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W. H. SEAVER

3,498,507

DISPENSER

Filed July 6, 1967

FIG. 1

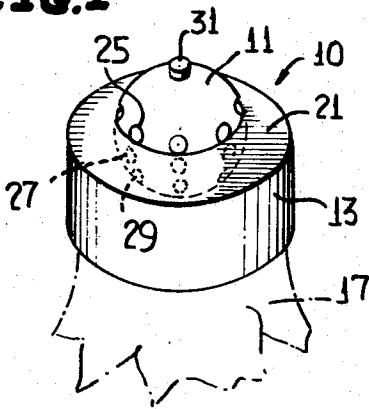


FIG. 4

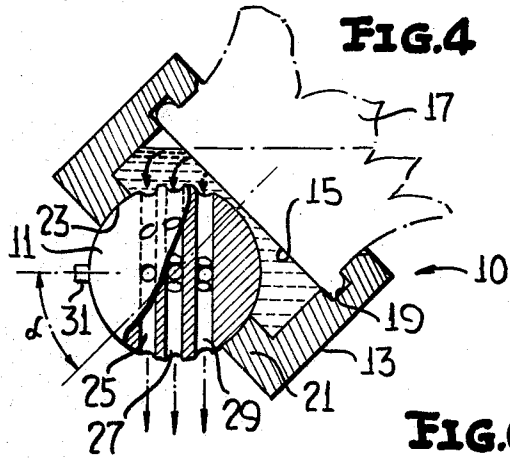


FIG. 2

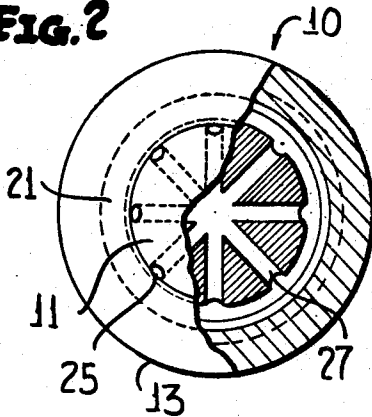


FIG. 5

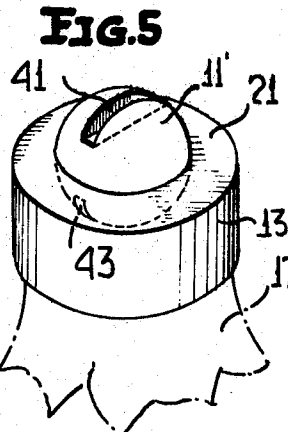


FIG. 6

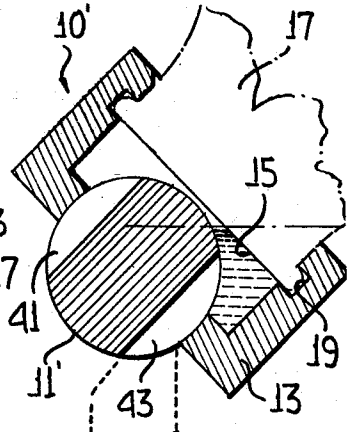


FIG. 3

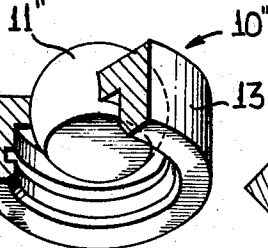
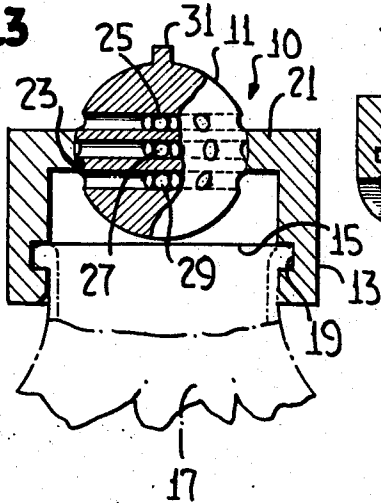
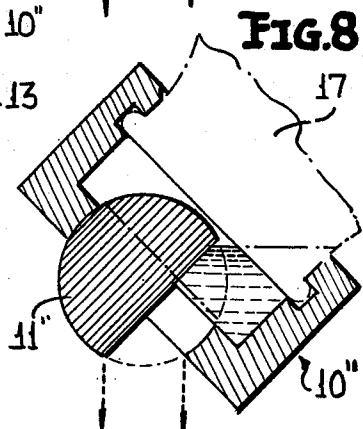


FIG. 7

FIG. 8



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Melbourne, Fla. 32901****Filed July 6, 1967, Ser. No. 651,944****Int. Cl. B65d 47/30, 47/32; B67d 3/00****U.S. Cl. 222-486****5 Claims****ABSTRACT OF THE DISCLOSURE**

A dispenser for granular, powered, liquid, or gaseous material comprising a spherical gate mounted in an annular retainer-like seat in such manner as to permit universal rotation of the gate. Portion of said seat housing may be either an integral part of, or adapted to be fitted to, a container, pipe, or tube, from, or through which, said material is passed to the dispenser. The gate has at least one passage defined therein for providing selective degrees of communication between the interior and exterior of the container, pipe, or tube.

BRIEF SUMMARY OF THE INVENTION

The invention for which application for patent is made is a mechanical dispenser consisting of a configured spherically shaped gate, and a retainer. Among other functions, the combination of holes, slots, or truncated configurations of the gate permit simultaneous, bi-directional control of the passage of solids, liquids, and/or gasses, through the dispenser.

The dispenser may be used to dispense table salt, pepper, sugar, vinegar, salad oil, salad dressings, syrup, condiments, flavorings, soaps, shampoos, hair lotions, medicines and many other materials in granular, powdered, liquid, or gaseous form.

BACKGROUND OF THE INVENTION

This invention generally relates to dispensers for granular, powdered, liquid or gaseous material and more specifically to an improved dispenser of the type comprising a rotatable spherical gate member having one or more passages defined therein.

Dispensers with rotatable gate members are known in the prior art but have a common disadvantage in that the degree of control over the flow rate of the dispensed material is somewhat limited. For example, dispensers disclosed in U.S. Patent No. 2,134,119 to Franz and U.S. Patent No. 2,805,801 to Jacobs et al. each comprise a spherical gate member which is rotatable about a single diametric axis to bring a cylindrical passage defined through the gate member into varying degrees of communication between the interior and exterior of a container of material to be dispensed. The gate member passage receives the material to be dispensed through a bore formed in a cover for the container, the bore having substantially the same cross-sectional configuration as the passage. Control over material flow through the gate is achieved by varying the alignment between the circular cross-sections of the passage and the bore, the alignment being adjustable in only one plane of motion. The area of the aligned portions of these cross-sections increases exponentially with decreasing separation between the center of the cross-sections, and therefore the degree of control over material flow becomes quite poor as the passage and bore are brought closer to full alignment.

The above-referenced Jacobs et al. patent suggests that the gate passage might be rotatable in more than one plane, but properly states that such a configuration is not preferred because of the resulting possibility that desired registration between the passage and bore would not be insured.

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In addition to the limited flow control provided by prior art dispensers of the type under discussion, another undesirable feature exists with respect to the operation of the dispenser when the container is nearly empty of its contents. This problem, too, is due primarily to the fact that the contents of the container can only communicate with the gate passage through the bore in the container cover, thus requiring continuous manipulation of the container to get the residue of contained material into the bore. As a result, the material is generally dispensed in a sporadic manner.

SUMMARY OF THE INVENTION

The dispenser of the present invention comprises a generally spherical gate member supported by a concave annular surface, or seat, having diameters at its rims which are less than the diameter of the sphere and a diameter at its apex of concavity which is equal to or just slightly greater than the diameter of the sphere. The distance between the two rims of the surface, or seat, is less than the diameter of the sphere so that portions of the surface area of the sphere extend above and below the rims of the annular surface, or seat, and the sphere is free to rotate universally. The spherical gate may be rotated universally in the annular seat in a manner similar to the typical ball in socket function. The annular surface defines an aperture in an otherwise continuous seat member, the seat member being adapted to be fitted to a container, pipe, or tube, holding the materials to be dispensed. Thus, all of the surface area of the sphere extending below the annular seat surface, that is, on the material-to-be-dispensed side of the annular seat surface, hereafter referred to as the interior, is free to communicate with the contents of the container. One or more passages are defined in the sphere.

Any passage positioned interiorly of the seat member may be made to partially or wholly communicate with the contents of the container to a degree determined by the attitude of the container. In addition, the passages may be rotated about the center of the sphere in any plane, thereby permitting gradual increases or decreases in the proportion of the passage cross-sectional area communicating between the contents of the container and the container exterior. Further, when the container is nearly empty, the contents may be gathered adjacent the sphere by proper orientation of the container, and the sphere may then be rotated to bring the sphere passage or passages in communication with the contents. By simply rotating the sphere in the appropriate direction, the contents may then be emptied from the container without the necessity for further re-orientation of the container body.

A feature of this dispenser is that the gate remains in its seat, whether the dispenser is open or closed; whereas, in many existing dispensers using a spherically shaped gate, the gate is moved from its seat as a function of opening the dispenser. The latter-type dispenser may require a spring, the use of gravity, or some other force to re-seat the gate in order to close the dispenser. The dispenser for which patent is solicited enables more positive action and thus presents an improvement over the above referenced dispenser in regard to this aspect, particularly when the dispenser is required to function in various attitudes with respect to the earth's surface.

In still other dispensers using a spherically shaped gate it is noted that the gate is limited by design to operate as part of its regular function in one plane with reference to the longitudinal axis of the dispenser, whereas, the gate of the dispenser for which patent is solicited may operate, as part of its regular function, in many planes relative to the axis of the dispenser, thus presenting improvement over existing dispensers.

Other features contributing to improvement are: The position of the openings, slots, or truncated configurations of the gate relative to the polar axis and coordinates of the gate; the planes of movement of the gate available to the user of the dispenser; the relationships which may be established between the configuration of the gate and the seat and axis of the dispenser during operation; and, the mode of arrangement and functioning of the gate in the retainer as later described under "Description of the Preferred Embodiments."

The retainer may be made as an integral part of, or formed within, the material of the container of the material to be dispensed, thus requiring no additional material for the establishment of the retainer beyond that of the container, thus effecting a saving of material over that required by existing dispensers.

Other features presenting uniqueness and improvement are: (1) The adaptability to the containment of marketable products by the product manufacturer or processor in lieu of conventional caps, lids, or stoppers, thus providing a means for the consumer to satisfactorily dispense the product from the original container without the need to utilize an additional container for dispensing purposes; (2) the applicability to automated and/or remote control systems or devices to control flow of granulated or powdered materials, liquids and gasses.

The above and still further objects, features and advantages of the present invention will become apparent upon consideration of the following detailed description of one specific embodiment thereof, especially when taken in conjunction with the accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view of a first embodiment of the dispenser of the present invention and an associated container;

FIGURE 2 is a top view in partial section of the embodiment of FIGURE 1;

FIGURE 3 is a front view in partial section of the embodiment of FIGURE 1;

FIGURE 4 is a view similar to FIGURE 3 wherein the container has been overturned and the dispenser opened to permit dispensing;

FIGURE 5 is a view in perspective of a second embodiment of the instant invention wherein the dispenser is illustrated in its closed position;

FIGURE 6 is a front view in partial section of the embodiment of FIGURE 5 illustrating the dispenser in operation;

FIGURE 7 is a view in perspective and partial section of a third dispenser embodiment of this invention wherein the dispenser is illustrated in its closed position; and

FIGURE 8 is a front view in partial section of the embodiment of FIGURE 7 illustrating the dispenser in operation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now specifically to FIGURES 1 through 4 of the drawing, there is illustrated a dispenser 10 being one version of design constructed in accordance with the principles of this invention. Dispenser 10 comprises a generally spherically shaped gate member 11 and a seat member 13. Seat member 13 has a generally cylindrical configuration with an open end adapted to be fitted to a container opening such as the mouth 15 of a container 17, or a pipe, or tube. The interior cylindrical wall of seat member 13 has a circumferential channel defined therein adjacent the open end of the seat member, the channel being of sufficient size and shape to receive the lip of mouth portion 15 of the container 17, pipe or tube. The open end of seat member 13 may also be threaded or otherwise adapted to engage the mouth 15 of the container, it being understood that whatever fitting means is employed, the open end of seat member 13 and the mouth 15 of container 17 provides a seal

for the contents of container 17. The opposite end of seat member 13 is defined by an end wall 21 having an annular aperture defined centrally therethrough. This annular aperture is defined by a concave annular surface 23 which provides a seat for spherical gate member 11 within which the latter may be rotated. The concavity of surface 23 is defined by the spherical contour of the gate member 11 so that the diameter of the annular aperture at the apex of concavity of surface 23 is equal to or just slightly greater than the diameter of the sphere. Similarly, the rims of the annular aperture, which define the intersection of surface 23 with the opposing surfaces of wall 21, have diameters which are somewhat smaller than the diameter of gate member 11. The gate member 11 is thereby free to rotate about any of its diametric axes within the confines of surface 23 without the danger of being dislodged therefrom. The thickness of end wall 21 is relatively small as compared to the diameter of spherical gate member 11 so that substantial proportions of the surface area of the gate member are exposed below and above end wall 21. Typically, the gate member diameter may be five or six times the wall thickness.

A plurality of passages may be defined through gate member 11, the passages being arranged, for example, in three groups 25, 27, and 29, with the passages in each group being coplanar, and with the planes of respective groups being parallel. Each group of passages 25, 27 and 29 thereby defines a circular plane through the gate member 11. There are, for example, four equally spaced diametric passages in each group. Each passage terminates in a pair of ports at the sphere surface and all passages in a group intersect at the center of the respective circular plane defined by that group. The plane of passage group 27 is disposed essentially through the center of spherical gate member 11, and the planes of groups 25 and 29 are disposed at equal distances on either side of group 27. A small cylindrical member 31 extends from the surface of gate member 11 generally along that diameter of the gate member which is perpendicular to the planes of passage groups 25, 27 and 29. Member 31 provides a means for easily rotating gate member 11 by hand. Although hand rotation of the gate member is suggested for the embodiment illustrated in FIGURES 1-4, it should be understood that remote control by means of intermediate mechanical connection, electrical means, or electromagnetic means is contemplated as being within the scope of this invention.

The operation of the dispenser 10 is best described with reference to FIGURES 3 and 4 wherein dispenser 10 is illustrated in the closed and open positions respectively. In the closed position the planes of passage groups 25, 27 and 29 are illustrated as being disposed parallel to the plane of end wall 21, and the dispenser is closed because none of the passages in any of groups 25, 27 and 29 communicate between the interior and exterior regions of the dispenser 10. Specifically, all of the passages 25 are disposed in a plane located entirely exterior of the dispenser. All of the passages in group 27 are blocked by the annular surface 23, and all passages in group 29 are disposed interior of end wall 21. In FIGURE 4 the gate member 11 is illustrated as having been rotated by a predetermined angle α and the container 17 is illustrated as partially overturned such that the contents of the container are poured from the container mouth 15 and into the region between the container 17 and end wall 21. The three passage groups 25, 27 and 29 each now provide some communication between the dispenser interior and exterior regions. By adjusting the angle α the number of passages in each group which provide such communication can be altered and the number of groups in which passages provide such communication can be similarly altered.

It is to be understood, of course, that the three groups of passages 25, 27 and 29 are illustrative only, and that one or any desired number of groups may be em-

ployed. For example, it may not be desirable to have a group of passages which are exposed to the air when the dispenser is closed, particularly in the case where salt is the material to be dispensed, since moisture in the air would tend to cause the salt to clog the passages. In such a case, passage group 25 may be eliminated. Other variations in passage arrangements are similarly contemplated.

It may be readily seen that the gate member 11 of this invention can be freely moved so as to provide a readily controlled, continuously adjustable flow of dispensed material. In addition, the container 17 may be oriented such that the contents can always be readily admissible to the passages in the various groups.

Another embodiment of this invention, dispenser 10', is illustrated in FIGURES 5 and 6. Dispenser 10' comprises a seat member 13' substantially identical to seat member 13 of dispenser 10 and a spherical gate member 11' having a pair of substantially rectangular channels 41 and 43 defined in its surface at diametrically opposed locations. In the closed position of dispenser 10', gate member 11' is disposed with one channel, 41 for example, communicating entirely with the environment exterior of dispenser 10' and with channel 43 disposed entirely within the dispenser 10'. Such a configuration is illustrated in FIGURE 5. As best illustrated in FIGURE 6, the spherical gate member 11' may be rotated through a predetermined angle such that both of channels 41 and 43 communicate at least partially between the interior and exterior of dispenser 10', thereby permitting flow of the contents of container 17 through one of said channels, 43 for example, and permitting the inflow of air into the container 17 through channel 41. The particular advantage of this embodiment of the dispenser lies in its utility for dispensing liquids. In particular, it is known that air must pass into the container of liquid to let the liquid flow out therefrom. In the illustration of FIGURE 6 the air inflow is provided by channel 41 and the liquid content outflow is provided by channel 43. By appropriately rotating the gate member 11' simultaneous control over the amount of inflow and outflow can be achieved. An alternative closed position is to locate channels 41 and 43 between the two rims of the annular seat surface.

FIGURES 7 and 8 illustrate still another embodiment of this invention wherein dispenser 10'' comprises a seat member 13'' substantially identical to seat member 13 of embodiment 10. A gate member 11'' is rotatably mounted in seat member 13'', gate member 11'' having the configuration of a truncated sphere. In the closed position of dispenser 10'', as illustrated in FIGURE 7, the surface of truncation is disposed interior of the dispenser 10''. By rotating the gate member 11'' in the direction and to the degree required, communication between the interior and exterior of 10'' may be achieved.

In both the embodiments of FIGURES 5 and 7 it is to be noted that no finger piece such as member 31 of FIGURE 1 is provided for facilitating hand operation of the gate member. Such member may be provided or a concave indentation as a finger grip provided, or control of gate members 11' and 11'' may be achieved through remote control.

The dispenser 10'' of FIGURES 7 and 8 is well suited to dispense heavy liquids such as salad dressing or syrup, or granulated materials. In its closed position, dispenser 10'' serves to inhibit the inflow of moisture and air, and also keeps the contents of container 17 free of contamination by insects, bacteria, and the like.

The seat and gate members may be manufactured from any suitable material such as plastic, rubber, glass or metal. The shapes may be molded, die cast, machined or formed as necessary. Insertion of the gate member into the seat may be accomplished by any known technique, including a press fitting if the material employed is sufficiently resilient.

While I have described and illustrated these specific embodiments of my invention, it will be clear that vari-

ation of the details of construction which are specifically illustrated and described may be resorted to without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A device for controllably dispensing fluid or granular material from an opening in a container, said device comprising:

a seat member having a generally annular aperture extending through one of its walls, said aperture being defined by a concave side wall, said seat member being disposed to overlie the opening in said container with said aperture and said opening in substantial alignment,

a captive closure for said aperture comprising a generally spherical gate member mounted for universal rotation in said annular aperture, said concave side wall comprising the sole means by which said gate member is supported in said aperture,

passage means defined in said gate member for controlling the egress of said material from said container at variable flow rates in accordance with the attitude of said passage means relative to the container opening, wherein the diameter of the gate member is substantially larger than the thickness of said one wall of said seat member, and further comprising a second plurality of co-planar radially extending passages intersecting interiorly of said gate member and terminating as ports at the surface of said gate member, wherein the planes of said first and second pluralities of passages are parallel.

2. A device for controllably dispensing fluid or granular material from an opening in a container, said device comprising:

a seat member having a generally annular aperture extending through one of its walls, said aperture being defined by a concave side wall, said seat member being disposed to overlie the opening in said container with said aperture and said opening in substantial alignment,

a captive closure for said aperture comprising a generally spherical gate member mounted for universal rotation in said annular aperture, said concave side wall comprising the sole means by which said gate member is supported in said aperture,

passage means defined in said gate member for controlling the egress of said material from said container at variable flow rates in accordance with the attitude of said passage means relative to the container opening, wherein the diameter of the gate member is substantially larger than the thickness of said one wall of said seat member, and wherein said passage means comprises three parallel groups of co-planar radially extending passages, the passages of each group intersecting at three respective points on a diameter of said gate member and terminating as ports at the surface of said gate member.

3. The device according to claim 1 wherein the diameter of said gate member is at least five times the thickness of said one wall of said seat member.

4. A device for controllably dispensing fluid or granular material from an opening in a container, said device comprising:

a seat member having a generally annular aperture extending through one of its walls, said aperture being defined by a concave side wall, said seat member being disposed to overlie the opening in said container with said aperture and said opening in substantial alignment,

a captive closure for said aperture comprising a solid generally spherical gate member mounted for universal rotation in said annular aperture, passage means defined in said gate member for controlling the egress of said material from said container at variable flow rates in accordance with the

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attitude of said passage means relative to the container opening, wherein the diameter of the gate member is substantially larger than the thickness of said one wall of said seat member,

wherein said passage means comprises a plurality of co-planar radially extending passages intersecting interiorly of said gate member and terminating as ports at the surface of said gate member, and

further comprising a second plurality of co-planar radially extending passages intersecting interiorly of said gate member and as ports at the surface of said gate member, wherein the planes of said first and second pluralities of passages are parallel.

5. A device for controllably dispensing fluid or granular material from an opening in a container, said device comprising:

a seat member having a generally annular aperture extending through one of its walls, said aperture being defined by a concave side wall, said seat member being disposed to overlie the opening in said container with said aperture and said opening in substantial alignment,

a captive closure for said aperture comprising a solid generally spherical gate member mounted for universal rotation in said annular aperture,

passage means defined in said gate member for controlling the egress of said material from said container at variable flow rates in accordance with the

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attitude of said passage means relative to the container opening, wherein the diameter of the gate member is substantially larger than the thickness of said one wall of said seat member,

wherein said passage means comprises three parallel groups of co-planar radially extending passages, the passages of each group intersecting at three respective points on a diameter of said gate member and terminating as ports at the surface of said gate member.

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