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(12) # EUROPEAN PATENT APPLICATION

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(71) Applicant: **BITUMARIN B.V., de Virieusingel 8, NL-5301 GB Zaltbommel (NL)**

(72) Inventor: **van Grunsven, Marinus Gerardus M., Nieuwstraat 1 A, NL-5396 PL Lithoyen (NL)**

(74) Representative: **Keuzenkamp, Abraham et al, P.O. Box 302, NL-2501 CH Den Haag (NL)**

(54) **Method and apparatus for the under-water application of material, preferably bituminous mixtures.**

(57) A method for the under-water application of material, preferably bituminous mixtures such as hot bituminous penetration mixtures, for the formation of coatings on slopes, dams, rubble beds, pipelines, etc., in which the material is applied with a dosing apparatus, characterized in that for dosing use is made of a combination of a rotating roller and a controllable slit, the quantity of material to be applied per unit of time being a function of the slit surface and/or the rotational speed of the roller.

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METHOD AND APPARATUS FOR THE UNDER-WATER APPLICATION OF MATERIAL, PREFERABLY BITUMINOUS MIXTURES

The banks of canals, rivers and other waterways are usually subject to erosion by water movements. This erosion specifically occurs near the waterline and is mostly caused by waves or currents wearing the slope of the dyke or dam. Erosion may also occur from the inside and be caused by effluent groundwater as a result of which the occurring hydraulic gradients become too large. In many instances there even arises a combination of factors. For these reasons it is essential to take measures to prevent erosion of the banks.

Under entirely different circumstances, for example on a sea bed, currents may undermine structures such as drilling platform foundations, pipelines, pipeline crossings, etc. by scouring. It may also be desirable to cover vital structures, for example pipelines, in order to prevent damage or to ensure stability.

The provisions which are required in the above instances mostly comprise a sufficiently heavy coating which in the case of slopes sometimes extends down into the toe of the slope. In the case of open coatings the application of a filter construction is essential in order to prevent washing out of underlying soil. In the case of closed coatings a filter construction is not essential but a minimum quantity of material is required in order to prevent lifting-up of the coating by water pressure.

Over the past decades the application of bituminous materials has greatly increased. Particularly the most recent developments have seen the application of bituminous mixtures which were overfilled. When these mixtures are used under water, such a slow cooling-down, known as "hot flow", occurs that handling or working per se is sufficiently assured. Understood are penetration mortars

or overfilled stone-asphalt mortars. The use of these mixtures mostly results in constructions which are closed by nature and are consequently relatively heavy constructions. Only partial penetration of the coatings results, with careful handling, in an open construction.

Especially when applying penetration mixtures it is essential for the predetermined quantity to be actually applied with the required accuracy, while, in addition, an application system with maximum continuative operation has a capacity-increasing effect.

The invention envisages a method for the under-water application of material, preferably highly viscous material, such as bituminous mixtures, such as hot penetration mixtures, for example hot mastic, in which the material and the water only come into contact at the last moment.

The invention therefore relates to a method for the under-water application of material, preferably bituminous mixtures, such as hot bituminous penetration mixtures, for the formation of coatings on slopes, dams, rubble beds, pipelines, etc. in which the material is applied with a dosing apparatus, characterized in that for dosing use is made of a combination of a rotating roller and a controllable slit, the quantity of material to be applied per unit of time being a function of the slit surface and/or the rotational speed of the roller. Preferably, use is made of a smooth roller.

The controllable slit may, for example, be obtained by combining the rotating roller with an adjustable slide or a counter-rotating roller. The roller(s) may be driven by electric motors.

The material may comprise mortars, sand asphalt, loose-grained material, but is preferably a bituminous mixture, such as a hot bituminous penetration mixture.

The invention also relates to a dosing apparatus, preferably for application of the above-mentioned method, the apparatus being provided with a rotating roller combined with a controllable slit, which is preferably obtained by combining said rotating roller

with an adjustable slide or with a counter-rotating roller. This embodiment in particular may be suitably used as a pump.

In addition, the invention relates to a closable hopper, the bottom of which is provided with a dosing apparatus. By injecting air, water is prevented from entering the hopper from underneath during application of the material.

The rotating roller ensures a uniform material flow across the entire slit. In this connection rotation of the roller is an essential feature. As mentioned above, the quantity of material applied per unit of time may be controlled by adjusting the slit surface and/or the rotational speed of the roller.

The hopper plus dosing apparatus combination may be installed on an undercarriage which moves along e.g. the slope in a guide rail.

The invention is elucidated below with reference to the drawings.

Fig. 1 represents a cross-section of an embodiment of a hopper filled with mastic 1. The dosing apparatus comprises a driven roller 2 and an adjustable slide 3. 4 designates a scraper, 5 air to displace the water and 6 a spreading device such as a blade with a number of teeth or U-shaped grooves through which the mastic is distributed over the entire length of the slit. Line 7 connects the space below the dosing apparatus to the space above the mastic, which space can be closed by means of the loading lid 8.

Fig. 2 represents a cross-section of an embodiment of dosing apparatus comprising two counter-driven rollers. In the drawing 1 is mastic, 2 and 3 are two adjustably spaced rollers and 4 and 5 are scrapers. This embodiment is also particularly suitable for pumping mastic.

By varying the distance between the two rollers and/or the rotational speed of the rollers, here too the quantity of mastic pumped per unit of time and the pressure can be regulated.

C L A I M S

1. A method for the under-water application of material, preferably bituminous mixtures, such as hot bituminous penetration mixtures, for the formation of coatings on slopes, dams, rubble beds, pipelines, etc., in which the material is applied with a dosing apparatus, characterized in that for dosing use is made of a combination of a rotating roller and a controllable slit, the quantity of material to be applied per unit of time being a function of the slit surface and/or the rotational speed of the roller.

2. A method as claimed in claim 1, characterized in that the controllable slit is obtained by combining the rotating roller with an adjustable slide.

3. A method as claimed in claim 1, characterized in that the controllable slit is obtained by combining a rotating roller with a counter-rotating roller.

4. A dosing apparatus, preferably for application of the method as claimed in claims 1-3, characterized in that the apparatus is provided with a rotating roller combined with a controllable slit.

5. A dosing apparatus as claimed in claim 4, characterized in that the rotating roller is combined with an adjustable slide.

6. A dosing apparatus as claimed in claim 4, characterized in that the rotating roller is combined with a counter-rotating roller.

7. A closable hopper, characterized in that its bottom is provided with a dosing apparatus as claimed in claims 4-6.

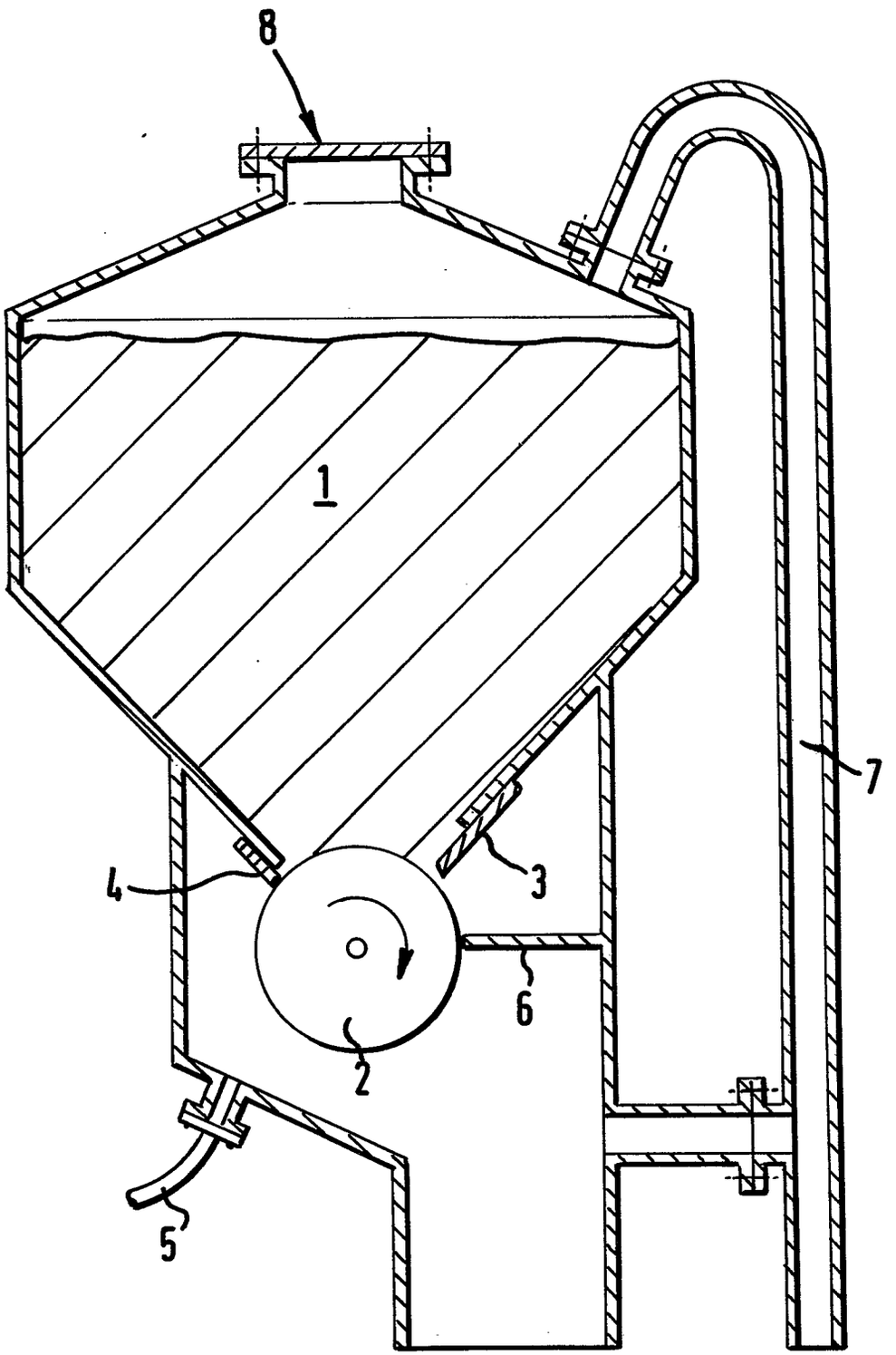

FIG.1

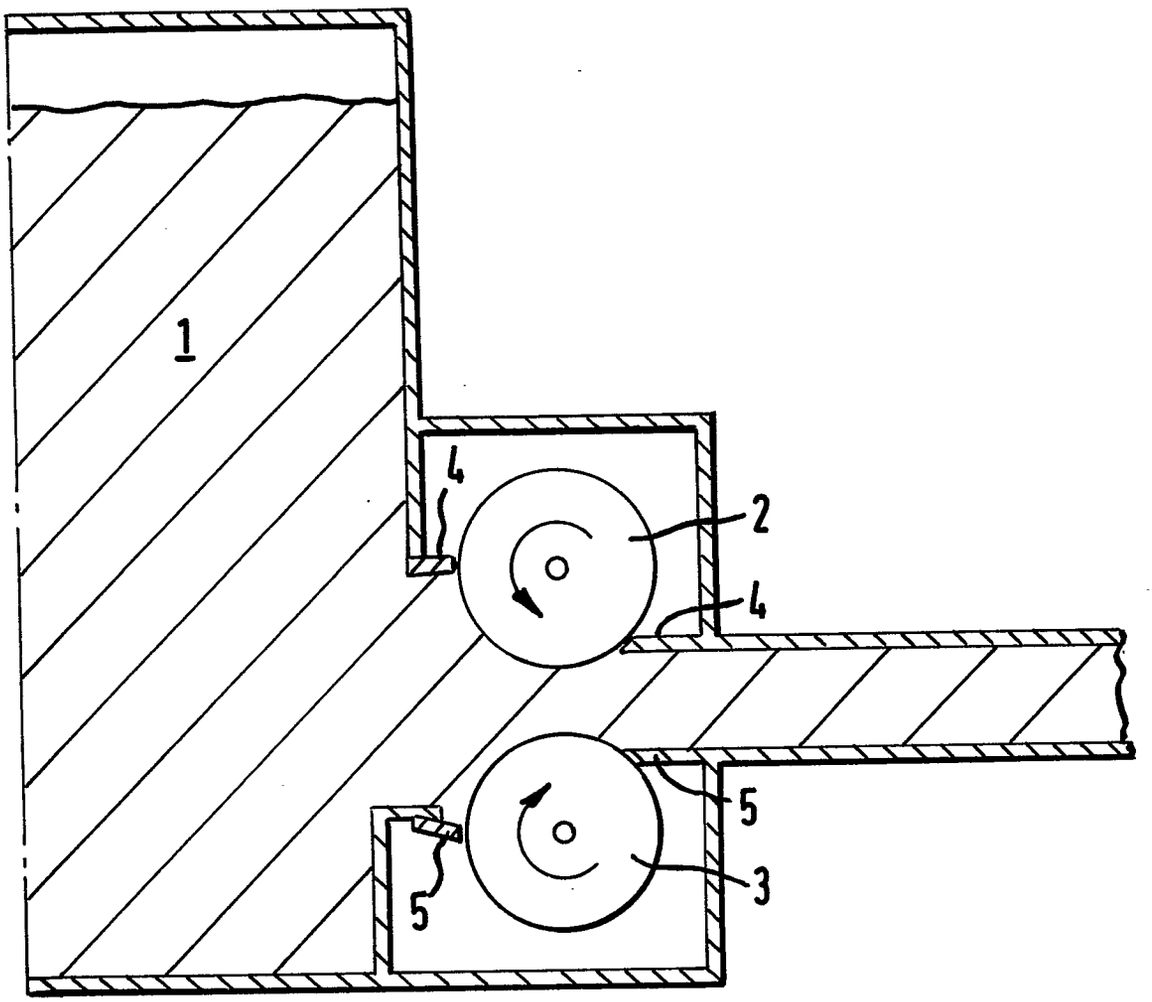

FIG.2