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(54) **Method and device for spreading of salt slurry**

Verfahren und Vorrichtung zum Streuen von angefeuchtetem Salz

Procédé et dispositif pour l'épandage de sel mouillé

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(56) References cited:
EP-A- 0 427 995
DE-A- 3 420 694
US-A- 3 420 451
US-A- 4 442 979

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Description

[0001] The present invention relates to a method and device for spreading of salt slurry.

[0002] Salt in various conditions is spread on the road lanes in order to dissolve ice and prevent skidding. The salt can be in the form of solid or a more or less coarse-grained powder or dissolved or slurried in water. Saturated solutions of salt are only used on special occasions and use of dry salt or salt in slurries is more common. Salt slurries are generally more efficient than dry salt as it penetrates the surface faster and not like dry salt i.e. may be blown away from the road.

[0003] Salt slurries primarily means salt substantially comprising sodium chloride and/or other substances which are included in the designation road salt and which are mixed with an amount of water which is less than what is required to make all of the salt become dissolved.

[0004] The various means and methods for spreading of salts set various requirements on the equipment used. As a rule, different equipments must be used for the different ways of spreading, which brings with it large investments. There are also difficulties, especially by preparing and using salt slurries, which appear as formation of lumps, blocking and adhesion into and onto the equipment.

[0005] A device for spreading moist material is disclosed in US-A-3420451. The device includes feeders to feed material into a vertical pipe through which it falls onto a rotor comprising radial throwing blades which seize and eject the spreading material. An agitator may be provided on the rotating shaft of the throwing rotor, said agitator projecting into the supply pipe, its wings distributing the spreading material uniformly over the throwing rotor.

[0006] The present invention relates to a new method for spreading of salt slurry. The invention also concerns a device for performing the method, whereby the salt slurry is produced in immediate connection with the spreading.

[0007] The invention will below be described more in detail with reference to the enclosed figures.

[0008] Figure 1 shows a complete equipment for producing and spreading of salt slurry using the method and device according to the invention.

[0009] Figure 2 shows part of the device of figure 1 more in detail.

[0010] Figures 3 and 4 show the device of the invention from the side and from above.

[0011] Figures 5 and 6 show another embodiment of the invention from the side and from above.

[0012] The device shown in figure 1 comprises a container 12 for salt and a tank 13 for water or solution of salt. Water and salt is delivered to a device enclosed in a tube 4, wherein the slurry is produced. The tube 4 is essentially vertical which in practice means that it deviates not more than 25° from a vertical line as by greater deviations there are problems with the conveyance of material through the tube. Thereupon the slurry falls down onto a spreader disc 15 from which it is spread over the road. The complete device when used is intended to be placed on a suitable transportation vehicle.

[0013] In the figures 3 and 5 half of the tube 4 has been removed to show the arrangements inside the tube.

[0014] Salt and water are supplied to the tube 4 from the top by a feeding screw 11 for salt and a tube 9 for water having a spreader disc 10 at its end. Thereafter, salt and water fall down through the tube to a device comprising two rotors made as fans 1 and 2. What is here named fans is a device which has several blades or wings 1 a-d, 2 a-d mounted to a shaft 3. The blades extend from the shaft all the way outwards close to the inside of the tube. The denomination fan aims at the appearance of the device. However, the rotating fan shall not cause a flow of air in the direction of the shaft 3. The fans are driven by a motor 5, suitably a hydraulic motor, and are directed opposite each other, i.e. so arranged that the flow of air which results from the rotation is nil or very small.

[0015] In the embodiment of the invention as shown in the figures, the fans are mounted onto a common shaft 3. The blades of the fans are immovably mounted to the shaft and thus always rotate at the same speed and at the same direction. The blades of the fans comprise flat surfaces which are somewhat oblique relative to the shaft and arranged so that the upper fan 1 alone would cause a flow of air directed in opposite direction to the flow of air from the lower fan 2. The fans rotate at high speed which means that the salt particles hit the blades of the fans and are broken thereby. The speed of rotation is based upon a desire to obtain a specific maximum particle size. It has also been found that the water shall be supplied before the fans and pass through them together with the salt as problems will otherwise occur with particles of salt that adhere to and form lumps on the blades of the fans.

[0016] From the fans the so obtained slurry falls via a funnel or duct 6 onto a conventional spreader including a spreader disc 15 with several blades 7. The spreader disc is mounted onto a shaft 8 which is driven by a motor that can be controlled to the desired rotational speed.

[0017] The fan device can be made in many different ways. The device as shown in figures 3 and 4 has two sets of fan blades 1, 2 on a common shaft. The blades of the fans may also be mounted onto two different concentric shafts which rotate in opposite directions where all of the blades are angled in the same direction.

[0018] It is essential that there is no or very little vertical air flow generated by the fans.

[0019] The speed of the rotors varies depending upon the other design features. However, there is a certain lowest speed at the outer ends of the blades close to the tube walls which is required and at a tube diameter of 200 mm the speed of rotation shall be not less than

1500 rpm, preferably about 2000 rpm.

[0020] Another embodiment of the invention is shown in figures 5 and 6, wherein the blades of the fans have been substituted for by chain links 15, 16, 17, 18. In many cases this design further reduces the formation of lumps and adhering layers on the rotors. Nor do the chain links cause a vertical flow of air.

Claims

1. Method for spreading of salt slurry, whereby salt particles and liquid are continuously supplied from above into an essentially vertical tube (4), wherein are arranged rotor (1,2) which rotate at a high speed and through which salt and liquid pass together, so that the salt particles are broken by the rotors (1, 2), characterized in that the rotors (1, 2) are two identical oppositely directed fans (1a-d, 2a-d) so that the resulting flow of air from the rotors (1, 2) in the longitudinal direction of the tube (4) is nil or very small.

2. Method according to claim 1, characterized in that the amount of salt supplied is greater than the amount which corresponds to the solubility of the salt in the liquid supplied at the same time.

3. Method according to any of the preceding claims, characterized in that the liquid is water.

4. Method according to any of the preceding claims, characterized in that the liquid is a solution of salt in water.

5. Device for spreading of salt slurry, comprising a vertical tube (4), wherein are arranged rotors (1, 2) along a vertical shaft (3), and arrangements (11, 9) to separately supply from above salt particles and water so that they will together pass through the rotors (1, 2), characterized in that the rotors (1, 2) are two identical oppositely directed fans having several blades (1 a-d, 2 a-d), which upon rotation generate nil or very small flow of air in the longitudinal direction of the tube (4).

6. Device according to claim 5, characterized in that the fan blades (1a-d, 2a-d) are permanently mounted onto the same shaft (3).

7. Device according to claim 5 or 6, characterized in that the fan blades (1a-d, 2 a-d) are made as flat sheets.

8. Device according to any of the claims 5-7, characterized in that the blades (1a-d, 2a-d) of the fans are oblique relative to the shaft (3).

9. Device according to claim 5, characterized in that the rotor blades are chains or individual chain links.

Patentansprüche

1. Verfahren zum Streuen von angefeuchtetem Salz, wobei Salzpartikel und Flüssigkeit kontinuierlich von oben in ein im wesentlichen senkrechtes Rohr (4) eingeführt werden, in dem Rotoren (1, 2), die mit hoher Geschwindigkeit rotieren und durch welche Salz und Flüssigkeit zusammen passieren, so daß die Salzpartikel von den Rotoren (1, 2) zerteilt werden, angeordnet sind, dadurch gekennzeichnet, daß die Rotoren (1, 2) zwei identische. entgegengesetzt gerichtete Flügelräder (1a - d, 2a - d) sind, so daß die resultierende Luftströmung von den Rotoren (1, 2) hin in die Längsrichtung des Rohres (4) null oder sehr klein ist.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die zugeführte Salzmenge größer ist als die maximale in der gleichzeitig zugeführten Flüssigkeit lösliche Salzmenge.

3. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Flüssigkeit Wasser ist.

4. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Flüssigkeit eine Lösung aus Salz in Wasser ist.

5. Vorrichtung zum Streuen von angefeuchtetem Salz, umfassend ein senkrechtes Rohr (4), in dem Rotoren (1, 2) auf einer senkrechten Welle (3) angeordnet sind, und Vorrichtungen (11, 9) zur separaten Zufuhr von Salzpartikeln und Wasser von oben derart, daß sie gemeinsam durch die Rotoren (1, 2) passieren, dadurch gekennzeichnet, daß die Rotoren (1, 2) zwei identische entgegengesetzt gerichtete Flügelräder mit mehreren Flügeln (1a - d, 2a - d) sind, die beim Rotieren keine oder nur eine sehr kleine Luftströmung in die Längsrichtung des Rohres (4) hin erzeugen.

6. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Flügel (1a - d 2a - d) dauerhaft auf derselben Welle (3) montiert sind.

7. Vorrichtung nach Anspruch 5 oder 6, dadurch gekennzeichnet, daß die Flügel (1a - d, 2a - d) aus flachen Blechen hergestellt sind.

8. Vorrichtung nach einem der Ansprüche 5 - 7, dadurch gekennzeichnet, daß die Flügel (1a - d, 2a - d) der Flügelräder im Verhältnis zu der Welle (3) schräg stehen.

9. Vorrichtung nach Anspruch 5, dadurch gekennzeichnet, daß die Rotorenflügel Ketten oder einzelne Kettenglieder sind.

Revendications

1. Procédé pour l'épandage de sel mouillé, au moyen duquel des grains de sel et du liquide sont fournis en continu par le haut dans un tube essentiellement vertical (4), dans lequel sont disposés des rotors (1, 2) qui tournent à grande vitesse et à travers lesquels le sel et le liquide circulent conjointement, de manière à ce que les grains de sel soient brisés par les rotors (1, 2), caractérisé en ce que les rotors (1, 2) sont deux ventilateurs identiques dirigés en sens inverse (1a à d, 2a à d) afin que l'écoulement d'air résultant des rotors (1, 2) dans la direction longitudinale du tube (4) soit nul ou très faible.

2. Procédé selon la revendication 1, caractérisé en ce que la quantité de sel fournie est supérieure à la quantité qui correspond à la solubilité du sel dans le liquide simultanément fourni.

3. Procédé selon l'une quelconque des revendications précédentes, caractérisé en ce que le liquide est de l'eau.

4. Procédé selon l'une quelconque des revendications précédentes, caractérisé en ce que le liquide est une solution de sel dans de l'eau.

5. Dispositif pour l'épandage de sel mouillé, comprenant un tube vertical (4), dans lequel sont disposés des rotors (1, 2) le long d'un arbre vertical (3), et des appareils (11, 9) pour fournir séparément par le haut des grains de sel et de l'eau afin qu'ils circulent conjointement à travers les rotors (1, 2), caractérisé en ce que les rotors (1, 2) sont deux ventilateurs identiques dirigés en sens inverse ayant plusieurs pales (1a à d, 2a à d) qui, lorsqu'en rotation, créent un très faible écoulement d'air ou aucun dans la direction longitudinale du tube (4).

6. Dispositif selon la revendication 5, caractérisé en ce que les pales (1a à d, 2a à d) des ventilateurs sont montées en permanence sur le même arbre (3).

7. Dispositif selon la revendication 5 ou 6, caractérisé en ce que les pales (1a à d, 2a à d) des ventilateurs sont faites comme des feuilles planes.

8. Procédé selon l'une quelconque des revendications 5 à 7, caractérisé en ce que les pales (1a à d, 2a à d) des ventilateurs sont inclinées par rapport à l'arbre (3).

9. Dispositif selon la revendication 5, caractérisé en ce que les pales des rotors sont des chaînes ou des maillons de chaîne individuels.

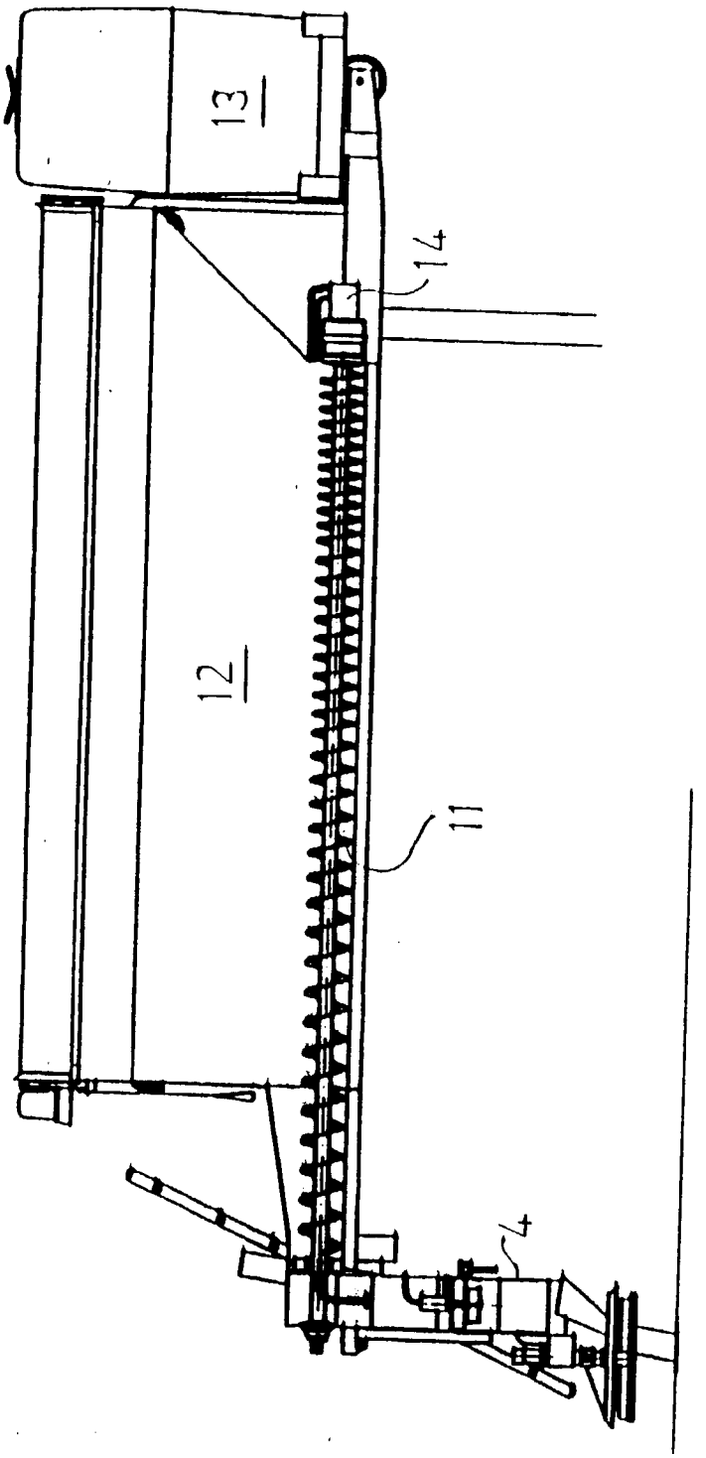

Fig 1

Fig 2

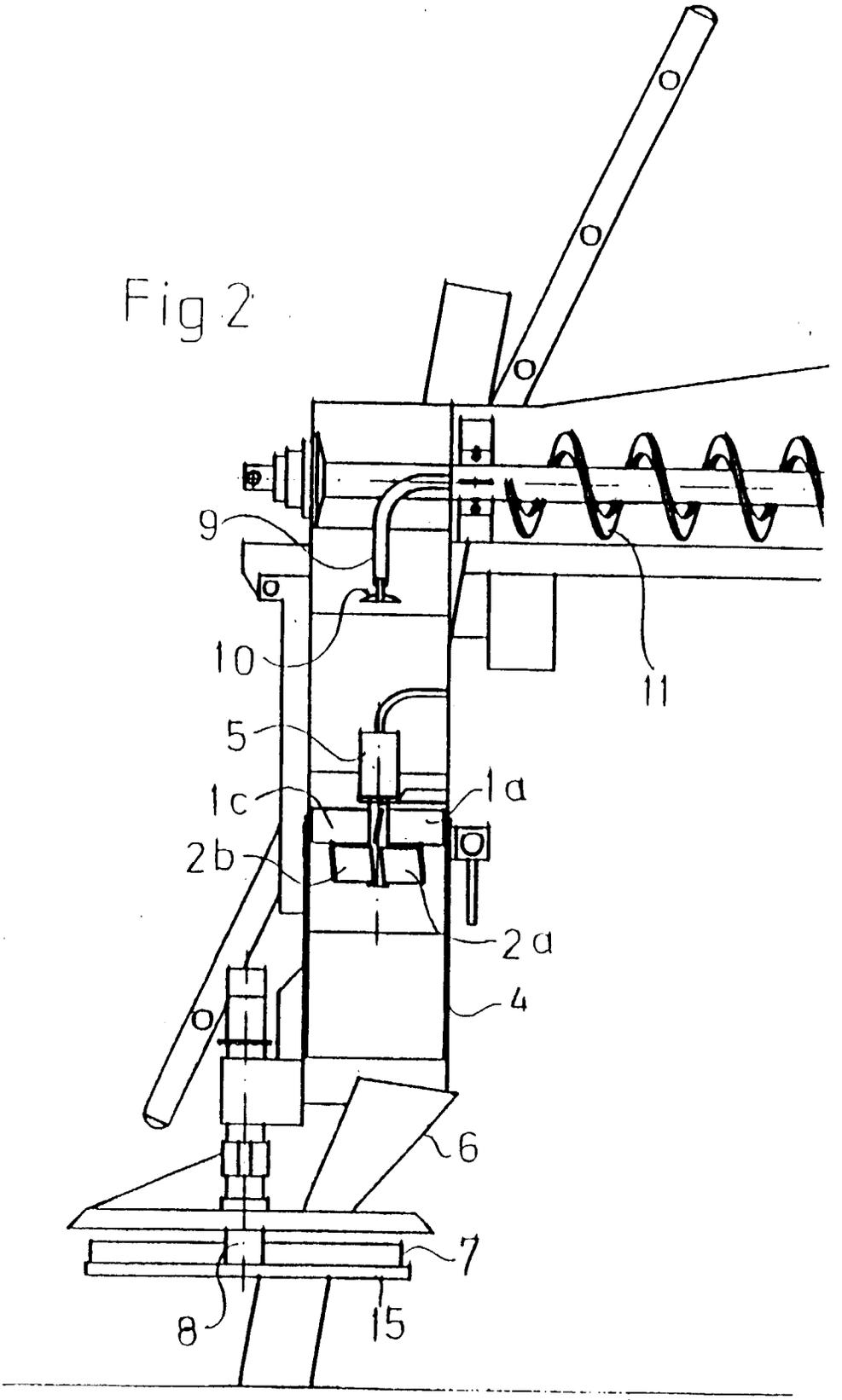

Fig 3

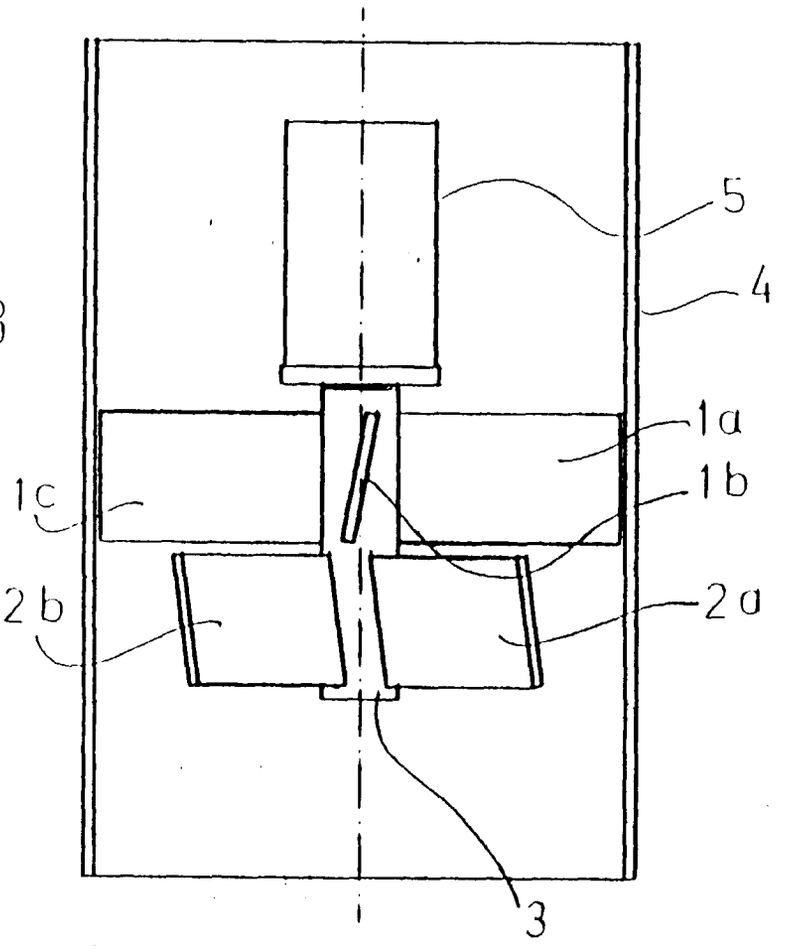

Fig 4

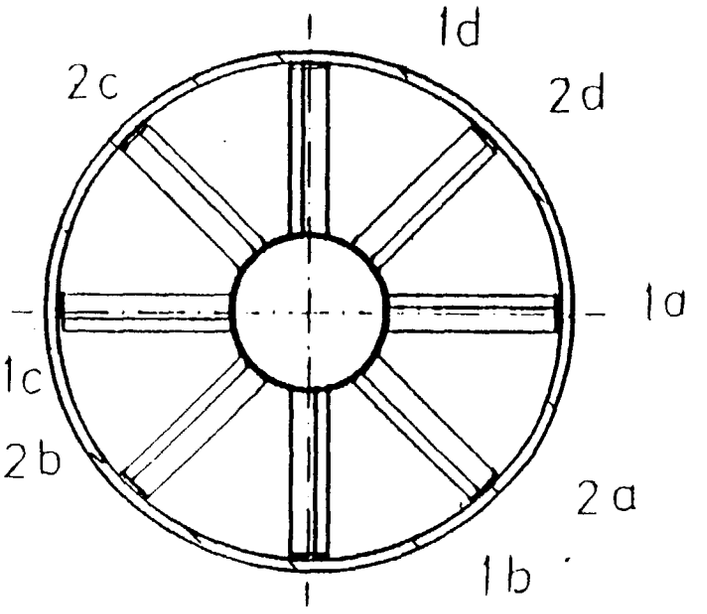

Fig 5

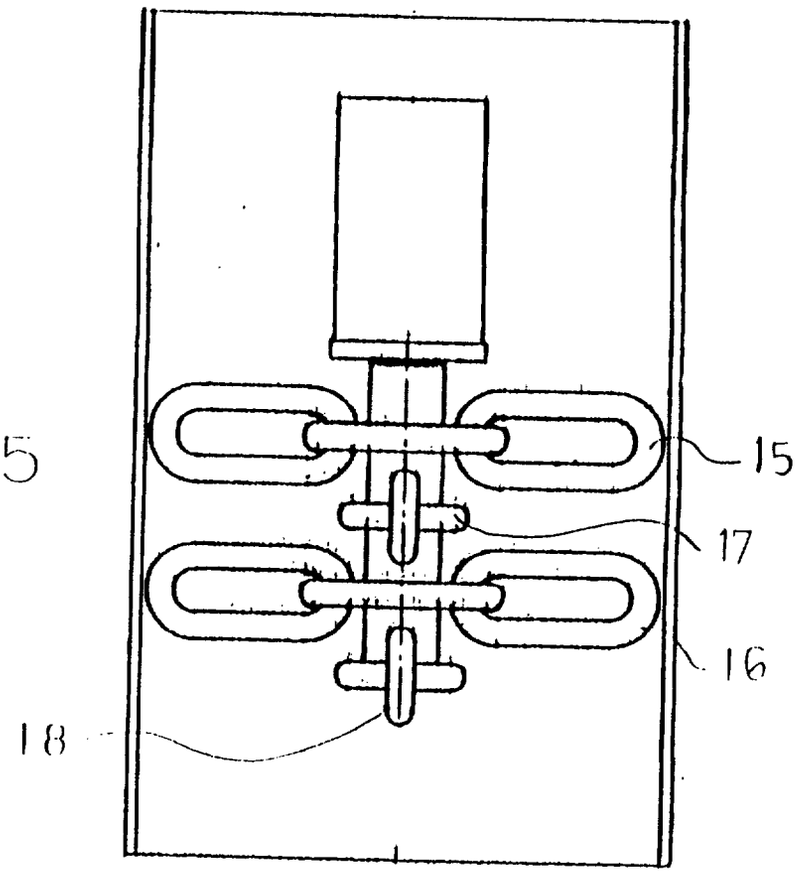

Fig 6