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E. T. OAKES ETAL

3,170,608

DRIPLESS DISPENSING APPARATUS

Filed Oct. 3, 1961

FIG. 1.

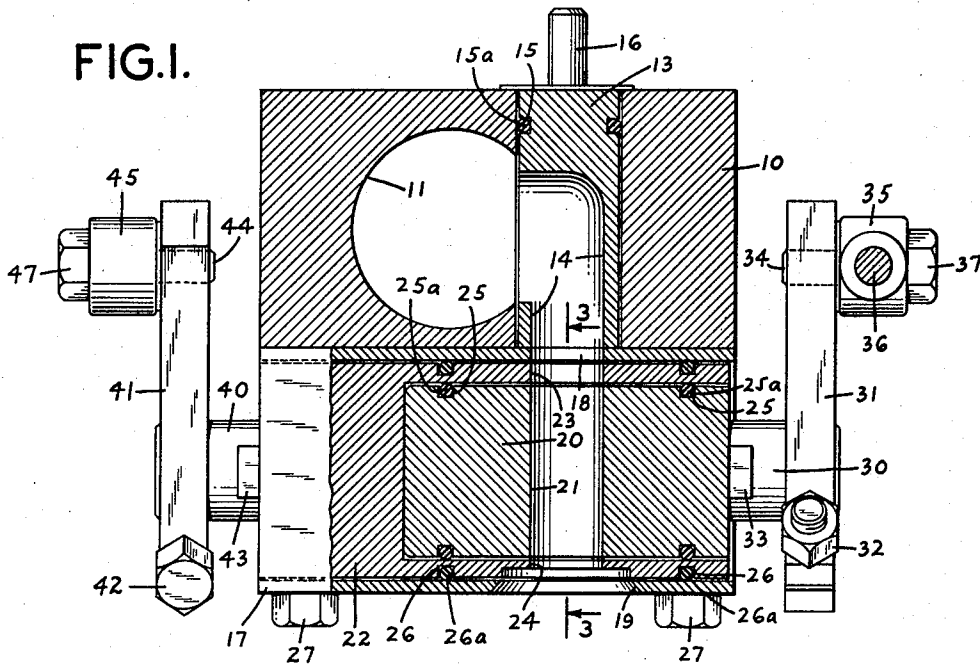


FIG. 2.

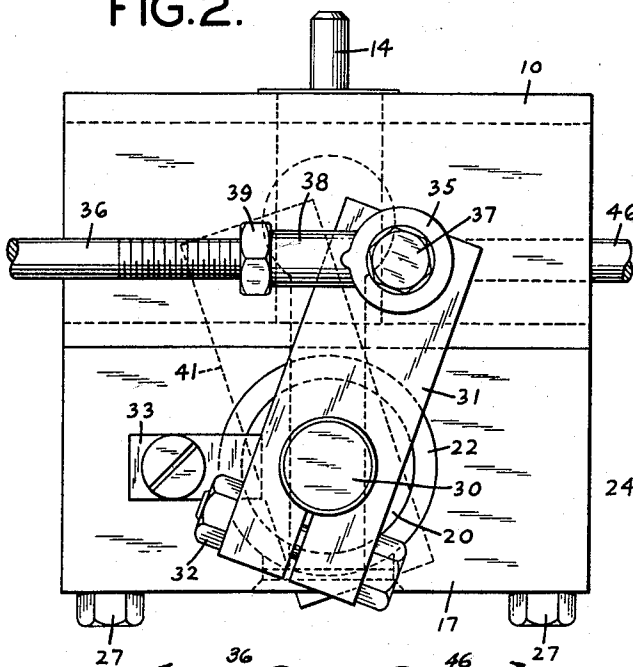


FIG. 3.

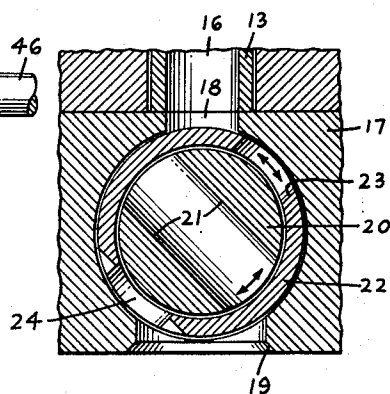
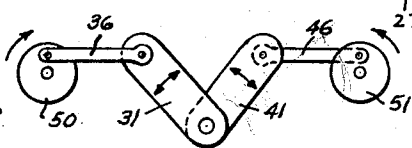


FIG. 4.



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DRIPLESS DISPENSING APPARATUS

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1 Claim. (Cl. 222-502)

This invention relates to dispensing devices, and more particularly to an improved valve structure for depositing semi-fluid materials, such as cake batters, icings, and the like, under pressure, on a receiving surface without dripping.

In commercial baking practices, utilizing automatic machinery, the raw batter has a tendency to adhere to the dispensing apparatus that deposits it on the baking trays, causing dripping and tailing, and a consequent unevenness in the finished product. It is accordingly the primary object of the present invention to provide a valve arrangement for a dispensing apparatus which is substantially drip-free in operation and which will permit greater uniformity of product.

It is a further object of this invention to provide a dispensing valve for use in the baking and confectionary industries wherein measured amounts of liquid raw materials may be deposited uniformly and without dripping on a receiving surface.

In accordance with the present invention, a valve means is provided between a source of the raw material, such as cake batter or the like which may be of varying viscosity, and a discharge port from which it is deposited on the receiving surface, said valve consisting of a pair of concentrically mounted cylinders, each of which is provided with a bore extending transversely therethrough. The cylinders are independently oscillated about their common axis so that they are always moving counter to one another, and are so arranged that their respective bores are brought into alignment with each other and with the source and discharge port during each cycle of oscillation. During the time when the bores are so aligned, the material is free to flow from the source to the receiving surface. As the counter oscillating cylinders are rotated beyond their aligned position, the relative shearing action occurring therebetween cuts off the flow of material cleanly and quickly, thereby eliminating undesirable dripping. By controlling the speed of the counter rotational movement, the period during which the respective bores are aligned may be varied, thus controlling the amount of material to be deposited during each operation. A change in the rate of oscillation of these cylinders will correspondingly change the frequency at which charges of the material are deposited on the receiving surface, which conventionally is moving at a constant speed beneath the dispensing apparatus.

The foregoing and other objects, features and advantages of the present invention will become more apparent from the following detailed description thereof, when taken in conjunction with the appended drawings, in which:

FIGURE 1 is a front elevation in partial section showing the internal arrangement of the present invention;

FIGURE 2 is a side elevation of the valve apparatus showing the arrangement for oscillating the individual valve elements;

FIGURE 3 is a section through the valve structure along the lines 3-3 of FIGURE 1 showing the valve in the closed position; and

FIGURE 4 is a schematic illustration of a mechanism for actuating the oscillating valve element of FIGURE 2.

In FIGURE 1, the numeral 10 indicates the manifold or head of the apparatus which includes a passage 11

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through which is supplied the batter or other raw material to be dispensed. The passage 11 may be connected to a continuous type mixer such as described in Oakes Patent No. 2,572,049, from which a continuous supply of the material is provided to the dispenser. Fitted in a suitably provided bore in the head 10, is a cylindrical element 13 having a vertical bore 14 extending partially therethrough and communicating at its upper end with the passage 11 through the side of the member. A liquid-tight seal is provided between the element 13 and the head 10 by means of a groove 15 and O-ring 15a therein, and pin 16 at the upper end of the element 13 enables ready withdrawal and insertion of the element. Rotation of element 13 by means of pin 16 is effective to vary the size of the communicating passage between the supply opening 11 and the bore 14, to thereby regulate the flow of material through the apparatus.

A valve block 17 is rigidly fastened to the under side of head 10 by means of bolts 27 and is provided with a horizontal bore for accommodating the valve structure to be described hereinafter. The block 17 is also provided with a vertical bore 18 of the same diameter as bore 14 in the head 10 and in alignment therewith. A widened, flaring discharge port 19 is provided in the lower surface of the block 17, from which the material is discharged onto the receiving surface.

The valve structure comprises an inner cylindrical member 20 including a bore 21 extending diametrically therethrough, and an outer cylindrical member or sleeve 22, surrounding the inner member 20, and provided with diametrically opposed bores 23 and 24. As illustrated in the drawings, the bores 21, 23 and 24 are preferably of the same diameter as each other and as bore 14. The inner cylindrical member 20 is mounted for rotational movement within the outer sleeve 22, which in turn is rotatably mounted within the horizontal bore in block 17. A pair of cooperating grooves and O rings 25, 25a provide a moisture-tight seal between the members 20 and 22 and groove-O-ring combinations 26, 26a provide a similar seal between the sleeve member 22 and the valve block 17. The output end of the bore 24 in the sleeve 22 is preferably widened to match the flaring opening 19 in the valve block.

A shaft portion 30 is made integrally with or fixed coaxially to the member 20 and extends exteriorly of the block 17. A crank arm 31 is rigidly fixed at one end thereof to the shaft 30, such as by a split ring clamp compressed by bolt 32. At the other end of the crank arm 31 is provided a pin 34 which is rotationally engaged by sleeve member 35. The latter is maintained on the pin by nut 37 and is provided with a lateral extension 38 and a threaded portion 39 (FIGURE 2) for receiving the threaded end of a reciprocating member 36.

The sleeve portion 22 of the valve has a closed end provided with a shaft 40 rigidly fixed thereto externally of the valve block 17. A crank arm 41, similar to element 31, is likewise fixed at one end of shaft 40 and clamped thereto by means of bolt 42. A pin 44 is provided at the other end of the arm 41 for retaining the sleeve 45 in rotational engagement. The latter receives a reciprocating shaft 46 (FIGURE 2) in a manner similar to the relationship between elements 35 and 36. The bolt 47 retains the sleeve 45 from lateral movement on the pin 44. Stops 33 and 43, disposed on opposite sides of the valve block 17 and secured thereto such as by screws, serve to retain the valve elements 20 and 22 in the bore in the block 17.

In FIGURE 1, the valve structure is shown in its aligned relationship, during which material from the source may be discharged on the receiving surface. As shown, the bores 21, 23 and 24, in the elements 20 and 22 of the valve structure, are in alignment with each other

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and with the bores 14, 18, and 19, to provide an unblocked passage for flow of the batter material. As can be seen more clearly in FIGURE 2, with the valve in the open, or aligned position, the crank arms 31, 41 assume a given angular displacement from each other as established by the positions of the reciprocating arms 36, 46. As one or both of the shafts 36, 46 moves horizontally, its respective crank arm and valve member is rotated and the valve bores brought out of alignment. While movement of just one of the valve members would be sufficient to close the valve passage, it has been found preferable to simultaneously move both members in opposite senses whereby more rapid closure of the valve is effected and dripping thus minimized. The closed position of the valve is illustrated in FIGURE 3.

The arms 36 and 46 may be reciprocated by any well-known means, such as motor-driven eccentric wheels 50 and 51 as shown in FIGURE 4, and preferably the extents of the reciprocation of the respective wheels are made equal, whereby the amplitudes of the oscillations of the respective valve members about their common axis are rendered equal. The counter or opposed-phase oscillations of the valve members may be adjusted, by positioning the members 36 and 46, to have varied amplitudes. For example, it may be desirable that the valve bores be in alignment at one extremity of the reciprocation of the members 36 and 46, whereby the valve is opened effectively once during each complete cycle of operation. Alternatively, the aligned or open condition of the valve may be arranged to be at the midpoint of the reciprocation of the arms 36, 46, whereby the valve is opened twice during each complete cycle of operation. The particular adjustment required will depend on such factors as the desired spacing of the dispensed material on the receiving surface and the volume to be discharged at each instance.

As will be apparent, the relative motion of the valve members 20 and 22 provides a shearing action therebetween which quickly and positively cuts off the flow of batter material from the source to the receiving surface. This rapid closing of the valve eliminates the dripping and tailing of the material and thereby enables a more uniform product to be obtained. Although the valve openings 21, 23 and 24 have been illustrated as being circular in cross-section, it will be evident that other shapes, e.g. rectangular, triangular, may be used to provide products of and desired configuration.

In practice, it has been found most advantageous to provide a plurality of dispensing valves in a single mani-

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fold, each of the valves communicating with the supply passage therein. In such an arrangement, it is desirable to control the valves such that say, half are open and depositing material on the receiving surface while the remainder are closed, to thereby prevent undesirable pressure build-up from occurring in the system.

While the invention has been described in connection with baking and confectionary manufacture and materials, it will be apparent that the novel principles thereof may be applied to other fields wherein the metered flow of a liquid material is desired. Accordingly, it is intended that the invention be limited only by the scope of the appended claim.

What is claimed is:

- 15 Apparatus for depositing individual portions of semi-fluid material onto a moving receiving surface comprising a depositing head having a material conducting channel therein, a valve in said channel for controlling flow of said material therethrough, a discharge port in said head, a cylindrical member disposed between said channel and said discharge port having a transverse bore extending therethrough, a cylindrical sleeve surrounding said member having a closed end and an open end and a pair of diametrically aligned openings in the wall thereof, said discharge port being of substantially larger diameter than said aligned openings and flaring outwardly from the adjacent aligned opening to prevent the adherence of said semi-fluid material thereto, said aligned opening adjacent said discharge port having an outer widened portion of substantially the same diameter as said discharge port, a first shaft fixed to and extending axially from said closed end of said sleeve, a second shaft fixed to and extending axially from the end of said cylindrical member adjacent to said open end of said sleeve and means connected to said shafts for oscillating said member and said sleeve about their respective axes to move the said openings and said transverse bore intermittently into and out of alignment with said channel and said discharge port to cause predetermined portions of said material to be cut off by the shearing action between said member and said sleeve and to be deposited on the moving receiving surface.

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