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(54) **A METHOD, DEVICE AND COMPOSITION IN MATERIAL SPRAYING**

VERFAHREN,VORRICHTUNG UND ZUSAMMENSETZUNG ZUM BESPRÜHEN VON METERIAL

PROCEDE, DISPOSITIF ET COMPOSITION POUR ASPERSION DE MATERIAUX

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(56) References cited:
EP-A- 0 247 795
EP-A- 0 384 546
EP-A- 0 548 408
EP-A- 0 567 208
DE-C- 372 395
DE-C- 927 741
SE-B- 437 937

- **HEINRICH SHUBERT, "Aufbereitung fester mineralischer Rohstoffe", 1967, VEB DEUTSCHER VERLAG FUER GRUNDSTOFFINDUSTRIE, (Leipzig), page 303, line 27 - page 305, line 2.**
- **DERWENT'S ABSTRACT, No. 91-27963/04, week 9104; & SU,A,1 546 163 (MAGN ORE-METAL INST), 28 February 1990 (28.02.90).**

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Description

BACKGROUND OF THE INVENTION AND PRIOR ART

[0001] Within most fields concerning spraying, e.g. in connection with material washing, the consumption of liquid is of importance, particularly when it is desirable to supply a washing medium for a cleaning purpose with a certain pressure to the material or the surface of any material that is to be washed. It might for instance be the spraying of cars, hulls of boats, buildings, and also plants or loose material, such as stones or sand.

[0002] The same applies to the washing of shingle and macadam, which, hereinafter, will be described as an area in which the present invention is applicable. However, the invention is not to be seen as confined to this application, but is supposed to be understood in a wider sense. Consequently, it is also intended for other sorts of applications where a medium for some treatment purpose, such as washing, is sprayed onto material, a plant or the like.

[0003] During the washing of shingle and macadam, a distinction is made between dust washing and capillary rise reducing washing, i.e. such washing that leads to a smaller tendency of so called capillary rise in the washed material. A capillary rise tendency as small as possible is desirable in a material which is to be used as a building material for instance.

[0004] According to prior art, capillary rise reducing washing is implemented in drums or in open plansifters, and in water baths as to finer fractions.

[0005] Plan washing machines normally have a capacity of 80-200 tons of material/hour, and the water consumption then is in the range of 1000-2000 litres/minute, i.e. approximately 750-1500 litres/ton material.

[0006] Washing drums, which are used for finer fractions and smaller quantities than plansifters, normally have a capacity of 25-40 tons/hour, and the water consumption is approximately 750-1200 litres/minute, depending on the required degree of purity.

[0007] The water, water being the medium that is generally used in this context, is normally pumped at a pressure of 6-8 bars into manifolds or nozzles that are located in the drum or above a sieving grate arranged at the plan sifter and accordingly sprays the material which is to be washed and which advances within the drum or upon the sieving grate.

[0008] A drawback of the prior art is the large amount of water which is required for a certain spraying result, in this case the washing result. This drawback also yields problems such as, for instance, large sludge basins that have to be arranged for the large amounts of waste water, and also the acquisition of water can be troublesome and costly.

[0009] Another drawback of the prior art is that the nozzles or manifolds used provide too small a spray image, i.e. surface sprayed upon, as at a certain, in general short, distance they are spraying the material that, for instance, is to be washed with the washing medium in question, and when it is required that a good cleaning ability is to be obtained in the sprayed area comprised by the spray image.

[0010] A particular drawback of the prior art with regard to capillary rise reducing washing is the relatively large capillary rise tendency presented by the washed material, e.g. shingle or macadam, also after the execution of the washing.

[0011] It is known by EP-A-0 247 795, EP-A-0 384 546, DE-C-3 72 395 and EP-A-0 567 208 to arrange a member provided with nozzles for a spraying medium to be movable. During spraying, this movable member is moved so that the material is subjected to sprays from the nozzle.

SUMMARY OF THE INVENTION

[0012] The object of the present invention is to provide a method and a device that reduces the consumed amount of spraying medium in comparison to prior art during the spraying of a material while an equivalent or even better result is obtained from the spraying.

[0013] According to the present invention the method is primarily characterized by the nozzles being rotated in relation to the movable member during spraying. Thus, the nozzle will be subjected to a combined movement comprising not only the movement caused by the movable member being moved but also by rotation of the nozzles themselves in relation to the movable member. This combined movement enhances the spraying efficiency substantially.

Said movable member is preferably a rotatable member, such as a wing, which is rotated and on which nozzles are arranged. Applied to plansifters, e.g. where the spraying relates to washing and the spraying medium is a washing medium, preferably water or a mixture of water and air, this means that the flow provided by manifolds or nozzles of conventional type is substituted by water jets which, under high pressure, are given a brushing effect through the motion of the movable member in relation to the material being washed. A brushing effect is thus obtained without the need of using any conventional brush. Of relevance is also that a conventional brush becomes worn as it is contact with the washed material, which is not the case with the equipment of the present invention.

[0014] Through high pressure and the relative motion a better washing effect is thus obtained, with smaller water consumption and thereby also a smaller amount of sludged water. When using particular, rotatable nozzles, which remain to be described, the liquid pressure ought to be at least 50-60 bars and the consumption of the rotatable nozzle at least 8-8,5 litres per minute. Both figures have a mutual relation to each other where the distance between the nozzle and material to be washed also has an influence. Under all circumstances "fog ef-

fect" is not allowed to occur. Through simple adjustment, flow-pressure can be changed to go from dust washing to capillary rise reducing washing, so called "scrubbing". The only occasion in which, however, fog effect is really requested is during irrigation of plants, another possible application of the invention.

[0015] The movable member can be driven by means of oblique positioning of the nozzles in relation to the material that is to be sprayed. Drive by means of an electric motor, water turbine or hydraulic means are other possible, alternative methods.

[0016] In yet another embodiment according to the invention, as the material is comprised by fragmental material, the material is moved about as it passes the movable member. This means that the material is subjected to a motion which rearranges the material so that a maximum part of the material will become brushed. This prerequisites that the material is of such a fragmental sort that this can occur, which is the case with shingle and macadam.

[0017] According to a particular embodiment of the method according to the invention prewashing of the material is included, and according to another embodiment it includes finishing rinsing of the material. Preferably, but not necessarily, prewashing and finishing rinsing take place at a pressure of approximately 20-25 bars, and with rotating nozzles.

[0018] The invention also comprises an embodiment of the method, which embodiment includes the supply of a capillary rise reducing medium. Preferably this is done after the rest of the washing steps have been finished or in connection with a finishing rinsing step. When such material as shingle or macadam is supplied with such a capillary rise reducing medium as related to, it acquires a significantly smaller capillary rise tendency than if this had not been the case.

[0019] The object of the present invention is also to provide a device which leads to reduction of the consumed amount of liquid in comparison with prior art during the spraying of a material, and that an equivalent or even better spraying result is obtained.

[0020] According to the invention the device is characterized in that it comprises nozzles rotatable in relation to the movable member.

[0021] Preferably, these first nozzles are of a sort that will be further described later. These nozzles obtain a high rotational speed as they are flowed through by a spraying medium under high pressure. The rotating jets, preferably of water, slung out from the nozzle under high pressure get a brushing effect through their circulating motion. At a certain distance from the material to be washed and at a certain pressure, they also provide a larger spray image than conventional nozzles, thereby requiring a smaller number of nozzles in comparison to the prior art.

[0022] According to another embodiment the device is characterized in that it also comprises second nozzles for the supply of a prewashing medium to the material. These nozzles are arranged before the movable member, as seen in the material advancing direction, i.e. the material which is to be washed passes these nozzles before it passes the movable member. Preferably these nozzles are rotatably designed, which implies the advantage of fewer nozzles being required and the amount of water consumed being reduced.

[0023] According to yet another embodiment the device according to the invention is characterized in that it comprises third nozzles, intended for the supply of a rinsing medium to the material. Preferably these third nozzles are arranged after the movable member, as seen in the material advancing direction, i.e. the washed material is confronted to the medium sprayed from these nozzles after it has passed or been passed by the movable member. Advantageously, these nozzles are also rotatably designed to give the best possible rinsing effect and the smallest possible consumption of medium. Preferably, this medium is water or, when a small capillary rise is requested, water with the addition of a capillary rise reducing means.

[0024] Another embodiment of the device according to the invention is characterized in that said device comprises fourth nozzles for the supply of a capillary rise reducing means to the material, and in still another embodiment the third and fourth nozzles are identical, i.e. they are located at the same site in the device and supply the material with an identical mixture of rinsing medium and capillary rise reducing means.

[0025] According to another embodiment of the device according to the invention, the nozzle comprises a fixed part and a rotatable part.

[0026] In another embodiment of the nozzle, the design of the latter is such that the rotatable part comprises a first rotating means, which, by means of force action from the medium flowing through the nozzle, is intended to set the rotatable part in rotation.

[0027] In another embodiment the nozzle is characterized in that the first rotating means is a turbine-like member arranged inside the rotatable part. With turbine-like member is here referred to as, by way of example, a member provided with a turbine blade, which member is arranged inside the rotatable part and sets the latter in rotation when it is subjected to a flow of a medium.

[0028] According to an alternative embodiment, the first rotating means is a member shaped as a spiral or a thread of a screw and arranged inside the rotatable part, and according to another embodiment, the nozzle comprises a second rotating means to set the medium passing through the fixed part in a rotating motion. Preferably, this rotating means comprises a member shaped as a spiral or a thread of a screw and is arranged in the fixed part. The two spiral-shaped members are preferably arranged with their pitches in different directions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The present invention will be more clearly un-

derstood in the light of the detailed description given below, and the appended drawings, which are only given by way of illustration and accordingly are not limiting the present invention, and in which:

Fig 1 is a side view of a plan sifter according to the invention;

Fig 2 is a view from above of the plan sifter of Fig 1; and

Fig 3 is a cross sectional view of a rotatably designed nozzle according to the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0030] Fig 1 shows, schematically, a plan sifter 1 comprising a movable member 2 in the form of a rotatable wing which is supplied with a medium via a centrally located inlet 3 and which is provided with outlets 4 in the form of nozzles that are rotatable in relation to the wing, to spray out the medium in question onto a material 5 which is to be washed. A preferred embodiment of such a nozzle will be discussed more in detail later. Preferably the medium is water or a water-air mixture.

[0031] Furthermore, the device comprises a sieving grate 6 on which the material is supposed to be conveyed. The sieving grate 6 slopes downwards in the advancing direction of the material to facilitate the conveying of the latter. At the location on the sieving grate where the material passes the movable member 2, the sieving grate 6 is equipped with a member 7 that moves about or reorganizes the material. This moving about preferably occurs just before the central position of the movable member 2, as seen in the material advancing direction. Here, the member 7 is a cam arranged on the sieving grate.

[0032] Depending on such factors as the advancing rate of the material, bed thickness, grade, requested degree of purity etc., such parameters as the rate of rotation of the movable member, the distance to the material, the pressure of the medium, composition and amount are determined to give the best possible result.

[0033] In the preferred embodiment the rate of rotation is 1-1,5 rotations per second.

[0034] From Fig 1 it is, furthermore, seen that the device according to this preferred embodiment is provided with nozzles 8, 9, before as well as after the movable member, as seen in the material advancing direction. In the preferred embodiment these are of a rotatable sort to minimize the number of nozzles required and the amount of water consumed.

[0035] The nozzles 8 located before the movable member 2 are intended for the prewashing of the material, the latter being supplied with a prewashing medium. The nozzles 9 located after the movable member 2 are intended for the finishing rinsing, the material being supplied with a means for finishing rinsing, preferably water. These nozzles 8, 9 are arranged on two carriers 10, 11 respectively, which, according to Fig 2, are supplied with water via separate supply lines 13, 14. Accordingly, in the preferred embodiment, a row of nozzles is arranged on each carrier.

[0036] A pressure of 20-25 bars is enough for the medium used in the nozzles 8, 9 respectively for prewashing and finishing rinsing, while the pressure of the medium in the movable member 2 preferably is at least 40 bars.

[0037] Furthermore, in the preferred embodiment, another row of nozzles 15 is arranged after the nozzles 9 for finishing rinsing, as seen in the material advancing direction. These spray the washed material with a capillary rise reducing means, "capillary stop".

[0038] Fig 3 shows a preferred embodiment of a rotatably designed nozzle 26. According to the preferred embodiment shown in Fig 3, this nozzle has a fixed part 27 and a rotatable part 28. Here both parts present a cylindrical design, one of the parts, in this case the rotatable one, being partially positioned on the outside of the other one. A bearing member (not shown) permits the rotatable part to rotate in relation to the fixed one, and at the same time prevents it from gliding off the fixed part in the lengthwise direction. Furthermore, the rotatable part comprises a first rotating means 29, which, through force affection of a medium flowing through the nozzle 26, is intended to set the rotatable part 28 in rotation. Here, this rotating means 29 is comprised by a spiral-shaped member arranged in the rotatable part. The latter can be compared to a part with the shape of a screw thread and is fixedly arranged in the rotatable part 28. Accordingly, a medium flowing through the nozzle 26 will suggest to turn the rotatable part as it hits this first rotating means 29.

[0039] In this preferred embodiment however, also the fixed part 27 has a spiral-shaped, second rotating means 30. Here the second rotating means 30 is a spiral-shaped member, the direction of thread of which is opposite to that of the rotating means 29 arranged in the rotatable part. This makes the medium conveyed in the nozzle 26 rotate in a certain direction.

[0040] By varying pitch angles, size of the rotating means and/or the pressure of the medium, the rate of rotation is varied.

[0041] The free end piece 31 of the rotatable part, and thereby of the nozzle, is releasably arranged on the rotatable part 28, here by means of a threaded coupling 32. This end piece 31 can thus be substituted to be replaced by another end piece, which as to shape, number of outlet openings, design and direction of the latters etc., differs from the former.

[0042] Of course the invention is not in any way confined to the preferred embodiments described above, but a plurality of possibilities of modifications thereof will be obvious to a man skilled in the art, without the embodiments diverging from the scope of the invention.

[0043] For instance, instead of a movable member in the form of a rotating wing, it is possible to use a member which executes some other motion, e.g. an oscillating one, in relation to the material being sprayed.

[0044] Likewise, the described plan sifter can be designed in different ways, e.g. as a perforated conveyor band, sloping of the device no longer being required.

[0045] Moreover, the washing medium and the capillary rise reducing means is preferably comprised of water besides the active agents respectively.

[0046] A significantly reduced water consumption is obtained with a device according to the invention at a plan sifter for shingle or macadam. When the water consumption of the prior art is approximately 1000-200 litres/minute, the consumption for the device according to the invention is only in the order of 100-200 litres/minute.

Claims

1. A method for spraying a material (5), a movable member (2) provided with nozzles (4, 26) for a spraying medium to be supplied to the material being set in motion during spraying, the spraying relates to washing and the spraying medium is a washing medium, **characterized** in that the nozzles (4, 26) are rotated in relation to the movable member (2) during spraying.

2. A method according to claim 1, **characterized** in that the movable member (2) is rotated during spraying.

3. A method according to any of the preceding claims, **characterized** in that the material is moved about while being brought to pass the movable member (2).

4. A method according to any of the preceding claims, **characterized** in that it includes prewashing of the material and/or finishing rinsing of the material and/or supply of a capillary rise reducing medium to the material.

5. A device for spraying a material comprising a movably arranged, movable member (2) provided with first nozzles (4, 26) for a spraying medium, the spraying relates to washing and the spraying medium is a washing medium, **characterized** in that the first nozzles (4, 26) are rotatable in relation to the movable member (2).

6. A device according to claim 5, **characterized** in that the movable member (2) is rotatably arranged.

7. A device according to any of claims 5-6, **characterized** in that it comprises second nozzles (8) for the supply of a prewashing medium to the material and/or third nozzles (9), intended for the supply of a rinsing medium to the material and/or fourth nozzles (15) for the supply of a capillary rise reducing medium to the material.

8. A device according to claim 7, **characterized** in that the second, third and/or fourth nozzles (8) are rotatably designed.

9. A device according to any of claims 5-8, **characterized** by said nozzles (4, 8, 9, 26) comprising a fixed part (17) and a rotatable part (28).

10. A device according to claim 9, **characterized** in that the rotatable part (28) comprises a first rotating means (29) for setting the rotatable part (28) in rotation through force action from the spraying medium flowing through the nozzle.

11. A device according to claim 10, **characterized** in that the first rotating means (29) is a turbine-like member arranged inside the rotatable part (28).

12. A device according to claim 10, **characterized** in that the first rotating means (29) is a spiral-shaped member arranged inside the rotatable part (28).

13. A device according to any of the claims 9-12, **characterized** in that said nozzle (4, 8, 9, 26) comprises second rotating means (30) to set the spraying medium that passes through the fixed part (27) in a rotating motion.

14. A device according to claim 13, **characterized** in that the second rotating means (30) of said nozzle (4, 8, 9, 26) comprises a spiral-shaped member arranged in the fixed part (27).

Patentansprüche

1. Verfahren zum Besprühen eines Materials (5), wobei ein mit Düsen (4, 26) für ein dem Material zuzuführendes Sprühmedium versehenes bewegliches Element (2) während des Besprühens in Bewegung versetzt wird, das Besprühen sich auf Waschen bezieht und das Sprühmedium ein Waschmedium ist, dadurch **gekennzeichnet**, daß die Düsen (4, 26) während des Besprühens in bezug auf das bewegliche Element (2) gedreht werden.

2. Verfahren nach Anspruch 1, dadurch **gekennzeichnet**, daß das bewegliche Element (2) während des Besprühens gedreht wird.

3. Verfahren nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß das Material

umher bewegt wird, während es dazu gebracht wird, das bewegliche Element (2) zu passieren.

4. Verfahren nach einem der vorhergehenden Ansprüche, dadurch **gekennzeichnet**, daß es eine Vorwäsche des Materials und/oder Endspülung des Materials und/oder eine Zufuhr eines einen kapillaren Aufstieg reduzierenden Mediums zum Material einschließt.

5. Vorrichtung zum Besprühen eines Materials mit einem beweglich angeordneten beweglichen Element (2), das mit ersten Düsen (4, 26) für ein Sprühmedium versehen ist, wobei sich das Besprühen auf Waschen bezieht und das Sprühmedium ein Waschmedium ist, dadurch **gekennzeichnet**, daß die ersten Düsen (4, 26) in bezug auf das bewegliche Element (2) drehbar sind.

6. Vorrichtung nach Anspruch 5, dadurch **gekennzeichnet**, daß das bewegliche Element (2) drehbar angeordnet ist.

7. Vorrichtung nach einem der Ansprüche 5 - 6, dadurch **gekennzeichnet**, daß sie zweite Düsen (8) für die Zufuhr eines Mediums für eine Vorwäsche zum Material und/oder dritte Düsen (9), die für die Zufuhr eines Spülmediums zum Material gedacht sind, und/oder vierte Düsen (15) für die Zufuhr eines einen kapillaren Aufstieg reduzierenden Mediums zum Material aufweist.

8. Vorrichtung nach Anspruch 7, dadurch **gekennzeichnet**, daß die zweiten, dritten und/oder vierten Düsen (8) drehbar ausgelegt sind.

9. Vorrichtung nach einem der Ansprüche 5 - 8, dadurch **gekennzeichnet**, daß die Düsen (4, 8, 9, 26) einen feststehenden Teil (17) und einen drehbaren Teil (28) aufweisen.

10. Vorrichtung nach Anspruch 9, dadurch **gekennzeichnet**, daß der drehbare Teil (28) eine erste Dreheinrichtung (29) aufweist, um durch Krafteinwirkung vom durch die Düse strömenden Sprühmedium den drehbaren Teil (28) in Drehung zu versetzen.

11. Vorrichtung nach Anspruch 10, dadurch **gekennzeichnet,** daß die erste Dreheinrichtung (29) ein innerhalb des drehbaren Teils (28) angeordnetes turbinenartiges Element ist.

12. Vorrichtung nach Anspruch 10, dadurch **gekennzeichnet,** daß die erste Dreheinrichtung (29) ein innerhalb des drehbaren Teils (28) angeordnetes spiralförmiges Element ist.

13. Vorrichtung nach einem der Ansprüche 9 - 12, dadurch **gekennzeichnet**, daß die Düse (4, 8, 9, 26) eine zweite Dreheinrichtung (30) aufweist, um das Sprühmedium, das durch den feststehenden Teil (27) gelangt, in eine Drehbewegung zu versetzen.

14. Vorrichtung nach Anspruch 13, dadurch **gekennzeichnet,** daß die zweite Dreheinrichtung (30) der Düse (4, 8, 9, 26) ein im feststehenden Teil (27) angeordnetes spiralförmiges Element aufweist.

Revendications

1. Procédé pour pulvériser un matériau (5), un organe mobile (2) muni de buses (4, 26) pour un agent de pulvérisation à fournir au matériau qui est en mouvement pendant la pulvérisation, la pulvérisation concerne le lavage et l'agent de pulvérisation est un agent de lavage,
caractérisé en ce que les buses (4, 26) tournent relativement à l'organe mobile (2) pendant la pulvérisation.

2. Procédé selon la revendication 1,
caractérisé en ce que l'organe mobile (2) tourne pendant la pulvérisation.

3. Procédé selon l'une quelconque des revendications précédentes,
caractérisé en ce que le matériau est déplacé tout en étant amené pour passer l'organe mobile (2).

4. Procédé selon l'une quelconque des revendications précédentes,
caractérisé en ce qu'il inclut un prélavage du matériau et/ou un rinçage de finition du matériau et/ou l'amenée d'un agent réduisant la remontée capillaire vers le matériau.

5. Dispositif pour pulvériser un matériau comprenant un organe mobile (2) agencé de façon mobile, muni de premières buses (4, 26) pour un agent de pulvérisation, la pulvérisation concerne le lavage et l'agent de pulvérisation est un agent de lavage,
caractérisé en ce que les premières buses (4, 26) peuvent tourner relativement à l'organe mobile (2).

6. Dispositif selon la revendication 5,
caractérisé en ce que l'organe mobile (2) est agencé de façon rotative.

7. Dispositif selon l'une quelconque des revendications 5 - 6,
caractérisé en ce qu'il comprend des deuxièmes buses (8) pour l'amenée d'un agent de prélavage au matériau et/ou des troisièmes buses (9), destinées à l'amenée d'un agent de rinçage au matériau

et/ou des quatrièmes buses (15) pour l'amenée d'un agent réduisant la remontée capillaire vers le matériau.

8. Dispositif selon la revendication 7, caractérisé en ce que les deuxièmes, troisièmes et/ou quatrièmes buses (8) sont conçues de façon rotative.

9. Dispositif selon l'une quelconque des revendications 5 - 8, caractérisé par lesdites buses (4, 8, 9, 26) comprenant une partie fixe (17) et une partie rotative (28).

10. Dispositif selon la revendication 9, caractérisé en ce que la partie rotative (28) comprend des premiers moyens de rotation (29) pour mettre la partie rotative (28) en rotation par l'intermédiaire d'une action de force à partir de l'agent de pulvérisation circulant à travers la buse.

11. Dispositif selon la revendication 10, caractérisé en ce que les premiers moyens de rotation (29) sont un organe analogue à une turbine, agencé à l'intérieur de la partie pouvant tourner (28).

12. Dispositif selon la revendication 10, caractérisé en ce que les premiers moyens de rotation (29) sont un organe en forme de spirale, agencé à l'intérieur de la partie pouvant tourner (28).

13. Dispositif selon l'une quelconque des revendications 9 - 12, caractérisé en ce que ladite buse (4, 8, 9, 26) comprend des seconds moyens de rotation (30) pour entraîner l'agent de pulvérisation qui traverse la partie fixe (27) dans un mouvement de rotation.

14. Dispositif selon la revendication 13, caractérisé en ce que les seconds moyens de rotation (30) de ladite buse (4, 8, 9, 26) comprennent un organe conformé en spirale, agencé dans la partie fixe (27).

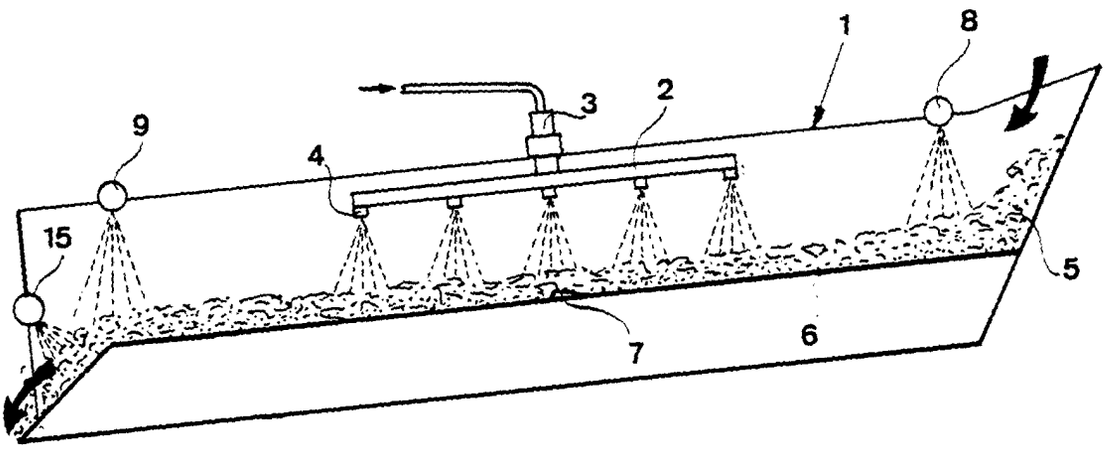

Fig 1

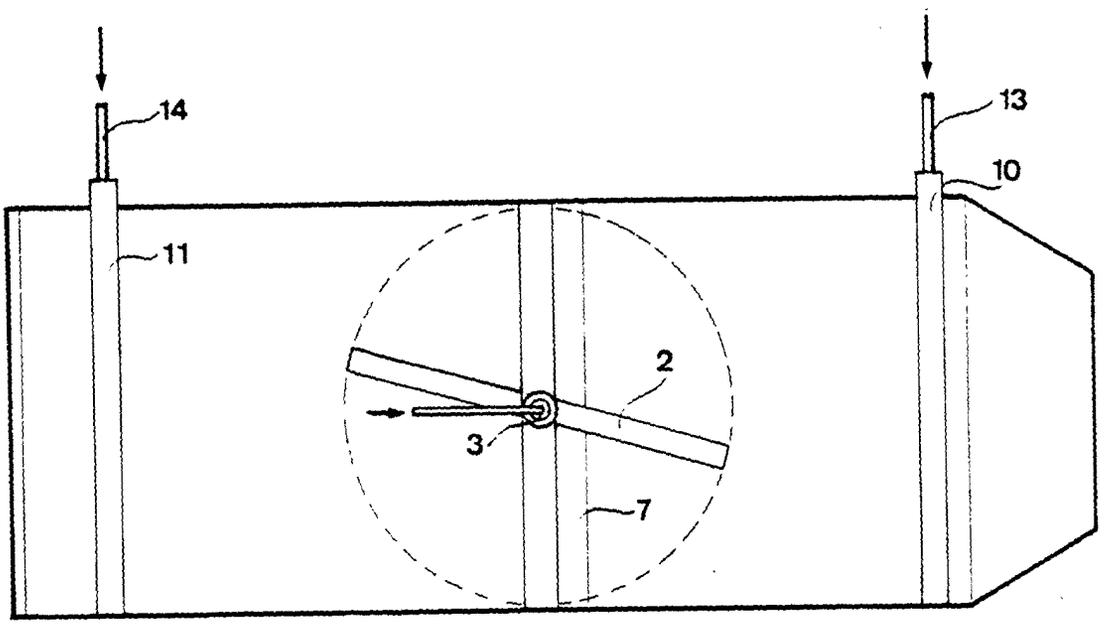

Fig 2

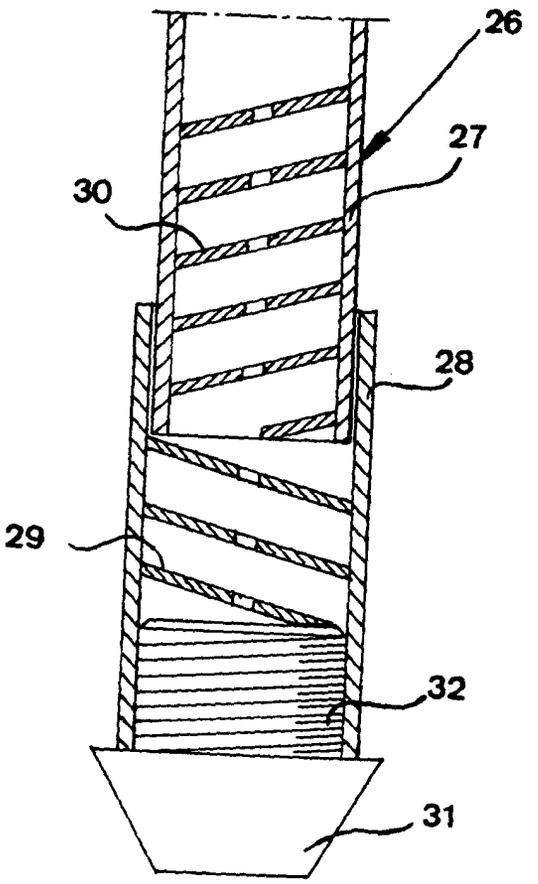

Fig 3