface itself, but it preferably also provides for a directional stable feeding of the tape within the device. Thus the tape applicator device 1 preferably allows for applying substantially straight markings over relatively long distances, and curved markings having a substantial uniform curvature.

[0032] The applicator roller in the example has a width (size along the rotation axis) of about 430 mm, but may have a width of between about 400 mm about 500 mm. Although such a width allows the application of differently wide tapes or the application of side by side tapes, it has also been found that the typical weight of a motorized device may require rollers of a similar minimum width to prevent the device from sinking in fresh pavement, for example into warm asphalt. Further a similar minimum width may be advantageous for providing a relatively directional stable movement of the device. This may make the use of the device suitable in the various marking methods. On marking method may for example comprise the steps of priming pavement, applying tape at about room temperature, and depressing the applied tape. Another marking method may comprise the steps of providing a hot bitumen layer on cold pavement, and applying tape on the about 40 °C to 60 °C hot bitumen, and a third method may comprise the steps of directly applying tape on about 60 °C hot asphalt. In particular in the latter method a wide application roller may prevent the tape and/or the fresh surface to be damaged by the device.

[0033] Further the pressure roller 10 is arranged at the device such that it can roll over tape applied via the applicator roll 9. In other words the pressure roller 10 is arranged at the device such that it trails the applicator roller 9 during application of tape to the surface 14. An actuator 13 is provided at the tape applicator device 1 for biasing the pressure roller 10 toward the surface 14. Preferably the tape applicator device 1 is adapted such that the pressure roller 10 can be biased at a predetermined depression force. For example the depression force may be adjustable at the device. Thus the force is preferably user-selectable. The depression force may further be fixedly predetermined, for example by design of the tape applicator device.

[0034] In one embodiment the force may be controlled automatically to compensate for a weight variation of the tape applicator device, for example resulting from the

tape supply roll (not shown in this Figure) emptying. Therefore the tape applicator device 1 may have a weight sensor (not shown). The weight sensor may for example be arranged at the device such that it can detect the weight of the tape supply roll. Therefore the weight sensor, eventually in combination with control circuitry and mechanisms, may be used for controlling the depression force depending on the weight of the tape supply roll.

[0035] The tape applicator device may be further adapted to move the pressure roller in the height dimension relative to the surface, for example to lift or lower the pressure roller. In the example the actuator 13 comprises a pneumatic cylinder. The pneumatic cylinder preferably allows for moving the pressure roller in a height dimension, and further for biasing the pressure roller toward to the surface at a predetermined force. The skilled person will recognize other actuators providing a similar or an equivalent effect, like for example a hydraulic cylinder, a magnetic actuator, or a combination of two or more actuators including springs and other resilient elements. A pneumatic cylinder may be advantageous because it may allow for resiliently biasing the pressure roller to the surface because the gas or air used to drive the cylinder may be compressible.

[0036] The maximum depression force typically depends on the weight of the tape applicator device. The device of the example may for example have a weight of between about 400 to about 600 kg, and in particular about 550 kg. Accordingly the maximum depression force would be about 5500 N. However it has been found that a depression force is preferably between about 1000 N and about 3000 N, in particular between about 2000 N and about 2400 N, and preferably about 2200 N. In particular in marking methods in which the tape gets warmed by hot a surface such forces may be advantageous to avoid distortions or breaks in the tape.

[0037] Thereby a surface pressure of about 3 kg/cm² may be achieved which typically provides for a good adhesion of the tape on the surface.

[0038] In the example shown the pressure rollers are arranged closer to the applicator roller than to the support roller. Therefore a lower maximum depression force is available compared to a position of the rollers under the center of gravity of the device. However at the position shown the maximum depression force available from the weight of the machine is about 300 kg which is sufficient for the depression forces specified above. On the other hand exceeding of the maximum depression force would only result in the applicator roller to lift with the device running still stable, whereas the rollers arranged under the center of gravity would under those circumstances cause the device to stand and move instable.

[0039] Fig. 3 illustrates a part of the tape applicator device 1 with the pressure rollers 10a, 10b, and 10c shown in more detail. Each of the pressure rollers 10a/10b/10c is pivotally suspended at the device 1 such that it can pivot about a skewing axis 15a/15b/15c. The skewing axis is preferably oriented in a direction generally par-

allel to the longitudinal dimension of the device 1, and generally perpendicular to the roller axes 16a/16b/16c. As illustrated the width of each of the pressure rollers 10a/10b/10c is preferably smaller than the width of the applicator roller (not shown in this view). However the pressure rollers 10a, 10b, and 10c are preferably distributed over the width (the size of the device laterally to the longitudinal direction) of the device, and particularly over the width of applicator roller (not shown in this view). Therefore the individual pressure rollers 10a, 10b, and 10c may adapt relatively well to a relatively narrow track of the surface, but may in combination cover the entire width of the device. It has been found that three rollers provide for a relatively uniform depression of tape even on somewhat bumpy surfaces, whereas such an amount of rollers can still be included in the device at acceptable costs. The width of the pressure rollers is preferably particularly sized such that tape still can be firmly applied on road surfaces which are longitudinally grooved, for example from removal of an old marking. The invention therefore may facilitate or enable the application of tape on soft pavement, for example fresh asphalt, because the tape applicator device may be supported by relatively wide rollers which avoid sinking into the pavement while the less wide pressure rollers may depress the tape at relatively high forces.

[0040] Old markings are often removed by milling the marking from the road surface. Typical markings have about a width of 120 to 150 mm so that milling often leaves behind more or less deep longitudinal grooves in the road surface of a greater width than 150 mm. In the example shown in the Figure the width of each of the pressure rollers is about 150 mm. Therefore the pressure rollers are enabled for typically reaching the bottom of the groove. Even when the roller runs over an edge of the groove due to its ability to skew the roller may at least with one end reach the bottom of the groove, where it can depress at least a portion of the tape. The skilled person will recognize that more than three rollers may be used, for example five, ten or more rollers to further maximize the adhesion of marking tape on an uneven surface.

[0041] Further the rollers may be provided with a relatively soft outer coating which may provide for conforming to the surface by deformation of the coating. However it has been found that that a certain material and hardness of the roller may be advantageous for preventing immoderate wear during operation of the device. Therefore the rollers of the example are made of or have an outer coating of silicone rubber having a Shore hardness A of between about 40 to about 50, and preferably between about 45 and about 47. A similar or identical material is preferably used for the applicator roller and/or the support roller, or at least for a coating thereon.

[0042] The pressure rollers are preferably radially offset relative to one another. Thereby the rollers can cover the entire width of the device, and particularly an axial gap is avoided between the rollers in which an area of the tape would eventually be omitted from contact with

the pressure rollers. Further the pressure rollers preferably axially overlap. Therefore during application of tape along a curve still the entire tape width may be depressed by one or more rollers.

[0043] Fig. 4 shows the tape applicator device 1 during application of a tape 17. The tape 17 is supplied from the tape supply roll 7. A second tape supply roll 7a is present for holding further tape available. The tape 17 is pulled from the roll by a pair of driven rollers 18a, 18b and guided over the splicing table 5. A guide roller 19 guides the tape 17 toward the applicator roller 9 where it is applied to the surface. The skilled person will recognize other possibilities for feeding and guiding the tape from the supply roll toward the applicator roller. In the example a cutter 4 is arranged between the supply roll 7 and the applicator roller 9. Thus the tape can be automatically cut in the tape applicator device, for example for automatic application of intermittent segments of tape.

Claims

1. A pavement marking tape applicator device adapted for applying pavement marking tape on a surface along a longitudinal dimension, the device comprising:

- a pressure roller adapted for rolling over the tape applied;
- an actuator which is provided at the tape applicator device for biasing the pressure roller toward the surface at a predetermined depression force; and
- wherein the pressure roller is pivotally suspended at the device, for pivoting about a skewing axis that is oriented generally parallel to the longitudinal dimension.

2. The tape applicator device of claim 1, wherein the actuator is adapted to resiliently bias the pressure roller toward the surface.

3. The tape applicator device of claim 1 or 2, wherein the actuator is further provided for displacing the pressure roller between a first and second position, and wherein in the first position the pressure roller is biased toward the surface and in the second position the pressure roller is urged away from the surface.

4. The tape applicator device of any of the preceding claims, wherein the actuator is operable by at least one of spring load, gas pressure, liquid pressure, and magnetic force.

5. The tape applicator device of any of the preceding claims, wherein the pressure roller is further pivotally suspended about a displacement axis which is offset

relative to a rotation axis of the pressure roller, for allowing the pressure roller to be displaced.

6. The tape applicator device of any of the preceding claims, having a plurality of pressure rollers.

7. The tape applicator device of claim 6, wherein the pressure rollers are radially and axially offset relative to one another, with the pressure rollers overlapping axially and being radially spaced from each other.

8. The tape applicator device of claim 6 or 7, wherein each of the pressure rollers is pivotally suspended about a skewing axis, and wherein an actuator is provided for each of the pressure rollers.

9. The tape applicator device of any of the preceding claims, further having an applicator roller for positioning the tape on the surface.

10. The tape applicator device of claim 9, wherein the applicator roller is greater in diameter than the pressure roller, and wherein the pressure roller is smaller in width than the applicator roller.

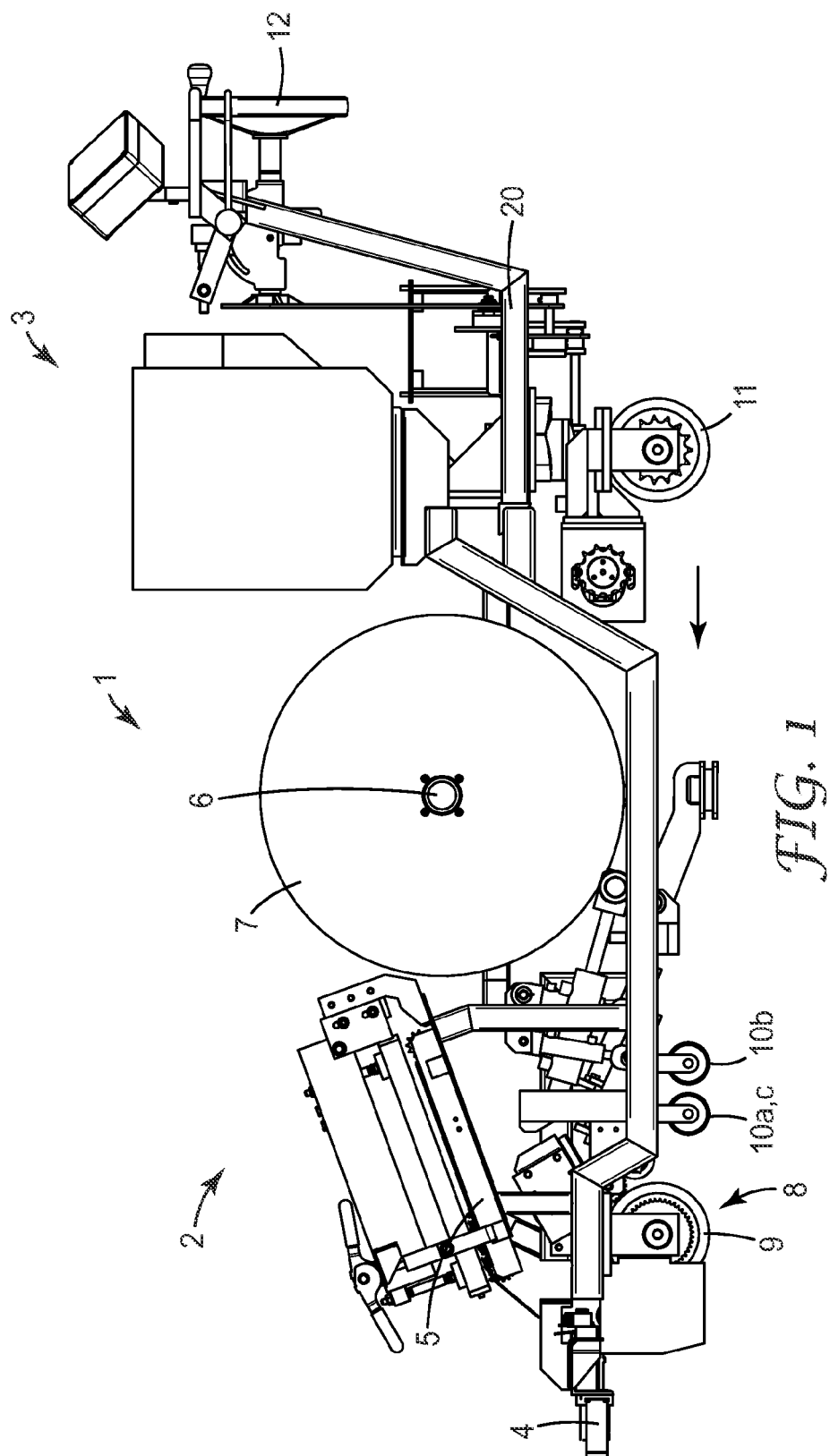
11. The tape applicator device of any of the preceding claims, further having a support roller for supporting the tape applicator on the surface.

12. The tape applicator device claim 11, wherein the support roller is rotatable about a steering axis which is oriented generally perpendicular to a rotation axis of the support roller and to the longitudinal dimension.

13. The tape applicator device of any of the preceding claims, being adapted for receiving a supply roll of marking tape, and having a tape feeding unit for feeding tape from the roll towards the surface.

14. The tape applicator device of any of the preceding claims, having a cutting device for automatic cutting the tape.

15. The tape applicator device of any of the preceding claims, being motorized for automatic advancing the tape applicator at least during tape application.



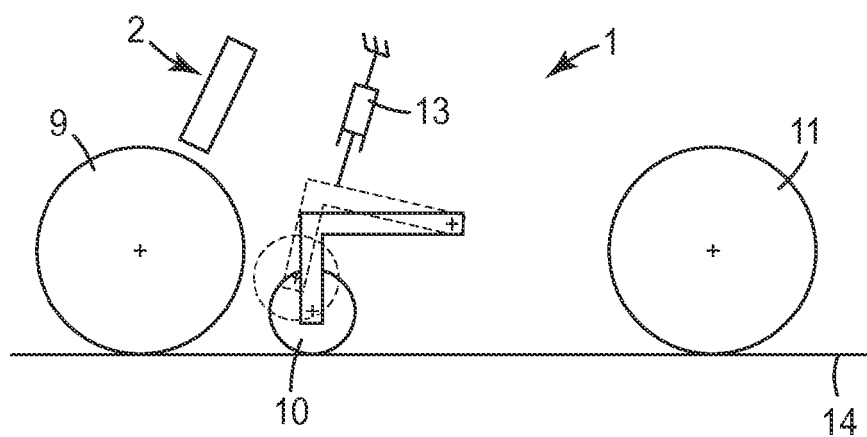


FIG. 2

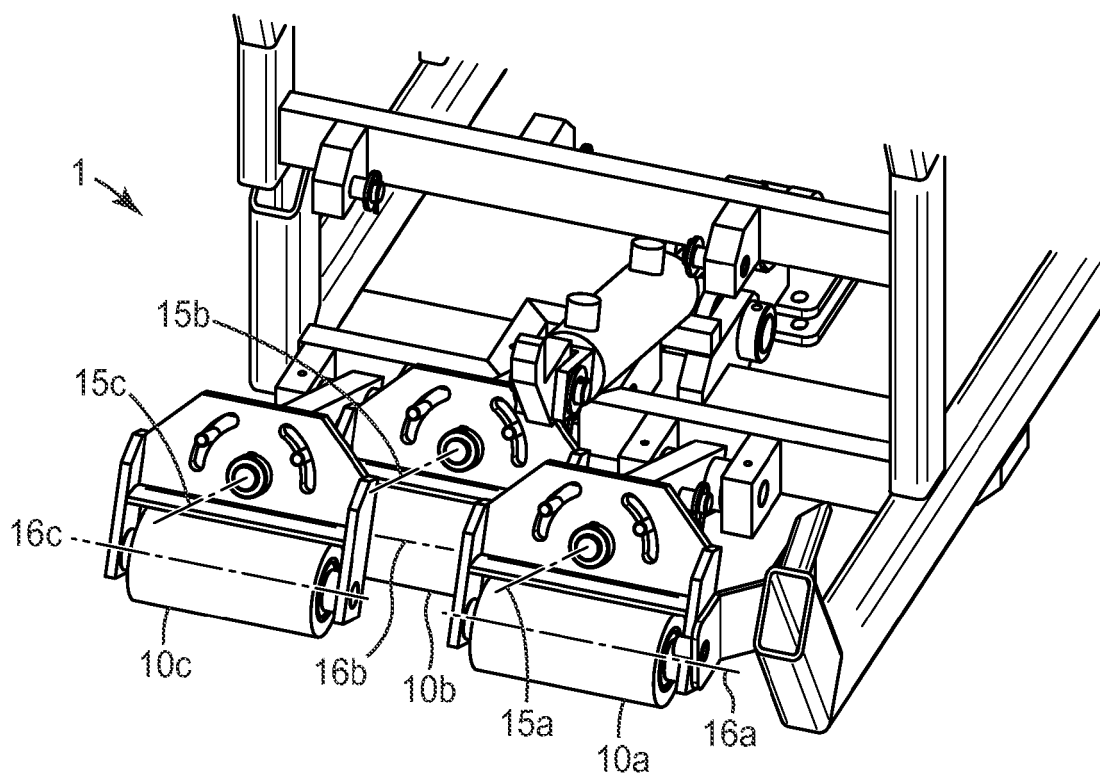


FIG. 3

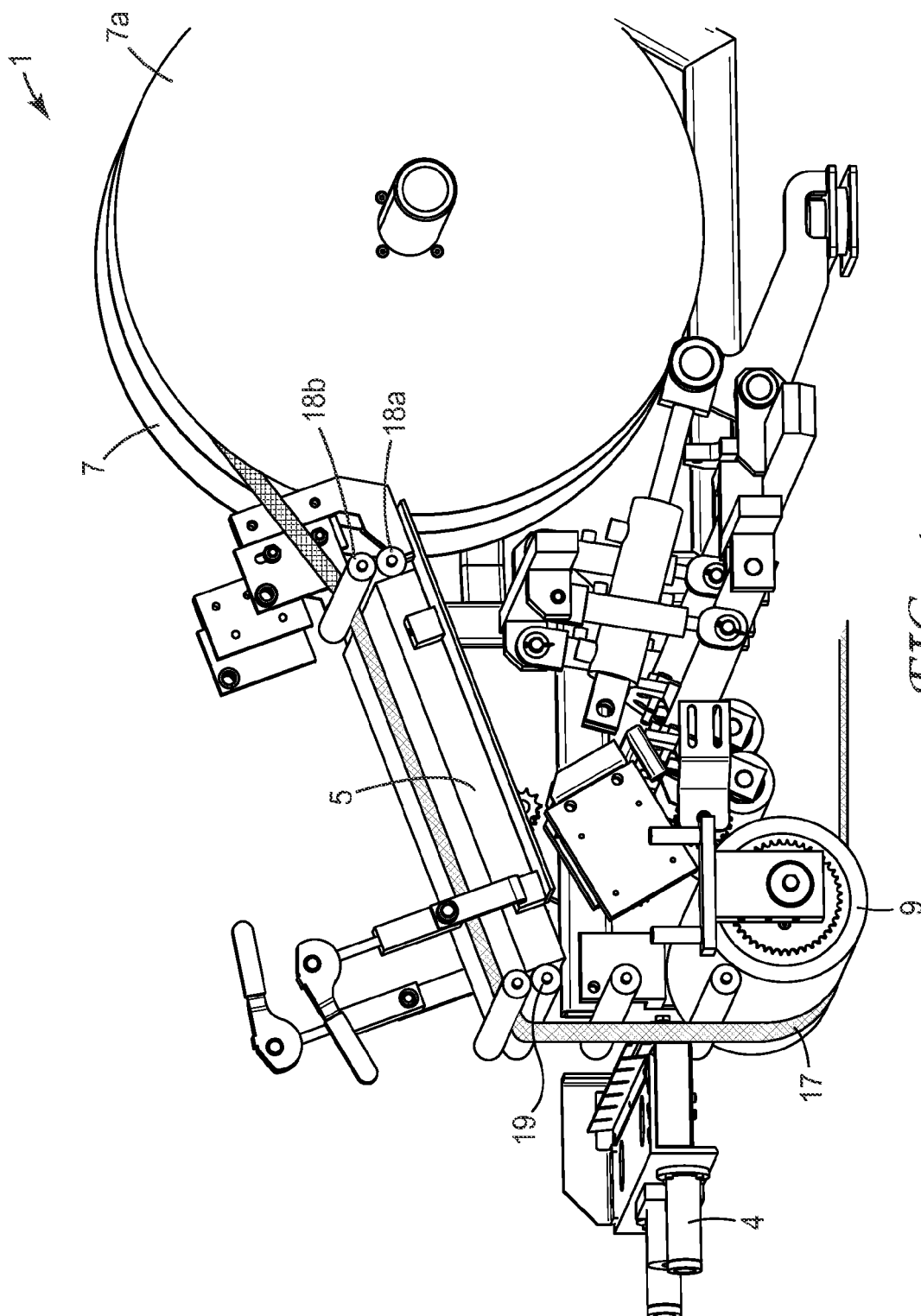


FIG. 4



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 7047

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 059 061 A (STENEMANN HEINRICH F [US] ET AL) 22 October 1991 (1991-10-22) * column 8, line 47 - column 9, line 17; figures 1-12 *	1-6	INV. E01C23/18
A	DE 44 40 688 C1 (HOFMANN WALTER MASCHF [DE]) 8 February 1996 (1996-02-08) * column 8, lines 3-42; figures 1,5 *	1	
A	WO 97/49867 A1 (MINNESOTA MINING & MFG [US]) 31 December 1997 (1997-12-31) * page 3, line 9 - page 4, line 13; figures 3-5 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E01C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 20 July 2010	Examiner Flores Hokkanen, P
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 15 7047

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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