

March 11, 1941.

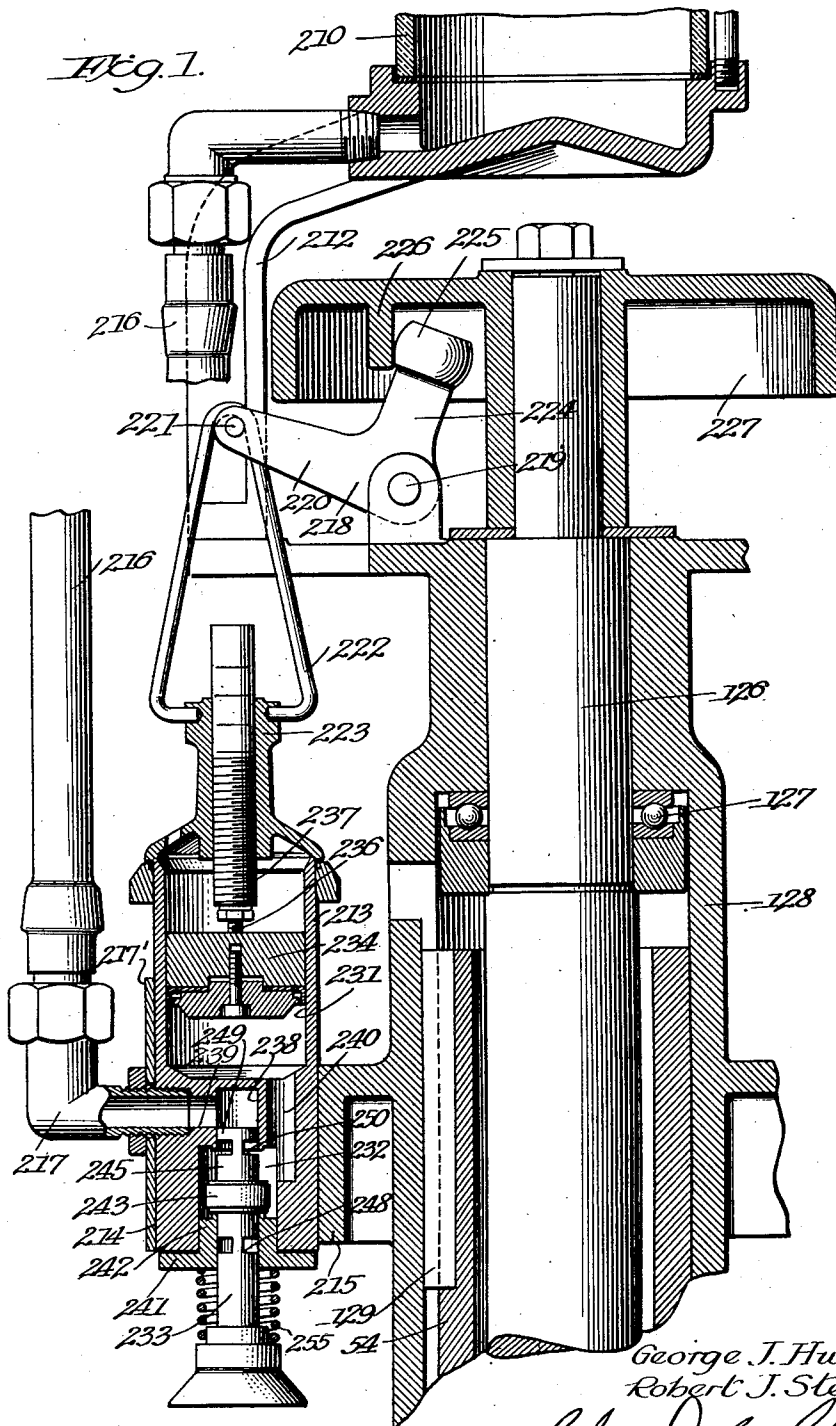
G. J. HUNTLEY ET AL

2,234,305

FILLING HEAD

Original Filed May 15, 1933

2 Sheets-Sheet 1



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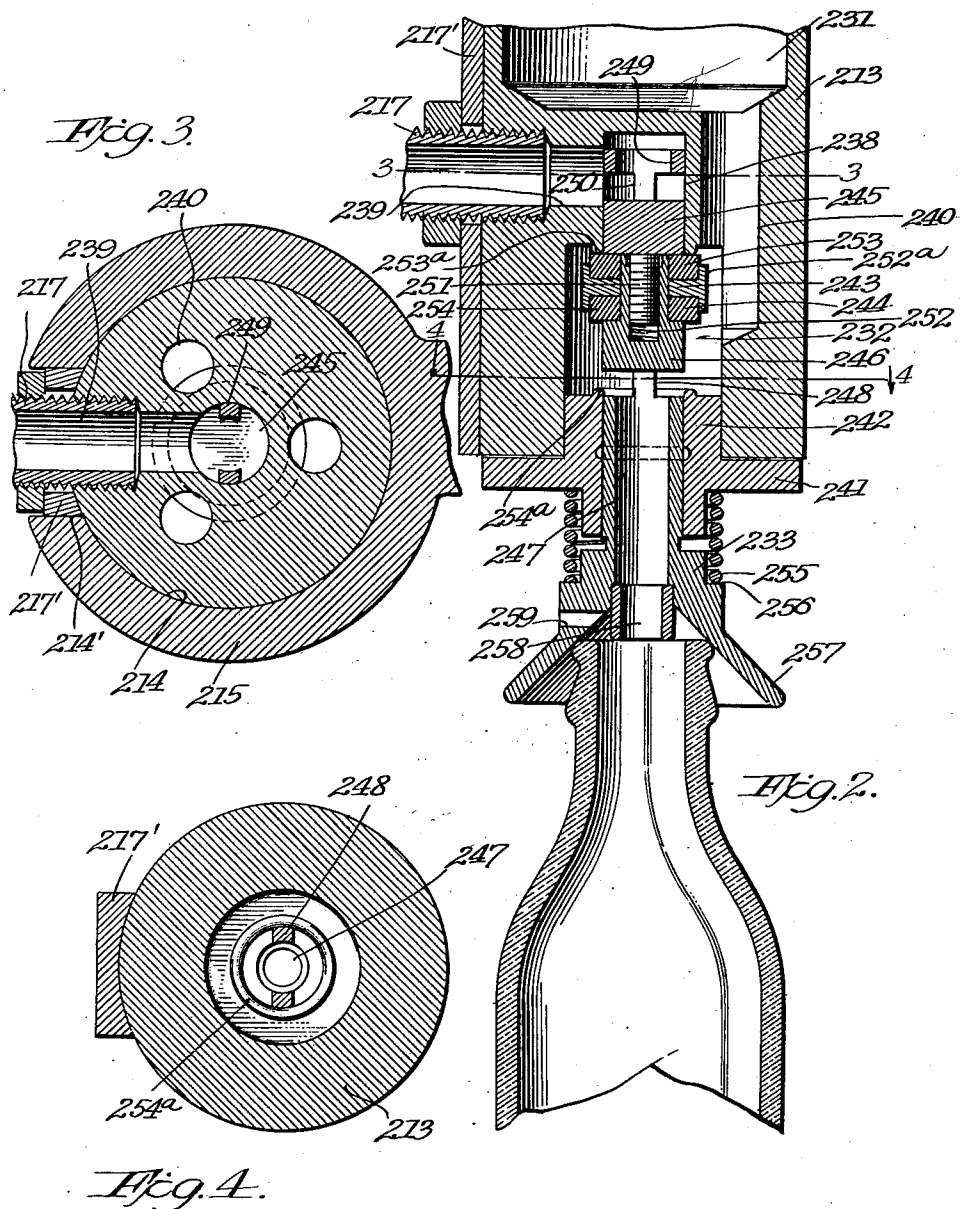
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UNITED STATES PATENT OFFICE

2,234,305

FILLING HEAD

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Original application May 15, 1933, Serial No. 671,266. Divided and this application February 15, 1935, Serial No. 6,720. Renewed February 15, 1939

4 Claims. (Cl. 226—103)

The present invention relates to a filling head, the application being a division of our filling machine application Serial No. 671,266, filed May 15, 1933.

The invention of the present application is particularly designed for use in placing a charge of syrup in a bottle to be subsequently completely filled by an additional charge of carbonated water. However, the invention is obviously applicable for completely filling a bottle or other container.

The principal object of the invention is to provide a filling head which is so constructed that an exactly measured quantity of liquid will be delivered to each bottle.

Because of the lack of any simple mechanism for filling bottles with an accurately measured quantity of liquid, it has heretofore frequently been the practice to fill each bottle to a predetermined height. Since bottles of the same rated capacity have varying internal measurements, if the filling of the bottle is regulated only according to the height of the liquid in the bottle, various bottles will contain different amounts of liquid, and in order to insure that each bottle will contain at least the quantity indicated on the label under which it is sold, it is necessary to fill each bottle to a height based on calculations as to the average minimum capacity of bottles of that size. Since a number of bottles of the same rated capacity may have an actual capacity considerably above the average minimum when filled to the predetermined height, it results that the bottler uses a considerably greater quantity of liquid than would be the case if each bottle were filled to exactly its labeled content.

For example, in the filling of two ounce liquor bottles, the height of filling is set at a point which will place an extra one-half cubic centimeter of liquor in the average bottle, thereby insuring that every bottle will have at least two ounces of liquor therein. However, actual measurements have proven that the amount of liquor in each bottle varies from two ounces to two ounces and three cubic centimeters. The result of this is that, in a day's filling, several hundred dollars worth of liquor is placed in the bottles merely to insure that each bottle will contain the proper quantity, this extra quantity of liquor of course being a complete loss to the bottler.

Our invention is obviously also applicable for the partial filling of bottles. In the bottling of soft drinks, it is customary to place a charge of syrup in the bottle before the charged water is

flowed in, but the syringing head structures used with filling machines at the present time are provided with valve mechanisms which will permit various quantities of syrup to flow to different bottles.

The filling machines used for bottling soft drinks include a syringing mechanism of syrup filling head provided with a measuring chamber which communicates with a main syrup tank or reservoir and also with a nozzle adapted to engage the mouth of the bottle, the measuring chamber alternately communicating with the reservoir and the filling nozzle by movement of a valve. Heretofore, the design of the structure has been such that it is possible for syrup to flow from the reservoir, past the valve and through the filling nozzle into the bottle during the interval when the valve is moving from one position to the other. Any syrup flowing past the valve in this manner is of course surplus and above the quantity delivered from the usual measuring chamber of the syringing head. In bottling practice, this surplus flow of syrup is ordinarily regarded as a constant factor, but differences in the amount of syrup in the main storage tank located some distance above the syringing head naturally affect the head of pressure under which the surplus syrup flows and cause variances in this flow, since the surplus syrup does not pass through the measuring chamber and its flow is entirely regulated by the head of pressure in the main syrup tank and line. This results in inefficient filling in that the amount of syrup in each bottle will vary with respect to the amount of charged water subsequently supplied to the bottle and the flavor of the beverage will vary accordingly.

Another defect of the type of valve ordinarily used in syringing heads results from the method of operation of the valve whereby if the machine is stopped during movement of the valve from one position to the other, the valve, being open, will permit syrup to flow continuously from the main syrup tank to the bottle, thereby resulting in a waste of syrup and requiring the operation of the machine to be suspended to enable it to be cleaned. A manual valve must be usually included in the syrup line to be closed under such conditions.

The filling head of the present invention includes a valve which is so designed that it will be impossible for the line from the main syrup tank to be opened directly to the bottle at any time. The valve is so constructed that when the line between the main syrup tank and the syrup

measuring chamber of the syringing head is open, the line between the syrup measuring chamber and the bottle will always be closed, and vice versa. This arrangement eliminates all of the defects discussed above.

The syringing heads of filling machines usually include a measuring chamber which is fitted with a syrup float, the syrup float being adapted to rise and fall as syrup flows into and out of the chamber, respectively. A rod is mounted in the upper portion of the syrup measuring chamber with its lower end positioned to limit the upward movement of the float and to thereby determine the amount of syrup which may flow into the measuring chamber and which subsequently may be delivered to a bottle. The opposite end of this rod projects from the measuring chamber and graduations are marked on the latter end of the rod. The positioning of the rod in accordance with these graduations is intended to position the float so that the capacity of the chamber will be fixed in accordance with the graduated marking at which the rod is set.

The arrangement just described is not accurate because of the fact that the capacity of the measuring chamber may vary due to slight variances in the diameter of the measuring chamber and because of differences in the thickness of the packing with which the float is provided. Even if the measuring chamber is carefully machined, its float positioning rod cannot be readily provided with graduations corresponding to the actual and exact capacity of the measuring chamber to which it is to be fitted, and therefore graduations on the rod do not necessarily indicate the true and exact capacity of the measuring chamber. It is obvious that if the capacity of a particular measuring chamber does not exactly correspond to the reading on the rod which controls the float of that measuring chamber, the measuring chamber will not deliver the proper amount of syrup to bottles, and this will result in a departure from the proper flavor of the beverage.

Another object of the present invention is to provide a means whereby the capacity of the syrup measuring chamber will be accurately indicated by the syrup measuring rod.

In conformity with this object, we provide an adjusting device at the lower end of the syrup measuring rod, which device may be pre-set at the factory so that the positions at which the syrup measuring float will be set by the rod will accurately correspond to the rod graduations.

Structures similar to the syringing mechanism used on soft drink filling machines are frequently used for the complete filling of bottles with alcoholic liquor or other liquids and when so used, result in the same inaccuracies in filling as result when such structures are used for syringing or partially filling bottles. These difficulties in the complete filling of bottles will naturally be obviated by the use of the mechanism of the present invention.

Other objects and advantages of the invention will be apparent from the following specification and drawings in which,

Figure 1 shows the filling head of the present invention in vertical section, the invention being shown mounted for use in syringing bottles and as comprising a part of the syringing mechanism of a filling machine. The view also shows the mounting of the device in vertical section.

Figure 2 is a detail vertical sectional view of the filling head,

Figure 3 is a horizontal sectional view on the line 3—3 of Figure 2, and

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 2.

The drawings show our filling head used with the syringing mechanism of a filling machine but it will be obvious that the head may be used on any machine for completely filling a bottle or other container.

Liquid is supplied to the filling mechanism of the invention from a storage tank, not shown, and located above the mechanism so that the liquid will flow from the storage tank to the syrup reservoir 210 by gravity, as is customary. Referring to Figure 1, the reservoir 210 preferably has the usual glass walls in order that its contents may be observed. Reservoir 210 is mounted at the upper end of the syringing mechanism upon uprights 212 fixed to the rotating syringing mechanism supporting structure 128 in order that the reservoir 210 may rotate with the syringing mechanism. The syringing mechanism preferably comprises one or more filling heads 213, according to the capacity of the machine of which the syringing mechanism forms a part. Each filling head is vertically reciprocable in a bore 214 in a flange 215 extending from the tubular supporting member 128. Liquid is supplied to each of the filling heads from reservoir 210 through a flexible tube 216 having its lower end positioned upon an inlet fitting 217 suitably secured to the filling head. The filling head 213 is supported upon a bell crank cam member 218 pivoted upon the upper end of the tubular member 128 at 219, the horizontal arm 220 of each bell crank 218 being provided with a pin 221 which supports a yoke 222, the lower end of the yoke being engaged in sockets in the cap 223 of the respective filling head. The upstanding arm 224 of the bell crank lever 218 is provided with a freely rotatable sleeve 225 which engages a vertically depending cam track 226 preferably formed integral with a head plate 227 fixed to the extreme upper end of a post 126.

By means of the structure described above, the rotation of the structure 128 with respect to the stationary post 126 and head plate 227 will cause the reservoir 210, filling head 213, and the bell crank cam lever 218 supporting the latter to rotate with respect to the cam track 226 so that the bell crank cam lever 218 will be swung on its pivot in accordance with the configuration of the cam track. The bottles to be syringed will be supported upon a rotating table, not shown, which will rotate with the heads 213 and structure 128. The arrangement of the cam track 226 is such that a head 213 aligned with a bottle just received by the syringing mechanism will be in raised position. Immediately thereafter, as the mechanism rotates, the head will descend to contact with the mouth of the bottle to syring the same. The head will move upwardly again and clear of the mouth of the bottle after the bottle has been syringed. The head is held against rotation in the bore 214 by reason of the fact that the inlet pipe fitting 217 carries a plate 217' (Fig. 3) which moves in vertical slots 214' opening from the bore 214.

It will be understood that the syringing head supporting and operating structure described above is similar to that of rotary filling machines of the type disclosed in our application Serial No. 671,266 and that the filling head of the present invention may be supported and operated by other mechanisms, according to the

design of the apparatus with which it is used. Also, bottles or other containers may be presented to the filling head by any type of conveyor mechanism or by hand.

5 The structure of each of the heads 213 whereby syringing or filling of a bottle is effected as follows: Each head 213 comprises a measuring chamber 231, a valve chamber 232 and a nozzle 233. The measuring chamber includes the usual 10 float 234 which is adapted to be moved upwardly by liquid entering the chamber 231 and to drop downwardly again when liquid flows from the chamber, thereby assisting the flow of the liquid from the chamber. The float 234 is provided 15 with packing to engage the walls of the measuring chamber 231 and its upper surface is adapted to be engaged by the lower end of a stud 236 threaded into the lower end of an adjusting rod 237 threaded in the cap 223 of the head. The 20 upper end of the rod 237 is provided with marked graduations in order that the lower end of the rod may be properly positioned in the measuring chamber 231 to regulate the upward limit of movement of float 234 and thereby the 25 amount of liquid which flows into the chamber. The stud 236 threaded in the lower end of the rod 237 is in the nature of a micrometric adjustment and may be pre-set at the factory or at any time when a new plunger 234 is placed 30 in the measuring chamber 231 in order that the capacity of the chamber as determined by the plunger 234 will exactly correspond with the graduated readings at the upper end of the rod 237.

35 The ordinary practice of merely seating a measuring rod such as 237 in the chamber is not accurate, since the graduations previously formed upon the rod may not accurately correspond with the actual capacity of the chamber 40 as determined by the engagement of the rod and plunger. For example, the thickness of the packing used with the plunger and the exact size of the other elements forming the plunger may vary even when the closest practice is followed. The provision of the pre-set micrometric 45 adjustment 236 permits the length of the measuring rod to be exactly fixed so that the capacity of the measuring chamber will exactly correspond to the graduated readings on the 50 rod 237.

As best shown in Figure 2, the valve chamber 232 formed in the lower part of each of the heads 213 is provided with an upwardly extending bore 238 into which opens an inlet port 239, 5 the fitting 217 to which the pipe 216 is attached being secured in the inlet port. A plurality of channels 240 extend from the sides of the valve chamber 238 to the measuring chamber 231. A collar 241 with an upwardly extending annular 10 flange 242 is secured to the lower end of the head, the flange 242 extending up into the valve chamber 232. A valve, generally indicated by the numeral 243, is provided in the valve chamber 232, the valve 243 comprising a central disc 15 element 244 and plug valve elements 245 and 246 extending respectively from the upper and lower faces of the disc element 244. The nozzle 233 and the lower plug valve element 246 are preferably formed integrally, the stem 247 of 20 the nozzle being a tubular extension of the plug valve element 246. Slots or kerfs forming ports 248 are cut into the upper end of the stem 247 of the nozzle below the plug valve element 246.

The upper plug valve element 245 includes an extended guide element 249 of tubular shape

and having slots or kerfs cut therein to form ports 250. The upper plug element 245 is preferably provided with a depending stem 251 which is threaded into a socketed tubular extension 252 provided at the upper end of the lower 5 plug element 246. The tubular extension 252 spaces the two plug elements from each other and upper and lower fibre discs 253 and 254, respectively, spaced by a flanged metal disc 252a, are clamped between the two plug valve elements 10 and about the extension 252. The two fibre discs 253 and 254 thereby form the opposite faces of the disc element 244, and each forms a disc valve face. A seat 253a for the upper disc valve face 253 is formed on the upper wall of 15 the valve chamber 232 about the bore 238 and a seat 254a for the lower disc valve face 254 is formed at the upper end of the flange 242.

A coil spring 255 surrounds the stem 247 of the nozzle to hold the latter normally in the 20 downward position shown in Figure 1, the upper end of the coil spring bearing upon the lower surface of the disc 241 and its lower end bearing upon a shoulder 256 about the nozzle 233. As is shown in Figure 2, the nozzle includes a centering bell 257 and a spout 258 is threaded into 25 the same at the lower end of the stem 247. The sloping walls of the centering bell serve to guide the mouths of bottles into a proper centered position about the spout 258. A port 259 is provided in the wall of the centering bell 257 above 30 the lower end of the spout 258 to permit air to escape from the bottle being filled.

The operation of the valve 243 and filling nozzle 233 is as follows: When a head 213 is elevated as shown in Figure 1, and the nozzle 233 35 is out of contact with the mouth of the bottle, the valve 243 is in the position shown in Figure 1. At this time, liquid may flow from the reservoir 210 of the mechanism and through the tube 40 216 and port 239 into the upper bore 238 of the valve chamber 232. Since the upper guiding element 249 of the valve 243 is tubular or hollow, liquid may flow therethrough and out of the ports 250 into the valve chamber 232. It is 45 obvious from Figure 1 that no liquid can flow from the valve chamber 232 to the nozzle 233. The elevation of the reservoir 210 above the head 213 will give the liquid sufficient head to flow upwardly from the valve chamber 232 50 through the channels 240 into the measuring chamber 231. The flow of liquid into the measuring chamber 231 will cause the float 234 to rise until its upper surface contacts with the stud 236 on the measuring rod 237. When this contact occurs, further upward movement of the 55 float 234 will be prevented and no further liquid may flow into the head. When, during the rotation of the mechanism, a head descends upon a bottle, the contact of the mouth of the bottle 60 with the inner surface of the centering bell 257 will cause the nozzle 233 and the valve 243 to move upwardly against the action of the spring 255, moving the lower disc valve face 254 from its seat 254a. As the centering bell moves down 65 about the bottle mouth its inclined walls will center the mouth of the bottle about the spout 258. The upward movement of the valve 243 will cause the upper plug valve element 245 to move into the extended bore 238 of the valve 70 chamber, thereby shutting off communication between the reservoir 210 and the valve chamber 232. Continued upward movement of the parts will subsequently cause the lower plug valve element 246 to move entirely out of the 75

bore through the flanged disc 241, causing the ports 248 in the stem of the nozzle to be opened to the valve chamber 232. The upper disc face 253 will next come into contact with the upper valve seat 253a of the valve chamber. As soon as the ports 248 have moved upwardly into the valve chamber, liquid will flow from the measuring chamber 231 and through the channels 240, ports 248 and the stem 247 into the bottle. The flow of the liquid will be accelerated by the float 234 in the measuring chamber in the usual manner.

As the bottle moves about the mechanism, it will be filled with the proper amount of liquid, the filling operation being completed and the cam-way 226 causing the bell crank cam member 218 to elevate the head to move the centering bell 257 clear of the mouth of the bottle immediately prior to the movement of the bottle from the mechanism by the rotation of the table on which the bottle is supported.

It will be understood that the invention is not limited to the details of construction shown in the drawings and that the examples of the use of the device which have been given do not include all of the uses of which it is capable; also, that the phraseology employed in the specification is for the purpose of description and not of limitation.

We claim:

1. The combination in a filling head including a measuring chamber, of a member in the chamber movable upwardly to permit liquid to flow into the chamber, and adjustable means threaded in the chamber to limit the upward movement of the member, the last named means including a micrometric adjustment.

2. The combination in a filling head including a measuring chamber, of a member in the chamber movable to permit liquid to flow into the chamber, a rod adjustable with respect to the chamber to limit the movement of the member, said rod having graduated markings thereon to indicate the limit of movement of the member, and adjustable means on the end of the rod adjacent the member to limit the movement of the member to accord with the markings on the rod.

3. In a filling head, a liquid measuring chamber, a valve chamber communicating with the

measuring chamber, the valve chamber including vertical axial bores extending from the upper and lower ends thereof and an annular seating surface surrounding each of the bores within the valve chamber, a double-faced disc valve of less diameter than the valve chamber reciprocable in the valve chamber and having axial extensions of reduced diameter projecting from its opposite surfaces and into the respective bores, a cage member on the axial extension within the upper vertical bore to provide for flow between said bore and the valve chamber, the lower axial extension having a passage therethrough opening from one side wall thereof at a point spaced from the valve disc and extending to its free end, a filling nozzle on the free end of the last-mentioned axial extension, the upper bore of the valve chamber being in communication with a source of liquid, said cage element and the side wall opening of the lowermost axial extension being so spaced with respect to the length of the valve chamber that movement of the disc valve toward one end of the valve chamber will cause flow through the passage in the corresponding extension to terminate and the disc valve to subsequently seat substantially simultaneously with the beginning of flow through the opposite extension.

4. In a filling head, a measuring chamber, a valve chamber, a filling nozzle, said valve chamber being provided with connections to a source of liquid, the measuring chamber and the filling nozzle, respectively, valve means in the valve chamber, said valve means being movable to a position to place the measuring chamber in communication with the source of liquid and to a position to place the measuring chamber in communication with the filling nozzle, respectively, its movement to either of said positions entirely cutting off the flow established at the other position, and means to define the size of said measuring chamber comprising a float within the same, an indexed rod movable in the upper wall of the measuring chamber, said rod having a set screw at its lower end adapted to contact with the float.

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