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APPARATUS FOR DISPENSING OF INDICATOR POLES**Field of the Invention**

This invention relates to apparatus for dispensing indicator poles and refers particularly, through not exclusively, to apparatus for dispensing indicator poles in a line parallel to a route of travel of a vehicle.

Background of the Invention

Special vehicles are often used for clearing a route through treacherous areas such as, for example, land in which mines have been laid. The mines may be anti-personnel, or for vehicles. Indicator poles are used to mark the boundaries of the route so that those who follow will know where they can go with safety.

Known apparatus for dispensing indicator poles have a variation in their distance from the vehicle so that the route is of uneven width. This causes problems to those who follow due to uncertainty as to the exact location of the boundaries of the safe route.

Summary of the Invention

In accordance with a first aspect there is provided apparatus for attachment to a vehicle, the apparatus being for dispensing indicator poles, the apparatus comprising a drum cartridge having a drum spiral path in which the indicator poles are locatable; and a dispensing apparatus for dispensing the indicator poles from the drum cartridge in a line parallel with a direction of travel of the vehicle.

The drum cartridge may be substantially cylindrical and may comprise a lid and a side wall, the lid comprising a lower spiral path on an upper surface thereof, the lower spiral path and the drum spiral path being the same.

The lower spiral path may further comprise a plurality of equally spaced openings, each opening being co-axial with a longitudinal axis of a indicator pole when located in the drum spiral path.

5 The lower spiral path may further comprise a cylindrical wall axially aligned with each opening and depending therefrom, there being a cylindrical latch release slidably mounted in and being co-axial with the cylindrical wall, the cylindrical latch release having a wall with a sloped step therein, and an enlarged head at a lower end of the wall.

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A cylindrical latch body may be slidably mounted in and co-axial with the latch release, the latch body having a hollow interior for slidably receiving therein a indicator pole, the hollow interior having a radially inwardly directed pin for engaging a slot in a head of the indicator pole.

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The latch body may have a radially outwardly extending flange for contracting a indicator pole tube head. A compression spring may be located around the latch body and may extend from the flange to the enlarged head.

20 A plurality of ball bearings may be moveably mounted in the latch body adjacent an upper end thereof for co-operative engagement with the head and the latch body.

The head may comprise an upper groove, an upper shoulder at a lower end of the upper groove, a lower groove, and a lower shoulder at an upper end of the lower groove. The upper and lower groove may be for releasably receiving therein the
25 the plurality of ball bearings, and the upper and lower shoulders be may for acting on the plurality of ball bearings.

The indicator pole tube may be fixedly mounted in a holding plate, the holding plate
30 being mounted within the drum cylinder and being co-axial with and parallel to the lid.

The drum cylinder is may be mounted on a shaft for rotation therewith. The shaft may be able to be rotated by the dispensing apparatus.

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The dispensing apparatus may comprise a guide plate having an upper spiral path, the upper spiral path being the same as the lower spiral path.

5 The guide plate may have an upper surface and a lower surface, the upper spiral path being on both the upper surface and the lower surface. The upper spiral path may comprise a plurality of equally spaced openings extending through the guide plate, the plurality of openings being axially aligned with the plurality of holes.

10 An index cylinder may be slidably mounted on at least one guide pole for movement relative to the guide plate radially of the guide plate in a direction parallel to the direction of the vehicle, and no other direction.

The index cylinder may further comprise an index cylinder plunger for movement
15 between an engaging position in engagement with one of the plurality of openings, and a retracted position where it is disengaged from the one of the plurality of openings.

The guide plate may be mounted on the shaft for rotation therewith.

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The dispensing apparatus may further comprise a nozzle head having a lower end thereof locatable in the lower spiral path for movement relative thereto, the nozzle head extending downwardly from a nozzle body, the nozzle head being biased axially upwardly relative to the nozzle body.

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The nozzle body may be slidably mounted on at least one pole for movement relative to the drum cartridge radially of the drum cartridge in the direction.

The dispensing apparatus may further comprise a latch cylinder having a latch
30 cylinder plunger extending upwardly therefrom, the latch cylinder plunger engaging the one of the plurality of openings when the one of the plurality of openings is not engaged by the index cylinder plunger.

The latch cylinder may be mounted to an outer end of a push pole of a push pole
35 cylinder, the push pole cylinder being for moving the latch cylinder from a first position to a second position when the latch cylinder plunger is engaged in the one of the plurality of openings to cause rotation of the guide plate, the shaft, and the drum cartridge.

- 5 The latch cylinder may be pivotally mounted relative to the nozzle head.

The apparatus may further comprise a source for compressed air, the compressed air being for operation of the index cylinder, the latch cylinder, and the nozzle.

10 **Brief Description of the Drawings**

In order that the invention may be fully understood and readily put into practical effect, there shall now be described by way of non-limitative example only a preferred embodiment of the present invention, the description being with reference to the accompanying illustrative drawings in which:

- 15 Figure 1 is a perspective view of the preferred embodiment;
 Figure 2 is a top plan view of a portion of the preferred embodiment;
 Figure 3 is a partial perspective view if partial section of the indexing mechanism at a first stage of the process;
 Figure 4 is a view corresponding to Figure 3 at a second stage in the process;
 20 Figure 5 is a view corresponding to Figure 3 at third stage in the process;
 Figure 6 is a view corresponding to Figure 3 at a fourth stage in the process;
 Figure 7 is a view corresponding to Figure 3 at a fifth stage in the process;
 Figure 8 is a partial cross-sectional view showing the first step in the loading of the indicator pole;
 25 Figure 9 is a view corresponding to Figure 8 at a second step in the process;
 Figure 10 is a view corresponding to Figure 8 at a third step in the process;
 Figure 11 is a view corresponding to Figure 8 at a fourth step in the process;
 Figure 12 is a view corresponding to Figure 8 at the fifth step in the process;
 Figure 13 is a view corresponding to Figure 8 at a sixth step in the process; and
 30 Figure 14 is a perspective view of the drum cartridge without an external casing.

Detailed Description of the Preferred Embodiments

- To first refer to Figures 1 to 3 there is shown a nozzle guide plate 10 in which are
 35 located a plurality of openings 20. The guide plate 10 is mounted above a drum

5 cartridge 62. The drum 62 has an outer wall 14. Guide plate 10 has a closed spiral path 12 in which the openings 20 are located, the spiral path 12 being defined by walls 16, 18. Openings 20 are of a uniform size and spacing along spiral path 12. Guide plate 10 is double-sided so that there is a spiral path 12 on both sides of the guide plate 10.

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Mounted above the plate 10 is an index cylinder 22 mounted on guide poles 24 for movement relative to the guide plate 10 in the direction of the "Y" axis only (Figure 2). The guide poles 24 are spaced apart and parallel, and are securely mounted on an L-shaped support 26 that also supports a bearing 28 for a shaft 30 (Figure 3)
 15 with which guide plate 10 rotates. Guide plate 10 may be secured to shaft 30 by any known means.

To now refer to Figures 3 to 7, an indexing mechanism is generally shown as 32. The indexing mechanism 32 may be mounted on a base plate 37 (Figure 1). The
 20 support 26 is mounted on a stationary dispenser bracket 34. At the outer end of stationary dispenser bracket 34 is mounted a nozzle solenoid 36. Compressed air is supplied to the nozzle solenoid 36 from a compressor 39, through a hose 38. The compressor 39 may also be or include a tank, or include an accumulator, or a reservoir (Figure 1). A second hose 40 connects nozzle solenoid 36 to a nozzle
 25 body 42. Nozzle solenoid 36 serves to control supply of compressed air to the nozzle body 42. Nozzle body 42 is mounted on nozzle guide poles 44 that are spaced apart and generally parallel. The mid-point between nozzle guide poles 44 is vertically aligned with the mid-point between guide poles 24.

30 Extending downwardly from index cylinder 22 is an index cylinder plunger 46, index cylinder 22 also being pneumatically operated to control the extension of index cylinder plunger 46. Index cylinder 22 is a double-acting cylinder. Mounted between index cylinder plunger 46 and the nozzle body 42 is a latch cylinder 48 with an upwardly extending latch cylinder plunger 50. Again, the latch cylinder 48
 35 is pneumatically operated to control the extension of latch cylinder plunger 50. Latch cylinder 48 is double acting. The latch cylinder 48 is attached to the outer end of a push pole 52 of a double acting, pneumatically operated, driving cylinder 54. Driving cylinder 54 is mounted on a mounting bracket 58 that is pivotally attached to nozzle body 42 by a pivotal mount 56.

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5 Extending downwardly from nozzle body 42 is a nozzle head 60. The central, longitudinal axis of nozzle head 60 is coincident or co-axial with the central, longitudinal axis of the index cylinder plunger 46, and pivotal mount 56.

10 In Figure 3 the index cylinder plunger 46 is engaged in an opening 20. The latch cylinder plunger 50 is disengaged from the opening 20. For indexing or rotation of guide plate 10 to take place, the index cylinder plunger 46 disengages from opening 20 and latch cylinder plunger 50 engages the opening 20 (Figure 4). At almost all times, one of the index cylinder plunger 46 and the latch cylinder plunger 50, engages any one of the openings 20. The driving cylinder 54 then operates to
15 push latch cylinder 54. As latch cylinder plunger 50 is engaged in opening 20, this causes the guide plate 10 to rotate in a clockwise direction (Figure 5) with shaft 30. Due to the length of push pole 52, when the movement is completed, a second opening 20 is aligned with index cylinder plunger 46. The index cylinder plunger 46 is sized and located to be a neat but sliding fit in the upper spiral path 12 when
20 in the retracted position. As such, the rotational movement of guide plate 10 causes index cylinder 22 to move along guide poles 24 under the influence of spiral path 12. All movement is in a direction that is radial of guide plate 10 and in the direction of the Y axis only. There is effectively no movement in the direction of the X axis.

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Latch cylinder plunger 50 then disengages from the first opening 20 (Figure 6) and index cylinder plunger 46 engages the second opening 20. Pushing cylinder 54 acts to pull pole 52 and thus latch cylinder 48 back until latch cylinder plunger 50 is aligned with the second opening 20 (Figure 7).

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Due to openings 20 being in spiral path 12, and spiral path 12 being both on the top and bottom surfaces of guide plate 10, the latch cylinder 48 will also follow the spiral path 12 due to latch cylinder plunger 50 being a neat but sliding fit in the lower spiral path 12 when in the retracted position. As latch cylinder 48 is attached
35 to nozzle body 42 by pivotal mount 56, the nozzle body 42 will also follow the spiral path 12 and will move along nozzle guide poles 44 in a direction that is radial of guide plate 10, and along the Y axis only. There is no movement in the direction of the X axis. As such there is no movement of nozzle body 42 and index cylinder 22 in the direction of the X axis. Index cylinder plunger 46 then disengages from the
40 second opening 20 and latch cylinder plunger 50 engages the second opening 20. At this stage, the latch cylinder plunger 50, index cylinder plunger 46, and nozzle

5 head 60 are all substantially coaxial. As guide plate 10 is fixed to shaft 30, rotation of guide plate 10 causes rotation of shaft 30.

Mounted below indexing mechanism 32 is the drum cartridge 62 that is also fixed to shaft 30 and therefore rotates with it. Drum cartridge 62 has a side wall 64 and at its top 66, is the lid 68 in which is formed a second spiral path 70 that matches (is the same as) spiral path 12. The second spiral path 70 also has a number of holes 72 that are of the same number and spacing as openings 20. Nozzle head 60 locates in the second spiral path 20 in the manner of a neat sliding fit and therefore follows the second spiral path 70. Therefore, when indexing plunger is in an opening 20. The nozzle head 60 is over a hole 72. The nozzle head 60 is normally within a hole 72, except as is described below.

As shown in Figures 8 to 14, located in drum cartridge 62 are a plurality of indicator poles 74 arranged in a drum spiral path 76 that is the same as both spiral path 12 and second spiral path 70.

As the drum cartridge 62 rotates with shaft 30, for each index movement of guide plate 10, the drum cartridge 62 rotates the same amount – the same angular movement. Due to the same spacing of holes 72 and openings 20, for each index movement a new hole 72 is immediately below nozzle head 60. Beneath each hole 72 is a indicator pole 74. Indicator pole 74 and hole 72 are co-axial.

Each hole 72 has a cylindrical wall 78 co-axial therewith. Slidably mounted in each wall 78 is a cylindrical latch release 80. Latch release 80 has a wall 82 stepped at 84, and a enlarged head 86. Slidably mounted in latch release 80 is a latch body 88 in which is slidably located an indicator pole assembly 108 comprising indicator pole 74 and indicator head 90. Latch body 88 is slidably mounted in a holding plate 92 mounted in drum cartridge 62, and has a radially outwardly directed flange 94 that engages a top surface of a head 96 of indicator pole tube 98. A latch spring 100 is mounted around latch body 88 and extends between flange 94 and enlarged head 86. Mounted within holes in latch body 88 are a plurality of ball bearings 102. Also, latch body 88 has a radially inwardly directed alignment pin 104 that engages a slot 106 in indicator head 90.

40 In Figure 8, the indicator pole 74 and its head 90 are located within indicator pole tube 98 and latch body 88. Spring 100 biases indicator body axially downwardly

5 and latch release 80 axially upwardly. The indicator pole 74, indicator head 90 and latch body 88 are moved axially upwardly by a force applied to indicator pole 74. The force may be exerted by the hands of an operator by inserting the pole 74 head-first into the marker rod tube 98. This forces indicator head 90 axially upwardly.

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Due to upper groove 110 and wall 82, the ball bearings 102 are forced inwardly. Therefore, shoulder 112 of indicator head presses on ball bearings 102 to force latch body 88 axially upwardly against the bias of spring 100. Pin 104 engages in slot 106 to ensure correct alignment and eventually contacts indicator head 90 at

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In Figure 10 the latch body 88 has moved sufficiently axially upwardly for ball bearings to reach step 84. The ball bearing 102 are then forced radially outwardly by shoulder 112 and they rest on step 84. At this stage the indicator pole 74 and indicator head 90 continue to move axially upwardly.

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In Figure 11, the ball bearings 102 move radially inwardly due to the slope of step 84 and locate in lower groove 114 in indicator head 90. Lower shoulder 116 engages ball bearings 102 and, under the bias of spring 100, the indicator pole assembly 108 moves axially downwardly until flange 94 contacts head 96. Pin 104 remains engaged in slot 106 (Figures 11 and 12).

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Compressed air is then supplied to nozzle body 42 (Figures 12 and 13). It passes down passage 120 in nozzle body 42. Passage 120 is blocked by plug 122 that is part of nozzle body 42 and that is aligned laterally with shoulder 124 of nozzle head 60. Thus, the compressed air acts on shoulder 124 of nozzle head 60 as it is able to move axially.

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This forces nozzle head 60 axially downwardly through hole 72 and into engagement with latch release 80. Latch release 80 is moved axially downwardly with nozzle head 60. A compression spring 118 within nozzle head 60 is compressed. Passage 120 is thereby opened as shoulder 124 and plug 122 are no longer in alignment.

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40 The compressed air continues down passage 120 and contacts indicator head 90. At this stage the downward movement of latch release 80 allows ball bearings 102 to move radially outwardly and to rest on step 84. Indicator pole 74 and indicator head 90 are forced axially downwardly by the compressed air and exit the drum

5 cartridge 62. Compression spring 118 forces nozzle head 60 axially upwardly until shoulder 124 aligns with plug 122. Spring 100 forces latch release 80 axially upwardly until head 86 contacts wall 78. The apparatus is now in the position of Figures 2 and 8 and the cycle recommences.

10 The compressed air may be at any suitable pressure such as, for example, 8 BAR.

Figure 14 shows the drum cartridge 62 without an outer wall 14 to show the internals of the cartridge 62. The cartridge 62 may comprise marker rods (not shown) that are already held within marker rod tubes 98 by the engagement of pin
15 104 in slot 106 (Figure 11). The marker rod tubes 98 are also arranged in a spiral manner.

Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the
20 technology that many variations or modifications in details of design or construction or operation may be made without departing from the present invention.

5 Lists

	10	-	nozzle guide plate
	12	-	spiral path
	14	-	outer wall of 62
	16	-	outer wall of 12
10	18	-	internal wall of 12
	20	-	openings
	22	-	index cylinder
	24	-	guide poles
	26	-	L-shaped support
15	28	-	hub
	30	-	shaft
	32	-	indexing mechanism
	34	-	stationary dispenses bracket
	36	-	nozzle solenoid
20	37	-	base plate
	38	-	hose
	39	-	compressor
	40	-	2 nd hose
	42	-	nozzle body
25	44	-	nozzle guide poles
	46	-	index cylinder plunger
	48	-	latch cylinder
	50	-	latch cylinder plunger
	52	-	push pole
30	54	-	pushing cylinder
	56	-	pivotal mount of 54 on 42
	58	-	mounting bracket
	60	-	nozzle head

5	62	-	drum cartridge
	64	-	side wall of 62
	66	-	top of 62
	68	-	lid
	70	-	second spiral path
10	72	-	holes in 70
	74	-	indicator poles
	76	-	drum spiral path
	78	-	cylindrical wall
	80	-	latch release
15	82	-	wall of 80
	84	-	step in 82
	86	-	enlarged head
	88	-	latch body
	90	-	indicator head
20	92	-	holding plate
	94	-	flange of 92
	96	-	head of 98
	98	-	indicator pole tube
	100	-	latch spring
25	102	-	ball bearings
	104	-	alignment pin
	106	-	slot in 90
	108	-	indicator pole assembly
	110	-	upper groove
30	112	-	shoulder of 90
	114	-	lower groove
	116	-	lower shoulder
	118	-	compression spring

5	120	-	passage
	122	-	plug
	124	-	shoulder

5 **The Claims**

1. Apparatus for attachment to a vehicle, the apparatus being for dispensing indicator poles, the apparatus comprising a drum cartridge having a drum spiral path in which the indicator poles are locatable; and a dispensing apparatus for dispensing the indicator poles from the drum cartridge in a line parallel with a direction of travel of the vehicle.
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2. Apparatus as claimed in claim 1, wherein the drum cartridge is substantially cylindrical and comprises a lid and a side wall, the lid comprising a lower spiral path on an upper surface thereof, the lower spiral path and the drum spiral path being the same.
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3. Apparatus as claimed in claim 2, wherein the lower spiral path further comprises a plurality of equally spaced openings, each opening being co-axial with a longitudinal axis of an indicator pole when located in the drum spiral path.
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4. Apparatus as claimed in claim 3, the lower spiral path further comprising a cylindrical wall axially aligned with each opening and depending therefrom, there being a cylindrical latch release slidably mounted in and being co-axial with the cylindrical wall, the cylindrical latch release having a wall with a sloped step therein, and an enlarged head at a lower end of the wall.
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5. Apparatus as claimed in claim 4, there being a cylindrical latch body slidably mounted in and being co-axial with the latch release, the latch body having a hollow interior for slidably receiving therein a indicator pole, the hollow interior having a radially inwardly directed pin for engaging a slot in a head of the indicator pole.
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6. Apparatus as claimed in claim 5, the latch body having a radially outwardly extending flange for contracting a indicator pole tube head, there being a compression spring located around the latch body and extending from the flange to the enlarged head.
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- 5 7. Apparatus as claimed in claim 5 or claim 6, there being a plurality of ball bearings moveably mounted in the latch body adjacent an upper end thereof for co-operative engagement with the head and the latch body.
- 10 8. Apparatus as claimed in claim 7, wherein the head comprises an upper groove, an upper shoulder at a lower end of the upper groove, a lower groove, and a lower shoulder at an upper end of the lower groove; the upper and lower grooves being for releasably receiving therein the plurality of ball bearings, and the upper and lower shoulders being for acting on the plurality of ball bearings.
- 15 9. Apparatus as claimed in claim 6 or claim 7 or claim 8 when a appending to claim 6, wherein the indicator pole tube is fixedly mounted in a holding plate, the holding plate being mounted within the drum cylinder and being co-axial with and parallel to the lid.
- 20 10. Apparatus as claimed in any one of claims 2 to 9, wherein the drum cylinder is mounted on a shaft for rotation therewith, the shaft being able to be rotated by the dispensing apparatus.
- 25 11. Apparatus as claimed in any one of claims 1 to 10, wherein the dispensing apparatus comprises a guide plate having an upper spiral path, the upper spiral path being the same as the lower spiral path.
- 30 12. Apparatus as claimed in claim 11, wherein the guide plate has an upper surface and a lower surface, the upper spiral path being on both the upper surface and the lower surface; the upper spiral path comprising a plurality of equally spaced openings extending through the guide plate, the plurality of openings being axially aligned with the plurality of holes.
- 35 13. Apparatus as claimed in claim 11 or claim 12, further comprising an index cylinder slidably mounted on at least one guide pole for movement relative to the guide plate radially of the guide plate in a direction parallel to the direction of the vehicle, and no other direction.

- 5 14. Apparatus as claimed in claim 13, the index cylinder further comprising an index cylinder plunger for movement between an engaging position in engagement with one of the plurality of openings, and a retracted position where it is disengaged from the one of the plurality of openings.
- 10 15. Apparatus as claimed in any one of claims 11 to 14 when appended to claim 10, wherein the guide plate is mounted on the shaft for rotation therewith.
- 15 16. Apparatus as claimed in any one of claims 13 to 15, the dispensing apparatus further comprising a nozzle head having a lower end thereof locatable in the lower spiral path for movement relative thereto, the nozzle head extending downwardly from a nozzle body, the nozzle head being biased axially upwardly relative to the nozzle body.
- 20 17. Apparatus as claimed in claim 16, the nozzle body being slidably mounted on at least one pole for movement relative to the drum cartridge radially of the drum cartridge in the direction.
- 25 18. Apparatus as claimed in any one of claims 14 to 17, the dispensing apparatus further comprising a latch cylinder having a latch cylinder plunger extending upwardly therefrom, the latch cylinder plunger engaging the one of the plurality of openings when the one of the plurality of openings is not engaged by the index cylinder plunger.
- 30 19. Apparatus as claimed in claim 18, wherein the latch cylinder is mounted to an outer end of a push pole of a push pole cylinder, the push pole cylinder being for moving the latch cylinder from a first position to a second position when the latch cylinder plunger is engaged in the one of the plurality of openings to cause rotation of the guide plate, the shaft, and the drum cartridge.
- 35 20. Apparatus as claimed in claim 18 or claim 19, wherein the latch cylinder is pivotally mounted relative to the nozzle head.

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21. Apparatus as claimed in any one of claims 11 to 20, further comprising a source for compressed air, the compressed air being for operation of the index cylinder, the latch cylinder, and the nozzle.

10 22. Apparatus as claimed in any of the preceding claims, wherein the drum cartridge has marker rod tubes arranged in a spiral manner.