Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

The present invention concerns an arrangement of the type described in the introduction to claim 1.

The Prior Art

It is known that environmental problems arise when carrying out painting, cleaning, blasting, etc., where spraying with nozzles takes place, often under high pressure. These problems make it difficult for the personnel employed to remain close to the place of work. It may also be difficult to satisfy applicable environmental requirements, particularly if one is working with contaminating or corrosive fluids or other spray media. It is often difficult to build constructions using screens or other enclosures to protect the personnel, and to be able to collect sprayed excess medium and used pressure medium (the spraying agent).

Generic SE502317 reveals an arrangement that is to combat the problems described above in that a guide tube is to be arranged to be placed along the object that is to be sprayed. The guide tube is provided with longitudinal slits, and is equipped with a cartridge that is arranged to be displaceable forwards and backwards along this. The cartridge is equipped with one or several spray nozzles. Furthermore, the cartridge is connected to a supply hose for pressure medium or spray medium, such as water, air, cleaning fluid, paint, sand, etc. The cartridge is displaced forwards and backwards in the guide tube with the aid of the supply hose, which is in turn driven with the aid of two pairs of friction wheels on each side of the supply hose. The arrangement of driving the supply hose with friction wheels as described above involves a number of disadvantages and problems.

- The area of contact between the supply hose and the friction wheels is small, which means that a high pressure is required from the friction wheels onto the supply hose in order to obtain sufficient friction to drive the supply hose. This will result in the long term in wear of the supply hose.
- Pulses directed in the radial direction may arise when working at high pressure, leading to a local deformation of the hose. This accelerates the wear of the supply hose from the friction wheels.
- A radially pulsing supply hose may also result in damage to the bearing mountings of the axles of the friction wheels.
- When a supply hose has been damaged through wear it must be exchanged, something that makes it necessary to halt production, and in this way lose income. It is also both time-consuming and complicated from the point of view of service to exchange a supply hose.
- A complete high-pressure supply hose with connectors costs between SEK 5,000 and SEK 15,000 (hose length 5-15 metres), and this means that also from the point of view of economics it is of interest to maintain the interval between exchange at a minimum.

A drive device with two pairs of driving wheels is also revealed in GB 2037392. The driving wheels have the form of friction wheels that grip around the hose to feed the hose forwards. The driving arrangement is mounted in this case in an apparatus for flushing drains in which the hose is to be fed into the drain and subsequently withdrawn. Continuous driving inwards and outwards is not relevant in this case.

US 4592282 shows feeding of hose-formed explosive into a drilled hole using a similar driving arrangement with pairs of wheels. Also in this case, a continuous driving arrangement for continuous forwards and backwards feed is not concerned.

A hose-feed apparatus is also revealed in US 4240017 with pairs of driving wheels, one driving roller that grips against the hose and against a tension roller.

A cleaning apparatus for drains in which a hose is fed out is revealed in the Japanese patent 2001-300458. Three obliquely placed rotation wheels are used to achieve rotation of the hose in this case. Each rotation wheel is placed at an oblique angle of 45° degrees to the direction of feed of the hose, and the rotation wheel exerts a contact force against the hose along a pressure line (an edge). This results in heavy wear on the hose.

Aim and Purpose of the Invention

The principal aim of the present invention is to achieve an arrangement adapted for continuous forwards and backwards driving of a supply hose, which arrangement wholly or partially solves the disadvantages and problems described above. This is achieved according to the invention through an arrangement that displays the features specified in claim 1. Wear of the supply hose that arises when using previously known solutions can be significantly reduced in accordance with the invention. The arrangement for axial driving of a supply hose for pressure medium or spray medium in the form of fluid, gaseous or solid, granule-formed or powder-formed, material according to the invention is characterised in that the arrangement has three driving wheels with concave jacket surfaces, which jacket surfaces make contact in a congruent manner with the supply hose and surround the hose at around 100° degrees of the circumference of the supply hose. The present invention has a greater total area of contact with the supply hose, divided into sections, which gives higher friction against the driving wheels. This means that the contact pressure between the driving wheels and the supply hose can be relatively low. This in turn means that wear of the supply hose is reduced.

In order to further reduce wear of the supply hose, the driving wheels should be manufactured, at least in their
concave jacket surfaces, from a polymer material with a coefficient of friction, $\mu > 0.8$ and preferably $\mu > 0.9$, between any driving wheel and the supply hose. Furthermore, the driving wheels should be manufactured, at least in their concave jacket surface, from a polymer material with a hardness that is equal to, or preferably, lower than, the hardness of the supply hose. This leads to the driving wheels being worn instead of the supply hose. It is both easier and significantly cheaper from the point of view of service to exchange the driving wheels. A driving wheel costs less than SEK 100, which is to be compared with SEK 5,000 - SEK 15,000 for a supply hose.

Description of Drawings

[0008] The invention will now be described in more detail through description of embodiments with reference to the attached drawings, in which:

Figure 1 shows a sketch of the principle for a system in which the arrangement according to the invention is included;
Figure 2a shows an embodiment of the driving wheels, where the contact pressure against the supply hose is controlled with the aid of elements under pneumatic control;
Figure 2b shows an embodiment in which a motor is connected through a gear to one of the axles of the driving wheels;
Figure 3 shows an embodiment of a hose magazine in which pneumatically controlled elements compensate for slack in the supply hose; and
Figure 4 shows a cross-section of a side view of a guide tube that comprises a cartridge and associated spray nozzles.

Detailed Description of Preferred Embodiments

[0009] Figure 1 shows a guide tube 41 placed along an object (not shown) that is to be sprayed. A forwardly and backwardly displaceable cartridge 42 is located in the guide tube 41, which cartridge is provided with one or several spray nozzles 43. The cartridge 42 is connected to a supply hose 11 for pressure medium or spray medium in the form of fluid, gaseous or solid, granule-formed or powder-formed material, such as, for example, water, air, cleaning fluid, paint, sand, etc. The cartridge 42 is driven along the guide tube 41 by the supply hose 11. The supply hose 11 is, in turn, driven forwards and backwards along its axial direction by means of three driving wheels 21 (one driving wheel is hidden in Figure 1). The driving wheels 21 will be described in more detail below, see Figures 2a and 2b. When the supply hose 11 is driven in a forwards direction (f) it is dispensed from the supply hose magazine 31, and when it is driven in a backwards direction (b) it is collected onto the hose magazine 31. The hose magazine will be described in more detail below, see Figure 3.

A scraper 12 is arranged between the driving wheels 21 and the guide tube 41, which scraper comprises at least one sealing arrangement (not shown in the drawing), which surrounds and seals the supply hose 11. A first aim of the scraper 12 is to scrape away any material/deposits from the supply hose 11 such that the friction between it and the driving wheels 21 is not degraded in such a manner that slipping occurs between the driving wheels 21 and the supply hose 11. A second aim of the scraper 12 is to make possible introduction into a pressurised vessel. A third aim of the scraper 12 is to make possible deflection of the supply hose 11 at an angle.

Material/deposits may arise on the supply hose 11, since the present invention is used to clean a drum filter in the paper pulp industry. A drum filter is a drum with a perforated strainer plate on the jacket surface, which surface rotates during operation. Furthermore, the drum filter is placed into a vessel with added weak liquor and lime sludge (which contains slaked lime). The water-part of the contents of the vessel are sucked through the strainer plate by applying a vacuum to the inside of the drum, by which means what is known as a "precoat layer" is formed, i.e. material of the contents of the vessel. The guide tube 41 is applied along the drum. A cartridge 42 is moved, forwards and backwards with the aid of a supply hose 11 into the guide tube 41. Water under pressure is supplied through the supply hose 11 and is spayed through spray nozzles 43 for removal of precoat and for cleaning the strainer plate of the drum. Part of this material may thus become attached to the supply hose 11.

Figure 2a and 2b show an embodiment of the arrangement according to the invention for achieving an axial driving motion of the supply hose 11. The arrangement is characterised in that it comprises three driving wheels 21, where each driving wheel has a concave jacket surface 27 congruent with the supply hose 11. The concave jacket surface 27 surrounds the supply hose 11 around at least 100° degrees of the circumference of the supply hose 11. At least one of the driving wheels 21 is driven to rotate by driving means, preferably a motor. Figure 21 b shows an embodiment in which the axis 24 of the driving wheel 21 a is driven by a motor 52, preferably through a gear 51. One example of the gear 51 is a drive belt between the axle 24 and the motor 52.

The outer sides of each driving wheel 21 are in physical contact with each other 29 in such a manner that the driving wheel 21 a drives the other two driving wheels 21 b and 21 c through its rotation. An embodiment is shown in Figures 2a and 2b in which the outer jacket surfaces of the driving wheels 21 are provided with teeth 28 that enter into a shape-determined engagement with the teeth of a neighbouring driving wheel, and ensure that no slippage occurs between the driving wheels 21 when under driven rotation. Another embodiment (not shown) has instead of teeth plane surfaces with a high coefficient of friction $\mu > 0.8$, preferably $\mu > 0.9$, between the driving wheels 21 at their surfaces of contact 29.
The sprung element has a low level (Fx) of force when the supply hose 11 is being driven in the forwards direction (i.e. the direction of dispensing (f) for the hose magazine) or in the backwards direction (i.e. the direction of collection (b) for the hose magazine). The signal from the sensor (s) is sent to a pressure valve (v) which is in turn connected to a pressure source (p). In the case in which the supply hose is driven in the forwards direction (f), the pressure valve (v) is opened, which causes a low level of force in the pneumatic cylinder. In the case in which the supply hose is driven in the backwards direction (b), the pressure valve (v) is closed, which causes a high level of force in the pneumatic cylinder.

**Figure 2a** shows a preferred embodiment in which the supply hose 11 is driven in the forwards direction (f), the supply hose 11 is dispensed from the hose magazine, which in this case rotates in the direction (f) of unrolling. When the supply hose 11 is driven in the backwards direction (b), the supply hose 11 is collected onto the hose magazine 31, which in this case rotates in the direction (b) of collection. A pulley wheel 32 is located at the centre of the hose magazine, arranged fixed relative to the hose magazine and rotating with it, onto which pulley a tension strap 33 is arranged. The tension strap 33 passes over a sprung element 34 and the tension strap is at its outer end fixed attached to an attachment 36, fixed in space. The sprung element has a low level (Fx) of force when the supply hose is driven in the forwards direction (f), and it has a high level (Fx) of force when the supply hose is driven in the backwards direction (b). When the driving wheels 21 drive the supply hose 11 in the forwards direction, the hose magazine is set into rotation in the direction (f) of dispensing by the drawing force from the supply hose 11, the tension strap 33 rolls off from the pulley 32 which then starts to rotate with the hose magazine in the collection direction (b). The sprung element 34, which has a high level (Fx) of force, maintains the tension strap 33 extended and ensures that the hose magazine does not rotate too slowly, rather that the supply hose 11 is maintained extended between the driving wheels 21 and the hose magazine 31.

In the case when the driving wheels 21 drive the supply hose 11 in the backwards direction (b), the hose magazine is caused to rotate in the direction (b) of collection in that the sprung element 34 has a high level (Fx) of force directed in the direction (b) of collection such that the tension strap 33 rolls off from the pulley 32 which then starts to rotate with the hose magazine in the collection direction (b). The sprung element 34, which has a high level (Fx) of force, maintains the tension strap 33 extended and ensures that the hose magazine does not rotate too slowly, rather that the supply hose 11 is maintained extended between the driving wheels 21 and the hose magazine 31. One preferred embodiment is shown in Figure 3 in which the sprung element 34 is constituted by a pneumatic cylinder in which the tension strap 33 makes contact with the piston rod 34. A sensor (s) detects whether the supply hose 11 is being driven in the forwards direction (i.e. the direction of dispensing (f) for the hose magazine) or in the backwards direction (i.e. the direction of collection (b) for the hose magazine). The signal from the sensor (s) is sent to a pressure valve (v) which is in turn connected to a pressure source (p). In the case in which the supply hose is driven in the forwards direction (f), the pressure valve (v) is opened, which causes a low level of force in the pneumatic cylinder. In the case in which the supply hose is driven in the backwards direction (b), the pressure valve (v) is closed, which causes a high level of force in the pneumatic cylinder.

**Figure 2a** is shows an embodiment of the invention where the contact pressure between the driving wheels 21 and the supply hose 11 is controlled with the aid of three individually sprung elements 25, which are arranged to interact with the mounting of each driving wheel 21 through levers 23. When increased contact pressure is required, the sprung element 25 is pressed upwards against the lever 23 such that the driving wheels are pressed in towards the supply hose 11. Since the mounting of the driving wheels is jointed 26 the bearings of the driving wheel will not be damaged if any radial unevenness or deformations are present in the supply hose 11, caused by a high working pressure in the supply hose 11.

**Figure 3** shows a hose magazine 31 onto which the supply hose 11 is rolled on and off. When the supply hose 11 is driven in the forwards direction (f), the supply hose 11 is dispensed from the hose magazine, which in this case rotates in the direction (f) of unrolling. When the supply hose 11 is driven in the backwards direction (b), the supply hose 11 is collected onto the hose magazine 31, which in this case rotates in the direction (b) of collection. A pulley wheel 32 is located at the centre of the hose magazine, arranged fixed relative to the hose magazine and rotating with it, onto which pulley a tension strap 33 is arranged. The tension strap 33 passes over a sprung element 34 and the tension strap is at its outer end fixed attached to an attachment 36, fixed in space. The sprung element has a low level (Fx) of force when the supply hose is driven in the forwards direction (f), and it has a high level (Fx) of force when the supply hose is driven in the backwards direction (b). When the driving wheels 21 drive the supply hose 11 in the forwards direction, the hose magazine is set into rotation in the direction (f) of dispensing by the drawing force from the supply hose 11, the tension strap 33 rolls off from the pulley 32 which then starts to rotate with the hose magazine in the collection direction (b). The sprung element 34, which has a high level (Fx) of force, maintains the tension strap 33 extended and ensures that the hose magazine does not rotate too slowly, rather that the supply hose 11 is maintained extended between the driving wheels 21 and the hose magazine 31.

In the case when the driving wheels 21 drive the supply hose 11 in the backwards direction (b), the hose magazine is caused to rotate in the direction (b) of collection in that the sprung element 34 has a high level (Fx) of force directed in the direction (b) of collection such that the tension strap 33 rolls off from the pulley 32 which then starts to rotate with the hose magazine in the collection direction (b). The sprung element 34, which has a high level (Fx) of force, maintains the tension strap 33 extended and ensures that the hose magazine does not rotate too slowly, rather that the supply hose 11 is maintained extended between the driving wheels 21 and the hose magazine 31.

**Figure 2a** shows a preferred embodiment in which the supply hose 11 is driven in the forwards direction (f), the supply hose 11 is dispensed from the hose magazine, which in this case rotates in the direction (f) of unrolling. When the supply hose 11 is driven in the backwards direction (b), the supply hose 11 is collected onto the hose magazine 31, which in this case rotates in the direction (b) of collection. A pulley wheel 32 is located at the centre of the hose magazine, arranged fixed relative to the hose magazine and rotating with it, onto which pulley a tension strap 33 is arranged. The tension strap 33 passes over a sprung element 34 and the tension strap is at its outer end fixed attached to an attachment 36, fixed in space. The sprung element has a low level (Fx) of force when the supply hose is driven in the forwards direction (f), and it has a high level (Fx) of force when the supply hose is driven in the backwards direction (b). When the driving wheels 21 drive the supply hose 11 in the forwards direction, the hose magazine is set into rotation in the direction (f) of dispensing by the drawing force from the supply hose 11, the tension strap 33 rolls off from the pulley 32 which then starts to rotate with the hose magazine in the collection direction (b). The sprung element 34, which has a high level (Fx) of force, maintains the tension strap 33 extended and ensures that the hose magazine does not rotate too slowly, rather that the supply hose 11 is maintained extended between the driving wheels 21 and the hose magazine 31.

**Figure 3** shows a hose magazine 31 onto which the supply hose 11 is rolled on and off. When the supply hose 11 is driven in the forwards direction (f), the supply hose 11 is dispensed from the hose magazine, which in this case rotates in the direction (f) of unrolling. When the supply hose 11 is driven in the backwards direction (b), the supply hose 11 is collected onto the hose magazine 31, which in this case rotates in the direction (b) of collection. A pulley wheel 32 is located at the centre of the hose magazine, arranged fixed relative to the hose magazine and rotating with it, onto which pulley a tension strap 33 is arranged. The tension strap 33 passes over a sprung element 34 and the tension strap is at its outer end fixed attached to an attachment 36, fixed in space. The sprung element has a low level (Fx) of force when the supply hose is driven in the forwards direction (f), and it has a high level (Fx) of force when the supply hose is driven in the backwards direction (b). When the driving wheels 21 drive the supply hose 11 in the forwards direction, the hose magazine is set into rotation in the direction (f) of dispensing by the drawing force from the supply hose 11, the tension strap 33 rolls off from the pulley 32 which then starts to rotate with the hose magazine in the collection direction (b). The sprung element 34, which has a high level (Fx) of force, maintains the tension strap 33 extended and ensures that the hose magazine does not rotate too slowly, rather that the supply hose 11 is maintained extended between the driving wheels 21 and the hose magazine 31.

In the case when the driving wheels 21 drive the supply hose 11 in the backwards direction (b), the hose magazine is caused to rotate in the direction (b) of collection in that the sprung element 34 has a high level (Fx) of force directed in the direction (b) of collection such that the tension strap 33 rolls off from the pulley 32 which then starts to rotate with the hose magazine in the collection direction (b). The sprung element 34, which has a high level (Fx) of force, maintains the tension strap 33 extended and ensures that the hose magazine does not rotate too slowly, rather that the supply hose 11 is maintained extended between the driving wheels 21 and the hose magazine 31.
the form of fluid, gaseous or solid, granule-formed or powder-formed, material, which supply hose (11) is connected to a displaceable cartridge (42) provided with at least one spray nozzle (43), which cartridge (42) is in turn arranged in a guide tube (41) along the object that is to be sprayed, characterised in that the arrangement comprises three driving wheels (21), where at least one driving wheel is driven by driving means and where each driving wheel (21) has a concave jacket surface (27) congruent with the supply hose (11), where the concave jacket surface (27) surrounds the supply hose (11) and surrounds this to at least 100° degrees of the circumference of the supply hose (11).

2. The arrangement according to claim 1, characterised in that the driving wheels (21) are in physical contact with each other in such a manner that there arises indirect driving of the other driving wheels (21b-21c) driven by the first wheel (21a).

3. The arrangement according to claim 2, characterised in that the outer sides of the jacket surfaces (27) on each driving wheel (21) comprises teeth (28) which enter into shape-determined interaction with the teeth (28) of neighbouring driving wheel.

4. The arrangement according to claim 2, characterised in that the outer ends of the jacket surfaces (27) are plane and in that the driving wheels (21) have a coefficient of friction between each other μ>0.8 and preferably μ>0.9.

5. The arrangement according to claims 1-4, characterised in that the contact pressure between the driving wheels (21) and the supply hose (11) is controlled by a sprung element (25).

6. The arrangement according to claim 5, characterised in that the sprung element (25) is a pneumatic cylinder.

7. The arrangement according to claims 1-6, characterised in that the supply hose (11) is rolled onto and out from a hose magazine (31).

8. The arrangement according to claim 7, characterised in that a pulley (32) is located at the centre of the hose magazine (31), which pulley is fixed arranged relative to the hose magazine and rotates with it, to which pulley a tension strap (33) is attached, where the tension strap (33) passes over a sprung element (34) and is fixed attached at its outer end in a fixture (36) fixed in space, whereby the hose magazine is influenced by a force level (Fx) in the opposite direction to the dispensing direction (f) of the supply hose (11) from the hose magazine (31).

9. The arrangement according to claim 8, characterised in that the sprung element (34) has a low force level (Fx) when the hose magazine rolls in the dispensing direction (f) and a high force level (Fx) when the hose magazine rolls in the collection direction (b).

10. The arrangement according to claims 8-9, characterised in that the supply element (34) is a pneumatic cylinder.

11. The arrangement according to claims 1-10, characterised in that a scraper (12) is arranged between the driving wheels (21) and the guide tube (41), with the purpose of scraping away any material deposited onto the supply hose (11).

12. The arrangement according to claim 11, characterised in that the scraper (12) comprises at least one sealing arrangement, which surrounds the supply hose (11) in a sealing manner.

13. The arrangement according to claims 1-12, characterised in that the driving wheels (21), or only their concave jacket surfaces (27), are manufactured from a polymer material with a hardness that is equal to that of the supply hose (11), or preferably lower than this hardness.

Patentansprüche

1. Anordnung zum axialen Antrieb eines Zufuhrschlauchs (11) für ein Druckmedium oder ein Aufbringungsmedium in der Form eines fluiden, gasförmigen oder festen, körnchenförmigen oder pulverförmigen Materials, welcher Zufuhrschlauch (11) mit einer verschiebbaren Patrone (42) verbunden ist, die mit zumindest einer Sprühdüse (43) versehen ist, welche Patrone (42) wiederum in einem Führungsrohr (41) entlang des zu besprühenden Objekts angeordnet ist, dadurch gekennzeichnet, dass die Anordnung drei Antriebsräder (21) umfasst, wobei mindestens ein Antriebsrad durch ein Antriebssmittel angetrieben wird, und wobei jedes Antriebsrad (21) eine konkave Mantelfläche (27) aufweist, die mit dem Zufuhrschlauch (11) übereinstimmend ist, wobei die konkave Mantelfläche (27) den Zufuhrschlauch (11) umgibt, und diesen zu mindestens 100 Grad des Umfangs des Zufuhrschlauchs (11) umgibt.

2. Anordnung nach Anspruch 1, dadurch gekennzeichnet, dass die Antriebsräder (21) auf eine derartige Weise in einem physischen Kontakt miteinander stehen, dass ein durch das erste Rad (21a) angetriebener indirekter Antrieb der anderen Antriebsräder (21b - 21c) entsteht.
3. Anordnung nach Anspruch 2, dadurch gekennzeichnet, dass die Außenseiten der Mantelflächen (27) an jedem Antriebsrad (21) Zähne (28) umfassen, die in eine formbestimmte Wechselschleife einlaufen mit den Zähnen (28) des benachbarten Antriebsrads (21) einlaufen.

4. Anordnung nach Anspruch 2, dadurch gekennzeichnet, dass die äußeren Enden der Mantelflächen (27) flach sind, und dass die Antriebsräder (21) untereinander einen Reibungskoeffizienten von μ > 0,8 und vorzugsweise μ > 0,9 aufweisen.

5. Anordnung nach Anspruch 1 bis 4, dadurch gekennzeichnet, dass der Kontaktradius zwischen den Antriebsrädern (21) und dem Zufuhrschlauch (11) durch ein gefedertes Element (25) gesteuert wird.


7. Anordnung nach Anspruch 1 bis 6, dadurch gekennzeichnet, dass der Zufuhrschlauch (11) auf ein Schlauchmagazin (31) und daraus heraus gerollt wird.

8. Anordnung nach Anspruch 7, dadurch gekennzeichnet, dass sich eine Scheibe (32) in der Mitte des Schlauchmagazins (31) befindet, welche Scheibe in Bezug auf das Schlauchmagazin fest angeordnet ist und sich damit dreht, an welcher Scheibe ein Zugband (33) angebracht ist, wobei das Zugband (33) über ein gefedertes Element (34) verläuft und an seinem äußeren Ende fest in einer Halterung (36), die im Raum fixiert ist, angebracht ist, wobei das Schlauchmagazin durch einen Kraftpegel (Fx) in der zur Abgaberichtung (f) des Zufuhrschläuchs (11) vom Schlauchmagazin (31) entgegengesetzten Richtung beeinflusst wird.

9. Anordnung nach Anspruch 8, dadurch gekennzeichnet, dass das gefederte Element (34) einen niedrigen Kraftpegel (Fx) aufweist, wenn das Schlauchmagazin in der Abgaberichtung (f) rollt, und einen hohen Kraftpegel (Fx) aufweist, wenn das Schlauchmagazin in der Einholrichtung (b) rollt.

10. Anordnung nach Anspruch 8 bis 9, dadurch gekennzeichnet, dass das gefederte Element (34) ein pneumatischer Zylinder ist.

11. Anordnung nach Anspruch 1 bis 10, dadurch gekennzeichnet, dass zwischen den Antriebsräden (21) und dem Führungsrohr (41) ein Abkratzer (12) eingerichtet ist, der den Zweck aufweist, jegliches Material, das sich auf dem Zufuhrschauch (11) abgelagert hat, abzukratzen.


13. Anordnung nach Anspruch 1 bis 12, dadurch gekennzeichnet, dass die Antriebsräder (21), oder nur ihre konkaven Mantelflächen (27), aus einem Polymersystem mit einer Härte hergestellt sind; die jener des Zufuhrschläuchs (11) gleich oder vorzugsweise geringer als diese Härte ist.

**Revendications**

1. Arrangement pour l’entraînement axial d’un tuyau flexible d’alimentation (11) pour un milieu sous pression ou un milieu d’application sous forme d’une matière fluide, gazeuse ou solide, constituée de granules ou de poudre, ledit tuyau flexible d’alimentation (11) étant connecté à une cartouche mobile (42) comportant au moins une buse de pulvérisation (43), ladite cartouche (42) étant à son tour agencée dans un tube de guidage (41) le long de l’objet qui doit recevoir la pulvérisation, caractérisé en ce que l’arrangement comprend trois roues d’entraînement (21), où au moins une roue d’entraînement est entraînée par des moyens d’entraînement et où chaque roue d’entraînement (21) présente une surface d’enveloppe concave (27) qui est congruente avec le tuyau flexible d’alimentation (11), dans lequel la surface d’enveloppe concave (27) entoure le tuyau flexible d’alimentation (11) et entoure celui-ci à au moins 100° de la circonférence du tuyau flexible d’alimentation (11).

2. Arrangement selon la revendication 1, caractérisé en ce que les roues d’entraînement (21) sont en contact physique l’une avec l’autre de telle sorte que survient un entraînement indirect des autres roues d’entraînement (21b-21c) qui sont entraînées par la première roue (21a).

3. Arrangement selon la revendication 2, caractérisé en ce que les côtés extérieurs des surfaces d’enveloppe (27) sur chaque roue d’entraînement (21) comportent des dents (28) qui entrent en interaction déterminée par la forme avec la dent (28) de la roue d’entraînement voisine.

4. Arrangement selon la revendication 2, caractérisé en ce que les extrémités extérieures des surfaces d’enveloppe (27) sont planes, et en ce que les roues d’entraînement (21) présentent un coefficient de frottement entre elles qui est de μ > 0,8, et de préférence μ > 0,9.
5. Arrangement selon l’une quelconque des revendications 1 à 4, caractérisé en ce que la pression de contact entre les roues d’entraînement (21) et le tuyau flexible d’alimentation (11) est commandée par un élément élastique (25).

6. Arrangement selon la revendication 5, caractérisé en ce que l’élément élastique (25) est un cylindre pneumatique.

7. Arrangement selon l’une quelconque des revendications 1 à 6, caractérisé en ce que le tuyau flexible d’alimentation (11) est enroulé sur et déroulé d’un magasin de tuyau flexible (31).

8. Arrangement selon la revendication 7, caractérisé en ce qu’une poulie (32) est positionnée au centre du magasin de tuyau flexible (31), ladite poulie étant agencée fixement par rapport au magasin de tuyau flexible et tournant avec celui-ci, une sangle de tension (33) est attachée à ladite poulie, la sangle de tension (33) passant au-dessus d’un élément élastique (34) et étant attachée fixement à son extrémité extérieure à un élément de fixation (36) fixé dans l’espace, dans lequel le magasin de tuyau flexible est influencé par un niveau de force (Fx) dans la direction opposée à la direction de distribution (f) du tuyau flexible d’alimentation (11) à partir du magasin de tuyau flexible (31).

9. Arrangement selon la revendication 8, caractérisé en ce que l’élément élastique (34) présente un niveau de force (Fx) bas lorsque le magasin de tuyau flexible est déroulé dans la direction de distribution (f), et un niveau de force (Fx) élevé lorsque le magasin est enroulé dans la direction de collecte (b).

10. Arrangement selon les revendications 8 ou 9, caractérisé en ce que l’élément élastique (34) est un cylindre pneumatique.

11. Arrangement selon l’une quelconque des revendications 1 à 10, caractérisé en ce qu’un racloir (12) est agencé entre les roues d’entraînement (21) et le tube de guidage (41), dans le but de racler toute matière qui est déposée sur le tuyau flexible d’alimentation (11).

12. Arrangement selon la revendication 11, caractérisé en ce que le racloir (12) comprend au moins un élément d’étanchéité qui entoure le tuyau flexible d’alimentation (11) d’une façon étanche.

13. Arrangement selon l’une quelconque des revendications 1 à 12, caractérisé en ce que les roues d’entraînement (21), ou seulement leurs surfaces d’enveloppe concaves (27), sont fabriquées à partir d’une matière polymère dont la dureté est égale à celle du tuyau flexible d’alimentation (11), ou est de préférence inférieure à cette dureté.
REFERENCES CITED IN THE DESCRIPTION

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