

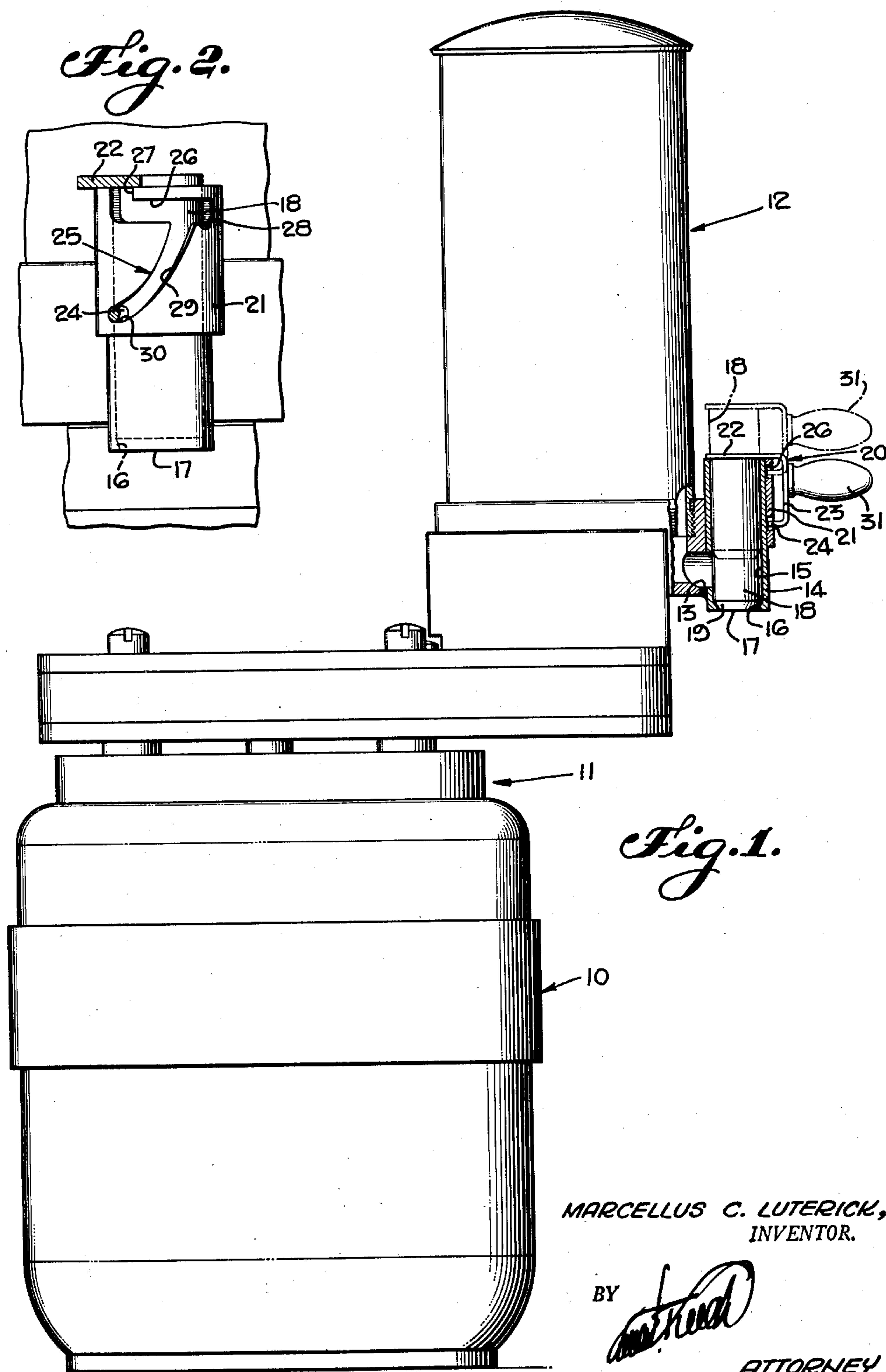
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# VALVE STRUCTURE FOR SEMISOLID PRODUCTS

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## VALVE STRUCTURE FOR SEMISOLID PRODUCTS

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2 Claims. (Cl. 251—39)

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This invention relates to a liquid control device and particularly pertains to a valve structure for semi-solid products. The invention disclosed in the present application is a division of my application entitled "Ice Cream Whipping Machine," filed December 12, 1949, Serial No. 132,499, now Patent No. 2,600,009, patented June 10, 1952.

In establishing and interrupting the flow of liquid and particularly semi-solid materials which flow slowly, it is desirable to provide valve means which may be opened readily to permit the semi-solid material to flow through the valve and form a fluid source and to interrupt the flow of the semi-solid material in a manner to cut off the flow completely without possibility of dripping or leakage. A valve of this type is a particular advantage in handling materials such as heavy oils, molasses, and semi-solid ice cream, all of which products are in a fluid state but tend to flow slowly. Such a valve is of especial importance in controlling the flow of semi-solid ice cream which is delivered from a source of supply as shown in the drawings of the above mentioned application of which this is a division.

In controlling the flow of ice cream by a valve it is highly important that the valve shall be easily operated and may be instantly taken apart so it can be sterilized and so that when the valve is opened a semi-solid material may flow rapidly and freely through the valve without possibility that the temperature of the product or its flavor will be changed objectionably.

It is the object of the present invention, therefore, to provide a valve structure which comprises a few parts easily assembled and separated so that the entire structure may be cleaned and sterilized without difficulty and which valve structure may be operated to close or open without the use of any packing means.

The present invention contemplates provision of an outer valve housing or sleeve within which a valve plunger may reciprocate longitudinally and which plunger carries means co-operating with portions of the sleeve to tend to position the plunger in its seated position and also to support the plunger when it is moved from its seat to an open position. The structure further contemplates an induction passageway through the wall of the sleeve and an eduction passageway at the end of the sleeve.

Referring more particularly to the drawings the invention is illustrated by way of example in the accompanying drawing in which:

Figure 1 is a view in side elevation showing an ice cream whipper as disclosed in the above men-

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tioned co-pending divisional application and indicating the closed valve in section as well as indicating by dotted lines the opened position of the valve.

Fig. 2 is an enlarged or fragmentary view in elevation showing the valve of the present invention with the operating handle broken away for the sake of clearness.

Referring more particularly to the drawings, 10 indicates an ice cream whipping machine comprising a base structure indicated at 11 and the whipping container 12 disposed thereabove. The whipping container in the present instance is supposed to receive ice cream in a semi-solid state and means, not shown in the present drawings, is provided to reduce the quantity of solid ice cream to a semi-solid fluid condition.

At the bottom of container 12 an eduction passageway 13 extends through the wall of the container parts and also through the wall of a valve sleeve or housing 14. The valve sleeve is cylindrical and tubular and is formed with a central bore 15 which is unobstructed throughout its length. The major portion of the bore 15 is of uniform diameter while the portion of the bore at the eduction end thereof is tapered inwardly to form a valve seat 16. This seat terminates in an end opening 17 which is of reduced diameter as compared with the main bore 15 of the sleeve. It is to be understood that in the present instance, the valve structure is designed to stand to be disposed with the longitudinal axis of the sleeve 14 extending vertically. In some instances however it may be desired to dispose the valve horizontally or at any other angle. This will be pointed out hereinafter.

Freely mounted within the sleeve 14 is a valve plunger 18. This plunger is cylindrical and has a sliding fit within the sleeve 14. The lower end of the plunger terminates in an incline tapered face 19 which registers with the incline seat 16 at the lower end of the bore 15. When the incline face of the plunger 19 rests against the face 16, the flow of fluid through the sleeve 14 from the induction passageway 13 to the eduction opening 17 will be interrupted completely. It is to be understood that the plunger 18 is usually made of a solid length of some selected metal stock of circular section and that the weight of this piece of material will be sufficient to hold the face 19 of the plunger in a sealing position against the valve seat 16 at the eduction end of the bore 15. By taking advantage of the weight of the plunger 18 it is not necessary to provide any fastening or tightening means; such struc-



tures, however, might be desirable in the event the fluid controlled by the valve is under excessive pressure or the valve is disposed at some angle to the vertical. It is to be pointed out, however, that the opening 17 of the sleeve 14 is spaced a substantial distance from the induction passageway 13 which passageway is disposed in a plane normal to the longitudinal axis of the sleeve. By this arrangement there is a normal tendency for the length of the plunger to cooperate with the tapered faces 16 and 19 in sealing off the flow of fluid through the valve.

The valve plunger 18 is held temporarily in its operative position within the sleeve 14 by cooperative latching and guide means. This includes a strip of material forming a fastening arm 20 which cooperates with a cam thimble 21 as will be hereinafter explained. The thimble 21 is substantially cylindrical and embraces the upper end of the sleeve 13. The arm 20 is provided with a horizontal extending portion 22 which lies in a plane normal to the end of the cylinder 14 and is fastened against the end of the valve plunger 18. The width of the arm 20 is such as to permit it to overhang the sleeve 14 and the thimble 21. It is understood, however, that the arm 22 will not prevent the plunger face 19 from resting upon the valve seat 16. The arm extension 22 is led downwardly and over the side of the thimble 21 as indicated at 23. This extension carries an inturned pin 24 at its lower end. The inturned pin 24 projects into a cam groove 25 particularly shown in Fig. 2 of the drawing. Here it will be seen that this groove includes an upper portion 26 which is cut circumferentially through the wall of the thimble 21. The groove 26 terminates at one end in an upwardly presented throat 27 through which the pin 24 may pass when in register therewith, thus facilitating in instantly dismantling the valve and separating the plunger 18 from its position within the sleeve 14. The opposite end of the groove 26 terminates in an arcuate latch seat 28 which occurs along the lower face of the groove. This latch seat or cutaway portion will receive the end of pin 24 and hold the plunger 18 in its uppermost position with the valve open. An arcuate groove 29 extends downwardly from the lower edge of groove 26 and at a point in advance of the arcuate seat 28. This groove describes a helix and is at a relatively steep pitch. Groove 29 terminates in a semi-circular end 30 into which the pin 24 may move when the plunger travels to its lowermost position. Secured upon the vertical extending portion 23 of the arm 22 is a handle 31 which is of sufficient size to permit an operator to rotate or lift the plunger 18 and to hold the plunger while it is being removed from position within the sleeve 14 or placed therein.

In operation of the present invention the valve is connected with any suitable source of fluid and particularly fluid which is in a semi-solid condition and flows at relatively low pressure. The induction passageway 13 is established through any suitable member communicating with the container carrying the fluid. This passageway is free to establish flow of fluid from the container 12 and to the cylindrical valve housing 14 providing the plunger 18 is in its elevated position.

The elevated position of the valve is indicated by dotted lines in Fig. 1. It will be understood that when the valve is in this position, the pin 24 on the handle arm 20 has been elevated along

the arcuate groove 29 and then moved by rotation of the plunger to a position of rest when in the arcuate seat 28. Due to this arrangement, the valve plunger will be rotated in elevated position and will have been rotated around the longitudinal axis of the plunger as the plunger 18 is lifted. When it is desirable to lower the tapered end face 19 of the valve plunger 18 on to the valve seat 16 of the sleeve 14, the handle 31 may be grasped to lift the pin 24 from the arcuate seat 28 and to rotate the pin 24 until it registers with the arcuate groove 29. The handle may then be released after which the plunger may move to its lowermost position by the weight of the plunger or as force is applied to the handle 31. In either event, it will be noted that the pin 24 will pursue a helical path as defined by the groove 29. This will act to rotate the plunger 18 as the plunger moves longitudinally and as the tapered face 19 of the plunger 18 reaches the tapered seat 16 of the cylinder 14 there will tend to be a wiping action between the two tapered faces. This will also occur as the plunger is lifted. It will be obvious that on the downward movement of the plunger there will be a self-cleaning action of the valve as the tapered faces rub against each other and the plunger rotates. It will also be evident that in the event the valve sticks, due to any cause, such as freezing, the action of the pin 24 traveling along the helical groove 29 will tend to produce rotational movement of the plunger and relieve any sticking or binding action between the surfaces of the plunger 18 and the sleeve 14. When the valve has been used and should be cleaned for any reason, the pressure is applied to the handle 31 so that the pin 24 will climb upwardly along the helical groove 29 and the pin 24 registers with the circumferential groove 26, the handle 31 may then be manipulated to move the pin 24 into register with the throat 27 after which the plunger 19 may be elevated bodily and removed from the sleeve. It may then be sterilized and if desired the sleeve 14 and its seat 16 may also be sterilized. The plunger and the sleeve may be instantly reassembled so that the valve is ready for operation without the use of tools, or without the necessity of packing of any kind.

It will thus be seen that the valve here disclosed is simple in construction, that it may be manipulated easily and that it may be quickly cleaned or sterilized as desired.

While I have shown the preferred form of my invention, it will be understood that various changes may be made in the combination, construction and arrangement of parts by those skilled in the art without departing from the spirit of the invention as disclosed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a valve for semi-solid products, the combination of: a tubular valve sleeve having a cylindrical bore; means for mounting said sleeve vertically and providing a passageway which opens into the bore of said sleeve near the lower end thereof; a cam thimble embracing an upper portion of said sleeve and having formed therein a cam slot; a cylindrical plunger slidably fitted within said sleeve for vertical movement therein; a control arm provided on the upper end of said plunger, said control arm extending outwardly and downwardly outside said thimble; a finger provided on said arm and extending into said cam slot, a lower portion of said slot receiving said



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finger when said arm comes to rest on the upper end of said sleeve, the lower end of said plunger at this time being flush with the lower end of said sleeve, an upper portion of said slot providing a rest for receiving said pin when the latter is swung into place over said rest and when said plunger is lifted to uncover the passageway for feeding semi-solid material into and through the lower portion of said sleeve; and a handle on said arm for manipulating said plunger and opening and closing said valve. 10

2. A combination as in claim 1 in which a steeply bevelled seat is formed just within the lower open end of the cylindrical bore of said sleeve, and in which the lower extremity of said plunger is correspondingly bevelled to fit said 15

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seat when said plunger is in its lowermost position with its lower end flush with the lower end of said sleeve.

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