

# United States Patent

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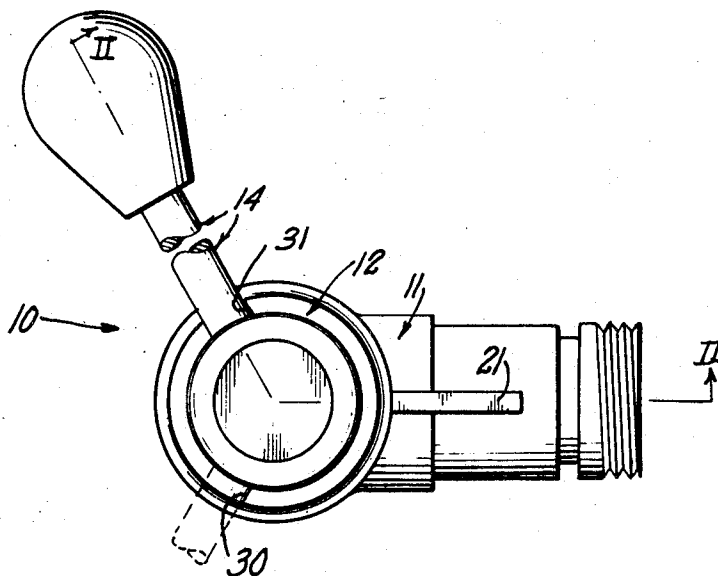
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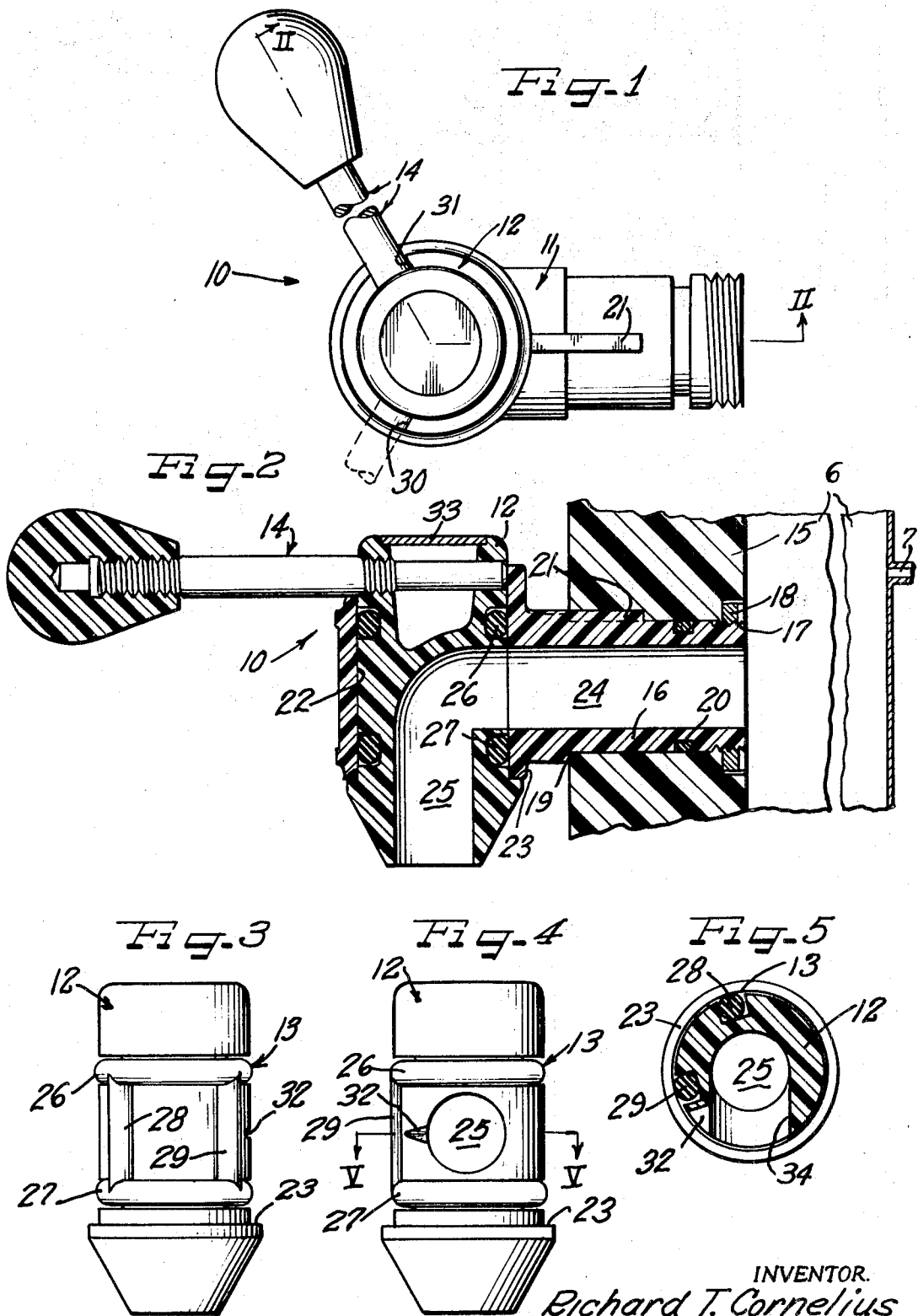
## [54] DISPENSING VALVE ASSEMBLY 1 Claim, 5 Drawing Figs.

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**ABSTRACT:** A valve assembly includes a body member having a bore, a valve core member rotatable therein, smooth-flow passage means extending through said members, a V-notch in the valve core member opening into said bore and said passage, a manually detachable handle retaining said valve core member in said body member, and a molded seal that includes a pair of spaced parallel circular portions and a pair of spaced elongated straight parallel connecting portions joined at their ends to the circular portions integrally, the seal portions respectively extending on opposite sides of the passage when the valve assembly is closed.





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## DISPENSING VALVE ASSEMBLY

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to manually operatable dispensing valves of the rotary plug type, and more specifically to such a valve assembly having a liquid agitation means for foaming carbonated slush-ice beverage and having a high-pressure seal embodied therein.

## 2. Prior Art

Although large capacity dispensing valves are known per se, none has been found to be suitable for being used with a source of carbonated slush-ice type of liquid which is under relatively high pressure. In particular, such devices have not been able to both satisfactorily control fluid flow and also pass ice crystal agglomerations. Further, seals thereof have been especially susceptible to failure and to a short life. Moreover, prior devices have not enabled the operator to withdraw a suitably foamy product.

## SUMMARY

The valve assembly has a rotary valve core member through which a flow passage extends, there being a V-notch type of groove in the valve core member which opens toward an impingement surface in the flow passage and into the bore in which the valve core member is rotatable. A molded seal provides long life under pressurized operation and includes spaced parallel circular portions integrally joined together by means of spaced elongated straight parallel connecting portions, such portions being disposed at opposite sides of the passage when the valve assembly is closed. A handle provides guidance and locking for the valve core member, and also indicates the functional position of said V-notch.

Accordingly, it is an object of the present invention to provide a valve assembly for dispensing pressurized carbonated slush-ice type of beverage.

Another object of this invention is to provide a valve assembly which will suitably control flow regardless of viscosity or consistency of slush-ice beverage to be dispensed.

Another object of the present invention is to provide a valve assembly which during dispensing will agitate a pressurized carbonated beverage passing therethrough to produce a foamy product.

A still further object of the present invention is to provide a valve assembly which can both control dispensing of slush-ice and that is self-cleaning as to any large agglomerations of ice crystals, without plugging up.

Yet another object of the present invention is to provide a valve assembly for handling a pressurized product having a seal assembly which will have a long life under adverse operating conditions.

A still further object of the present invention is to provide a dispensing valve assembly of a sanitary type of construction that can be manually disassembled for cleaning without use of any tool.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheet of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

## ON THE DRAWINGS

FIG. 1 is a top view of a dispensing valve assembly provided in accordance with the principles of the present invention;

FIG. 2 is a cross-sectional view taken along line II-II of FIG. 1 with mounting means added;

FIG. 3 is an elevational view of a valve core member and seal shown in FIG. 2;

FIG. 4 is a side view of the valve core member shown in FIG. 3; and

FIG. 5 is a cross-sectional view taken along line V-V of FIG. 4.

As shown on the drawings:

The principles of this invention are particularly useful when embodied in a valve assembly such as illustrated in the drawings, generally indicated by the numeral 10. The valve assembly 10 includes a body member 11, a valve core member 12, a seal 13, and a manually detachable handle 14.

The body member 11 has an inlet end constructed to be secured to a wall 15 of a chamber having a compartment 6, for instance one having a pressurized supply of carbonated slush-type of beverage therein, the chamber 6 having a beverage inlet 7 of restricted size. The body member 11 has a shank 16 with a threaded outer end 17 carrying a nut 18 which coacts with a shoulder 19 to clamp the valve body member 11 to the wall 15. A static seal 20 is carried in a peripheral groove, and a key 21 is received in a corresponding keyway in the wall 15 to preclude rotation of the valve body. The valve body member 11 has a cylindrical bore 22 extending therethrough from the upper to the lower sides.

The valve core member 12 is cylindrical and is rotatable within and guided by the bore 22, and is also axially slidable therein. Upward axial movement is limited by a shoulder 23 which is carried on a projecting portion of the valve core member 12, the shoulder 23 engaging the lower side of the body member 11 at the bore 22. The upper end of the valve core member 12 also projects from the bore 22, and it is into this upper end that the handle 14 is secured so that the handle is engageable with the upper side of the body member 11 to prevent axial withdrawal of the valve core member 12. However, when it is desired to clean the valve assembly 10, the handle 14 is unscrewed manually, thus permitting the valve core member 12 to be pressed out of the bore 22 manually.

The members 11, 12 have a flow passage extending therethrough, the body member 11 having a flow passage portion 24 and the valve core member 12 having a flow passage portion 25. The flow passage portion 24 is thus the inlet and is in the body member 11 while the flow passage portion 25 is an outlet that is in the valve core member 12. The flow passage 24, 25, when open, presents a flow path which is of substantial size and capacity, much less than that of the compartment 6 and much more than that of the restricted beverage inlet 7, and which in this embodiment is devoid of discontinuities so that ice agglomerations of product can be conducted smoothly. This type of construction also enables a foamy beverage to be discharged smoothly therefrom, as explained below. With the handle 14 disposed as shown in FIG. 1, the flow passage 24, 25 is in its most open position which is fully open as shown in FIG. 2. With the handle 14 rotated to the position shown in broken lines in FIG. 1, the flow passage 24, 25 is fully closed.

To effect proper sealing of the bore 22 and to effect full closing of the passage 24, 25, the seal 13 is disposed at the bore 22 and lies in grooves provided in the valve core member 12. As best seen in FIG. 3, the seal 13 includes a pair of spaced parallel circular portions 26, 27 of substantially equal size, and as shown in FIG. 2, the circular portions 26, 27 lie at opposite sides of the flow passage 24, 25. The seal 13 further includes a pair of spaced elongated straight parallel connecting portions 28, 29, each of which is integrally joined to the circular portions 26, 27 at opposite ends thereof. When the valve core member 12 is in the fully open position as shown in FIG. 2, then that side of the valve core member 12 and seal 13 which is shown in FIG. 4 is directed toward the flow passage portion 24. When the valve core member 12 is in the fully closed position, then that part of the valve core member 12 and the seal 13 which is shown in FIG. 3 is directed toward the flow passage portion 24. With the valve assembly fully closed, the inlet pressure is thus applied to the central part of the squarelike configuration shown in FIG. 3, and such force urges the connecting portions 28 and 29 apart, and corresponding portions of the circular portions 26, 27 also apart. Atmospheric pressure is at all times present at the upper side of the circular portion 26 and at the lower side of the circular portion 27 by entry from the upper and lower ends of the bore 22. When the valve core member 12 is fully closed, atmospheric pressure enters the outlet end of the passage por-

tion 25 and reaches the circular opening shown in FIG. 4 at the bore 22 and the inner side of the remainder of the circular portions 26, 27 is likewise also exposed to atmospheric pressure. Thus the four legs of the squarelike portion of the seal 13 shown in FIG. 3 are urged apart and are each placed in tension. However, as the seal 13 is a molded unitary element, and as it is installed in its as-molded configuration, the internal stresses are those that are produced only by pressure, without any deformation due to the mode of installation.

When the valve core member 12 is rotated toward the open position, the connecting portion 29 first moves over the aperture in the body member 11 which is the end of the flow passage portion 24 at the bore 22. Product thus begins to rush out past such seal portion 29, but its opposite ends are firmly held by the circular portions 26, 27 so that no damage results thereto, even with repeated long use.

To regulate the angular extent of movement of the valve core member 12, the upper end of the body member 11 has a pair of stops 30, 31 between which the shank of the handle 14 projects for respectively defining the closed and the open positions of the valve core member 12.

One of the most important features of this invention is that the valve core member 12 has means that define a groove 32, the groove being in the form of a V-notch with its widest part, as best seen in FIG. 4, opening into the flow passage 25 and also opening into the bore 22. When the valve core member 12 is moved from its fully closed position, after the connecting portion 29 has exposed liquid under pressure, such liquid, at the moment of the beginning of opening, finds that its easiest exit path is to enter the groove 32. As the passage upstream of the groove or notch 32 is larger, the groove 32 provides a restriction of variable size. The groove 32 is so directed that it causes pressurized carbonated product flowing therethrough to impinge with high velocity against a surface or wall portion 34 of the passage 25, thereby producing an extreme agitation of the carbonated product. The wall portion 34 is at the side of the passage 25 which is opposite to the groove 32. Such agitation causes the carbon dioxide gas to break out, thereby converting the product into a foamy product which flows smoothly through the passage 25 at a satisfactory reduced velocity. During normal dispensing only the groove 32, and not the passage portion 25, is aligned with the passage portion 24. This condition normally produces a pressure drop across the groove 32. As the product includes ice crystals, which can agglomerate, there is a likelihood that the groove 32 may become blocked with such ice. If and when this happens, the handle 14 is turned further to align the large passage portion 25 briefly directly with the passage portion 24, and on doing so, any trapped ice is readily flushed out of the valve assembly 10. Preferably when the handle 14 is in a position midway between the stops 30, 31, only the groove 32 is aligned with the passage portion 24.

As shown in FIG. 2, the valve core member 12 is molded

and to save material, a cavity is provided which is closed by a cover 33 which serves three purposes. The cover 33 renders the resulting construction to be sanitary, it provides a means for carrying product identification, and it improves the appearance of the device aesthetically.

During the dispensing, after any broken-out CO<sub>2</sub> gas in the compartment 6 has reached a pressure equal to the inlet pressure at the beverage inlet 7, and with the core member 12 in a suitably open position, because of the relative sizes of the flow areas, the rate of product flow is controlled by flow restriction of the inlet 7, whereby flow through the valve 10 is effected hydrostatically.

With this dispensing valve, a carbonated beverage can be dispensed with a variable degree of agitation, thus also enabling the operator to regulate to some extent the degree of foaminess for liquids or beverages which may have a wide variance in carbonation stability. Moreover, as explained, where the beverage includes shush-ice, any ice that is trapped in the notch or groove 32 is readily flushed out so that the valve is self-cleaning in response to being opened further. Further, the seal 13 provides a reliable durable low-friction seal even where the product is handled at high inlet pressures. Moreover, the foregoing has been provided with simple construction of a sanitary nature that can be readily manually disassembled or reassembled without tools for inspection and cleaning.

I claim:

1. Means for dispensing a pressurized gas-charged semi-frozen confection, comprising:

- a. a body member having a vertical bore;
- b. a valve core member disposed in said bore and manually movable about a vertical axis;
- c. means defining a flow passage through said members, said passage having a horizontal inlet end in said body member and a vertical discharge end in said valve core member communicating with the atmosphere, said passage being closable and openable in response to a substantial angular movement of said valve core member, and having a size capable of passing ice crystal agglomerations therethrough;
- d. means in said valve core member defining a single restricted groove opening into said bore and into said passage, and at all times communicating with said discharge end of said passage and the atmosphere, for agitating the confection flowing therethrough when said restricted groove is aligned with said horizontal inlet end of said flow passage in said body member; and
- e. a semi-frozen confection compartment upstream of said passage and a confection inlet to said compartment, said passage when only said restricted groove is most open having a flow area the size of which is intermediate the flow areas of said compartment and said confection inlet.