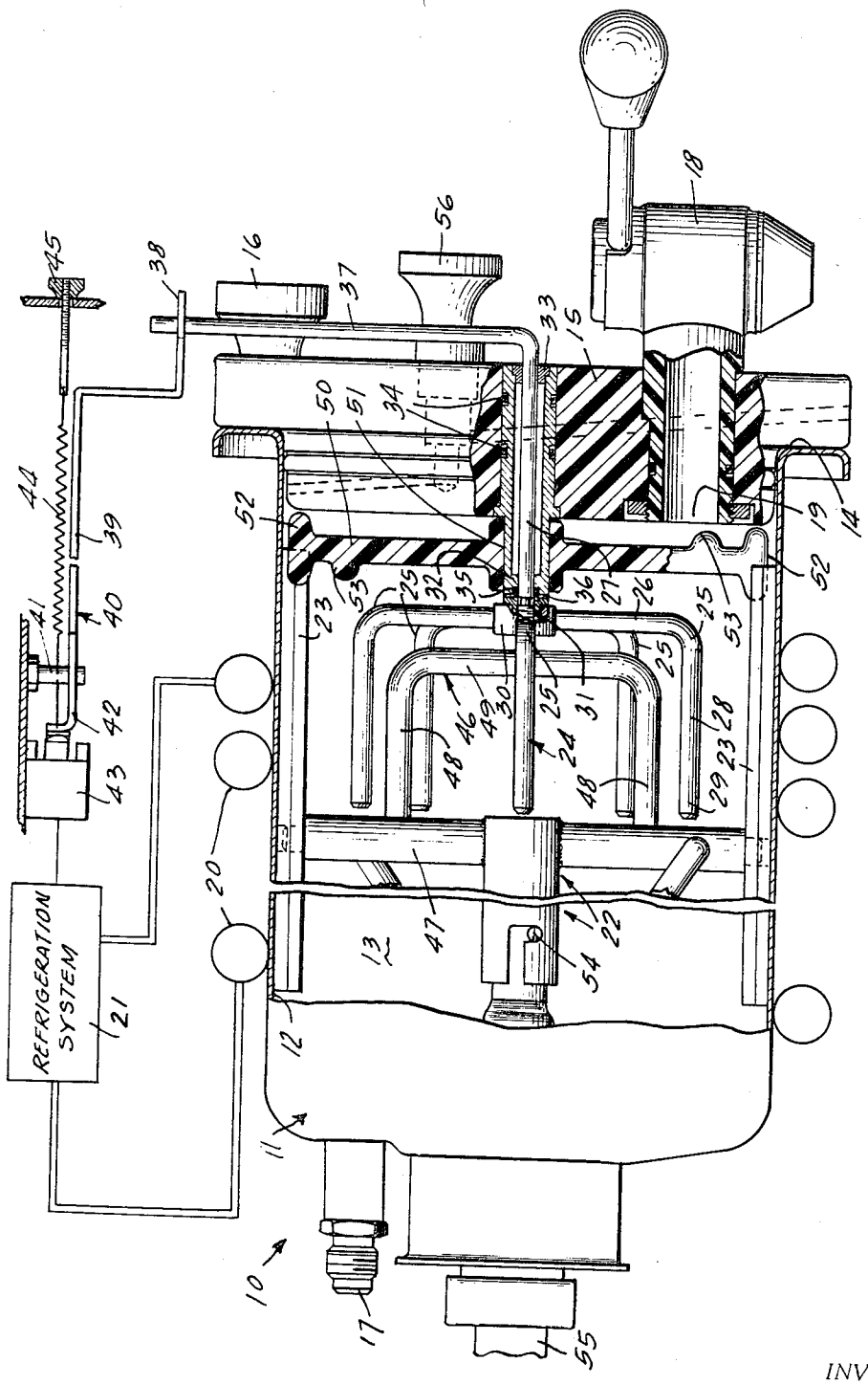
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CONTROL FOR A SLUSH-ICE BEVERAGE MACHINE

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INVENTOR.

RICHARD T. CORNELIUS

BY Kill, Sherman, Morsi, Gross & Simpson ATTORNEYS

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CONTROL FOR A SLUSH-ICE BEVERAGE MACHINE

Richard T. Cornelius, Minneapolis, Minn., assignor to The Cornelius Company, Anoka, Minn., a corporation of Minnesota

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ABSTRACT OF THE DISCLOSURE

The freezing chamber of a slush-ice beverage machine has a rotatably driven scraper assembly, at one axial end of which is an independently supported claw-like torque sensing element connected to refrigeration controls. Means on the scraper assembly rotate within such claw-shape, scraper blades rotate about such claw-shape, and a spinner rotates between the claw-shape and the end of the freezing chamber independently of the torque sensing element. The spinner rotates past the inlet of a dispensing valve to keep it clean.

BACKGROUND

(1) *Field of the invention*

This invention pertains to the control of a refrigeration system connected to a beverage freezing chamber, such control being in response to the viscosity of the product being frozen.

(2) *Prior art*

It has been known heretofore in the control of freezing chambers for producing a slush-type of beverage to sense the viscosity of the slush as a means for controlling the amount of water frozen out of the beverage. With prior devices, there has been a tendency for the slush to agglomerate in two manners. When fine crystals are produced, if they are agitated, they stick to each other to form a consistency much like sand. A further type of agglomeration takes place when a beverage containing such ice particles is agitated and mixed, such further agglomeration being in the nature of "globs" or snowballs. Where such agglomerating takes place in the vicinity of the viscosity sensing element, not only does the beverage tend to become nonhomogeneous, but the accuracy of control is destroyed.

SUMMARY

A torque sensing element is spaced at all points from a scraper assembly, and while gentle stirring of product is provided, there is no agitation or mixing. A faceplate provides the sole support for the sensing element which extends adjacent to the scraper blades, a U-shaped rod being carried by the scraper assembly and rotatable within the sensing element, there being an elongated spinner disposed between the sensing element and the faceplate and extending past the inlet of a dispensing valve carried by the faceplate.

Accordingly, it is an object of the present invention to provide a control for a slush-ice beverage machine which will not cause the product to agglomerate.

Another object of the present invention is to provide a sanitary construction for a slush-ice beverage machine control.

Yet another object of the present invention is to provide a control for slush-ice beverage machine wherein any tendency for agglomeration to begin is positively overcome.

A still further object of the present invention is to provide means that form a part of the refrigeration control that also keep the inlet to a dispensing valve clear at all times.

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 drawing in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

ON THE DRAWING

The single figure is a side elevational view, partly broken away and cross-sectioned, of a control for a slush-ice beverage machine provided in accordance with the principles of the present invention.

AS SHOWN ON THE DRAWING

The principles of this invention are particularly useful when embodied in a machine for producing and dispensing a slush-ice beverage such as illustrated in the drawing, generally indicated by the numeral **10**. The machine **10** includes a housing **11** which has a cyilndrical internal surface **12** which defines a cylindrical freezing chamber **13**. The housing **11** is closed by its configuration at the left illustrated end, and at its other end **14**, the housing **11** and its chamber **13** are closed by a faceplate **15** which is held in place by a set of four screws, one of which is illustrated at **16**. Product to be treated enters the chamber **13** through an inlet **17**, and leaves the chamber **13** through a dispensing valve **18** which has an inlet **19** at the inner side of the faceplate **15**.

The housing **11** is provided with a refrigeration coil **20** which is connected to a refrigeration system **21** whereby the housing **11** is externally refrigerated to freeze out some of the water of beverage disposed therein to form fine crystals, the resulting product having a slushy consistency. As water particles freeze out on the internal surface **12**, they are removed therefrom by the wiping action of a rotatably driven scraper assembly **22**, a portion thereof constituting a pair of scraper blades **23**, **23**. The details of the scraper assembly **22** form another invention, and so far as is necessary for the understanding of the present invention, it should be explained that the scraper assembly **22** moves gently through the product without agitating it, providing a slight stirring action to break up any channeling in the product without actually mixing the product.

The faceplate **15** is spaced at all points from the scraper assembly **22**, and in the axial space therebetween, there is provided a torque sensing element generally indicated at **24** which is also spaced at all points from the scraper assembly **22**. The torque sensing element **24** includes L-shaped finger means, the illustrated embodiment having five such fingers of the same size arranged in the manner of a claw with a uniform angle between each of the L-shaped fingers, each such finger being indicated by the numeral **25**. Considering one of the L-shaped fingers, its L-shape has a leg **26** which extends radially from a shaft **27**, and a second leg **28** secured at one end to the outer end of the leg **26**, the leg **28** extending in a direction which is parallel to the axis of the shaft **27** and terminating in a free unsupported end **29**. Each of the other four legs **25** is identical to the one described and they jointly define a claw-like arrangement having a central hub **30**. Preferably, the five finger means **25** and the hub **30** are molded as a single piece, and a threaded insert or reducer **31** is provided in the hub and which is secured to the inner end of the shaft **27**.

The shaft **27** is supported intermediate its ends by a bushing **32**, and by a bearing **33** carried in such bushing **32**. The bushing has a pair of O-ring seals **34**, **34** which

prevent leakage along the outer surface thereof, while a further O-ring **35** surrounds the shaft **27** at the inner end of the bushing **32** and is held in place by a plastic washer **36** disposed between the hub **30** and the inner end of the bushing **32**. The washer **36** is of a plastic that has good lubricity properties, such as nylon or tetrafluoroethylene. Thus the faceplate provides the sole support for the sensing element **24**.

An arm **37** is secured to the outer end of the shaft **27** and forms part of a refrigeration control means for regulating the refrigeration system **21**. The upper end of the arm **37** extends into a bifurcated end **38** which forms part of one arm **39** of a bell crank **40** which is pivoted at **41** and which has a second arm **42** which controls an electric switch **43** operatively connected to the refrigeration system **21**. The bell crank **40** is biased by a spring **44**, the degree of such bias being selectable by a manual adjustment means **45**. The spring **44** so biases the bell crank **40** that the switch **43** keeps the refrigeration system **21** energized. When the viscosity of the beverage increases, the torque sensing element **24** is pivoted slightly to move the arm **37** and the bell crank **40** against the bias of the spring **44** to actuate the switch **43** to a position where the refrigeration system **21** is shut down.

The rotatably driven scraper assembly **22** moves through the product so smoothly that there is very little tendency to cause the product to rotate. Its typical rotational speed is 100 r.p.m. In order to keep the sensing element **24** clear of any agglomeration and also in order to transmit thrust thereto, there is provided means secured to the scraper assembly for rotation adjacent to the sensing element, such means in this embodiment comprising a U-shaped torque pulsing rod generally indicated at **46** and secured to an arm **47** of the scraper assembly **22**. The U-shaped torque pulsing rod **46** has a pair of leg portions **48**, **48** which extend parallel to the leg portions **28** of the sensing element, and a leg portion **49** which extends in parallel relation to the leg portion **26** when aligned therewith. The U-shaped torque pulsing rod is therefore disposed within the various L-shapes of the fingers **25** and is disposed axially between the scraper assembly **22** and the faceplate **15**.

Between the faceplate **15** and the claw portion of the sensing element **24** there is provided means which rotate, such means being in the nature of an elongated spinner **50** which is rotatably supported on the outer cylindrical surface **51** of a portion of the bushing **32** that projects axially into the chamber **13**. The bushing **32** thus spaces the spinner **50** from the sensing element **24** while enabling it to rotate between the legs **26** and the faceplate **15**. The elongated spinner **50** is of such length that its distal ends **52**, **52** can be engaged by the scraper blade **23** and be thereby positively driven. This spinner thus further transmits torque to the legs **26**, to aid the leg portion **49** of the torque pulsing rod **46**.

The spinner **50** also rotates immediately past the inlet **19** of the dispensing valve **18**, and thus clears the zone just upstream of the inlet **19** from any agglomeration that may be present. If desired, a projection **53** may be provided thereon for this purpose. To balance its weight and to enable the spinner **50** to be installed with either side confronting the valve inlet **19**, a similar projection is carried on the other end. The spacing between the projection **53** that is directed toward the faceplate **15** and the valve inlet **19** is relatively small, and is in any event a distance which is less than the diametral size of the inlet **19**.

The scraper assembly **22** is secured by a bayonet connection **54** to a rotatably driven shaft **55** which rotates continually. In use, the chamber **13** is entirely filled with liquid beverage initially, any trapped air being vented by a manually controlled vent valve **56**. When the product in the chamber **13** is all liquid, there is no significant torque transmitted by the various moving parts to the pivotable torque sensing element **24**. As ice begins to form, it is removed from the inner wall **12** of the housing **11** by the scraper blades **23** and floats about in the remaining liquid to provide a homogeneous drink. If the ice particles for a given percentage of ice were relatively large, this would not materially affect viscosity. However, the ice particles are kept as small as possible since they are not agitated, and therefore since the crystals are very, very small, the product progressively becomes viscous and serves to transmit force from the moving parts **46**, **23**, **50** to the claw portion of the sensing element **24** until the selected force or level is reached. This terminates refrigeration, but as the driven shaft **55** continues to rotate, when the viscosity decreases due to melting or to the addition of fresh product, the refrigeration system is promptly turned back on. With this invention, there is no tendency of the product to snowball or agglomerate, and thus the structure is one that needs no attention, enabling the mechanism to be utilized in unattended dispensing machines of the coin operated type wherein the dispensing valve **18** is electrically actuated.

Although various minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon, all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A machine for producing a slush-ice beverage, comprising:

(a) an externally refrigerated housing having an internal surface defining a cylindical freezing chamber;

(b) a rotatably driven scraper assembly supported therein for acting on said internal surface;

(c) a faceplate closing an end of said chamber and axially spaced at all points from said scraper assembly;

(d) a torque sensing element spaced at all points from said scraper assembly and having a shaft pivotally supported intermediate its ends by and extending through said faceplate, said faceplate providing the sole support for said sensing element, said element having L-shaped finger means, one leg of the L-shape being secured to said shaft and extending radially therefrom and the other leg of the L-shape extending from said one leg in parallel relation to said shaft and adjacent to a portion of said scraper assembly, and terminating in a free end; and

(e) refrigeration control means connected to said shaft.

2. A machine according to claim **1**, wherein said portion of said scraper assembly is at least one scraper blade.

3. A machine according to claim **1**, wherein a U-shaped rod is secured to said scraper assembly, said U-shaped rod having leg portions disposed within the L-shape of said finger means, and respectively parallel to the legs of said L-shape.

4. A machine according to claim **3**, wherein said U-shaped rod is disposed in space axially between said scraper assembly and said faceplate.

5. A machine according to claim **3**, wherein said portion of said scraper assembly is at least one scraper blade.

6. A machine according to claim **1**, wherein an elongated spinner is rotatably supported for rotation about the axis of said shaft disposed axially between said L-shaped finger means and said faceplate.

7. A machine according to claim **2**, wherein an elongated spinner is rotatably supported for rotation about the axis of said shaft axially between said L-shaped finger means and said faceplate, a distal end of said spinner being engageable by said scraper blade to impart a rotational force thereto.

8. A machine according to claim **6**, wherein said faceplate supports a dispensing valve having an inlet, an end of said spinner during its rotation passing by said valve inlet at a distance less than the size of said inlet for removing any slush accumulation therefrom.

9. A machine according to claim **3**, wherein said finger

means includes five L-shaped fingers of the same size angularly spaced from adjacent ones of said fingers by a uniform angle.

10. A machine according to claim **6**, wherein said faceplate has a fixed bushing extending into said chamber, said bushing receiving said shaft and providing its pivotable support, and said bushing being received by said spinner and providing its rotatable support, said sensing element being spaced at all points from said spinner.

11. A machine according to claim **2**, wherein said finger means includes several L-shaped fingers arranged in the manner of a claw, said scraper blade being rotatable about the outside of such claw, means fixed to said scraper assembly and extending into such claw for rotation inside of

such claw, and rotatable means disposed between said faceplate and such claw and spaced from such claw.

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ROBERT A. O'LEARY, *Primary Examiner.*

W. E. WAYNER, *Assistant Examiner.*