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[0001] The present invention relates to a spreading apparatus for winter service employed in winter service spreading vehicles for the spreading of road salt humidified with brine.

[0002] Such a spreading apparatus is known, for example, from EP 1 433 902 A2 and comprises a spreading disk disposed rotatably around a usually perpendicularly oriented rotation axis, as well as a sliding surface which is usually configured as a down pipe, but can also be configured as a chute, and via which the road salt is supplied to the spreading disk from a road salt holding tank. Therein, the road salt drops through the force of gravity onto the spreading disk via a mouth piece adjacent to the sliding surface. The mouth piece is directed radially inwardly towards the center of the spreading disk, where the road salt strikes a central cone. Due to the rotation of the spreading disk, the road salt is discharged from the spreading disk in a substantially horizontal direction and is thus spread on the road surface to be strewn. For this purpose the spreading disk comprises radially oriented discharge blades distributed around its circumference which take up the supplied road salt and accelerate it in a circumferential direction of the spreading disk, whereby the road salt is discharged radially from the spreading disk due to the action of the centrifugal force.

[0003] The cone surface is frequently equipped with deep, radially extending grooves which take up the road salt in a fashion similar to the discharge blade, correspondingly accelerating it in the circumferential direction. The deep grooves also have the disadvantageous effect, however, that the road salt is taken up in uncontrolled fashion, so that the spreading pattern of the road salt spread on the road surface can vary correspondingly. Therefore also such spreading disks are employed the central cones of which have a smooth surface. However, also the road salt dropping back from smooth cone surfaces onto the spreading disk is not always distributed uniformly.

[0004] From CH 382 790 A a salt or sand spreading apparatus is known in which the outlet end of the mouth piece, from which the spreading grit drops onto the spreading disk, is directed away from the rotation axis of the spreading disk and has a very steep inclination angle, or, with reference to the perpendicular rotation axis of the spreading disk, a very small inclination. From DE 32 35 046 A1 a mineral fertilizer spreader is known in which the outlet end likewise points away from the rotation axis of the spreading disk, however the inclination angle relative to the perpendicular rotation axis is steeper and lies somewhere between 20° and 30°.

[0005] From DE-U-201 19 003 a winter service spreading apparatus according to the preamble of claim 1 is known, in which the outlet end of the mouth piece is oriented parallel to the rotation axis of the spreading disk. The spreading disk itself has a horizontal upper side on which the spreading grit impinges after exiting from the mouth piece.

[0006] From EP 0 427 995 A1 a winter service spreading apparatus according to the preamble of claim 1 is known. The outlet end of the mouth piece is oriented such that the spreading grit impinges on the tooth flanks of a guide cone from radially outside. The setting angle of the mouth piece can be changed slightly, however maximally up to an impingement angle of the spreading grit on the impact surfaces of the guide cone of 90°.

[0007] It is therefore the object of the present invention to improve a winter service spreading apparatus with regard to the uniform supply of a spreading grit or in particular of a mixture of spreading grit and brine to the spreading disk.

[0008] This object is achieved by a winter service spreading apparatus with the features of claim 1. In claims dependent thereon advantageous developments and embodiments of the invention are specified.

[0009] According to the invention, the mouth piece is oriented so that its outlet end, from which the road salt drops onto the spreading disk through the force of gravity, points away from the central region around the rotation axis of the spreading disk. The spreading grit is thus supplied to the spreading disk in the discharge direction. Therein the outlet end of the mouth piece is preferably directed radially towards the outside relative to the rotation axis.

[0010] According to the invention, the outlet end of the mouth piece is so arranged relative to the cone surface of the spreading disk that, when the rotation axis of the spreading disk is arranged perpendicularly, spreading grit dropping from the outlet end through the force of gravity impinges on the cone surface.

[0011] Under these circumstances it can no longer occur that the spreading grit supplied to the spreading disk ends up in the central region of the spreading disk where it is exposed to no or only little centrifugal force.

[0012] Since the mouth piece can be disposed in the region of the rotation axis of the spreading disk when spreading grit is supplied in the discharge direction of the spreading disk, the rotary drive of the spreading disk is preferably implemented by means of a motor which is offset from the rotation axis and which is coupled to the rotation axis via a gear. Thereby space is created for the mouth piece at the center of the spreading disk.

[0013] The inside surface of the mouth piece at the outlet end preferably has an inclination angle of 20°-60°, particularly preferably between 30° and 45°, especially approximately 35°-40°, relative to the rotation axis of the spreading disk. Thereby the spreading grit slides on the inside of the mouth piece and is bunched, so that a targeted supply of this mixture to the spreading disk is possible. The flat inclination angle of the outlet end of the mouth piece is of special importance also when driving around bends, since, whereas in conventional mouth pieces which generally have a very steep inclination angle of e.g. 6° the spreading grit within the mouth piece is forced radially toward the outside against the inside wall of the mouth piece due to the centrifugal force when driving around bends, this influence of the centrifugal force is considerably lower in the case of a flat inclination angle of the mouth piece, since the spreading grit slides back to the middle of the mouth piece against the centrifugal force due to the force of gravity, in particular when said mouth piece has a concavely arched cross-section in its preferred embodiment. Therefore, a comparatively exact supply of the mixture of spreading grit and brine to the spreading disk is possible even when driving around bends.

[0014] When the spreading grit is not returned to the middle of the sliding section by means of the flatly inclined mouth piece, this has two consequences when driving around bends, which both have an effect on the spreading pattern materializing on the road. On the one hand, in a perpendicular mouth piece the spreading grit is forced radially toward the outside in the mentioned manner and will therefore impinge on the spreading disk in a different location than when driving straight on. On the other hand, the spreading grit slides down the sliding surface in the form of a relatively broad band of spreading grit and is usually oriented tangentially to the rotation axis of the spreading disk when driving straight on. When the spreading grit band is forced radially toward the outside against the inside wall of a perpendicular mouth piece when driving around bends, the band of spreading grit is correspondingly oriented radially to the rotation axis of the spreading disk. This results in a reduction of the spreading angle of the spread-out spreading grit, consequently a narrower spreading pattern. In a spreading disk turning clockwise when viewed from above, taking a left turn results in total in a shift of the spreading pattern toward the left, wherein the right-hand portion of the spreading pattern is missing due to the reduction of the spreading angle, and the rest of the spreading pattern is denser than provided by the setting of the apparatus. Conversely, when taking a right turn, the spreading pattern is shifted toward the right, wherein also in this case the right-hand portion of the spreading pattern is missing due to the reduction of the spreading angle. When taking right turns, the spreading pattern is therefore still approximately aligned towards the right, if with a slightly higher spreading density, however the spreading pattern does not reach the left-hand expansion preset on the apparatus. Therefore the measure of keeping the spreading grit band sliding down the sliding surface in a middle position also when driving around bends is therefore important. The flatly inclined mouth piece serves for this purpose.

[0015] The bunching and exact supply of the mixture of spreading grit and brine to the spreading disk can be further optimized when, at least over a certain distance, the cross-section of the mouth piece is conically tapered in the direction of the outlet end of the mouth piece. However, good results can also be achieved with a constant extension of the cross-section.

[0016] In an especially preferred embodiment of the invention the inside surface of the mouth piece extends in an arch in a cross-section of the mouth piece parallel to the sliding direction of the spreading grit, thus in a cross-section which coincides with the rotation axis or is disposed parallel thereto.

[0017] For the spreading grit to be taken up by the cone surface provided centrally on the spreading disk despite the mouthpiece being directed towards the spreading disk in the discharge direction, the inside surface at the outlet end of the mouth piece can be provided more strongly inclined towards the horizontal than the cone surface of the spreading disk when the rotation axis is arranged perpendicularly. To increase the flexibility of use, it can be reasonable to configure the inclination angle of the mouth piece or of the outlet end of the same to be adjustable. Particularly for this case it is expedient to configure the mouth piece and the down pipe/ chute independently of each other. Otherwise, also a single-piece configuration is possible.

[0018] A particular aspect of the invention concerns the uniform supply of a mixture of spreading grit and brine to the spreading disk. For road salt is frequently humidified when it is spread. It is assumed that with humidified road salt the thawing effect of the salt sets on more quickly and the flight properties of the road salt are influenced positively. However, humidifying the road salt a long time before the spreading can lead to the road salt's clumping together still in the holding tank, whereby the spreading would be impeded substantially. The humidifying therefore is effected substantially only at the moment of the spreading process. For this purpose the road salt and the brine employed for humidifying the road salt are carried in separate containers on a winter service vehicle and are mixed with each other only at the time of the actual spreading, by supplying the two components to the rotating spreading disk separately in a strictly limited region in targeted fashion.

[0019] In DE 3 937 675 C2 different variants are specified for orienting the supply of spreading grit and brine to the spreading disk in order to reach a mixture that is as ideal as possible. By a special configuration of the discharge blades of the spreading disk a uniform and intensive humidification of the road salt on the spreading disk is to be achieved. In DE 10 007 926 in contrast, the brine supply is effected with an overflow tank in a central position of the spreading disk, while the road salt is guided against an impact plate from which it impinges on the spreading disk with a radial component. The mixing of the salt and of the brine is effected on the spreading disk. Proceeding from this state of the art DE 10 255 101 A1 suggests to arrange a concentric nozzle at the upper end of the down pipe leading to the spreading disk in order to improve the humidifying of the road salt to be spread, wherein the concentric nozzle has openings equally distributed around its circumference by means of which the spreading grit which is transported through a central opening in the concentric nozzle is humidified with brine from the outside by sprinkling it with brine from several sides simultaneously. The concentric nozzle is comparatively elaborate with regard to construction and does not always work correctly when driving around bends at high speed. For, when driving around bends, the brine level in a chamber surrounding the concentric nozzle will sometimes tip so strongly that it is no longer possible to feed brine to all openings of the concentric nozzle distributed around the circumference of the down pipe.

[0020] Correspondingly, according to a special development of the invention for the purpose of spreading a mixture of spreading grit and brine, a liquid supply tube is provided on the upper end of the sliding surface formed by the down pipe or the chute in addition to a spreading grit supplying device for supplying spreading grit, such that a liquid film can be produced on the inclined sliding surface by said liquid supply tube when the rotation axis of the spreading disk is oriented perpendicularly. In contrast to the concentric nozzle, the brine is preferably supplied directly to the lower wall of the inclined down pipe or the inclined chute, so that the liquid film can form on the sliding surface. An annular chamber surrounding the down pipe can be omitted then, so that a discontinuation of the brine supply when driving around bends can be ruled out. The formation of the liquid film on the sliding surface of the down pipe is not influenced by the centrifugal force acting on the brine when driving around bends. In particular, the centrifugal force acts in the same fashion on the liquid film and the supplied salt, both components are thus forced in the same direction, so that the mixing of the salt with the brine when sliding down the sliding surface of the down pipe is not impaired substantially. In fact, tests have shown that in this fashion a good mixing of salt and brine can be achieved. By means of the measures explained hereinafter, this mixing can be further improved additionally.

[0021] The road salt is preferably supplied to the sliding surface in a location where the brine film has already formed. It is particularly advantageous to arrange the liquid supply tube and the spreading grit supplying device such that a flow of spreading grit supplied by the spreading grit supplying device using the force of gravity impinges on the liquid film produced on the sliding surface. The spreading grit thus drops onto the film, is carried away by the same and humidified in the process.

[0022] The angle of inclination of the sliding surface to the rotation axis of the spreading disk can lie between 5° and 40° and lies preferably between 10° and 30°, approximately 20° are particularly preferred, in order to arrive at a mixing of the spreading grit with the brine while the spreading grit simultaneously slides over the sliding surface. An inclination of approximately 20° seems to be an inclination which is suitable for most types of spreading grit.

[0023] Depending on the height of the vehicle it can be reasonable to configure the sliding surface to be longer or shorter. The length of the sliding surface can therefore lie between 300 mm and 1500 mm.

[0024] In order to achieve a uniform liquid film on the sliding surface it is advantageous when the liquid supply tube ends immediately at the sliding surface to make it possible to feed the brine in a fashion as laminar as possible, without much splashing. Preferably the liquid supply tube is therefore directed obliquely towards the sliding surface with its supply tube end, so that the brine exiting from the supply tube end is diverted only slightly upon impinging on the sliding surface.

[0025] When the supply tube end of the liquid supply tube is positioned substantially parallel to the rotation axis of the spreading disk, for example, which may be practical for reasons of construction, the angle of inclination between the sliding surface of the down pipe or of the chute and the supply tube end of the liquid supply tube preferably amounts to a maximum of 40°. For as mentioned above, the sliding surface is inclined preferably at an angle between 5° and 40° to the rotation axis, in particular between 10° and 30°. The supply is effected preferably at an angle of 45° or less, e.g. 20°, to the sliding surface.

[0026] The supply tube end of the liquid supply tube can have an at least partially obliquely oriented outlet cross-section relative to the direction of the supply tube. Thereby, the central axis of the supply tube end can be disposed closer to the sliding surface, which enables the formation of a more uniform liquid film on the sliding surface. The obliquely oriented outlet cross-section can be achieved by chamfering the supply tube end at a corresponding angle, for example at the 20° mentioned above, wherein the chamfering should not extend over the whole diameter of the liquid supply tube, since a sufficient passageway has to remain between the supply tube and the sliding surface for supplying the brine. The cross-section of this passageway can lie between 5 and 30 mm, preferably between 15 and 20 mm.

[0027] The spreading grit supplying device with which the spreading grit impinges on the brine film preferably, as mentioned, in a location below the liquid supply tube, is preferably disposed opposite the sliding surface. Possible centrifugal forces then act on the liquid film in the same manner as on the spreading grit streaming out of the spreading grit supplying device, so that the spreading grit will impinge on the liquid film in any case.

[0028] According to a special embodiment, the spreading grit supplying device has a supply pipe or chute arch, from the end of which the spreading grit drops onto the sliding surface through the force of gravity. Such a supply arch focuses the spreading grit stream in the direction of the liquid film on the sliding surface. For this purpose the supply arch preferably extends in a plane parallel to or with the rotation axis of the spreading disk and further preferably has a cross section that is tapered in the direction of the sliding surface.

[0029] The supply arch can end directly below a spreading grit supplying device, so that the spreading grit drops immediately from the spreading grit supply device into the supply arch without any further devices, by the exception of a valve for the regulation of the amount of spreading grit, for example – which has to be allocated to the spreading grid supply device functionally. The spreading grit feeding end of the supply arch is in particular oriented so steeply up to perpendicularly that the spreading grit transported by the spreading grit supply device drops perpendicularly into the supply arch through the force of gravity.

[0030] With some types of spreading grit it can occur that a part of the spreading grit floats on top of the liquid film. In order to obtain a uniform mixing of the spreading grit with brine also in such cases, according to a further special embodiment of the invention, the mouth piece at the lower end of the sliding surface is inclined in a direction opposite to the sliding surface and arranged such that spreading grit sliding over the sliding surface impinges on an inside surface of the mouth piece from the lower end of the sliding surface and is diverted from there in the other direction towards the outlet end of the mouth piece. From the outlet end of the mouth piece, the spreading grit mixed with brine then drops onto the spreading disk. Through this reversal of direction, the spreading grit and the brine are again intensively mixed before they end up on the spreading disk together.

[0031] The location of impingement of the mixture of spreading grit and brine dropping from the sliding surface onto the inside surface of the mouth piece is disposed preferably at a distance of least 200 mm in front of the outlet end of the mouth piece, in particular of at least 230 mm, in order to achieve the desired bunching and mixing of the rest. This means that the virtual extension of the sliding surface intersects with the inside surface of the mouth piece at a distance of at least 200 mm or 230 mm from the outlet end of the mouth piece.

[0032] The invention will hereinafter be explained by way of example with reference to the single Figure 1.

[0033] Figure 1 shows a winter service spreading apparatus according to the invention for spreading a mixture of road salt and brine. The apparatus can be an integral part of a winter service vehicle or can form part of a corresponding winter service spreading superstructure for the load areas of trucks. In any case, spreading grit S is supplied by means of a suitable transport device, for example a conveyor belt or a conveyor screw, from a not shown spreading grit holding tank to the upper end of a down pipe arrangement 2, 3, 4 via a supply channel 1. The spreading grit exits at the lower end of the down pipe arrangement, which can also be configured as an arrangement of chutes, and drops onto a spreading grit disperser in the form of a spreading disk 6 rotating around a rotation axis 5 from which the spreading grit S is discharged in an approximately horizontal direction through the action of centrifugal force. The central down pipe 3 of the down pipe arrangement 2, 3, 4 can be configured telescopically in order to render the apparatus adaptable to different spreading vehicles. The length of said down pipe 3 should lie between 300 mm and 1500 mm in order to provide a sufficiently long sliding surface for the spreading grit S and the liquid F or brine, as will be explained hereinafter, to be mixed with the spreading grit S.

[0034] The inclination of the central down pipe 3 can be stronger or weaker than shown in Figure 1. An inclination angle relative to the rotation axis 5 of the spreading disk 6 should lie between 5° and 40°, preferably between 10° and 30°, particularly preferably at around 20°. The angle of inclination influences the retention time of the spreading grit S on the sliding surface 7 of the down pipe 3 and therefore the time available for mixing the spreading grit S with the brine F.

[0035] The brine F is supplied at the upper end of the down pipe 3 directly to the sliding surface 7 in such a manner that a liquid film is formed on the sliding surface 7, that the brine F thus flows down the sliding surface 7 in a laminar manner. A pipe-shaped liquid supply tube 8 serves for this purpose, the supply tube end 9 of which ends immediately at the sliding surface. The supply tube end 9 of the liquid supply tube 8 is directed obliquely towards the sliding surface 7. In the shown embodiment example, this supply direction is approximately parallel to the rotation axis 5 of the spreading disk 6.

[0036] In order to be able to achieve a laminar flow of the brine F on the sliding surface 7 from the start, the supply tube end 9 of the liquid supply tube 8 is chamfered at the side facing the sliding surface 7. The brine thus comes into contact with the sliding surface 7 at a time when it is still guided inside the liquid supply tube, whereby the formation of a laminar flow is facilitated. The remaining cross-section of the passageway for the brine F between the sliding surface 7 and the supply tube 8 then amounts to approximately 15-20 mm, preferably at least between 5 and 30 mm.

[0037] The feed rate of the road salt S and of the brine F are ascertained and adjusted automatically and depend on the driving speed of the spreading vehicle, the spreading width adjusted via the rotational speed of the spreading disk and the desired spreading density. The liquid supply tube 8 is correspondingly connected to a brine holding tank R via a pump P, the sole F being pumped out of said tank into the down pipe 3.

[0038] In addition to the down pipe 3, the down pipe arrangement 2, 3, 4 has a down pipe arch 2 at the upper end of the down pipe 3 and a mouth piece 4 at the lower end of the down pipe 3, of which the down pipe arch 2 can be possibly omitted, but which facilitates a uniform mixing of the spreading grit S with the brine F in combination with the down pipe 3 (or chute) and the mouth piece 4.

[0039] The basic function of the down pipe arch 2 consists in supplying the spreading grit S to the sliding surface 7 in a defined location disposed below the supply tube end 9 of the liquid supply tube 8, preferably in a location where a laminar liquid film has already formed on the sliding surface 7. In particular, the outlet opening 2a of the down pipe arch 2 is disposed completely below the supply tube end 9, so that no or the smallest possible amount of brine splashes into the down pipe arch 2 and can lead to the spreading grit S adhering there.

[0040] A more special function of the down pipe arch consists in ensuring that the spreading grit S always impinges on the same location on the sliding surface 7 of the down pipe 3, also when the complete down pipe arrangement 2, 3, 4 (including the spreading disk 6) is rotated around the rotation axis 5 of the spreading disk 6 relative to the stationary supply channel 1 by means of a pivoting mechanism. This would not be the case if the spreading grit dropped directly into the down pipe 3 from the supply channel 1.

[0041] Correspondingly, the outlet opening 2a of the down pipe arch 2 is arranged opposite the sliding surface 7. The down pipe arch 2 lies in a plane parallel to or preferably with the rotation axis 5 of the spreading disk 6 and ends with its upper end below the supply channel 1, such that the transported spreading grit S drops perpendicularly into the down pipe arch 2 through the force of gravity.

[0042] Moreover, the down pipe arch 2 is conically tapered in the direction of its outlet end 2a, i.e. its diameter is correspondingly reduced and the arching of the walls of the down pipe arch 2 guiding the spreading grit S is correspondingly increased. The spreading grit S is thus bunched and impinges on the sliding surface 7 of the down pipe 3 in the defined location.

[0043] On the whole it is thus achieved that a uniform mixing of spreading grit S and brine F can be effected in the down pipe 3 in every situation, in particular also when driving around bends.

[0044] The mixture of spreading grit and brine is again diverted by the mouth piece 4 at the lower end of the down pipe 3, here in particular in a direction opposite the direction of the down pipe. Correspondingly, the mouth piece 4, like the down pipe arch 2, extends in a plane parallel to or preferably with the rotation axis 5 of the spreading disk 6. The mouth piece 4 can be configured as an integral component of the down pipe 3 (or chute), but is preferably executed as a separate part, the inclination of which can be adjusted in particular.

[0045] The mixture of spreading grid and brine impinges on an inside surface 4a of the mouth piece 4 in a location 4b which is disposed at a distance of at least 200 mm, preferably more than 230 mm, from the outlet end 4c of the mouth piece 4. This distance again enables the mixture of spreading grit and brine, after it was swirled around upon hitting the location 4b, to further mix and in particular to bunch centrally before dropping from the outlet end 4c onto the spreading disk 6.

[0046] The inside surface 4a of the mouth piece 4 at the outlet end 4c therefore has an angle of inclination of between 20° and 60°, preferably of around 35°-40° relative to the rotation axis 5.

[0047] Also the inside surface 4a of the mouth piece 4 is configured to be arched and in this embodiment example is conically tapered in the direction of its outlet end 4c. Like in the down pipe arch 2, this conical tapering serves the bunching of the mixture of spreading grit and brine. However, a constant extension of the cross-section is also possible.

[0048] The spreading disk 6 has a central cone surface 11, equipped with deep grooves here. In the represented embodiment example, the inclination of the inside surface 4a of the mouth piece 4 at the outlet end 4c relative to the rotation axis 5 of the spreading disk 6 in comparison to the inclination of the cone surface 11 is so chosen that the mixture of spreading grit and brine exiting from the mouth piece 4 is taken up by the cone surface 11, although the outlet end 4c of the mouth piece 4 points away from the rotation axis 5.

[0049] The drive A for the spreading disk 6 is offset laterally relative to the rotation axis 5 of the spreading disk 6 and is coupled in actuating manner with the spreading disk 6 via a gear 13 which is a belt- or chain hoist in the shown embodiment example, but can also be a pinion gear or other gear, for example.

PATENTKRAV

1. Spredeindretning til vintertjeneste, der omfatter en spredetallerken (6), der kan drejes omkring en omdrejningsakse (5), og en faldrørs- eller sliskeindretning (2, 3, 4) til tilførsel af strømateriale (S) til spredetallerkenen (6) med et mundstykke (4), fra hvis udløbsende (4c) strømaterialet (S), når omdrejningsaksen (5) er orienteret lodret, betinget af tyngdekraften falder ned på spredetallerkenen (6), hvor spredetallerkenen (6) er forsynet med en central kegle, kendetegnet ved, at mundstykket (4) ved sin udløbsende (4c) peger væk fra et centralt område omkring spredetallerkenens (6) omdrejningsakse (5), således at strømaterialet (S) tilføres til spredetallerkenen (6) i udkastningsretningen, hvor mundstykkets (4) udløbsende (4c) er placeret på en sådan måde i forhold til kegleoverfladen (11), at strømateriale (S), der, når spredetallerkenens (6) omdrejningsakse (5) er orienteret lodret, betinget af tyngdekraften falder ned fra udløbsenden (4c), rammer spredetallerkenens (6) kegleoverflade (11).

2. Indretning ifølge krav 1, kendetegnet ved, at udløbsenden (4c) i forhold til spredetallerkenens (6) omdrejningsakse (5) er rettet udad i radial retning.

3. Indretning ifølge krav 1 eller 2, kendetegnet ved et drejedrev (A) til spredetallerkenen (6), der omfatter en motor, der er forskudt i forhold til spredetallerkenens (6) omdrejningsakse (5), og et gear (13), der er koblet sammen med spredetallerkenens (6) omdrejningsakse (5).

4. Indretning ifølge et af kravene 1 til 3, kendetegnet ved, at den indvendige flade (4a) af mundstykket (4) ved udløbsenden (4c) har en hældningsvinkel på mellem 20° og 60°, fortrinsvis 30° og 45°, særligt foretrukket omtrent 35° og 40°, i forhold til spredetallerkenens (6) omdrejningsakse (5).

5. Indretning ifølge et af kravene 1 til 4, kendetegnet ved, at udløbsenden (4c) har et konkavt buet tværsnit.

6. Indretning ifølge et af kravene 1 til 5, kendetegnet ved, at mundstykkets (4) tværsnit i det mindste i et afsnit af mundstykket (4) tilspidses konisk hen mod mundstykkets (4) udløbsende (4c).

7. Indretning ifølge et af kravene 1 til 6, kendetegnet ved, at mundstykket (4) i et plan parallelt med eller med spredetallerkenens (6) omdrejningsakse (5) forløber i en bueform.

8. Indretning ifølge krav 1, kendetegnet ved, at mundstykket (4) ved udløbsenden (4c), når spredetallerkenens (6) omdrejningsakse (5) er orienteret lodret, har en større hældning i forhold til det horisontale plan end spredetallerkenens (6) kegleoverflade (11).

9. Indretning ifølge et af kravene 1 til 8, kendetegnet ved, at en hældningsvinkel af udløbsenden (4c) kan indstilles.

10. Indretning ifølge et af kravene 1 til 9, kendetegnet ved, at faldrørs- eller sliskeindretningen (2, 3, 4) omfatter en glideflade (7) til strømaterialet (S), som har en hældning i forhold til omdrejningsaksen (5), og som, når omdrejningsaksen (5) er orienteret lodret, har en øverste ende, der vender væk fra spredetallerkenen (6), og en nederste ende, som vender mod spredetallerkenen (6), og som mundstykket (4) slutter sig til.

11. Indretning ifølge krav 10, kendetegnet ved en tilførselsindretning til strømateriale (1, 2) ved den øverste ende af glidefladen (7) til tilførsel af strømateriale (S) til glidefladen (7) og en væsketilførselsledning (8) ved den øverste ende af glidefladen (7) til tilførsel af en saltopløsning (F), der er udformet på en sådan måde, at der med den kan frembringes en væskefilm på glidefladen (7), når spredetallerkenens (6) omdrejningsakse (5) er orienteret lodret.

12. Indretning ifølge krav 11, kendetegnet ved, at glidefladen (7) har en hældningsvinkel i forhold til spredetallerkenens (6) omdrejningsakse (5) på mellem 5° og 40°, fortrinsvis mellem 10° og 30° og særligt foretrukket på omtrent 20°.

13. Indretning ifølge krav 11 eller 12, kendetegnet ved, at glidefladen (7) har en længde på mellem 300 mm og 1500 mm.

14. Indretning ifølge et af kravene 11 til 13, kendetegnet ved, at væsketilførselsledningen (8) ender umiddelbart ved glidefladen (7).

15. Indretning ifølge krav 14, kendetegnet ved, at væsketilførselsledningen (8) med en tilførselsledningsende (9) er rettet skråt mod glidefladen (7), fortrinsvis i en vinkel i forhold til glidefladen på 45° eller mindre.

16. Indretning ifølge krav 15, kendetegnet ved, at væsketilførselsledningen (8) ved tilførselsledningsenden (9) har et udløbstværsnit, der i det mindste delvist er orienteret på skrå i forhold til ledningsretningen.

17. Indretning ifølge krav 15 eller 16, kendetegnet ved, at tilførselsledningsenden (9) i det væsentlige er orienteret parallelt med spredetallerkenens (6) omdrejningsakse (5).

18. Indretning ifølge et af kravene 11 til 17, kendetegnet ved, at tilførselsindretningen til strømateriale (2) er forsynet med en udløbsåbning til strømateriale (2a), der ligger over for glidefladen (7).

19. Indretning ifølge et af kravene 11 til 18, kendetegnet ved, at væsketilførselsledningen (8) og tilførselsindretningen til strømateriale (2) er placeret på en sådan måde, at en strøm af strømateriale, der betinget af tyngdekraften tilføres fra tilførselsindretningen til strømateriale (2), når spredetallerkenens (6) omdrejningsakse (5) er orienteret lodret, rammer væskefilmen, der er frembragt på glidefladen (7).

20. Indretning ifølge et af kravene 11 til 19, kendetegnet ved en pumpe (P) i væsketilførselsledningen (8).

21. Indretning ifølge et af kravene 11 til 20, kendetegnet ved, at tilførselsindretningen til strømateriale er forsynet med en tilførselsrør- eller sliskebøjning (2), fra hvilken strømaterialet (S) betinget af tyngdekraften kan falde ned på glidefladen (7).

22. Indretning ifølge krav 21, kendetegnet ved, at tilførselsbøjningen (2) ligger i et plan parallelt med eller med spredetallerkenens (6) omdrejningsakse (5).

23. Indretning ifølge krav 21 eller 22, kendetegnet ved en transportindretning til strømateriale, hvor tilførselsbøjningen (2) ender under en tilførselskanal (1) i transportindretningen til strømateriale.

24. Indretning ifølge krav 23, kendetegnet ved, at strømateriale (S), der transporteres fra transportindretningen til strømateriale, når spredetallerkenens (6) omdrejningsakse (5) er orienteret lodret, betinget af tyngdekraften kan falde ned i tilførselsbøjningen (2) fra tilførselskanalen (1).

25. Indretning ifølge et af kravene 21 til 24, kendetegnet ved, at tilførselsbøjningen har et tværsnit, der tilspidses i retning af glidefladen (7).

26. Indretning ifølge et af kravene 10 til 25, kendetegnet ved, at mundstykket (4) i forhold til spredetallerkenens (6) omdrejningsakse (5) hælder i en modsat retning af glidefladen (7), og er placeret på en sådan måde, at strømateriale, der, når spredetallerkenens (6) omdrejningsakse (5) er orienteret lodret, glider via glidefladen (7), fra den nederste ende af glidefladen (7) rammer en indvendig flade (4a) af mundstykket (4), og derfra omdirigeres i den modsatte retning hen til mundstykkets (4) udløbsende (4c).

27. Indretning ifølge krav 26, kendetegnet ved, at skæringspunktet mellem en tænkt lineær forlængelse af glidefladen (7) og den indvendige flade (4a) af mundstykket (4) ligger på et sted, der har en afstand til mundstykkets (4) udløbsende (4c) på mindst 200 mm, fortrinsvis mindst 230 mm.

DRAWINGS