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METHOD OF MAKING PRESSURE REGULATING DEVICES

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Fig. 1.

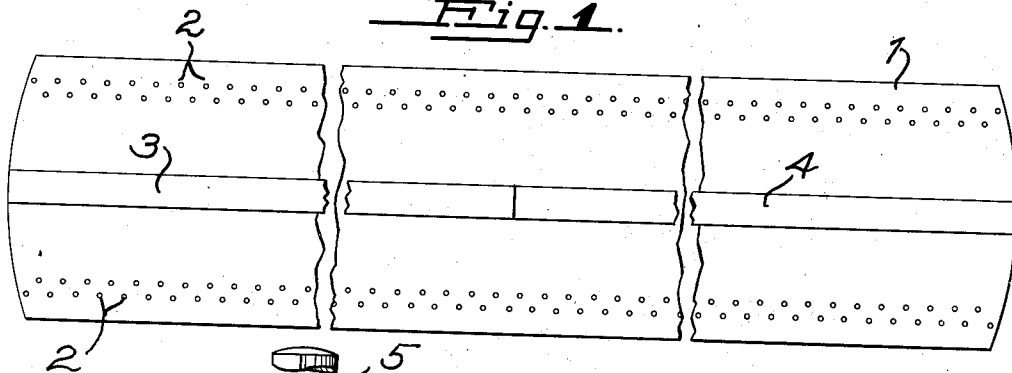


Fig. 2.

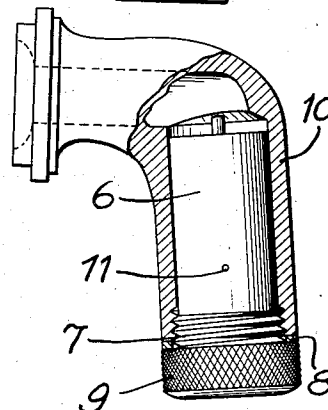
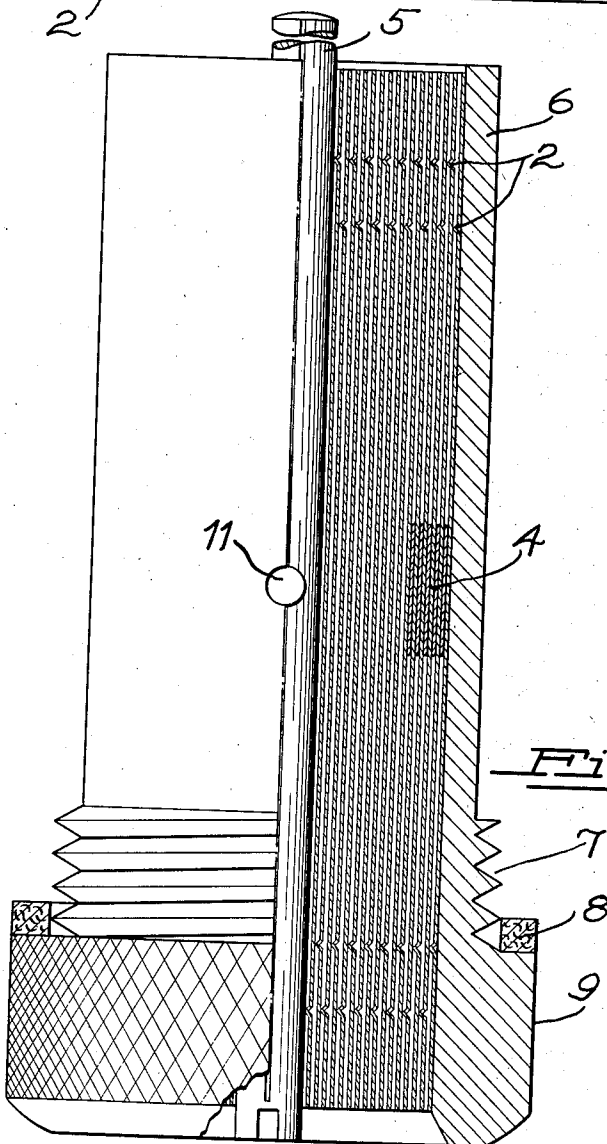


Fig. 3.



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METHOD OF MAKING PRESSURE
REGULATING DEVICESGilbert G. Budwig, Burbank, Calif., assignor to
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8 Claims. (Cl. 29—157)

My invention relates to pressure regulating devices, and more particularly to a device adapted for use in beverage dispensing devices such as is used for dispensing beer or similar carbonated liquids. This application is a continuation in part of my and V. Ray Bennett's prior application entitled "Beverage dispensing apparatus," Serial No. 91,132, filed July 17, 1936, now Patent No. 2,132,011, dated October 4, 1938.

In the operation of the usual apparatus for dispensing beer or the like, the degree of pressure under which the beverage is stored is limited by the fact that the velocity with which it leaves the dispensing valve determines the character or appearance thereof in the final container. When beer is dispensed it must be done gently so as to avoid excessive turbulence, upon the degree of which depends the resultant "head." The ability to retain a maximum "head" depends not only upon the number and size of individual gas bubbles formed as a result of a pressure decrease incident to escape from the dispenser, but also upon rarity of the opportunities offered the bubbles to unite with each other. Since the number of such opportunities depends upon the turbulence, it is highly desirable to maintain this factor at a minimum value.

For the above reasons, many installations dispense beer at pressures in the neighborhood of seven or eight pounds, and thus avoid "wild" flow of beer from the valve. It is desirable to utilize higher pressures if it is also possible to dispense without turbulence.

The pressure reduction device which forms a part of my present invention is of such character that pressures in the neighborhood of twenty pounds per square inch may be employed with an efficiency in pressure reduction such that turbulence is substantially eliminated, and high flow maintained.

Accordingly, among the objects of my invention are: to provide a beverage dispensing apparatus capable of dispensing under pressure with substantially complete pressure reduction, under conditions which substantially eliminate turbulence during such reduction; to provide a pressure reduction device which is simple in construction and assembly and lends itself to production methods; to provide a pressure reduction device which may be quickly replaced in service; to provide a means and method of obtaining an accurate spacing in a pressure reduction device; to provide a means and method of accurately assembling a pressure reduction device; to provide a means for maintaining close spacings in a

pressure reduction device operating by friction; to provide a means and method of cleaning small apertures; to provide a means and method of regulating heat exchange in a device dispensing carbonated liquids; and to provide a simple and efficient beverage dispensing device for use in conjunction with carbonated liquids.

My invention possesses numerous other objects and features of advantage, some of which, together with the foregoing, will be set forth in the following description of specific apparatus embodying and utilizing my novel method. It is therefore to be understood that my method is applicable to other apparatus, and that I do not limit myself, in any way, to the apparatus of the present application, as I may adopt various other apparatus embodiments, utilizing the method, within the scope of the appended claims.

Referring to the drawing:

Figure 1 is a plan view of my pressure reduction device before assembly.

Figure 2 is a view partly in section and partly in elevation, showing the completed pressure reduction device installed in a beverage outlet.

Figure 3 is an enlarged view partly in section and partly in elevation, of the completed pressure reduction device.

In the prior application referred to above, we there described a pressure reduction device formed by spirally winding sheet metal around a core, the sheet metal being spaced by bosses thereon. It is desirable, however, in order that uniformity of production be obtained, that extremely accurate spacings between the layers of the windings be used, and I have found that in order to standardize the control of various pressures, it is necessary that the spacing have a tolerance of less than one-fourth of one tenthousandths of an inch between each layer. I have found it desirable, in order to obtain such spacing, to utilize a special assembly means and method, and by the use of this means and method I have been able to completely standardize the production of these pressure reduction devices.

Broadly as to method, I wind sheet metal having embossed spaces thereon in a spiral around a core. In doing so, however, I place the spacing bosses toward the edge of the sheet and in the center of the sheet position, before winding, a separate spacing sheet of a material which can later be dissolved out of the assembly. The winding is therefore accurately spaced during the making of the spiral, and the spacer is later removed.

In addition, I have found that it is highly

desirable to polish the surfaces of the layers, and this polishing may be regulated so that each device will reduce pressure in exactly the same manner. Furthermore, I have found that when dispensing carbonated liquids the temperature of the reduction device plays an important part in the dispensing of the first amount of liquid after the device has remained unused for a time, and I have therefore provided my spiral with heat exchange regulation so that the first amount through the reduction device will behave in substantially the same manner as later amounts.

My present invention may be more fully understood by direct reference to the drawing.

A strip 1, preferably of shim stock, and in one embodiment two-thousandths of an inch thick, two inches wide, and fifty-two inches long, is provided near each edge thereof with embossed spacers 2, leaving the central portion of the strip free from embossing. A spacing ribbon 3, one-fourth of an inch wide, in this particular example, and three-thousandths of an inch thick, is placed along the center of the entire strip, and in some instances the entire strip may be of "Celluloid" or similar cellulose material. However, in certain instances, I may prefer to utilize a cellulose ribbon for approximately one-half of the fifty-two inches, and a metal ribbon 4 of exactly the same size and thickness for the remainder of the strip, and in this latter instance the metal ribbon is to be utilized between the outermost turns of the wound strip. Inasmuch as I prefer to make the embossed spacers 2 five-thousandths of an inch high, and the spacing ribbons 3 and 4 only three-thousandths of an inch thick, it is obvious that when the strip is wound, under pressure, that the spacing bosses will be reduced to the thickness of the Celluloid and metal ribbons, and thus the spacing is controlled wholly by the ribbons, but maintained by the bosses.

In winding the strip 1 with its associated spacing ribbons, I place a core 5, shown in Figure 3, in a lathe or similar device, and wind the strip, under pressure, on the core. After the entire spiral is formed I force it into a restraining shell 6, which is provided at one end with threads 7, a washer 8 and a knurled knob 9, in order that the device may be inserted in the dispensing faucet 10. Inasmuch as the strip has been wound under relatively high pressure, at least sufficiently high to reduce the height of the spacing bosses, it will remain under its own pressure in the restraining shell 6, but I prefer, in order to maintain the relative positions of the various layers, to drill a hole completely through the restraining shell, all layers of the winding, and the central core, and insert a restraining pin 11 in that hole to maintain the complete relative position of the winding.

The assembled device is now, of course, inoperable, because of the positioning therein of the Celluloid ribbon. The next step, therefore, is the removal of this ribbon by a heating treatment. The open spaces in the wound core are so narrow that it has been found impossible to remove the Celluloid from within the winding by any solvent means. I have, however, found that if the assembled windings are placed in an oven and baked at approximately 650° F., the Celluloid is completely cooked out, leaving no ash within the winding and with only the collection of an ash at both ends of the core. There is no flame developed nor any explosion. After the cooking process, the ash is removed

from the ends of the winding and the winding is open, and the flow of liquid through the winding is normal as to volume. However, I have ascertained that under these conditions, while the volume of carbonated liquid which will pass through the core is normal, the functioning of the device, as far as controlling foam is concerned, is not good, and in fact the device will foam excessively.

In order to prevent this foaming, I have found it highly desirable to clean or polish the opposed surfaces of the winding, and I do this by passing through the winding a liquid under high pressure, such as water, followed by the use of a mild abrasive, such as tripoli, with an oil solvent. The accuracy and thoroughness of this polishing and cleaning operation is a major factor in the success of the final operation of the device. The better the cleaning of the layers and the smoothing of the surface area in the stock in the winding is made, the higher the beer temperature can be and still be controllable by this device. With a carefully cleaned and polished device made as outlined, I have been able to serve beer which is as warm as 70° F. in the barrel and as high as 58° F. when served in the glass. Obviously, these temperatures are well above those normally encountered in practice, and I am therefore able to dispense beer at a higher temperature and with a high volume.

Furthermore, by thus altering microscopically the surface of the winding, I can determine and regulate the amount of "head" which it is possible to give a glass of beer which is dispensed at a given temperature. I believe this to be entirely novel, and furthermore, this "head" can be maintained constant over a relatively wide range of temperatures and pressures. This is accomplished without reduction of the volume of beer flowing. For example, ordinarily when beer is chilled to 44° F. or less for serving, the ordinary beer dispenser requires a reduction in delivery volume so that an eleven-ounce glass requires as high as thirteen seconds to fill. At the higher temperature outlined above, I am able to fill the same glass in six seconds and at the same time maintain the proper "head" on the beer.

In describing my method of winding the shim stock to form my pressure reduction device herein described, I have above-stated that in some instances Celluloid is utilized only for about one-half of the spacing ribbon and that the other half may be a metal ribbon 4, and that this metal ribbon is utilized in the outer turns of the winding. In the example dimensionally quoted, I prefer to utilize about twenty-four inches of cellulose spacing ribbon, the remainder of the fifty-two inches being a soft brass ribbon. Of course, in the removal of the cellulose, this soft brass ribbon is not removed and stays in position throughout the operation of the device, and therefore effectively prevents any liquid from passing through the outer spaces of the winding. When the windings are so made, I have found that the first glass of beer drawn after the faucet has been idle is not nearly so inclined to be "wild", as usual, and I attribute this to the fact that under ordinary circumstances an idle faucet reaches room temperature and when the first glass of beer goes through at a lower temperature, ready for drinking, that the sudden rise of the temperature in the faucet causes excessive foaming. In almost every prior beer installation, the first glass of beer through an idle

faucet is thrown away because it is so "wild", or at least, if it is not thrown away, it must be allowed to settle before it can be filled up, thus utilizing a lengthy time for the filling of the first glass.

It is my conclusion, therefore, that the air spaces between the outer layers of the winding act as a heat insulator, preventing the rapid exchange of heat between the main metal body of the faucet and shell of the device, and the beer. The only place that heat can be readily conducted from the outside of the faucet to the beer flowing through the central channels is where the metal strip 4 is wound. Inasmuch as this strip is very narrow, heat conduction to the beer takes place only through a relatively small metal path. I believe that this point has been definitely proved by experiments wherein the metal strip 4 was extended the full width of the winding. Under these conditions the device delivers exceptionally "wild" beer for the first two or three glasses. By reducing the strip I reduce the wildness to the point where the first glass can be dispensed within a reasonably short time without excessive foaming.

I have therefore improved our prior device, first, by accurately controlling the spacing of the layers; second, by accurately controlling the tendency to foam by polishing and cleaning the layer surfaces in the device; and third, by providing insulating air spaces between the column of beer and the metal body of the faucet.

I claim:

1. In a pressure reduction device having a spirally wound strip in a liquid conduit to provide closely adjacent friction surfaces, a method of assembly which comprises providing spacing bosses along the length of the strip, placing an organic ribbon on said strip of lesser thickness than the height of said bosses, winding the strip under sufficient pressure to deform said bosses to the same height as the thickness of said organic ribbon, fixing the winding, and removing the organic ribbon material by raising the temperature of the strip sufficiently to gasify said organic ribbon.

2. In a pressure reduction device having a spirally wound strip in a liquid conduit to provide closely adjacent friction surfaces, a method of assembly which comprises providing spacing bosses along the length of the strip, placing an organic ribbon on said strip of lesser thickness than the height of said bosses, winding the strip under sufficient pressure to deform said bosses to the same height as the thickness of said organic ribbon, fixing the winding, removing the organic ribbon material, by gasification thereof and cleaning the opposed surfaces of said winding by passing a liquid therethrough.

3. In a pressure reduction device having a spirally wound strip in a liquid conduit to provide closely adjacent friction surfaces, a method of assembly which comprises providing spacing bosses along the length of the strip, placing an

organic ribbon on said strip of lesser thickness than the height of said bosses, winding the strip under sufficient pressure to deform said bosses to the same height as the thickness of said organic ribbon, fixing the winding, removing the organic ribbon material by gasification thereof, and polishing the opposed surfaces of the wound strip by passing a liquid containing a fine abrasive through the winding.

4. In a pressure reduction device having a spirally wound strip in a liquid conduit to provide closely adjacent friction surfaces, a method of assembly which comprises winding said strip with an organic spacer between the turns thereof to provide a spacing between turns of a size to retain a liquid by capillarity therebetween, fixing the winding, and removing the spacer material by the application of heat to the winding to gasify said spacer.

5. In a pressure reduction device having a spirally wound strip in a liquid conduit to provide closely adjacent friction surfaces, a method of assembly which comprises winding said strip with a cellulose spacer between the turns thereof to provide a spacing between turns of a size to retain a liquid by capillarity therebetween, fixing the winding and removing the spacer material by the application of heat to the winding to gasify said cellulose.

6. In a pressure reduction device having a spirally wound strip in a liquid conduit to provide closely adjacent friction surfaces, a method of assembly which comprises winding said strip with a cellulose spacer between the turns thereof to provide a spacing between turns of a size to retain a liquid by capillarity therebetween, fixing the winding, and removing the spacer material by baking the winding at a temperature of approximately 650° F. to gasify said cellulose.

7. In a pressure reduction device having a spirally wound strip in a liquid conduit to provide closely adjacent friction surfaces, a method of assembly which comprises winding said strip with a cellulose spacer between the turns thereof to provide a spacing between turns of a size to retain a liquid by capillarity therebetween, fixing the winding, removing the spacer material by baking the winding at a temperature of approximately 650° F. to gasify said cellulose and cleaning the winding by passing liquid under high pressure therethrough after assembly.

8. In a pressure reduction device having a spirally wound strip in a liquid conduit to provide closely adjacent friction surfaces, a method of assembly which comprises winding said strip with a cellulose spacer between the turns thereof to provide a spacing between turns of a size to retain a liquid by capillarity therebetween, fixing the winding, removing the spacer material by baking the winding at a temperature of approximately 650° F., to gasify said cellulose and polishing the winding by passing a liquid containing a mild abrasive therethrough after assembly.

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