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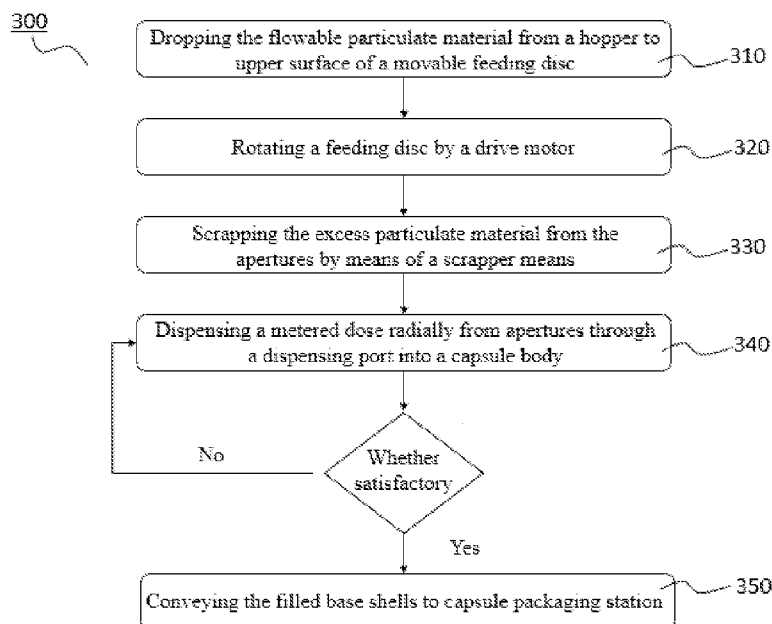


Fig:4

(57) Abstract: The present disclosure pertains to the field of a metering device for metering and dispensing contents into capsules. The device 100 shown in Figure 1 for metering and dispensing contents into capsules. The flowable material may, for example, take the form of powdered or granular products such as pellets, micro-tablets or the like.

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PROGRAMMABLE DOSING DEVICE AND METHOD THEREOF

FIELD OF THE INVENTION

[0001] The present disclosure pertains to the field of a metering device for metering
5 and dispensing contents into capsules.

BACKGROUND OF THE INVENTION

[0002] Conventionally capsules are manufactured in various sizes and shapes comprising a capsule cap and a capsule body. The capsule cap is introduced into the
10 capsule body or vice versa. Capsules are generally oblong in shape, vary in size, and can be assembled using a variety of structures and methods. Typically, a capsule cap is telescopically fitted onto the capsule body such that a radially inward projecting ring defined by the capsule cap is introduced into a radial groove define by the capsule body. Alternatively, the capsule cap and capsule body can be configured such that a friction fit
15 between the two components can be achieved when they are assembled. In either arrangement, the capsule cap is capable of being removed from the capsule body in order to introduce material, such as powders or granules, coated pellets, tablets, micro-tablets, smaller capsules, and various combinations of any of the mentioned forms. It is also possible to fill liquids, provided that the material of the capsule (generally gelatin,
20 although there are other alternatives) is not soluble in the solvent used in the formulation. Subsequently, the capsule cap can be releasably attached to the capsule body to seal the material within the capsule such that the capsule can be used.

[0003] Once the medication or other powdered, granular, or liquid material has been placed in the capsule bodies, the caps of the capsule shells are concurrently replaced on to the open mouths of the capsule body shells. The caps and the bodies are then concurrently pressed toward each other a sufficient distance so that the annular, radially inwardly protruding ring on each capsule cap engages the outwardly facing annular groove on the outer wall of a capsule body.

[0004] Various devices have been developed to introduce material into capsules. For example, large automated systems have been developed that disassemble a plurality of capsules, fill the capsule bodies, and reassemble the capsules. These devices, however, have multiple drawbacks such as requiring constant monitoring, being expensive to repair, and difficult to operate. Therefore, a need exists for improved capsule filling systems and methods of using a capsule filling system.

[0005] Capsule fillers are invented to facilitate the capsule filling process. However, there are several drawbacks with traditional capsule fillers. First of all, there are basically 100 capsule receiving holes in the conventional capsule filler. High density of the hole configuration makes the manual handling process inconvenient. Moreover, during each manual handling process, all of the capsules in the capsule receiving holes are filled; even not all the capsules are actually required. In this case, empty capsules are made, which will cause the capsules damage by repeating quite often a time. Moreover, the demand of customized drug capsulation is increasing. Drug customization is needed because different drugs are applied for different disease treatment. Such customised capsules require a precise dosing of the medicaments into the capsules.

[0006] Roughly classified, there are three widely known systems for successively filling the conventional medicinal hard gelatin capsules with a predetermined quantity of medicinal substance or food material, depending on the physical properties of the material to be filled. The first of which is called as "Die Compression System" and is employed
5 mainly for filling powdery medicine. The second one is "Gravitation System" which is applied to filling granular materials such as granules and fine granules. And the last one is "Pumping Unit System" employed for filling liquid.

[0007] Of these three systems, a capsule filling machine according to the "Gravitation System" is almost similar to that of the "Die Compression System" in its mechanical
10 aspects. The application of the "Gravitation System" machine is however restricted to the granular material, such as, granules and fine granules which have excellent fluidity, and the machine is hardly applicable to the handling of the powdery material which has poor fluidity. The machine is generally composed of a metering chamber of a predetermined capacity provided on its metering disk. The granular material piled up on the upper
15 surface of the disk is gravitated down into the chamber wherein the material is portioned. In the next step, the portioned material in the metering chamber is then allowed to fall down into the body of the hard gelatin capsule positioned under the outlet of the metering chamber with virtually no artificial force.

[0008] Even in the case of the granular material of excellent fluidity, the conventional
20 "Gravitation System" machine is however still unsatisfactory, if an extremely high standard of accuracy and small variance in the quantity of the material actually filled in the capsule are imposed. Namely, so-called bridging of the material may sometimes be formed at an inlet of the metering chamber, in the metering chamber itself and at its outlet

during the gravitational travel of the material from the upper surface of the metering disk down to the metering chamber and from the chamber into the body of the capsule to invite an inaccurate portioning or an irregular transposition of the material.

[0009] Therefore, in the conventional machine, all of the inlet of the metering chamber, the metering chamber itself and its outlet have heretofore been usually designed
5 as widely as possible in order to prevent the bridging of the granular material to be filled. This wide design of the inlet of the metering chamber, the metering chamber itself and its outlet, however, means occupation of a large horizontal span by these components, and results in a limitation on the number of the components such as metering chambers for
10 unit area of the capsule filling machine. This in turn reflects on an inconvenience of lowering of the filling (capsule handling) capacity for unit time, i.e., productivity of the machine.

[00010] Furthermore, in the conventional machine, the adjustment on the capacity of the metering chamber is usually performed by lateral insertion of a capacity-restricting
15 means, for instance, a comb-teeth type device, into the metering chamber. Application of this type of adjustment is, however, restricted to a machine having metering chambers of just two rows at most. Therefore, the adjustment in a machine having the chambers in three or more rows must have been made by interchanging the metering disks of various thickness. Thus, there is felt a need for a metering device for metering and dispensing
20 contents into capsules which is compact, precise and programmable.

SUMMARY OF THE INVENTION

[00011] In one aspect, the present invention is directed to a dosing device for repeatedly dosing volumetrically measured amounts of flowable material. The device of the present invention has a hopper with a spout for storing the flowable flowable material.

5 The device further has a movable feeding disc beneath the hopper. The movable feeding disc is rotatable about a vertical axis. Moreover, the movable feeding disc is provided with a plurality of cross sectionally round apertures at the periphery of the movable feeding disc. The device further has a stationary bottom plate positioned below the movable feeding disc, the stationary bottom plate comprises a dispensing port through
10 which flowable flowable material is dispensed from the dosing device. Further, the device has a capsule body holder adapted to receive the volumetrically measured amount of flowable material through the dispensing port. Furthermore, the device also comprises a drive motor comprising an electric motor which is connected to drive a geneva drive mechanism and being adapted to effect relative movement of the movable feeding disc to
15 sequentially bring each aperture in communication with the dispensing port.

[00012] In another aspect of the present invention, disclosed is a method of dosing volumetrically measured amounts of flowable flowable material into capsules, whereby the method has the steps of dropping, a pre-determined amount of flowable flowable material from a hopper to upper surface of a movable feeding disc. In the next step, the
20 method includes rotating a feeding disc by a drive motor such that the flowable material travels down into a plurality of apertures. In the further step, the method involves rotating the feeding disc and scrapping the excess flowable material from the apertures by means of a scrapper means when the feeding disc reaches the scrapper means thereby creating a

metered dose in the apertures. The next step includes rotating the feeding disc and dispensing the metered dose radially from the apertures through a dispensing port into a capsule body holder comprising a capsule body; wherein the dispensing occurs when the feeding disc the apertures and the dispensing port come in line with each other.

5 BRIEF DESCRIPTION OF THE DRAWINGS

[00013] Reference will be made to embodiments of the invention, examples of which may be illustrated in accompanying figures. These figures are intended to be illustrative, not limiting. Although the invention is generally described in context of these embodiments, it should be understood that it is not intended to limit the scope of the
10 invention to these particular embodiments.

FIGURE 1 illustrates a programmable dosing device in accordance with an embodiment of the invention.

FIGURE 2 illustrates a movable feeding disc in accordance with an embodiment of the invention.

15 FIGURE 3 illustrates a programmable dosing device in accordance with an embodiment of the invention.

FIGURE 4 shows a method of dosing volumetrically measured amounts of flowable material into capsules in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

20 [00014] The following is a detailed description of embodiments of the present disclosure. The embodiments are in such detail as to clearly communicate the disclosure.

However, the amount of detail offered is not intended to limit the anticipated variations of embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the present disclosure as defined by the appended claims.

5 [00015] Unless the context requires otherwise, throughout the specification which follow, the word “comprise” and variations thereof, such as, “comprises” and “comprising” are to be construed in an open, inclusive sense that is as “including, but not limited to.”

[00016] Reference throughout this specification to “one embodiment” or “an
10 embodiment” means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, the appearances of the phrases “in one embodiment” or “in an embodiment” in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any
15 suitable manner in one or more embodiments.

[00017] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

20 [00018] In some embodiments, the numbers expressing quantities of ingredients, properties such as concentration, and so forth, used to describe and claim certain embodiments of the invention are to be understood as being modified in some instances

by the term “about.” Accordingly, in some embodiments, the numerical parameters set forth in the written description are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiments, the numerical parameters should be construed in light of the number of
5 reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiments of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable.

[00019] The recitation of ranges of values herein is merely intended to serve as a
10 shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein.

[00020] All methods described herein can be performed in suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any
15 and all examples, or exemplary language (e.g., “such as”) provided with respect to certain embodiments herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

20 [00021] The headings and abstract of the invention provided herein are for convenience only and do not interpret the scope or meaning of the embodiments.

[00022] Various terms are used herein. To the extent a term used in a claim is not defined below, it should be given the broadest definition persons in the pertinent art have given that term as reflected in printed publications and issued patents at the time of filing.

[00023] In one aspect of the present invention, the programmable dosing device 100
5 as shown in Figure 1 for repeatedly dosing volumetrically measured amounts of flowable material into capsules is disclosed. Figure 1 illustrates a programmable dosing device 100 in accordance with an embodiment of the present invention for repeatedly dosing volumetrically measured amounts of flowable material into capsules (not shown in the figure). In an exemplary embodiment, the flowable material may, for example, take the
10 form of powdered or granular products such as pellets, micro-tablets or the like.

[00024] According to an embodiment of the invention, the dosing device 100 comprises a support frame including a support column, a drive motor 103 and a hopper 101, a movable feeding disc 105, a dosing chamber 111 and a capsule body holder 113. The hopper 101 houses the flowable material to be filled in the capsules. The hopper 101
15 further has a funnel shaped interior and the sloping surfaces thereof which are intended to guide the flowable material on the feeding disc 105 by means of gravity. In an embodiment of the present invention, the hopper 101 comprises at least one sensor (not shown in the figure) for determining the quantity of the flowable material on the feeding disc 105 such that the flow of the flowable material from the hopper 101 is stopped or
20 restarted depending upon the output received from the sensor. Further, the sensor also generates an output to notify the user regarding the levels of the flowable material in the hopper 101.

[00025] As illustrated in Figure 2, the feeding disc 105 comprises a plurality of cross sectionally round apertures 109 at the periphery of the feeding disc 105 which are adapted to receive only a pre-determined amount of the product. Moreover, depending on the user requirements, the apertures 109 are of varied dimensions. The feeding disc 105 comprising a plurality of cross sectionally round apertures 109 is disposed underneath the hopper 101.

[00026] The drive motor 103 is below the feeding disc 105. The drive motor 103 comprises an electric motor which is connected to drive a geneva drive mechanism which, in turn, effects rotation of feeding disc 105 in the pre-determined direction. The drive motor 103 runs continually but the geneva drive mechanism ensures the feeding disc 105 rotates at a predetermined maximum speed, slows down, momentarily stops, speeds up, and resumes maximum speed.

[00027] In an embodiment of the present invention, the device 100 operates as follows: the feeding disc 105 which receives the flowable material from the hopper 101, is rotated at pre-determined speeds by the drive motor 103. During rotation, the flowable material travels down into the apertures 109. If additional flowable material has collected in the region of the apertures 109, then with further rotation of the feeding disk 105, these additional flowable materials are removed aside by a scrapper 107 back into the feeding disk 105, thereby ensuring that only the pre-determined quantity of the flowable material is placed in the apertures 109.

[00028] With further rotation of the feeding disk 105, the apertures 109 filled with the flowable material travel out of the scrapper 107 and as soon as the apertures 109 come in

line with the capsule body holder 113, the flowable material falls out from the aperture/s into the capsule body holder 113 comprising a capsule body. The filled capsule body is then pivoted away and the position is replaced by another empty capsule body. Further, the device also comprises a stationary horizontally disposed bottom plate (not shown in the figure) below the feeding disk 105 and having a material dispensing hole (not shown in the figure) therethrough beneath which the capsule body holder 113 passes. Typically, the dispensing hole is offset or displaced from (i.e., not in registering with) the hopper funnel. When the feeding disc 105 rotates, the apertures 109 receive the flowable material such that the bottom plate cooperates with the feeding disc 105 to close off the lower end of the apertures 109 and thereby define a chamber of predetermined volume into which flowable material is received. As the feeding disc 105 continues to rotate, the flowable material filled apertures 109 passes through the scrapper 107. The scrapper 107 operates to level off or sweep away any excess flowable material protruding from the flowable material filled apertures 109 so that only a predetermined measured volume of material remains in the apertures 109. As the feeding disc 105 rotates further, the flowable material filled apertures 109 moves into registry with the dispensing hole in the bottom plate, momentarily stops thereat and the flowable material falls through the dispensing hole into a capsule body in the capsule body holder 113, whereupon upper plate rotation resumes to repeat the cycle.

[00029] In an exemplary embodiment of the present invention the production capacity of the device 100 can be increased by providing a plurality of spaced-apart apertures in the feeding disc which are circumferentially arranged around the axis of rotation of the feeding disc. Further productivity increases can be achieved by using a feeding disc

having a plurality of apertures and by providing two or more circumferentially spaced apart hoppers and corresponding plurality of circumferentially spaced apart dispensing holes in the bottom plate.

[00030] In a preferred embodiment of the present invention, programmable dosing
5 device 100 may be provided with a housing (not shown) to confine and contain any stray material escaping from feeding disk 105 or from between the apertures 109 thereby prevent the material from contaminating the area round the device 100.

[00031] While the present invention has been described with respect to certain
embodiments, it will be apparent to those skilled in the art that various changes and
10 modification may be made without departing from the scope of the invention as defined in the following claims.

WE CLAIM

1. A dosing device (100) for repeatedly dosing volumetrically measured amounts of flowable material, said device comprising:
 - a hopper (101) with a spout and adapted to store flowable particulate material;
 - a movable feeding disc (105) beneath said hopper (101) and rotatable about a vertical axis;
wherein said movable feeding disc (105) is provided with a plurality of cross sectionally round apertures (109) at the periphery of said movable feeding disc (105);
 - a stationary bottom plate positioned below said movable feeding disc (105) and comprising a dispensing port (115) through which flowable particulate material is dispensed from said dosing device;
 - a capsule body holder adapted to receive the volumetrically measured amount of flowable material through said dispensing port (115); and
 - a drive motor (103) comprising an electric motor which is connected to drive a geneva drive mechanism and being adapted to effect relative movement of said movable feeding disc to sequentially bring each aperture (109) in communication with the dispensing port (115).
2. The dosing device (100) as claimed in claim 1, wherein said hopper (101) is in a substantially perpendicular direction in relation to said movable feeding disc (105) and in fluidic communication with said feeding disc (105) for introduction of flowable material thereto.
3. The dosing device (100) as claimed in claim 1, wherein said movable feeding disc (105) is adapted to move at a pre-determined speed such that said flowable material is moved into said round apertures (109).

4. The dosing device (100) as claimed in claim 1, further comprising scraper means (107), wherein said scraper (107) means adapted to remove the excess flowable material from said round apertures (109)
5. The dosing device (100) as claimed in claim 3, wherein said scraper means (107),
5 is biased towards said feeding disc (105).
6. The dosing device (100) as claimed in claim 1, wherein said movable feeding disc (105) has a circular shape and is provided with a plurality of cross sectionally round apertures (109) at the periphery of said movable feeding disc (105).
7. The dosing device (100) as claimed in claim 1, wherein said hopper (101) and said
10 movable feeding disc (105) comprise at least one sensor for determining the quantity of the particulate material on said movable feeding disc (105) such that the flow of said flowable material from said hopper (101) is stopped or restarted depending upon the output received from the sensor.
8. A method (300) of dosing volumetrically measured amounts of flowable
15 particulate material into capsules, comprising the steps of:
 - dropping (310), a pre-determined amount of flowable particulate material from a hopper (101) to upper surface of a movable feeding disc (105);
 - rotating (320) a feeding disc (105) by a drive motor (103) such that said particulate material travels down into a plurality of apertures (109);
 - 20 – rotating said feeding disc (105) and scrapping (330) the excess particulate material from said apertures (109) by means of a scraper means (107) when said feeding disc (105) reaches said scraper means (107) thereby creating a metered dose in said apertures (109); and
 - rotating said feeding disc (105) and dispensing (340) said metered dose
25 radially from said apertures (109) through a dispensing port (115) into a capsule body holder (113) comprising a capsule body; wherein the dispensing occurs when said feeding disc (105) said apertures (109) and said dispensing port (115) come in line with each other.

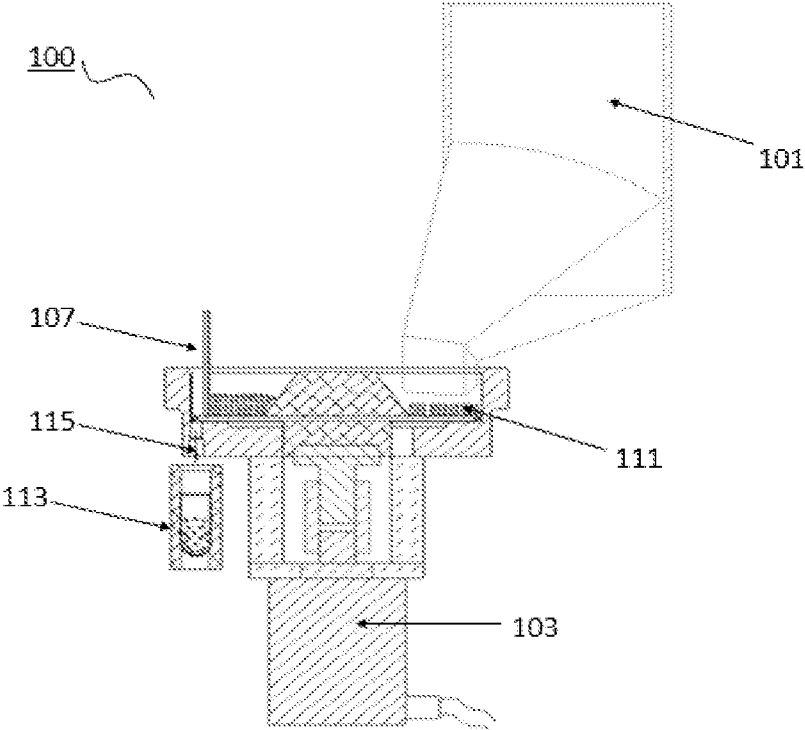


FIGURE 1

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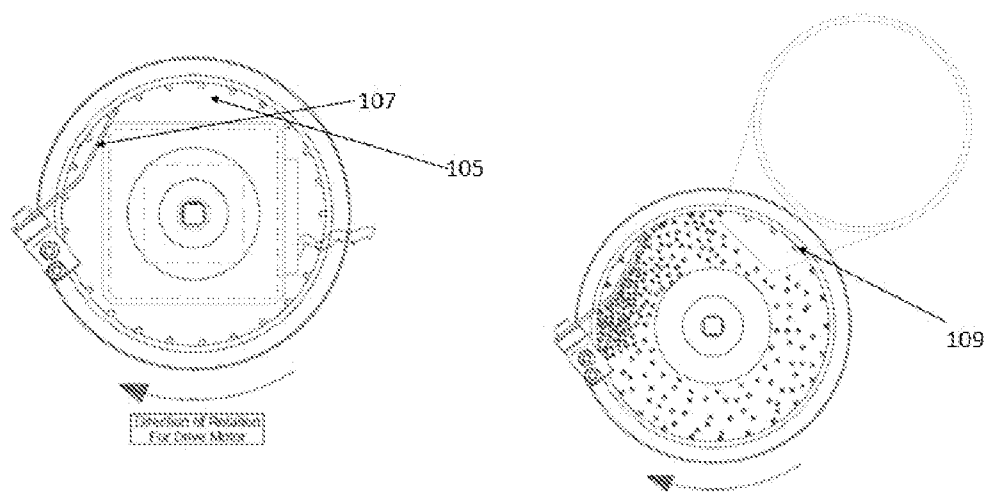


Fig 2

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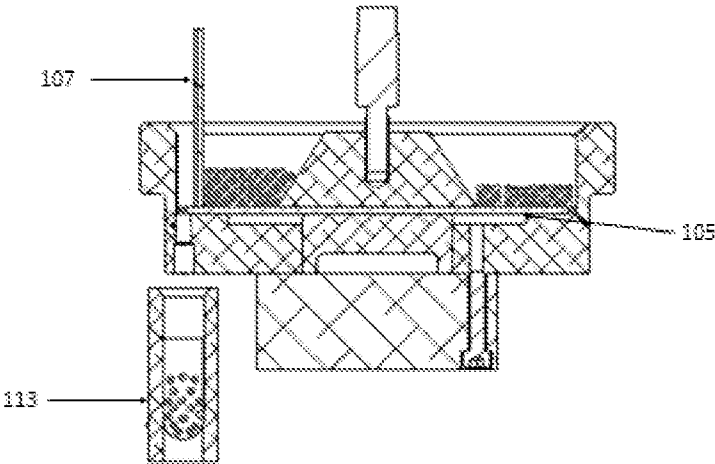


Fig: 3

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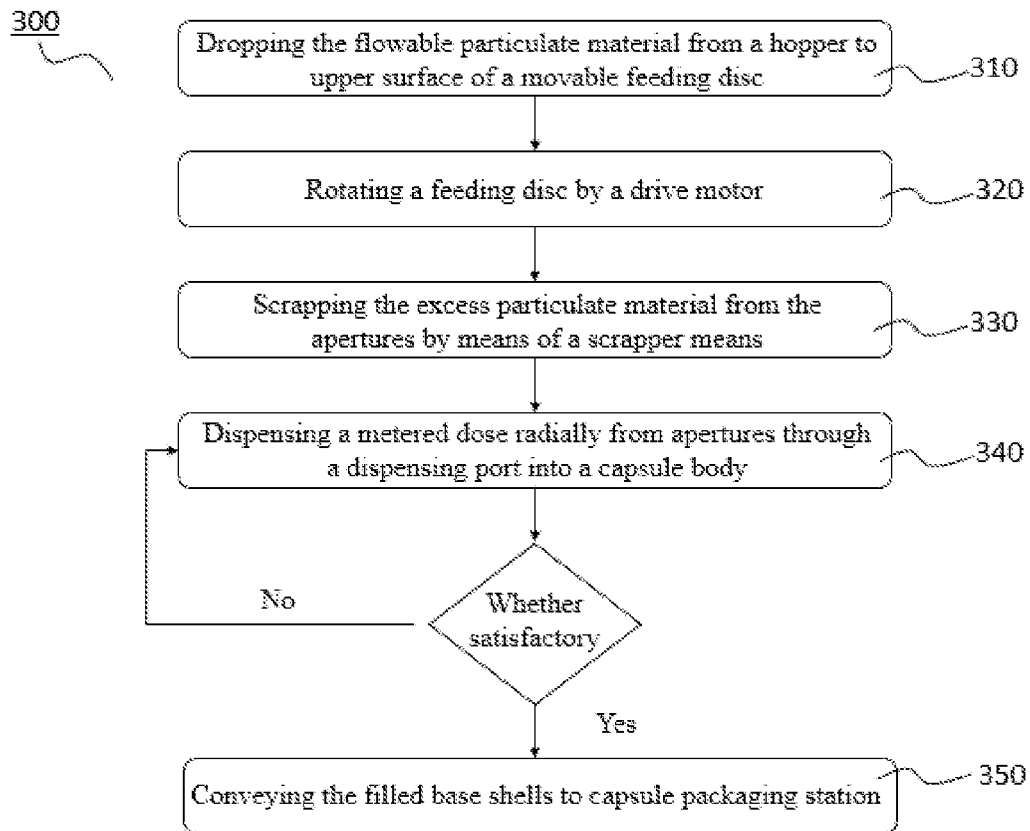


Fig:4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IN2024/050336

A. CLASSIFICATION OF SUBJECT MATTER
A61J3/00, B65B1/04 Version=2024.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61J, B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

PatSeer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US2020078269A1 (SCITECH CENTRE and ACG PAM PHARMA TECH PVT LTD) 12 Mar 2020 claims 1-4 and Para 0007-0019	1-8



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

03-07-2024

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2024/050336

Citation	Pub.Date	Family	Pub.Date
US 2020078269 A1	12-03-2020	CN 110877471 A	13-03-2020
		EP 3620150 A1	11-03-2020
		HR P20210758 T1	20-08-2021