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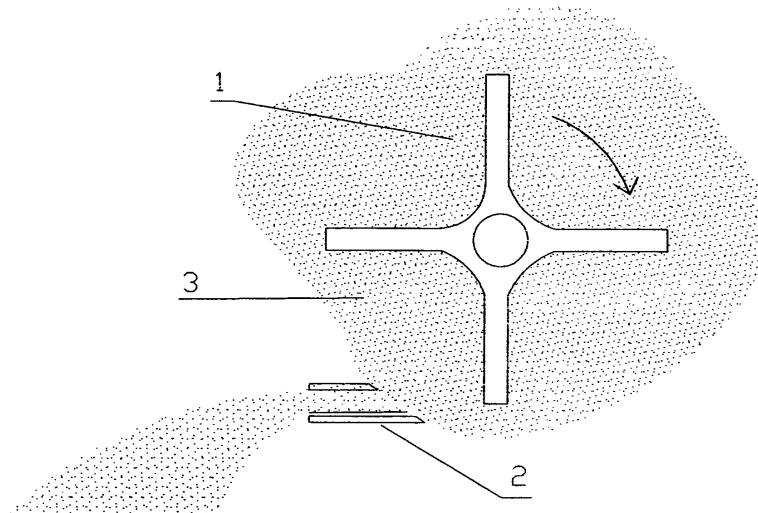
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(54) **Dosing device for powder or granular materials using centrifugal force to dose the material**

(57) The present invention refers to a dosing device of powder or granular materials to be applied both in the industrial and civil sector. The device is characterized by one or more rotary elements, of proper dimensions and

shapes, to apply to powders or granular materials the necessary centrifuge energy to convey them into one or more calibrated ports. Such openings constitute the outlet of the dosed material.

Fig.1



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**Description**

**[0001]** The present invention refers to a dosing device of powder or granular. The powder or granular which will be later on named as "material to dose". The application could be used in industrial and civil applications.

**[0002]** The apparatus of the present invention is characterized by a remarkable efficiency and simplicity. It is essentially composed of one or more rotary elements of proper dimensions and shapes, (depend on the type of the material to dose) whose velocity of spin confers to the material to dose the necessary centrifuge energy conveyed in one or more calibrated ports placed in suitable distance and position. Such calibrated ports constitute the outlet of the dosed material. A proper rotating movement of the rotary elements keep fluid the material to dose contributing, this in order to keep constant and homogeneous the dosage for powders and/or grains, that try to agglomerate.

**[0003]** In many industrial processes and civil applications the precise dosage of powder and granular materials is a constant problem on the optimization processes.

**[0004]** The control of mass flow of powders and the granular materials, carried out using the usual technical of dosage (exp. screw feeder system, vibration system, volumetric etc.), introduces many difficulties mainly in the case of granular and powder which try to agglomerate. In order to guarantee the precise dosage it is necessary to apply sophisticated techniques that have as consequence high cost of equipment.

**[0005]** The present invention means to solve, in its intrinsic simplicity, the cases where the present systems of dosage on the market involves high costs, huge dimensions and remarkable difficulties.

**[0006]** **A better understanding of the invention will be given with the following detailed description and reference to the enclosed diagrams which illustrates only through an example and not a restrictive solution, a possible realization method of a device with single rotating element and single calibrated port.**

**[0007]** In the table that follows, are presented numerical references of the particulars shown in the figure N°1, where the general principle of operation of the device is illustrated, and in the figures N°2 and N°3 where two system solutions of the device are illustrated.

<b>(1)</b>	<b>rotary element</b>	<b>(5)</b>	<b>blade</b>
<b>(2)</b>	<b>calibrated port of outlet</b>	<b>(6)</b>	<b>pipeline of the transport fluid</b>
<b>(3)</b>	<b>material to dose</b>	<b>(7)</b>	<b>motor rotary element</b>
<b>(4)</b>	<b>container</b>	<b>(8)</b>	<b>motor blade</b>

**Description of the general principle of operation (figure N°1)**

**[0008]** The rotary element (1), set in action by motor (7), is dipped in the material to dose (3) and derives a centrifuge force to push it through the port of outlet (2).

**[0009]** The speed of spin of the rotary element determines in a precise way the amount of material that passes through the calibrated port controlling the flow rate of the dosed material.

**[0010]** In order to apply the previously described principles all the elements are opportunely dimensioned depending on the material to dose and the flow rate to obtain.

**[0011]** The rotary element, which can be of interchangeable type and with several shapes, is designed according to the physical and fluid-dynamical characteristics of the material to dose.

**[0012]** The calibrated port can be of interchangeable fixed areas or shapes or made with a variable geometry. In such a way it can be obtained various ranges of flow rate and the device can be adapted to the various physical and fluid-dynamical characteristics of the material to dose.

**[0013]** The dosed material can be directly collected or sent at the outlet of the calibrated port or interfaced to mechanical, hydraulic or pneumatic transport systems.

**[0014]** A particular useful application is the interface to a system of pneumatic transport which in case of powder dosage transforms everything into a valid and reliable aerosol generator.

**[0015]** In general, the present invention provides us with two types of plants solutions:

- **Autonomous system**

- **Immersion system**

**[0016]** The dosing device of an independent solution includes the container for the material to dose (see figure 2).

**[0017]** The dosing device of immersion system is dipped in a container or pre-existing pipe where it flows the material to dose. The material to dose is expelled outside the container through the action of a transport fluid (see figure 3).

**Example of independent system (figure 2)**

**[0018]** The material to dose (3) has been poured in the container (4) and held in motion by an appropriate blade (5) activated by a motor (8) in order to break off some eventual agglomerations. In this way the constant presence of the material to dose is guaranteed by the rotary element (1), activated by the motor (7), and it produces a centrifuge force to expel it from the container through the calibrated port of outlet (2).

**[0019]** The regulation of desired flow rate is obtained by varying the speed of the rotary element.

**Example of immersion system (figure 3).**

**[0020]** The material to dose (3) is found in the container (4) and is held in motion by appropriate blade (5) in order to break off some eventual agglomeration. In this way the constant presence of the material to dose is guaranteed by the rotary element (1), activated by the motor (7), and produces a centrifuge force to expel it from the container through the calibrated port of outlet (2). The dosed material is therefore expelled from the container through the pipeline (6) by a transport fluid.

**[0021]** The regulation of the desired flow rate is obtained by varying the speed of the rotary element.

**[0022]** The present invention has been described and illustrated based on its preferred form of realization, but any technician will be able to make modifications or equivalent changes always respecting the protection of the present patent in industrial and civil application.

**Claims**

1. Dosing device for powder or grains **characterized by** the fact that one or more elements, of opportune dimension and shape, determine a centrifuge force to expel the material to dose through one or more calibrated port placed in suitable distance and position.
2. Dosing device for powders and/or grain according to claim 1, **characterized** that the flow rate of material to dose is regulated by varying the speed of the rotary element.
3. Dosing device for powders and/or grain according to claim 1 and 2, **characterized** that the rotary element produces a local fluidization of homogenous and constant flow rate, also for powder and/or grains that try to agglomerate.
4. Dosing device for powders and/or grains according to claim 1 to 3, **characterized** that the rotary element, could be of interchangeable type and with several shapes in function of the physical and fluid-dynamic characteristics of the material to dose.
5. Dosing device for powders and/or grains according to claim 1, **characterized** that the calibrated port be of interchangeable type with fixed or variable area and geometry. In this way we can obtain various ranges of flow rate and it can be adapted to the various physical and fluid-dynamic characteristics of the material to dose.
6. Dosing device for powders and/or grains according to claim 1 to 5, **characterized** that the container that contains the material to dose constitutes part of the device (figure 2).
7. Dosing device for powders and/or grains according to claim 1 to 6, **characterized** that it is dipped in a container or pre-existing pipeline where the material to dose is present (fig. 3).
8. Dosing device for powders and/or grains according to claim 7, **characterized by** the fact that the dosed material is expelled outside through a pipeline by a transport fluid.
9. Dosing device for powders and/or grains according to claim 1 to 8, in which the dosed material can be directly collected or used in the outlet port or interfaced to mechanical, hydraulic or pneumatic systems of transport.
10. Dosing device for powders and/or grains according to claim 1 to 9, **characterized by** the possibility to generate aerosol.
11. Dosing device for powders and/or grains according to claim 1 to 10, **characterized by** the fact of being suitable for industrial and civil applications.

Fig.1

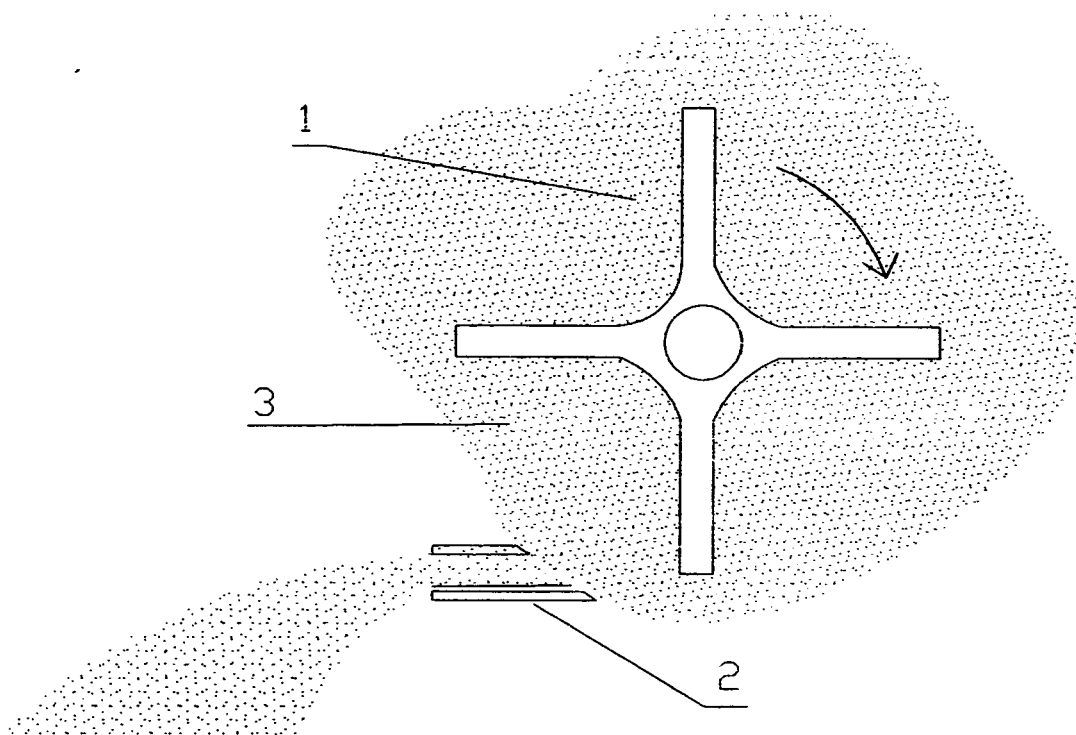


Fig. 2

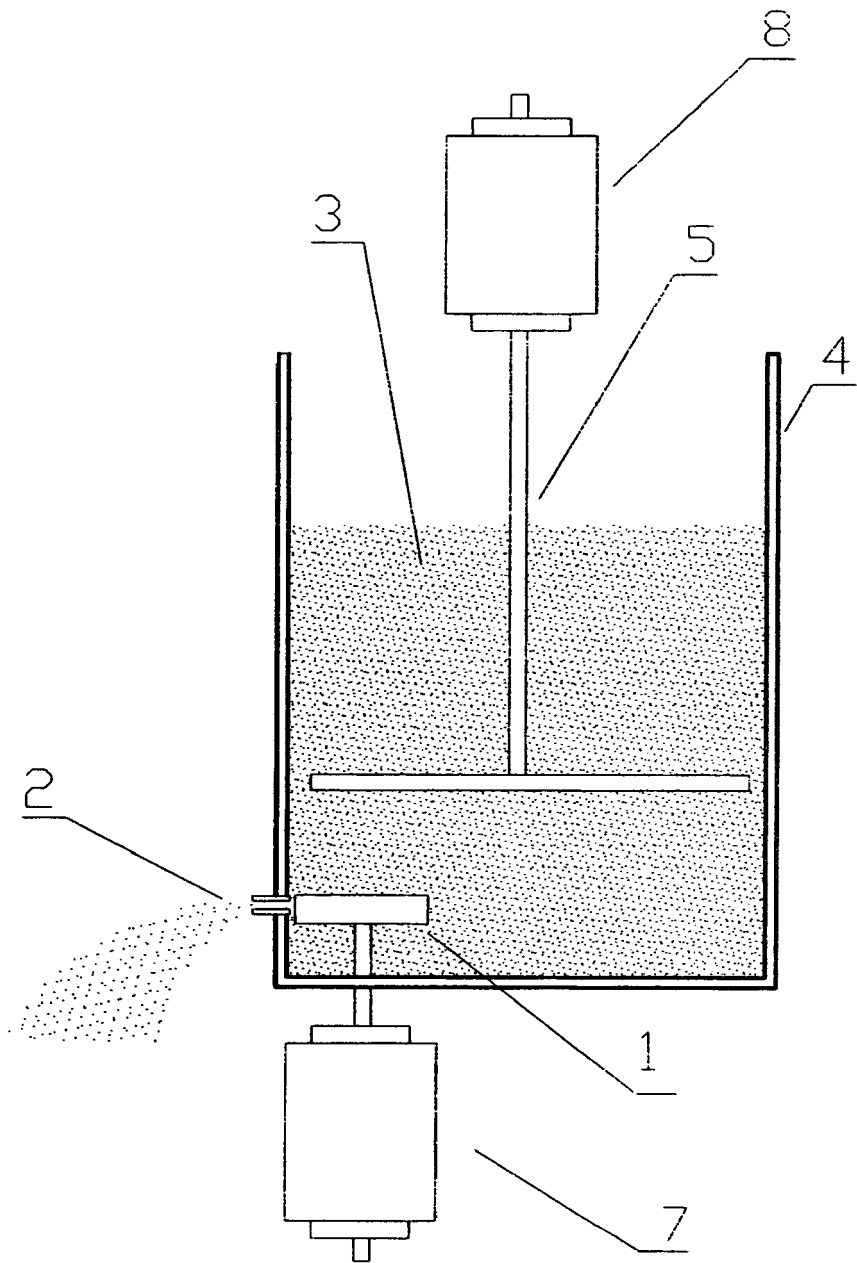
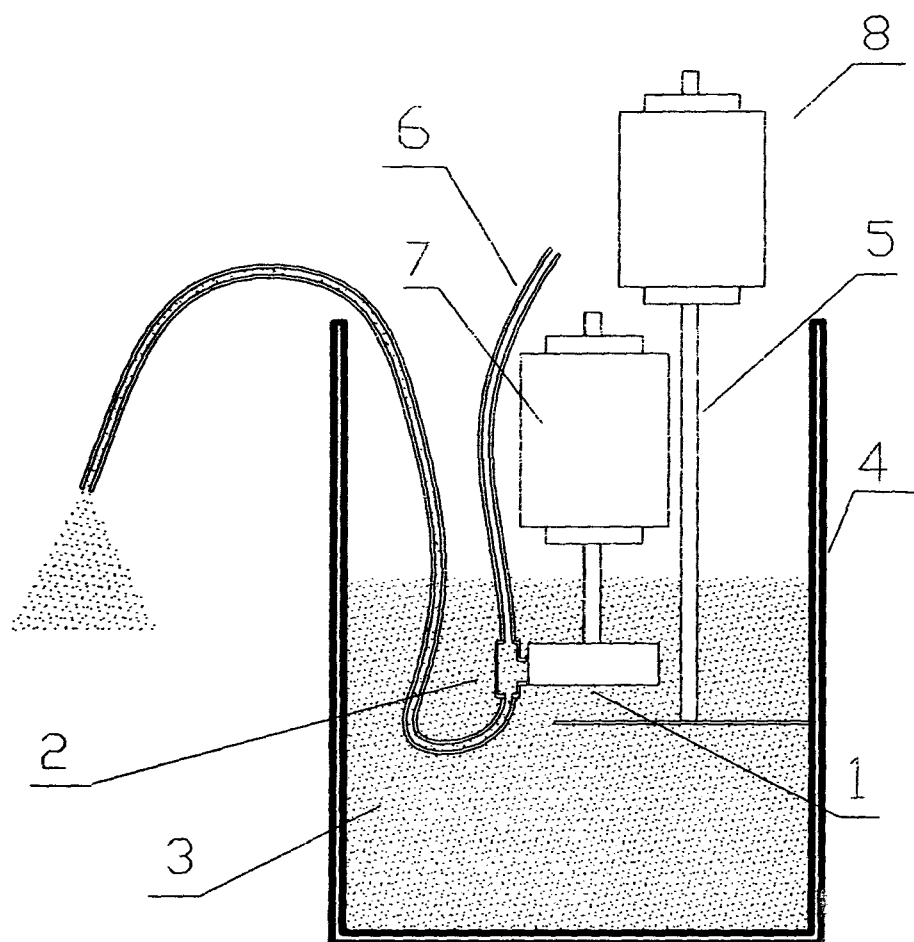


Fig.3





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# EUROPEAN SEARCH REPORT

Application Number  
EP 05 42 5748

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2 890 079 A (STUMPF FRANK M) 9 June 1959 (1959-06-09) * the whole document *	1-3,5,6, 8-11	B05B7/14 B65B1/14 A01C17/00
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 February 2006	Examiner Thanbichler, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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