The present invention relates to a machine for filling liquids, such as syrups and the like into containers or cans, and has particular reference to devices for filling measured charges of the liquid into cans while maintaining the cans under vacuum.

An object of the invention is the provision of a machine for filling liquids into cans wherein the filling of the liquids into the cans is effected while a partial vacuum is continuously and simultaneously drawn on the interior and exterior of the cans so that flow of the liquids into the cans is facilitated while collapse of the cans is prevented.

Another object is the provision of such a liquid filling machine wherein a partial vacuum is drawn on the liquid measuring chamber while in communication with a can to facilitate flow of liquid for a subsequent can into the measuring chamber and to build up a pressure above a received measured charge of liquid to facilitate its discharge into the subsequent container.

Numerous other objects and advantages of the invention will become 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 vertical section of a liquid filling machine embodying the instant invention, with parts broken away;

Figure 2 is a horizontal section taken substantially along the broken line 2--2 in Figure 1, with parts broken away;

Figure 3 is a top plan view of a portion of the machine shown in Figure 1, with parts broken away;

Figures 4 and 5 are enlarged sectional details of parts of the machine, the two views showing certain of the parts in different positions, with parts broken away; and

Figure 6 is an exploded perspective view of certain of the parts shown in Figures 3, 4 and 5, with parts broken away.

As a preferred embodiment of the instant invention the drawings illustrate principal parts of a continuously operating machine, in which rectangular shaped, fibre containers having metal bottoms, preferably of the type used for packaging frozen food products, and filled with a product, are treated to a syrapping operation, although the invention is equally well adapted to both metallic or non-metallic containers of any shape and to complete liquid filling operations, if desired.

The containers enter the machine in an upright, on-end position, as shown in Figure 1 with their top ends open and are brought into communication with a closed vacuumizing chamber where the interior and the exterior of the containers are subjected to a vacuumizing treatment. A vacuum of preferably 14 inches of mercury is drawn on this chamber, although the invention is equally well adapted to other degrees of vacuum if desired. Any product within the containers is simultaneously subjected to this vacuumizing treatment.

This vacuumizing treatment is effected while a container is traveling along a curved path of travel and while the vacuum is continuously drawn on the chamber. During this advancement of the container, it is filled with a measured charge of syrup which has been previously segregated in a measuring chamber. Thus the filling is effected while a vacuum is drawn on the container, both inside and outside. This provides for easy flow of the liquid into the container and thus expedites the filling operation.

At the completion of the filling operation, the emptied measuring chamber is vacuumized by communication with the vacuumizing chamber. This vacuumizing of the measuring chamber provides for rapid inflow of liquid from the reservoir into the chamber for a subsequent container.

During this measuring of a charge of liquid for a subsequent container, the container already filled with liquid is discharged to any suitable place of deposit for sealing. This completes the cycle of operation of the machine.

The containers A to be syrpped, enter the machine by way of a horizontal runway 11 (Figure 2) and are advanced in spaced and timed order by a continuously rotating screw conveyor 12 having trunnions 13 journaled in bearings 14 formed on a frame 15 which constitutes the main frame of the machine. The conveyor is rotated in any suitable manner in time with the other moving parts of the machine.

Beyond the screw conveyor 12, the containers are further advanced along a curved portion of the runway 11, by a continuously rotating star wheel 17, mounted on a vertical shaft 18 journaled in a long bearing formed in the main frame 15. The shaft may be driven in any suitable manner in time with the screw conveyor 12.

The machine end of the runway 11 terminates adjacent a wide opening 21 (Figure 2) in a stationary cylindrical housing 22 which extends up from the main frame 15 and which contains a rotatable turret 23 having a plurality of spaced pockets 24.
formed in its outer periphery. The turret 23 rotates in a close fitting seat 25 formed in the housing. This turret is mounted on the upper end of a vertical shaft 21 which is journaled in a large bearing 27 formed in the frame 15. The shaft is rotated continuously in time with the entrance star wheel 17 by a spur gear 28 which is mounted on the lower end of the shaft and which meshes with and is driven by a gear 29 (Fig. 2) carried on the lower end of the star wheel shaft 16.

The timing of the rotation of the turret 23 and the entrance star wheel 17 is such, that as a pocket 24 of the turret passes the terminal end of the entrance runway 11 in the opening 21 of the housing 22, the star wheel 17 pushes a container A into the passing pocket as best shown in Fig. 2 and the container thereafter is carried forward by the turret. The container is retained in the turret pocket against displacement thereto from by the curved seat 25 in the housing 22 which acts as a guide for the container.

As soon as a turret pocket 24 and its container A is within the housing 22 where it is sealed from the outside atmosphere, the rotating turret 23 advances the pocket and its container into communication with a vacuumizing chamber 30. This chamber is formed in the inner surface of the housing 22 as shown in Figs. 1 and 2 and extends for slightly more than half way around the chamber.

A low vacuum of substantially 14 inches of mercury as hereinbefore mentioned is constantly maintained in this chamber by means of a vacuum pipe 31 which is in communication with the chamber. One end of this pipe is threaded into the housing 22. The opposite end leads to a suitable source of vacuum. It is the maintenance of this vacuum in the chamber that vacuumizes the container, its contents, and the space around the container.

While the container is in communication with the vacuumizing chamber 30 and while the vacuum is still being drawn on the container, a measured charge of syrup or other liquid is filled into the container. The syrup or other liquid, is contained in a closed tank 39 or retort 38 (Figs. 1 and 2) which is mounted on top of the turret 23 and which rotates with the turret. An inlet pipe 33 in the top of the tank provides for replenishment of the liquid in the tank.

Measuring of the liquid before filling into the containers is effected by a plurality of measuring chambers 34 which are formed in a deep flange 35 surrounding and formed on the tank 32. There is one of these measuring chambers 34 for each pocket 24 of the turret 23 and they are located directly above the pockets in vertical alignment with the containers in the pockets. A plurality of inlet ports 36 formed in the tank 32 near its bottom and located one opposite each measuring chamber 34 communicates with the chambers near their lower ends and provides for transfer of the liquid from the tank to the chambers.

The volume of the measuring chambers 34 may be altered as desired to suit the quantity of liquid to be filled into the containers. For this purpose each measuring chamber 34 is provided with a manually adjustable sleeve 35 which extends downward and is journaled in a vertical shaft 21 (see also Fig. 1) which is journaled in a large bearing 27 formed in the frame 15. The shaft is rotated continuously in time with the entrance star wheel 17 by a spur gear 28 which is mounted on the lower end of the shaft and which meshes with and is driven by a gear 29 (Fig. 2) carried on the lower end of the star wheel shaft 16.

The timing of the rotation of the turret 23 and the entrance star wheel 17 is such, that as a pocket 24 of the turret passes the terminal end of the entrance runway 11 in the opening 21 of the housing 22, the star wheel 17 pushes a container A into the passing pocket as best shown in Fig. 2 and the container thereafter is carried forward by the turret. The container is retained in the turret pocket against displacement thereto from by the curved seat 25 in the housing 22 which acts as a guide for the container.

As soon as a turret pocket 24 and its container A is within the housing 22 where it is sealed from the outside atmosphere, the rotating turret 23 advances the pocket and its container into communication with a vacuumizing chamber 30. This chamber is formed in the inner surface of the housing 22 as shown in Figs. 1 and 2 and extends for slightly more than half way around the chamber.

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Measuring of the liquid before filling into the containers is effected by a plurality of measuring chambers 34 which are formed in a deep flange 35 surrounding and formed on the tank 32. There is one of these measuring chambers 34 for each pocket 24 of the turret 23 and they are located directly above the pockets in vertical alignment with the containers in the pockets. A plurality of inlet ports 36 formed in the tank 32 near its bottom and located one opposite each measuring chamber 34 communicates with the chambers near their lower ends and provides for transfer of the liquid from the tank to the chambers.

The volume of the measuring chambers 34 may be altered as desired to suit the quantity of liquid to be filled into the containers. For this purpose each measuring chamber 34 is provided with a manually adjustable sleeve 35 which extends downward and is journaled in a vertical shaft 21 (see also Fig. 1) which is journaled in a large bearing 27 formed in the frame 15. The shaft is rotated continuously in time with the entrance star wheel 17 by a spur gear 28 which is mounted on the lower end of the shaft and which meshes with and is driven by a gear 29 (Fig. 2) carried on the lower end of the star wheel shaft 16.

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As soon as a turret pocket 24 and its container A is within the housing 22 where it is sealed from the outside atmosphere, the rotating turret 23 advances the pocket and its container into communication with a vacuumizing chamber 30. This chamber is formed in the inner surface of the housing 22 as shown in Figs. 1 and 2 and extends for slightly more than half way around the chamber.

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While the container is in communication with the vacuumizing chamber 30 and while the vacuum is still being drawn on the container, a measured charge of syrup or other liquid is filled into the container. The syrup or other liquid, is contained in a closed tank 39 or retort 38 (Figs. 1 and 2) which is mounted on top of the turret 23 and which rotates with the turret. An inlet pipe 33 in the top of the tank provides for replenishment of the liquid in the tank.

Measuring of the liquid before filling into the containers is effected by a plurality of measuring chambers 34 which are formed in a deep flange 35 surrounding and formed on the tank 32. There is one of these measuring chambers 34 for each pocket 24 of the turret 23 and they are located directly above the pockets in vertical alignment with the containers in the pockets. A plurality of inlet ports 36 formed in the tank 32 near its bottom and located one opposite each measuring chamber 34 communicates with the chambers near their lower ends and provides for transfer of the liquid from the tank to the chambers.

The volume of the measuring chambers 34 may be altered as desired to suit the quantity of liquid to be filled into the containers. For this purpose each measuring chamber 34 is provided with a manually adjustable sleeve 35 which extends downward and is journaled in a vertical shaft 21 (see also Fig. 1) which is journaled in a large bearing 27 formed in the frame 15. The shaft is rotated continuously in time with the entrance star wheel 17 by a spur gear 28 which is mounted on the lower end of the shaft and which meshes with and is driven by a gear 29 (Fig. 2) carried on the lower end of the star wheel shaft 16.

The timing of the rotation of the turret 23 and the entrance star wheel 17 is such, that as a pocket 24 of the turret passes the terminal end of the entrance runway 11 in the opening 21 of the housing 22, the star wheel 17 pushes a container A into the passing pocket as best shown in Fig. 2 and the container thereafter is carried forward by the turret. The container is retained in the turret pocket against displacement thereto from by the curved seat 25 in the housing 22 which acts as a guide for the container.

As soon as a turret pocket 24 and its container A is within the housing 22 where it is sealed from the outside atmosphere, the rotating turret 23 advances the pocket and its container into communication with a vacuumizing chamber 30. This chamber is formed in the inner surface of the housing 22 as shown in Figs. 1 and 2 and extends for slightly more than half way around the chamber.

A low vacuum of substantially 14 inches of mercury as hereinbefore mentioned is constantly maintained in this chamber by means of a vacuum pipe 31 which is in communication with the chamber. One end of this pipe is threaded into the housing 22. The opposite end leads to a suitable source of vacuum. It is the maintenance of this vacuum in the chamber that vacuumizes the container, its contents, and the space around the container.

While the container is in communication with the vacuumizing chamber 30 and while the vacuum is still being drawn on the container, a measured charge of syrup or other liquid is filled into the container. The syrup or other liquid, is contained in a closed tank 39 or retort 38 (Figs. 1 and 2) which is mounted on top of the turret 23 and which rotates with the turret. An inlet pipe 33 in the top of the tank provides for replenishment of the liquid in the tank.
position where it covers and closes the inlet port 38 as shown in Fig. 5 and at the right in Fig. 1. Thus the flow of liquid from the tank 32 is cut off and the liquid in the measuring chamber 34 is segregated as a measured charge from the liquid in the tank.

This turning of the valve 41 also shifts its discharge ports 56, 57 into registry with the discharge channels 52 in the turret as shown in Fig. 5 and at the right in Fig. 1, and thereby permits the segregated measured charge of liquid to flow out through these aligned ports and chambers and then upwardly through the nozzle. From the nozzle, the liquid flows from the orifice 55 into the moving containers. The compressed air above the liquid in the measuring chamber and the constantly maintained vacuum within the vacuumizing chamber facilitate and expedite this flow of the charge of liquid into the container.

This filling of a measured charge of the liquid or syrup into the container takes place while the container is traveling through approximately 180 degrees of the rotation of the turret 23 as indicated in Fig. 5. During all of this travel the vacuum is being drawn on the container and the vacuumizing chamber 30. Near the end of this cycle of travel, the filling operation is completed and the empty filling chamber 34 is vacuumized by reason of its communication, through the aligned ports 52, 55, 57 and turret port 24, with the vacuumizing chamber 30. Since only a partial vacuum is drawn in the vacuumizing and the measuring chambers, a small amount of air still remains in these chambers and it is this air in the measuring chamber 34 that is trapped and compressed when this chamber is again filled with a new subsequent container, as hereinbefore mentioned.

At the termination of the filling cycle the turret pocket 24 passes the terminal end of the vacuum chamber 33 and thereby cuts off further vacuumizing of the container. Simultaneously, with this action the projecting actuating pin 64 of the valve 41 engages against and rides along the tapered stationary valve closing cam 45 (Fig. 3) and this turns the valve into the closed position shown in Fig. 4 and at the left in Fig. 1. This is the initial position of the valve, in which the ports 52, 55, 57 are out of registry and closed and the inlet cut off shoe 58 of the valve is in registry with the tank inlet port 36. Thus the valve 41 is in position to permit refilling of the measuring chamber 34 with a charge of liquid for a subsequent container.

While the measuring chamber 34 is refilling, the filled container A is discharged from the turret 23. This discharge is brought about by a discharge finger 60 (Figs. 1 and 2 which is located within a recess 61 formed in the turret adjacent each pocket 24. There is one of these fingers in each pocket of the turret and each finger is carried on pivot pin 62 carried in the turret. The pins extend below the turret and carry on their lower ends, actuating arms 63 having cam rollers 65 which operate in a cam groove 66 of a stationary cam 67 formed in the main frame 15. The cam groove surrounds the turret shaft 26.

Hence as the turret 23 rotates, it carries the fingers 60 with it while the cam rollers 65 traverse the cam groove 66. The groove is shaped to keep the discharge fingers 60, well within the turret pockets 24 in a position which serves as a rear gage for the containers during the major portion of the rotation of the turret. However, after the containers are filled, the cam groove 66 is shaped to rock the fingers outwardly and this pushes a filled container out of its pocket as shown in Fig. 2. This discharge of the container takes place when a pocket 24 passes adjacent the wide opening 21 in the housing 20. The discharged container is received in the terminal end of a curved discharge runway 71 located on top of the frame 15. The container is propelled along this runway to any suitable place of deposit for sealing, by a discharge star wheel 72 mounted on a vertical shaft 73 journal bearing 74 formed in the machine frame 15. The shaft is rotated continuously in time with the turret 23 by a gear 75 which is carried on the lower end of the shaft and which meshes with the turret drive gear 28.

In this manner, the containers are filled or syrped while being continuously vacuumized and while passing through the machine in spaced and timed order in a continuous procession.

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 in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. A machine for filling containers with liquid contents, comprising a stationary vacuum chamber having means for vacuumizing the same, a pocket communicably connected with said chamber for confining a container to be vacuumized and filled, a liquid supply tank having a measuring chamber communicating therewith, said measuring chamber also communicating with said pocket for partially vacuumizing the measuring chamber through said pocket from said vacuum chamber, liquid passage ports respectively connecting said measuring chamber with said tank and with said pocket, a valve having a liquid port therethrough movably mounted between said measuring chamber and said pocket, said valve being registrable with said liquid passage ports for controlling admission of liquid from said tank to said measuring chamber and from the latter to a container in said pocket through said valve port, means for successively moving said valve to two positions respectively for establishing communication between said measuring chamber and said tank to fill the measuring chamber while simultaneously shutting off communication between the measuring chamber and a container in said pocket, and to fill said container while simultaneously shutting off communication between the measuring chamber and said tank, and means for maintaining said container pocket in communication with said vacuum chamber during both described positions of said valve.

2. A machine for filling containers with liquid contents, comprising a housing enclosing a vacuumizing chamber, having means for vacuumizing the same, a turret having a peripheral container holding pocket therein rotatably mounted in said housing for registry of the pocket with said vacuum chamber to vacuumize the pocket and a container therein, a liquid supply tank rotatable with said turret and having a measuring chamber disposed above and communicating with said pocket to vacuumize said measuring chamber through said pocket, said measuring chamber having valve controlled ports respectively communicating with
said tank and with said container pocket in said turret, a valve movably mounted in said measuring chamber and bodily rotatable therewith for controlling admission of liquid thereto from said tank and from said measuring chamber to a container in said pocket, said valve having a port therein registerable with the port between said measuring chamber and said container pocket, said valve on said housing for moving said valve during rotation of said turret, whereby to alternately establish communication between said measuring chamber and said tank and simultaneously shutting off communication between the measuring chamber and said container pocket when said valve is moved to one position, and vice versa when said valve is moved to another position by said moving means.

3. A machine for filling containers with liquid contents, comprising a housing enclosing a vacuumizing chamber having means for vacuumizing the contents of said container, a turret having spaced peripheral container holding pockets therein rotatably mounted in said housing for registry of the pockets with said chamber to vacuumize the pockets and the containers confined therein, a liquid supply tank rotatable with said turret and having a plurality of measuring chambers disposed above and communicating with said turret pockets to vacuumize said measuring chambers through said pockets, said measuring chambers each having valve controlled ports respectively communicating with said tank and with a said container pocket in said turret, a valve rotatably mounted in each of said measuring chambers and bodily rotatable therewith for controlling admission of liquid thereto from said tank and from such measuring chamber to a container in said pocket, said valve having a port therein registerable with the port between its associated measuring chamber and container pocket, and spaced members on said housing for rotating said valves during rotation of said turret, whereby to alternately establish communication between said measuring chambers and said tank and simultaneously shutting off communication between the measuring chambers and said container pockets when said valves are moved to one position by one of said spaced members, and vice versa when said valves are moved to another position by another of said spaced members.

4. A machine for filling containers with liquid contents, comprising a housing enclosing a vacuumizing chamber having means for vacuumizing the same, a turret having spaced peripheral container holding pockets therein rotatably mounted in said housing for successive registry of said pockets with said chamber to vacuumize the pockets and the containers therein, a liquid supply tank rotatable with said turret and having spaced measuring chambers disposed above and communicating with said pockets to vacuumize said measuring chambers through said pockets during rotation of said turret, each of said chambers having valve controlled ports respectively communicating with said tank and with a said container pocket, a valve rotatably mounted in each measuring chamber for controlling admission of liquid thereto from said tank and from said container pocket in said pockets, said valve having a port therein registerable with the port between said chamber and said container pocket, means on said housing for engaging and rotating said valves during rotation of said turret to establish communication between said measuring chambers and said tank while simultaneously shutting off communication between the measuring chambers and said container pockets to fill said measuring chambers and said tank while simultaneously establishing communication between the measuring chambers and said container pockets to fill said containers while continuing the vacuumizing of said turret pockets and the containers confined therein.

5. A machine for filling containers with liquid contents, comprising a stationary housing enclosing a vacuum chamber having means for vacuumizing the same, a rotatable turret having peripheral container confining pockets communicably connected with said chamber respectively for confining containers to be vacuumized and filled, a rotatable liquid supply tank carried by said turret having a plurality of measuring chambers communicating with said tank and also communicating with said pockets respectively for partially vacuumizing the measuring chambers through said pockets, liquid passage ports respectively connecting each of said measuring chambers with said tank and with its associated turret pocket, a rotatable valve having a liquid port therethrough mounted between each of said measuring chambers and its associated turret pocket, a said valve being registerable with said liquid passage ports for controlling admission of liquid from said tank to a said measuring chamber and from the latter to a container in said associated pocket through said valve port, fixed and spaced means on said housing for successively moving said valves in opposite directions to two positions respectively during rotation of said turret for establishing communication between said measuring chambers and said tank and to each fill the measuring chambers while simultaneously shutting off communication between the measuring chambers and said container pockets, and to fill said pocketed containers while simultaneously shutting off communication between the measuring chambers and said container while maintaining the interior and exterior of said containers in communication with said vacuum chamber during both described positions of said valve to successively fill said measuring chambers and said confined containers.

WALTER K. CABOT.

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