Jan. 30, 1940. J. H. MURCH 2,188,306

METHOD OF AND APPARATUS FOR FILLING CANS

Filed March 10, 1937 6 Sheets-Sheet 1

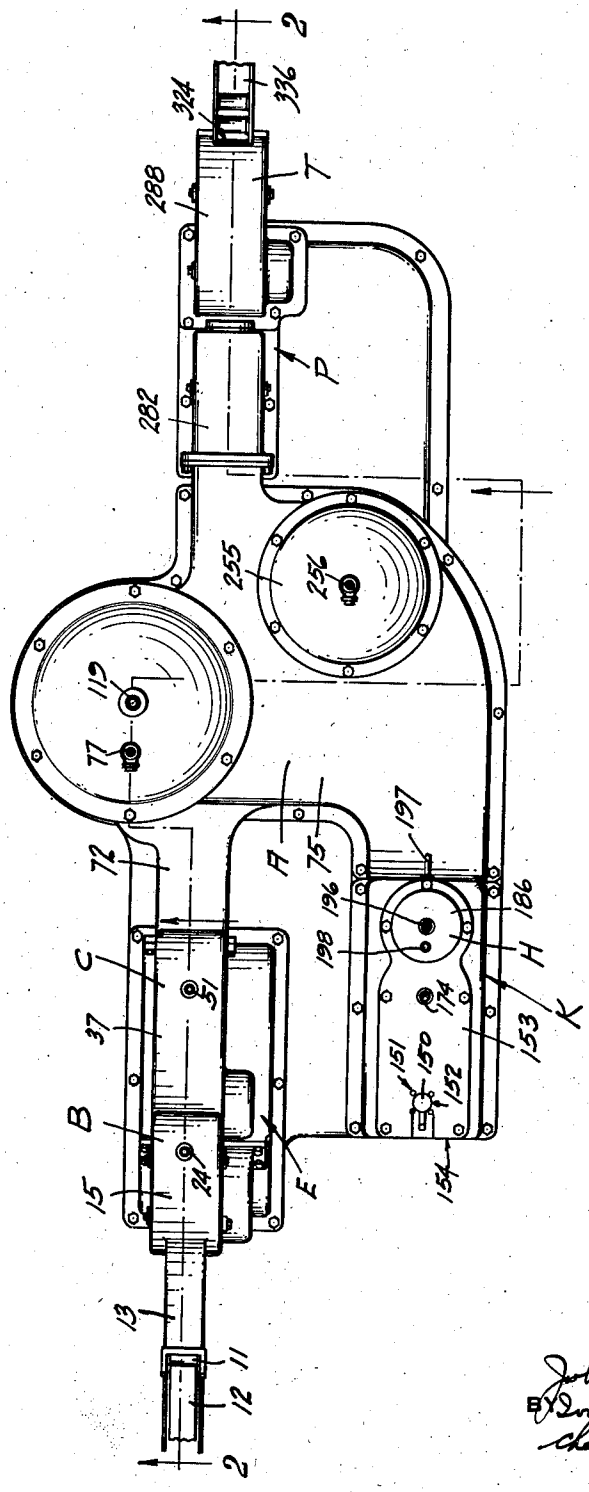


Fig. 1

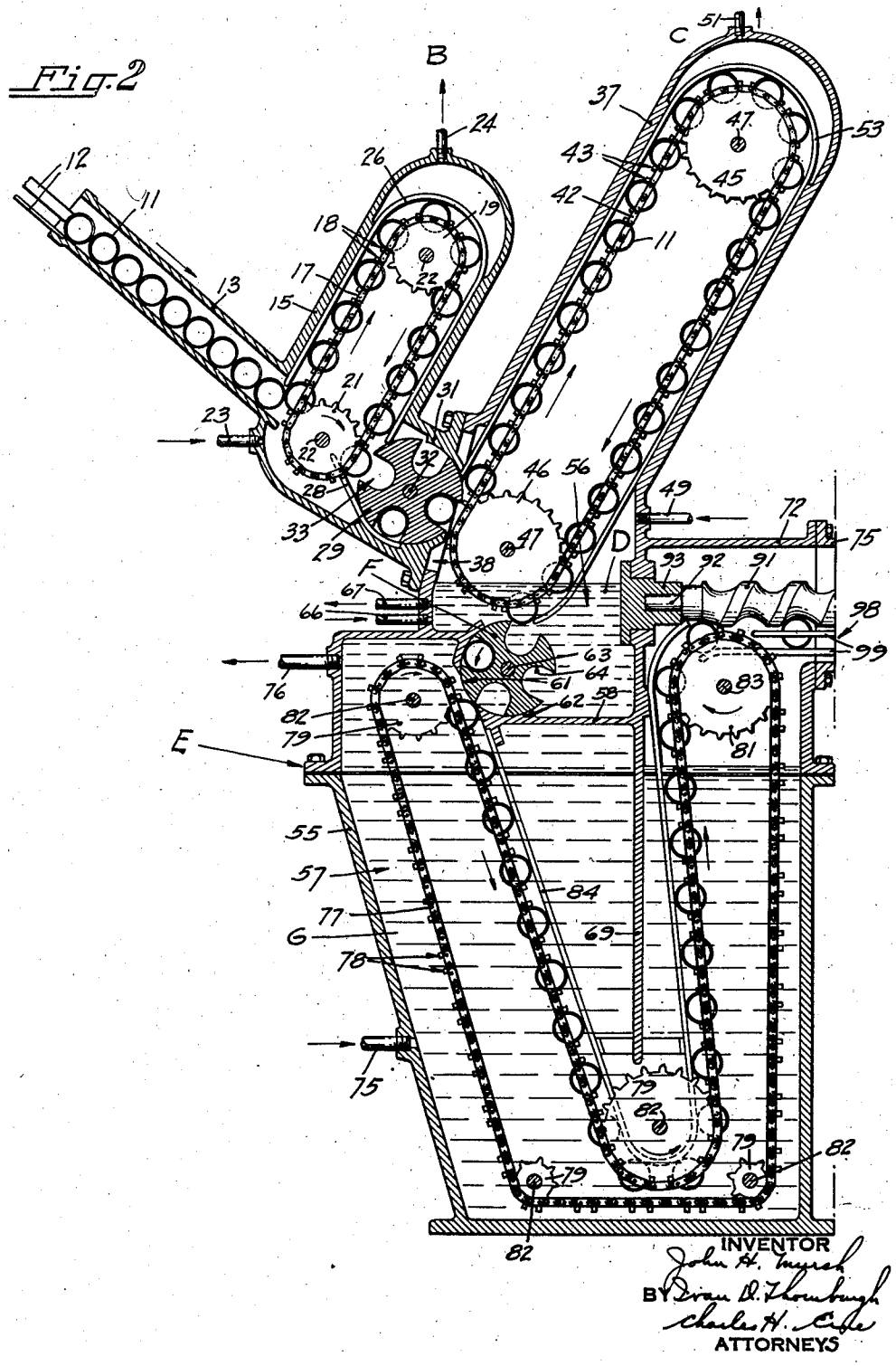
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Jan. 30, 1940. J. H. MURCH 2,188,306

METHOD OF AND APPARATUS FOR FILLING CANS

Filed March 10, 1937 6 Sheets-Sheet 2

Fig. 2



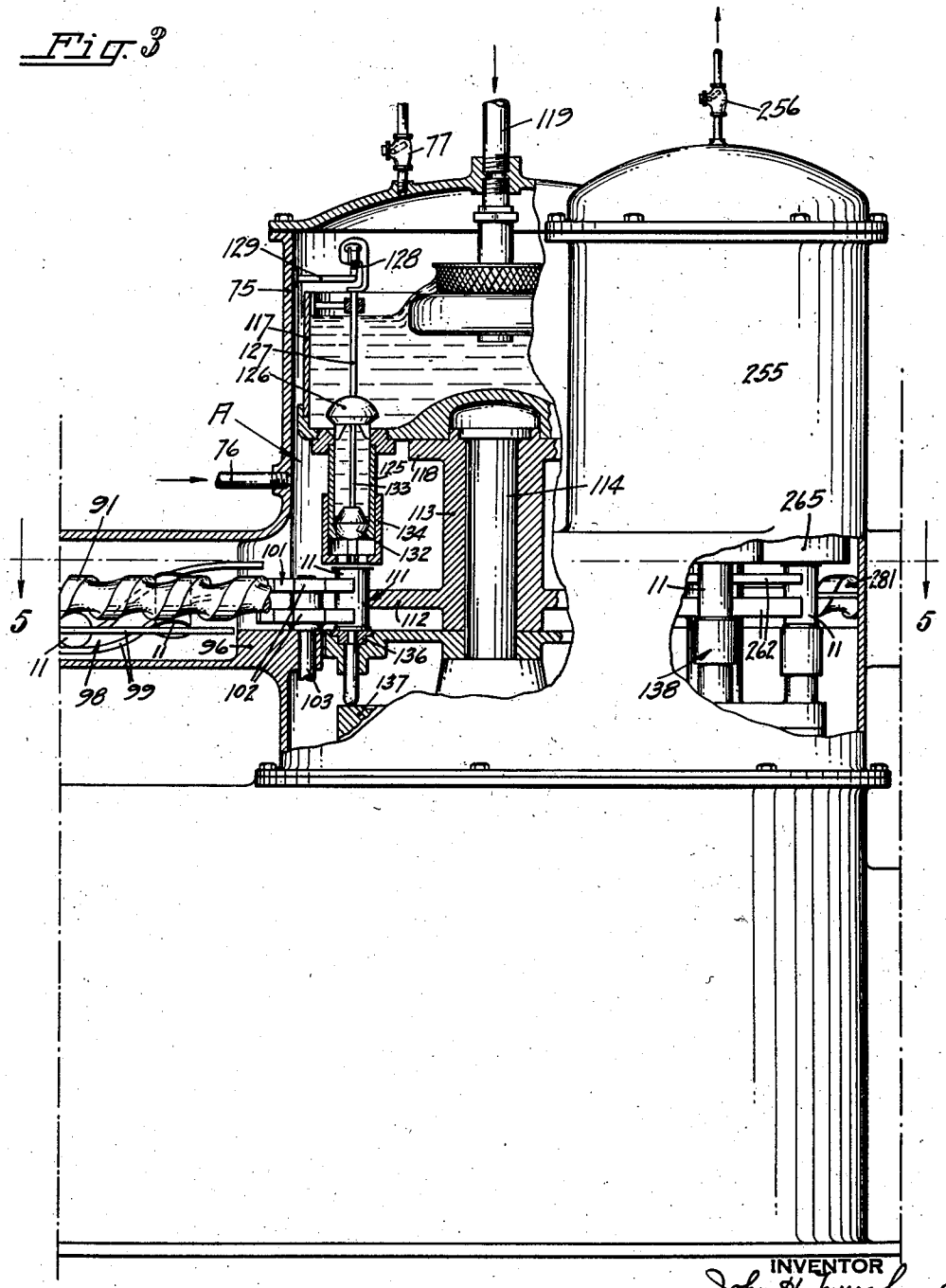
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Jan. 30, 1940. J. H. MURCH 2,188,306

METHOD OF AND APPARATUS FOR FILLING CANS

Filed March 10, 1937 6 Sheets-Sheet 3

Fig. 3



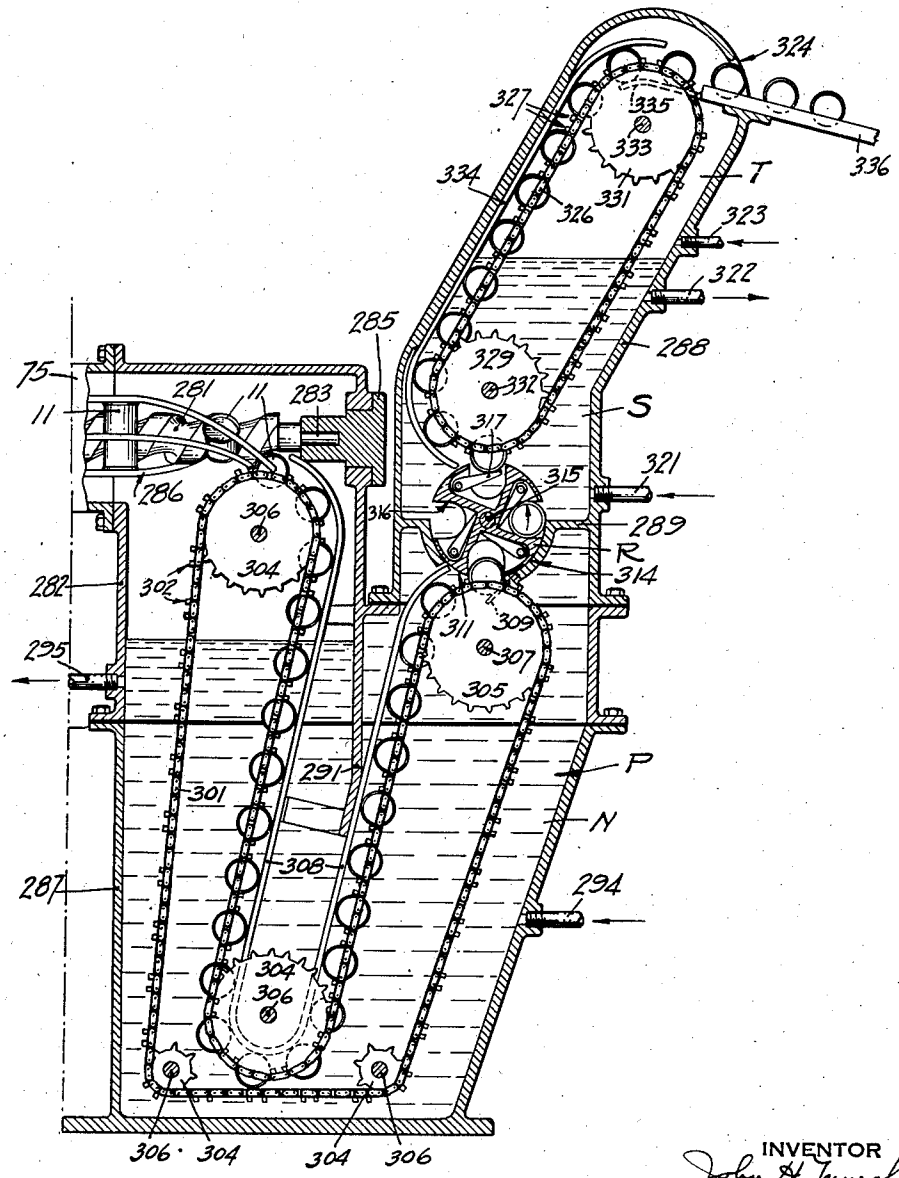
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Jan. 30, 1940. J. H. MURCH 2,188,306

METHOD OF AND APPARATUS FOR FILLING CANS

Filed March 10, 1937 6 Sheets-Sheet 4

Fig. 4



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Jan. 30, 1940. J. H. MURCH 2,188,306

METHOD OF AND APPARATUS FOR FILLING CANS

Filed March 10, 1937 6 Sheets-Sheet 5

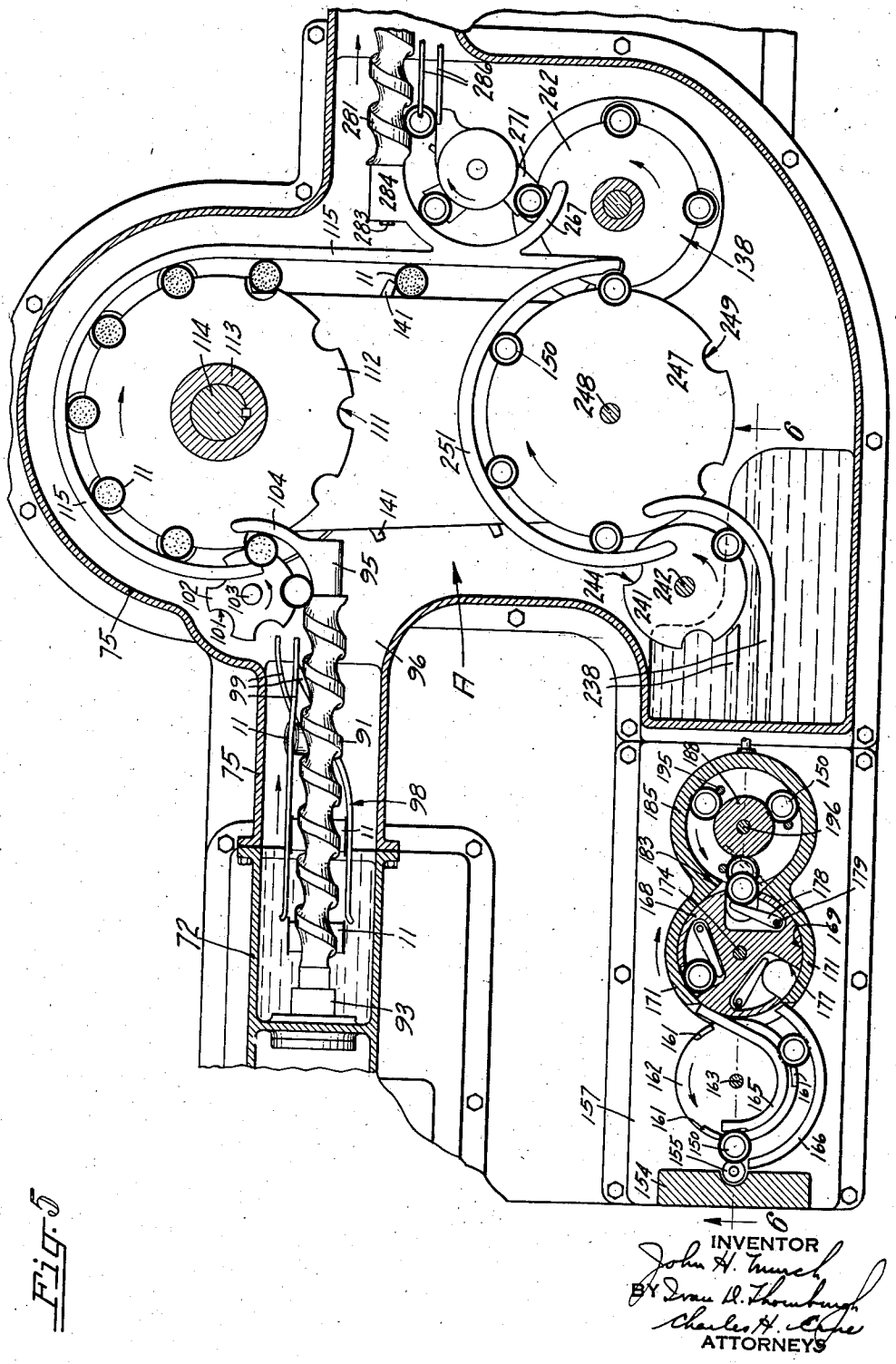


Fig. 5

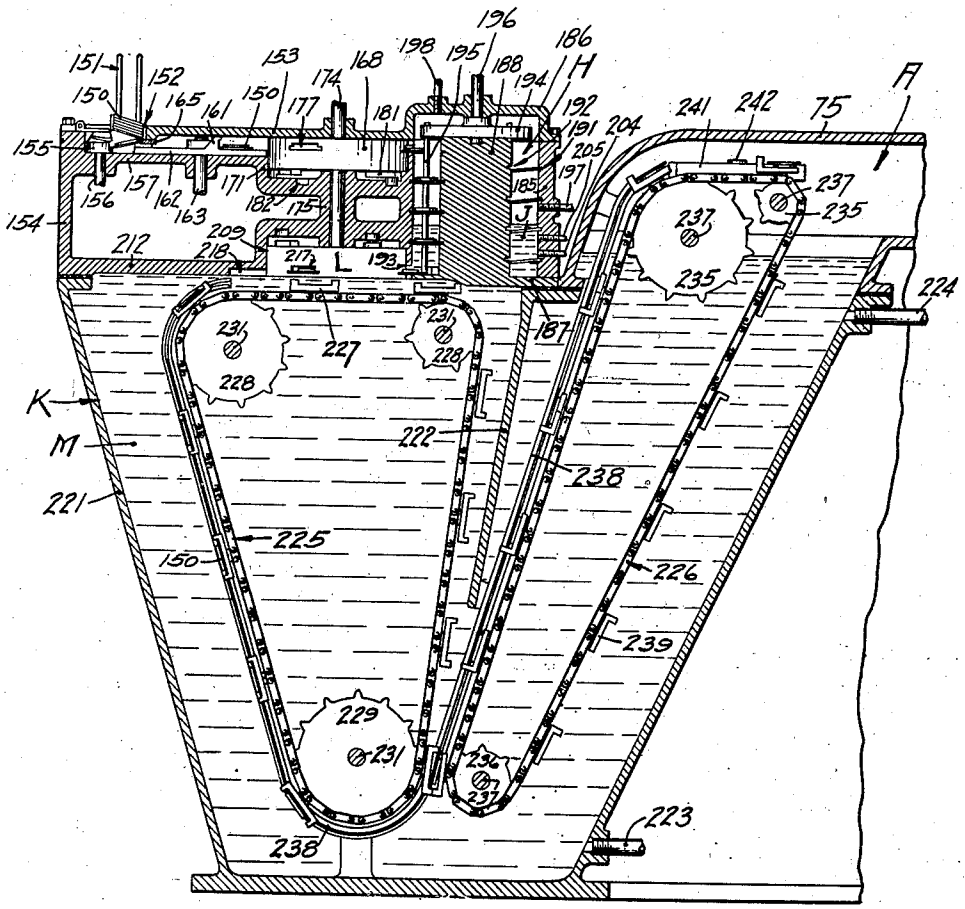
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Jan. 30, 1940. J. H. MURCH 2,188,306

METHOD OF AND APPARATUS FOR FILLING CANS

Filed March 10, 1937 6 Sheets-Sheet 6

Fig. 6



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UNITED STATES PATENT OFFICE

2,188,306

METHOD OF AND APPARATUS FOR FILLING CANS

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Application March 10, 1937, Serial No. 130,198

17 Claims. (Cl. 226—68)

The present invention relates to an improved method of filling beer and other products into air free cans and under an atmosphere of carbon dioxide gas preferably under considerable pressure and to an apparatus for performing the steps of such a method and has particular reference to the filling of the cans within a gas filling chamber maintained in sealing condition by liquid traps through which can and cover are introduced into the chamber, the can being freed of its air prior to receiving its product and after being filled under gas conditions is sealed with its cover and then removed from the filling chamber.

The present invention contemplates the use of liquid traps for separating a confined high pressure atmosphere of filling gas from a low pressure atmosphere without an attending excessive difference in liquid levels. This is effected by providing a suitable lock or valve in the liquid trap which greatly reduces the hydrostatic head and requires only a relatively small quantity of liquid in the trap, the valve permitting the passage of the can parts through the liquid and into and out of the gas atmosphere.

An object of the invention, therefore, is the provision of a method and apparatus of filling carbonated or gasified products such as beer or the like in air freed cans while in an air freed and gas filled chamber under pressure, to minimize foaming or other disintegration and to prevent escape of the gaseous content of the product.

Another object is the provision of such a method and apparatus wherein the filled cans while still in the gas filled chamber are hermetically sealed with the gas to retain the gas within the beer.

Yet another object is the provision of such a method of and apparatus for canning beer and other products wherein the product is filled into cans within an air free and gas filled chamber maintained in sealing condition by liquid traps having suitable valves for confining the liquid in the traps and for assisting in transferring cans and covers through the liquid, the cans being freed of air by immersion in the liquid thus being properly conditioned for receiving the product and after being filled the cans are hermetically sealed by securing the covers thereon following which the cans are removed from the filling chamber.

Another object is the provision of such a method of and apparatus for canning beer and other products in an air free gas filled chamber wherein the chamber is maintained in sealing condition by liquid traps each comprising a pair of independent but contiguous bodies of liquid separated by a suitable valve which is also utilized for transferring the can parts from one liquid to another, the liquids being maintained under different pressures and out of contact with the outside atmosphere and kept in constant circulation to free the can parts from any air trapped within them so that only air freed can parts will enter the filling chamber.

Still another object is the provision of a canning method and apparatus of this character wherein the can parts are passed through a pasteurizing chamber before being introduced into the liquid traps to free the cans of any contamination before being filled, the liquid in the traps being preferably filtered water so that the pasteurized surfaces of the can parts will remain free from contamination during their passage through the traps and thereafter.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of one form of apparatus for carrying out the method steps of the instant invention;

Figs. 2, 3 and 4 are enlarged vertical and sectional continuing views which when joined along the dot and dash lines of the various figures, with Fig. 3 in the middle, illustrate a part sectional, part elevational view of the complete apparatus as extending longitudinally thereof and substantially along the broken line 2—2 in Fig. 1;

Fig. 5 is a horizontal section taken substantially along the line 5—5 in Fig. 3; and

Fig. 6 is a vertical section taken substantially along the line 6—6 in Fig. 5.

In the machine illustrated in the drawings as a preferred embodiment of the invention, the filling of the cans is effected in an air free chamber A (Figs. 3 and 5) which contains a suitable gas, preferably carbon dioxide, under a pressure of between twelve and twenty-five pounds per square inch above atmospheric pressure. The beer or other product to be filled into the cans is introduced into this chamber.

Empty cans to be filled with the product are introduced into the chamber A by way of a plurality of steam filled chambers and liquid traps and this insures perfect evacuation of all air in

the cans. The cans are first fed into an exhaust chamber B (Fig. 2) in which by far the greatest percent of the air in the cans is expelled and replaced with steam at atmospheric pressure. The steam filled cans are then passed into a chamber C (Fig. 2) where they are pasteurized. This pasteurizing chamber is preferably filled with steam at substantially 220 degrees F. and two pounds pressure above atmospheric.

The pasteurized cans are then immersed into a liquid D (Fig. 2) of a liquid trap E disposed adjacent the pasteurizing chamber. Here any small trace of air which may still be in the cans mixes with the liquid and is substantially dissipated. The liquid D is preferably filtered, germ freed or sterilized water confined out of contact with the atmosphere and maintained at a pressure equal to that of the steam in the pasteurizing chamber.

The water filled cans are passed by way of a submerged valve F into a second liquid G under higher pressure and also contained in the trap E. This increases the pressure within and around the cans so that any possible traces of air yet remaining in them will be expelled. This second liquid is contiguous with the first mentioned liquid and is preferably also filtered water but maintained at the pressure of the gas in the air free chamber A. Cans after circulating through this water G are passed into the chamber A, drained of all water and then filled with the beer or other product.

Simultaneously with the introduction of the cans into the air free chamber A, can covers are also passed into the chamber for uniting with the filled cans. The covers are first fed into a cover pasteurizing chamber H (Fig. 6) where they are pasteurized. This chamber is preferably filled with steam maintained at substantially 220° F. and at about two pounds pressure above atmospheric.

The pasteurized covers are next immersed into a liquid J of a liquid trap K associated with the cover chamber. In the liquid the covers are substantially freed of air in a manner similar to that described in connection with the cans being inverted when immersed in the liquid so that any tendency of trapped air clinging to the inside of the curl for example will be nullified and the air evacuated. This liquid is preferably filtered water kept out of any contact with the atmosphere and maintained at the pressure of the steam in the pasteurizing chamber H.

The water surrounded cover is then passed by way of a submerged valve L (Fig. 6) into a second liquid M which is held under a higher pressure and is contiguous with the liquid J. This liquid M is disposed within the trap K and is maintained at the pressure of the gas in the air free chamber A. The liquid M is preferably also filtered water. After circulating through the liquid the cover is passed into the chamber A, is drained of its water, positioned onto a filled can and united thereto in any suitable manner this hermetically sealing the can.

The filled and sealed cans are discharged from the air free chamber A by first immersing them into a liquid N (Fig. 4) of a liquid trap P open to the chamber A. The liquid N is maintained under the pressure of the gas in the chamber. The cans are then transferred by way of a submerged valve R into a second liquid S also in the trap P and maintained at atmospheric pressure. This transfer reduces the pressure on the cans. The cans are then moved into a discharge chamber T preferably filled with steam at atmospheric pressure and from this chamber the sealed cans are discharged into the atmosphere to any suitable place of deposit.

It will thus be observed that the can parts and the product are at all times, during the various steps of the method, kept isolated from atmospheric air, the can parts being moved through chambers and liquid traps so that contamination of either the can parts or the product is practically entirely prevented.

For the purpose of more clearly illustrating the instant invention, the drawings show the principal parts of an apparatus adapted to permit accomplishment of the various operations heretofore mentioned. Empty cans 11 (Fig. 2) open at one end are fed into the apparatus in any suitable manner, as for example, by way of an inclined runway 12, the cans rolling on their sides preferably in a continuous procession. The runway 12 extends into one end of an inclined tunnel element or tube 13 which connects at its discharge end with the exhaust chamber B hereinbefore mentioned, the tunnel element forming in effect a continuation of the runway for guiding the cans into the chamber.

The exhaust chamber B is enclosed in an elongated, vertically inclined casing 15, a side wall of which is formed integrally with the tunnel element 13, the latter being located adjacent the bottom of the casing. Inside the casing is a suitable endless chain conveyor which comprises a pair of spaced and parallel endless chains 17 having can carriers 18 secured to them at spaced intervals along their length. This conveyor moves past the end of the tunnel element 13. The conveyor chains take over upper and lower sprockets 19, 21 which are mounted on cross-shafts 22 carried in suitable bearings formed in the casing 15. The shafts are rotated in any suitable manner in time with the other moving parts of the apparatus.

Steam is circulated through the chamber B by a supply pipe 23 which is threaded into the casing bottom wall and by a vent pipe 24 which is threaded into the casing top wall.

As the cans 11 enter the steam filled exhaust chamber B they are picked up by the carriers 18 of the conveyor 17 and are carried up along one side of the casing 15 and thence down along the opposite side to provide sufficient time for the steam to substantially displace the air in the cans. During this travel of the cans they are held in the carriers 18 by a guide rail 26 which is secured to the inside walls of the casing.

The substantially air free but steam filled cans upon reaching the exit end of the guide rail 26 are individually cammed out of the conveyor carriers 18 by a stationary inclined cam plate 28 (Fig. 2) which is located in the bottom of the chamber. The cans thus ejected from the carrier are immediately discharged from the chamber by a rotating valve 29.

Valve 29 is disposed in a seat 31 which is formed in the exhaust chamber casing 15 at its lower end. The valve is mounted on a shaft 32 journaled in bearings formed in the casing and is rotated in any suitable manner in time with the travel of the conveyor chains. Spaced pockets 33 are provided in the valve for carrying the cans.

Rotation of the valve 29 moves its pockets 33 successively past the cam plate 28 and a pocket receives a can as it is cammed out of the conveyor 17. The pocketed cans are thus carried out of the exhaust chamber B and are trans-

ferred into the pasteurizing chamber C hereinbefore mentioned.

The pasteurizing chamber C is provided in a housing 37 which is located adjacent the exhaust chamber casing 15 the latter being mounted on the housing as shown in Fig. 2. Housing 37 is formed with an upper and a lower section. The upper section is inclined to correspond with the exhaust chamber casing 15 and it is this section which encloses the pasteurizing chamber. Cans are passed into the pasteurizing chamber through an opening 38 which is formed in a wall of the housing adjacent the transfer valve 29.

A conveyor is also located within the pasteurizing chamber C and comprises a pair of spaced and parallel endless chains 42 having can carriers 43 secured to them at spaced intervals along their length. These chains move past the can entrance opening 38 of housing 37 and take over upper and lower spaced sprockets 45, 46. The sprockets are mounted on cross-shafts 47 which are carried in suitable bearings formed in the casing 37 and are rotated in any suitable manner in time with the other moving parts of the machine.

Steam is circulated through the chamber by means of an inlet supply pipe 49 which is threaded into a side wall of the chamber housing 37 and by an outlet or vent pipe 51 which is secured in the housing top wall.

Steam filled cans 11 entering the pasteurizing chamber C from the exhaust chamber B are picked up by the conveyor carriers 43 as they move past the chamber opening 38 and are carried upwardly along one side of the chamber and thence downwardly along its opposite side. This provides time for proper pasteurization of the cans. A guide rail 53 which is secured to the casing walls holds the moving cans in their carriers during this travel.

At the end of travel of the cans through the pasteurizing chamber C they are passed into the trap E hereinbefore mentioned. Trap E is preferably located directly under the pasteurizing chamber C and provides a liquid seal between chamber C and the can filling chamber A. Trap E is formed partly in the lower section of housing 37 and partly in a base member 55 on top of which housing 37 is bolted. The trap is divided into an upper compartment 56 and a lower compartment 57 as shown in Fig. 2.

The upper compartment 56 is formed entirely within the lower section of housing 37 at the bottom of the pasteurizing chamber C and is in communication therewith. This compartment is separated from the lower compartment 57 by a bottom wall 58 which is integral with housing 37 and which is formed with an opening 61 providing communication between upper and lower compartments for the passage of cans therethrough.

Trap valve F hereinbefore mentioned is located adjacent the opening 61 in bottom wall 58 and rotates in a seat 62 formed in the wall around the opening. The valve is mounted on a cross-shaft 63 which is carried in bearings formed in housing 37 and which is rotated in any suitable manner in time with the other moving parts of the machine. Can pockets 64 are provided in the valve and these receive and transfer the cans through the opening 61 as the valve rotates.

Filtered water D is circulated through the upper compartment 56 by an inlet supply pipe 66 and an outlet or return pipe 67. These pipes are threaded into a side wall of housing 37 (Fig. 2). The water completely submerges the valve F and is under the low pressure of the steam in the pasteurizing chamber C.

Thus at the end of travel of the cans in the pasteurizing chamber C, the conveyor 42 plunges the cans into the filtered water D in the trap upper compartment 56, the water completely filling each can so that air is expelled from the can. The conveyor drops the cans into the pockets 64 of valve F. As the valve rotates, moving its pockets past the trap opening 61 in compartment bottom wall 58, a can carried in a pocket, falls out through the opening and enters the trap lower compartment 57.

The lower compartment 57 of trap E is divided transversely by a vertical wall of housing 37 forming a baffle plate 69 which extends down into the interior of the base member 55 separating the compartment into left and right hand sections as viewed in Fig. 2. The lower portions of these sections open into each other. The upper portion of the left hand section communicates with the opening 61 of the upper compartment 56. The upper portion of the right hand section opens into a horizontal tunnel element 72 which is filled with carbon dioxide gas passing into it from chamber A as will be hereinafter described.

Filtered water G is circulated through the lower compartment by an inlet supply pipe 75 and an outlet or return pipe 76. These pipes are threaded into a side wall of the base member 55. The water completely fills the left hand section of the lower compartment and presses against the exposed part of the valve F in the opening 61. In the right hand section of the compartment the water level is much lower as the surface is under the high pressure of the carbon dioxide gas in the tunnel element 72.

A conveyor is provided in the lower compartment of trap E and is submerged in the water G to carry the cans therethrough. This conveyor comprises a pair of endless chains 77 having can carriers 78 spaced at regular intervals along its length. The chains take over a plurality of idler sprockets 79 and a driving sprocket 81 arranged as shown in Fig. 2 so that the conveyor moves through both sections of the lower compartment. The idler sprockets are mounted on cross shafts 82 and the driving sprocket is mounted on a driving shaft 83 all of the shafts being carried in bearings formed in housing 37 and base member 55. The driving shaft is rotated in any suitable manner in time with the other moving parts of the machine.

As a can 11 enters the lower compartment 57 it is immediately caught in a carrier 78 of conveyor 77. The conveyor carries the cans down through the water in the left hand section of the compartment toward the bottom of the trap and thence upwardly under the baffle plate and through the right hand section of the compartment. In the right hand section the cans are carried up out of the water and enter into the tunnel element 72, the water in the meantime draining out of the cans. The drained cans immediately fill with the carbon dioxide in the tunnel. During this travel of the cans they are held in the conveyor carriers by a rail 84 which is secured to the walls of housing 37 and to brackets fastened to the baffle plate.

Tunnel element 72 provides an ante-chamber for the gas filled cans going into chamber A. The element is connected with a covered casing 75 which encloses the chamber. The carbon dioxide gas is introduced into the chamber by

way of an inlet supply pipe 76 threaded into a wall of the casing 75. A vent valve 77 is provided in the cover of the casing. Within the tunnel element there is disposed a horizontal rotatable screw conveyor 91 (Figs. 2, 3 and 5) for moving the cans therethrough.

The can receiving end of the screw conveyor 91 is located directly over the top of the chain conveyor driving sprocket 81. This end of the screw is supported on a trunnion 92 formed integrally with the screw and journaled in a bearing block 93 secured in a wall of the casing 38. The opposite end of the screw extends into the chamber A and is supported on a similar trunnion (not shown) which is journaled in a bearing block 95 (Fig. 5) secured to a horizontal wall or table 96 of the chamber casing 75. The screw is rotated in any suitable manner in time with the other moving parts of the apparatus.

Cans entering the tunnel element 72 are brought into engagement with the screw conveyor 91 by the conveyor chains 77 and are propelled along a runway 98 which is located adjacent the screw. The runway comprises a plurality of spaced and parallel side and bottom guide rails 99 which are curved around the screw so that the cans will be rotated from their horizontal position into an upright position as they are moved forward by the screw. At the end of the screw the upright cans move out of the runway and onto the top of the table 96 and are then in chamber A proper.

The screw also serves as a can timing device for properly spacing the cans and for inserting them into pockets 101 (Figs. 3 and 5) of a rotatable starwheel 102 located within the chamber. The star wheel is carried on the upper end of a substantially vertical shaft 103 journaled in suitable bearings formed in the table 96. This shaft is driven in any suitable manner in time with the other moving parts of the apparatus. A curved guide 104 formed on the bearing block 95 holds the cans in their pockets as the star wheel rotates.

The star wheel advances the cans in timed order into a suitable can filling mechanism which is located within the chamber A and which is utilized to fill the product into the cans. In the instant case the filling mechanism is arranged to fill a liquid, preferably beer, into the cans. The drawings illustrate one such type of filling mechanism which is similar to that shown in United States Patent 1,523,607 issued January 20, 1925, to F. W. Prael on Filling machine.

In such a filling mechanism the timed cans are placed by the star wheel 102 into spaced pockets 111 (Figs. 3 and 5) of a rotating turret 112 formed on a central column 113 which is keyed to a vertical shaft 114. The shaft is journaled in the chamber casing 75 and is rotated in any suitable manner in time with the other moving parts of the apparatus. The cans are retained within the turret pockets by a guide rail 115 which is secured to the casing bottom wall 96 and which is curved around the turret parallel with its circumference.

The beer is contained in a reservoir 117 which is disposed within the chamber A. The reservoir is secured to a flange 118 formed on the top of the central column 113 and rotates with the central column and the turret. The top of the reservoir is open to the chamber A so that the carbon dioxide within the chamber will also exert a pressure on the beer and thus prevent escape of the gas contained in the beer. The supply of beer in the reservoir is replenished by way of a supply pipe 119 which is threaded into the chamber casing cover.

The beer is dispensed from the reservoir 117 into the pocketed cans 11 by measuring and filling heads 125 which depend from the bottom of the reservoir. There is one head for each pocket of the turret 112, each head being located directly over the top of its corresponding pocket and in vertical alignment with the can retained therein.

A valve device 126 disposed in the top of each of the heads 125 and connected to a vertical tubular stem 127, is operated by a stationary cam track 128 to measure out into the heads a predetermined quantity of beer. The cam track is carried on brackets 129 which are secured to the inside of the chamber casing 75.

A second valve device 132 disposed within each head adjacent its lower end is utilized to release the measured beer and to fill it into the cans. This valve is secured to a vertical rod 133 which slides within the tubular stem 127. The stem is connected to a sleeve 134 which surrounds the lower end of the head.

Release of the measured quantity of beer is effected by a lifting of the can as it is carried around in its turret pocket 111. A lifter plate 136 supports each can and is located under each pocket and is lifted vertically by a stationary cam 137. This lifting action raises the can against the head sleeve 134 moving the latter up and thereby opening the lower valve 132 permitting the beer to flow out of the head into the can.

Filling of the can is completed in approximately a 180 degree revolution of the turret 112. The filled can then descends with its lifter plate 136 to its original level, is removed from its turret pocket 111 and is thence moved toward a closing mechanism 138 which is also disposed within the air free chamber. The filled can is advanced to the closing mechanism by a suitable conveyor having can pushing fingers 141 (Fig. 5).

At the closing mechanism the filled can is brought into position for sealing with a can cover 150 which has been previously brought into sealing alignment with the can as will now be described, the actual sealing operation being explained hereinafter.

The can covers 150 are individually introduced into the apparatus from a stack of such covers which are arranged in a magazine 151 (Fig. 6). The magazine is disposed over an opening 152 formed in a cover plate 153 of a housing 154. The lower end of the stack of covers extends through the opening and into the housing, where it is adjacent a rotating cover separating screw 155 carried on a vertical shaft 156 journaled in bearings formed in a horizontal wall 157 of the housing. The shaft is rotated in any suitable manner in time with the other moving parts of the apparatus. The rotating screw separates the lowermost cover from the stack and brings it to rest in an inclined position as shown in Fig. 6.

While in the inclined position the cover is moved laterally from under the stack by a lug 161 of a rotating horizontal feed disc 162. The disc is carried on a vertical shaft 163 journaled in bearings formed in the housing wall 157. The shaft is rotated in any suitable manner in time with the other moving parts of the apparatus. The lug on the rotating feed disc moves the cover along a curved path of travel on guide rails 165, 166 (see also Fig. 5) which are secured to the bottom of the cover plate 153. These guide rails di-

rect the fed cover into a horizontal rotatable valve 168 which seals off the interior of the cover advancing portion of the apparatus from the outside atmosphere.

The cover valve 168 is located in a seat 169 which is formed in the housing wall 157 and in vertical walls 171 which are integral therewith. The vertical walls extend up to the cover plate 153, which fits tightly against the top of the valve in an air tight joint thus excluding the outside atmosphere. The valve is secured to a vertical shaft 174 which is journaled in a bearing 175 formed in the housing 154. This shaft is rotated in any suitable manner in time with the other moving parts of the apparatus. Pockets 177 are provided in the valve for the covers.

Covers received in the pockets of the valve 168 are carried to a position adjacent the pasteurizing chamber H hereinbefore mentioned which is disposed in line with the valve. Here the covers are pushed out of their pockets by cam operated fingers 178 which are located within the pockets to rest behind the covers.

The fingers are secured to the upper ends of vertical pins 179 which are carried in suitable bearings formed in the valve and at their lower ends carry levers 181 (Fig. 6) the movement of which, as the valve turns, is controlled by a cam groove 182. The covers thus removed from their pockets are introduced into the pasteurizing chamber H, through an opening 183 which is formed in the housing walls 171.

The pasteurizing chamber H is enclosed in a vertical cylindrical structure comprising side walls 185 which are formed integrally with housing 154. The upper end of the structure is closed with a domed cap section 186 of cover plate 153 and the lower end is closed with a bottom plate 187. The bottom plate is formed with a vertical column 188 which extends up through the center of the pasteurizing chamber and sets off a restricted space between the column and the side walls 185 for the passage of covers through the chamber.

The inner surface of the side walls 185 is formed with a helical, cover supporting groove 191. Similarly the outer surface of the central column 188 is formed with a corresponding helical, cover supporting groove 192. These helical grooves extend to the bottom of the structure and terminate adjacent an opening 193 which is formed in the side wall 185 adjacent the bottom plate 187.

The central column also supports on its top a disc 194 having secured thereto depending rods 195 which extend down into the chamber space adjacent the cover supporting grooves. The disc is secured to the bottom end of a vertical shaft 196 which is carried in a bearing in cover plate 153 and which is rotated in any suitable manner in time with the other moving parts of the machine.

Covers introduced into the pasteurizing chamber H are received in both helical grooves 191, 192, with a diametrically opposite flange portion of the cover edge entering each groove. This supports the covers in a horizontal position. While the covers are thus supported the rods 195 of rotating disc 194 push them along the grooves through a descending helical path of travel concentric with the column 188. The covers are thus propelled through the length of the pasteurizing chamber toward its bottom wall 187.

During this travel of the covers through the chamber H they are pasteurized by steam which is circulated through the chamber. For this purpose an inlet supply pipe 197 is threaded into the chamber side wall and an outlet pipe 198 is secured in the domed cap section 186 of cover plate 153. Any air trapped in the covers or brought into the chamber with the covers mixes with the circulating steam and is carried away through the outlet pipe 198.

The covers after being pasteurized are immediately passed into the liquid trap K hereinbefore mentioned. The trap is disposed between the pasteurizing chamber H and the filling chamber A and in fact the liquid of the trap extends into the bottom of the pasteurizing chamber. Trap K is thus naturally divided into an upper compartment and a lower compartment which are separated by the valve L.

The trap upper compartment being in the bottom of the pasteurizing chamber it retains the filtered water J which is maintained under the low pressure of the steam in the chamber H. The water is circulated through the compartment by an inlet supply pipe 204 and an outlet or return pipe 205 which are threaded into the side wall 185 of the chamber structure.

The pasteurized covers therefore while still supported in the helical grooves 191, 192 are moved down and are submerged in the water J by rotation of disc 194 and are finally passed out of the compartment through the opening 193.

The covers thus discharged from the upper compartment of trap K are received in the valve L which is located adjacent the upper compartment opening 193 and is retained in a seat 209 formed in a bottom wall 212 of casing 154. The valve is mounted on the lower end of shaft 174 and therefore is rotated in time with the valve 168. Valve L is provided with cover carrying pockets 217 having cover ejecting fingers (not shown) which are similar to those described in connection with valve 168. Covers received by the valve are carried through 180 degrees of travel and are then ejected into a recess 218 which is formed in the housing bottom wall 212 adjacent the valve. This recess opens into and is filled with the liquid of the lower compartment of trap K.

The lower compartment is formed in a base member 221 which supports the housing 154 and which also supports a portion of casing 75 enclosing the filling chamber A. The compartment is divided transversely by a depending baffle plate 222 which extends down into the interior of base member 221 separating the compartment into left and right hand sections as viewed in Fig. 6. The baffle plate terminates near the middle of the compartment thereby leaving the left and right hand sections joined, this being adjacent the bottom of the base member. It will thus be evident that entrance to the left hand section is controlled by the valve L while the right hand section opens into the filling chamber A.

Filtered water M is circulated through both sections of the lower compartment by an inlet supply pipe 223 and an outlet or return pipe 224 both of which are threaded into a side wall of the base member 221. The water in the right hand section is maintained at a predetermined level under the high pressure of the carbon dioxide gas in chamber A.

A pair of chain conveyors 225, 226 which are located in the trap lower compartment are provided for carrying the covers through the water M. Conveyor 225 is disposed in the left hand sec-

tion and comprises an endless chain which carries spaced cover holders 227. The chain takes over a pair of spaced sprockets 228 disposed in the upper portion of the section adjacent the transfer valve L and over a sprocket 229 located in the bottom portion as shown in Fig. 6. This arrangement provides a run of the chain which passes under the cover recess 218. The sprockets are mounted on cross-shafts 231 which are journaled in bearings formed in the base member 221 and which are rotated in any suitable manner in time with the other moving parts of the apparatus.

Conveyor 226 is similar to conveyor 225 and comprises an endless chain carried on a pair of spaced sprockets 235, which are located in the upper portion of the compartment right hand section, and on a sprocket 236 located in the bottom of the section adjacent sprocket 229 as shown in Fig. 6. These sprockets are secured to cross-shafts 237 which are journaled in bearings formed in the housing and which are rotated in any suitable manner in time with the other moving parts of the apparatus.

As the conveyor 225 carries a cover holder 227 under the recess 218 a cover 150 brought therein by the valve L falls onto the holder. The cover within its holder is then conveyed down through the liquid M in the left hand section of the compartment during which travel it is held in the holder by a pair of grooved tracks 238. These tracks are fastened to suitable brackets secured to the walls of the base member 221.

The tracks 238 continue up on the right hand side of the baffle plate 222 and alongside of one run of the conveyor chain 226. Accordingly after a cover within its holder 227 passes under the sprocket 229 it leaves it holder 227 and is caught in a holder 239 which is one of a series carried on the conveyor chain 226. The continuing tracks 238 effect an easy transfer and thereupon the cover within its holder 239 is moved up through the liquid M in the right hand section of the compartment (Fig. 6).

The conveyor 226 further carries the covers up out of the liquid M into the air free chamber A where a short horizontal run of the conveyor passes into the chamber and above the surface of the liquid in the trap. This permits the water to drain away from the covers.

Near the end of the horizontal run of the conveyor 226, the cover carried thereby is removed by a horizontal star wheel 241 (Figs. 5 and 6) which is located at the terminal ends of the grooved tracks 238. The star wheel is secured to a vertical shaft 242 which is journaled in suitable bearings formed in the chamber table 96 and which is rotated in any suitable manner in time with the other moving parts of the apparatus. The can covers are received in spaced pockets 244 of the rotating star wheel and are retained therein by a curved end of one of the grooved tracks 238 which extends partially around the wheel.

The star wheel 241 rotates in time with a cover feeding turret 247 (Fig. 5) which is disposed adjacent the star wheel and which occupies the space between the wheel and the can closing mechanism 138 hereinbefore mentioned. The cover feeding turret is secured to a vertical shaft 248 journaled in bearings formed in the chamber table 96 and is rotated in any suitable manner in time with the other moving parts of the apparatus.

Spaced cover pockets 249 formed in the periphery of the turret 247 receive the covers 150 from the star wheel 241 and carry them into a position adjacent the can closing mechanism 138. The covers are held in their pockets 249 during this movement by a curved guide rail 251 which is disposed adjacent the periphery of the turret and which is secured to the chamber table 96.

The upper portion of closing mechanism 138 is located within the carbon dioxide filled chamber A and is disposed within a covered housing 255 (Fig. 3) which is formed as a part of chamber casing 75. A vent valve 256 is provided at the highest point of the housing.

The closing mechanism may be of any suitable construction, preferably of the type having devices such as for example, a turret 262 for carrying the cans and covers through the mechanism and a closing head 265 for sealing the cover to the can. One such mechanism is illustrated in P. W. Fleischer et al. United States Patent 1,601,910, issued October 5, 1926, on Multispindle double seamer.

At the closing mechanism the transfer turret 247 brings the covers into vertical alignment with the beer filled cans 11 which are being propelled from the filling mechanism along the chamber table 96 by the conveyor fingers 141 as previously described. A cover is positioned over the top of a filled can, and can and cover are simultaneously pushed into pockets formed in the turret 262 of the closing mechanism. The turret conveys the cans, with their covers, under the seaming head 265 where the cans are hermetically sealed.

The sealed cans are removed from the closing mechanism by a curved stationary guide rail 267 which is formed as a part of the guide rail 115 and which extends into the path of travel of the cans in the turret 262. The moving cans strike against the rail as the turret rotates and are thereby pushed out of their pockets onto the chamber table 96.

A can removed from the closing mechanism may be caught by a decelerating device similar to that shown in N. P. Bach United States Patent 2,026,811 issued January 7, 1936, on Can feeding mechanism. A cam actuated arm 271 (Fig. 5) engages the sealed can and passes it along the curved guide rail at a decreasing rate of speed.

At the end of travel along the curved guide rail 267 the sealed cans are brought into engagement with a horizontal rotating screw conveyor 281 (Figs. 4 and 5) which extends from the chamber A into a discharge housing 282 bolted to the chamber casing 75. The ends of the screw conveyor are formed with trunnions 283 which are journaled in a bearing 284 formed at the end of guide rail 267 and in a bearing 285 secured in a side wall of housing 282. The screw is rotated in any suitable manner in time with the other moving parts of the apparatus.

Rotation of the screw conveyor 281 advances the sealed cans along a runway 286 which is curved around the outside of the screw in a manner similar to the can entrance runway 98. The sealed cans are thus discharged from the chamber A and are also turned from an upright position into a horizontal position as they were when they first entered the apparatus as empty cans.

The sealed cans brought into the discharge housing 282 are passed through the liquid trap P which is located adjacent the housing and this maintains the discharge end of the chamber

A in sealing condition. Trap P is formed, partially in the lower portion of housing 282, partially in a base member 287 which supports the housing 282, and partially in a casing 288 which is mounted on a hollow side wing of housing 282 as shown in Fig. 4. The trap P is divided into upper and lower compartments which are separated by the valve R hereinbefore mentioned and by a compartment division wall 289 in casing 288.

The lower compartment of trap P occupies space in housing 282, base member 287 and casing 288. This compartment is provided with a depending baffle plate 291 which transversely divides the compartment into a left hand section and a right hand section as viewed in Fig. 4. The baffle plate is formed as a part of housing 282 and extends down into base member 287, terminating near the middle of the compartment so that the sections are open to each other adjacent the bottom of the base member.

Filtered water N is circulated through the sections of the lower compartment by an inlet supply pipe 294 which is threaded in a wall of the base member 287 and by an outlet or return pipe 295 which is secured in a wall of housing 282. The water in the left hand section of the compartment is maintained at a predetermined level in housing 282 under the high pressure of the carbon dioxide gas in chamber A which also fills the housing. The water in the right hand section completely fills it and contacts the bottom of division wall 289 and valve R.

A conveyor is disposed in the lower compartment and is partially submerged in the water for passing the cans therethrough. The conveyor comprises a pair of spaced and parallel endless chains 301 having can carriers 302 secured thereto at spaced intervals along their length. The chains take over a plurality of paired idler sprockets 304 and a pair of driving sprockets 305 arranged in the lower compartment as shown in Fig. 4. The pairs of idler sprockets are mounted on cross-shafts 306 and the driving sprockets are mounted on a drive shaft 307. These shafts are carried in suitable bearings formed in housing 282 and base member 287. The drive shaft is rotated in any suitable manner in time with the other moving parts of the apparatus.

As the sealed cans in discharge housing 282 leave the screw conveyor runway 286 they fall into the passing carriers 302 on conveyor chains 301 and are carried down into the liquid N in the left hand section of the lower compartment of trap P. Adjacent the bottom of the compartment they are passed under the baffle plate 291 and thence conveyed upwardly through the right hand section toward the valve R. During this travel the cans are held in their carriers by a guide rail 308 which is secured to the baffle plate 291.

Near the end of travel of the cans in the lower compartment, i. e., when they are on top of the driving sprockets 305 the cans are lifted out of their carriers by a stationary deflecting finger 309 which is secured to the compartment division wall 289. The finger directs the cans through an opening 311 formed in the division wall and into the path of travel of the valve R which is adjacent the opening.

Valve R is disposed in a seat 314 which is formed in the compartment division wall 289. The valve is mounted on a horizontal cross shaft 315 which is journaled in bearings formed in casing 288 and which is rotated in any suitable manner in time with the other moving parts of the apparatus. The valve is provided with can carrying pockets 316 having can ejecting fingers 317 which are mounted and actuated in a manner similar to the fingers in the cover valve 168 already described.

Rotation of the valve R moves its pockets 316 past the opening 311 in the compartment division wall 289 in time with the passage of cans therethrough. The cans are thus picked up by the passing pockets and carried through approximately one half revolution at which time they are ejected, by the valve fingers 317, into the trap upper compartment.

The upper compartment of trap P is entirely within the casing 288. The upper part of this casing is inclined in a manner similar to the can exhaust chamber casing 15 and the pasteurizing chamber housing 37 (Fig. 2). The bottom portion of the upper compartment retains filtered water S which completely submerges the valve R. The water is circulated by an inlet supply pipe 321 and an outlet or return pipe 322 which are threaded into a side wall of the casing.

The water is maintained at a predetermined level in the casing under the low pressure of steam which is circulated through the upper portion of the compartment. This steam enters the compartment through an inlet supply pipe 323 which is threaded into a wall of casing 288 above the level of the water. The steam is vented out through a can discharge opening 324 formed in the casing side wall near the top of the compartment.

Within the upper compartment there is a conveyor comprising a pair of spaced and parallel endless chains 326 having spaced can carriers 327 secured thereto at intervals along their length. The chains take over a pair of idler sprockets 329 located in the lower portion of the compartment adjacent the valve R and over a pair of driving sprockets 331 located in the upper portion of the compartment adjacent the opening 324. Idler sprockets 329 are mounted on a cross-shaft 332 and driving sprockets 331 are mounted on a driving shaft 333. These shafts are journaled in bearings formed in the casing 288, the driving shaft being rotated in any suitable manner in time with the other moving parts of the apparatus.

As the sealed cans are ejected from valve R they are picked up by the carriers 327 of chains 326 and are conveyed up through the water S and steam in the upper compartment. During this travel of the cans they are held in their carriers by a guide rail 334 which is secured to a side wall of casing 288. When the cans reach the top of the conveyor they are lifted from their carriers, while passing over the driving sprockets 331, by an inner extension 335 of an inclined discharge chute 336. Chute 336 projects through the compartment discharge opening 324 and conveys the cans to a suitable place of deposit. The cans thus removed from the conveyor, roll down the chute and are discharged from the machine.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction, and arrangement of parts of the apparatus mentioned herein and in the steps and their order of accomplishment of

the process described herein, without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the apparatus and process hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans to be filled, a liquid trap located in communication with said chamber for maintaining the latter in sealed condition, and a valve in said liquid trap for confining the liquid and for introducing the empty cans into said trap, and means in said trap for receiving the empty cans from said valve and conveying the cans through the confined liquid and into said filling chamber.

2. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans to be filled, a liquid trap in communication with said chamber for maintaining the chamber in sealed condition, a valve in said liquid trap for confining the liquid and for introducing the empty cans into said trap, and means in said trap for receiving the empty cans from said valve and conveying the same through the confined liquid and into said filling chamber, and means for circulating the liquid within said trap to carry off air brought into and mixed with the liquid by the passage of the cans therethrough.

3. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans to be filled, devices located within said filling chamber for filling the product into said empty cans, a liquid trap in communication with said chamber for maintaining the chamber in sealed condition, and a valve in said liquid trap for confining the liquid and for introducing the empty cans into said trap, and means in said trap for receiving the empty cans from said valve and conveying the same through the confined liquid and into said filling chamber.

4. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans to be filled, a liquid trap communicating with said chamber and containing a liquid for maintaining the chamber in sealed condition, a valve in said liquid trap for confining the liquid therein and for introducing the empty cans into the confined liquid, and an endless conveyor in said trap for receiving the empty cans from said valve and moving the same through the liquid and into said chamber for filling with the product.

5. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans for filling and for receiving covers for closing the filled cans, filling mechanism located within said chamber for filling the empty cans with a product, can closing means also located within said chamber for uniting a cover with a filled can, inlet and outlet liquid traps communicating with said chamber and through which the cans and covers pass when brought into said chamber and through which the closed cans pass when discharged from the chamber, the liquid contained in said liquid traps maintaining the chamber in sealed condition, valves in said traps for confining the liquid therein and for passing the empty cans and covers into and the closed cans out of said confined liquid, and conveyors in said traps for moving the can parts and the closed cans through said traps.

6. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans to be filled, a liquid trap in communication with said chamber and through which the empty cans are passed for delivery into said chamber, the liquid contained in said liquid trap maintaining the chamber in sealing condition, a pasteurizing chamber in communication with said liquid trap for pasteurizing the empty cans prior to filling, and a valve in said liquid trap for receiving cans from said pasteurizing chamber and for passing them through said trap liquid.

7. In a machine for filling beer and other products into cans, the combination of an air free filling chamber maintained at a pressure for receiving empty cans to be filled, a liquid trap communicating with said chamber and through which the empty cans are passed for delivery into said chamber, said trap containing a liquid for maintaining the chamber in sealing condition, and a valve in said liquid dividing the latter into two contiguous portions one of which is confined under the pressure of the filling chamber and the other of which is maintained at a different pressure.

8. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans to be filled, a liquid trap communicating with said chamber and containing a liquid for maintaining the chamber in sealing condition, a valve in said liquid trap for confining the liquid therein, a pasteurizing chamber communicating with said liquid trap, an exhaust chamber communicating with said pasteurizing chamber, and can feeding means for passing empty cans through said chambers and said liquid trap for delivery into said filling chamber whereby the cans are progressively exhausted of air, are pasteurized and are delivered into said filling chamber free of all air and in condition for filling.

9. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans to be filled, separate liquid traps communicating with said chamber and through which empty cans and can covers are passed for delivery into said chamber, said traps containing liquid for maintaining the chamber in sealing condition, a valve in each of said liquid traps for confining the liquid therein and for passing the cans and their covers into and through the liquid, and pasteurizing chambers communicating with said liquid traps and through which the cans and covers are passed for pasteurization prior to their introduction into said traps.

10. In a machine for filling beer and other products into cans, the combination of an air free filling chamber for receiving empty cans to be filled and covers for closing the filled cans, filling mechanism located within said chamber for filling the empty cans with a product, can closing means also located within said chamber for sealing the filled can with a cover, a liquid trap communicating with said chamber and through which the sealed cans are discharged from said chamber, said trap containing a liquid for maintaining said chamber in sealing condition, means for conveying the filled and closed cans from said closing means to said liquid trap, a valve in said liquid trap for confining said liquid and through which the sealed cans are

passed in being discharged, and endless conveyor means in said trap for moving the filled cans therethrough and from said first mentioned conveyor means to said valve.

11. In a machine for filling beer and other products into cans, the combination of an air free filling chamber maintained under a pressure for receiving empty cans to be filled and covers for closing the filled cans, filling mechanism located within said chamber for filling the empty cans with a product, can closing means also located within said chamber for sealing the filled can with a cover, a liquid trap communicating with said chamber and through which the sealed cans are discharged from said chamber, said trap containing a liquid for maintaining said chamber in sealing condition, a valve in said liquid trap dividing the liquid into two portions and confining one portion under the pressure of the filling chamber, a discharge chamber communicating with said liquid trap and containing a gas under a pressure different than that of said filling chamber for protecting the unconfined portion of the liquid in the trap against the outside atmosphere, and conveyors in said trap and in said discharge chamber for discharging the sealed can by way of said valve from the filling chamber into the atmosphere.

12. In a machine for filling carbonated or gasified liquids into cans, the combination of an exhaust chamber, means communicating with said chamber for freeing empty cans of air and replacing the same with steam, an air free chamber containing carbon dioxide gas under pressure confined out of contact with air, devices including a liquid trap chamber through which the empty cans are introduced into said gas filled chamber, and filling mechanism disposed in said air free chamber for filling the cans with liquid thereby replacing the gas in the cans and while under pressure of the gas in said chamber.

13. In a machine for filling carbonated or gasified liquids into cans, the combination of a plurality of treating chambers, means for feeding empty cans to be filled to one of said chambers, means communicating with said chambers for freeing empty cans and covers of air and replacing the same with steam, a plurality of air free chambers containing carbon dioxide gas under pressure confined out of contact with air, devices including intercommunicating liquid trap chambers through which the empty cans and covers are introduced respectively into said gas filled chambers, filling mechanism disposed in one of said air free chambers for filling the cans with liquid thereby replacing the gas in the cans and under the pressure of the gas in the chamber, and can closing means also located within said chamber for hermetically sealing the filled cans with the covers while still under the gas pressure of the chamber.

14. In a machine for filling carbonated or gasified products into cans, the combination of an air free chamber containing carbon dioxide gas under pressure confined out of contact with air, a liquid trap communicating with and sealing said air free chamber, means for conveying empty cans while turned on their sides through the trap liquid to fill the same and to free them of air, means for transferring the liquid filled air freed cans from said conveying means and into said chamber the while draining them of the trap liquid whereby the emptied cans are filled with the carbon dioxide gas of the chamber, means associated with said transferring means for turning said empty cans to upright position and filling mechanism disposed in said chamber for replacing the gas in the cans with the product while under the pressure of the gas within the chamber.

15. A method of filling beer and other products into an air free can while in a closed air free filling chamber which comprises first feeding empty air filled cans and replacing the air therein with steam, then moving said cans through a liquid trap whereby the can is filled with the trap liquid, thence delivering the can into a filling chamber the while emptying it of its trap liquid, feeding can covers while excluding air from contact therewith, delivering said covers into said filling chamber, filling the empty can with its product while in said filling chamber, and securing said cover onto said filled can thereby sealing the product within the can.

16. A method of filling beer and other products into an air free can while in an air free filling chamber, which comprises first pasteurizing continuously and progressively a plurality of empty cans and passing the same while turned on their sides continuously and in succession through a liquid trap whereby the can is filled with the trap liquid, thence continuously delivering the cans into a filling chamber the while emptying the cans of their trap liquid and turning the empty cans to upright filling position, pasteurizing a can cover and delivering it into said filling chamber, successively filling the cans with the product while in said filling chamber, and securing said pasteurized cover onto the filled cans to seal the product within the latter.

17. A method of filling beer and other products into an air free can while in an air free filling chamber, which comprises first substantially exhausting the air from a plurality of empty cans, continuously and successively pasteurizing the exhausted cans and passing the same while turned on their sides through a liquid trap whereby the cans are progressively filled with the trap liquid and any air remaining in the cans is displaced and expelled therefrom, thence delivering the liquid filled air free cans successively into a filling chamber the while emptying the cans of their trap liquid and turning the empty cans to upright filling position, pasteurizing successively a plurality of can covers and delivering the same into said filling chamber, progressively filling the empty cans with the product while in said filling chamber, and respectively securing said pasteurized covers onto said filled cans thereby sealing the product within the latter.

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