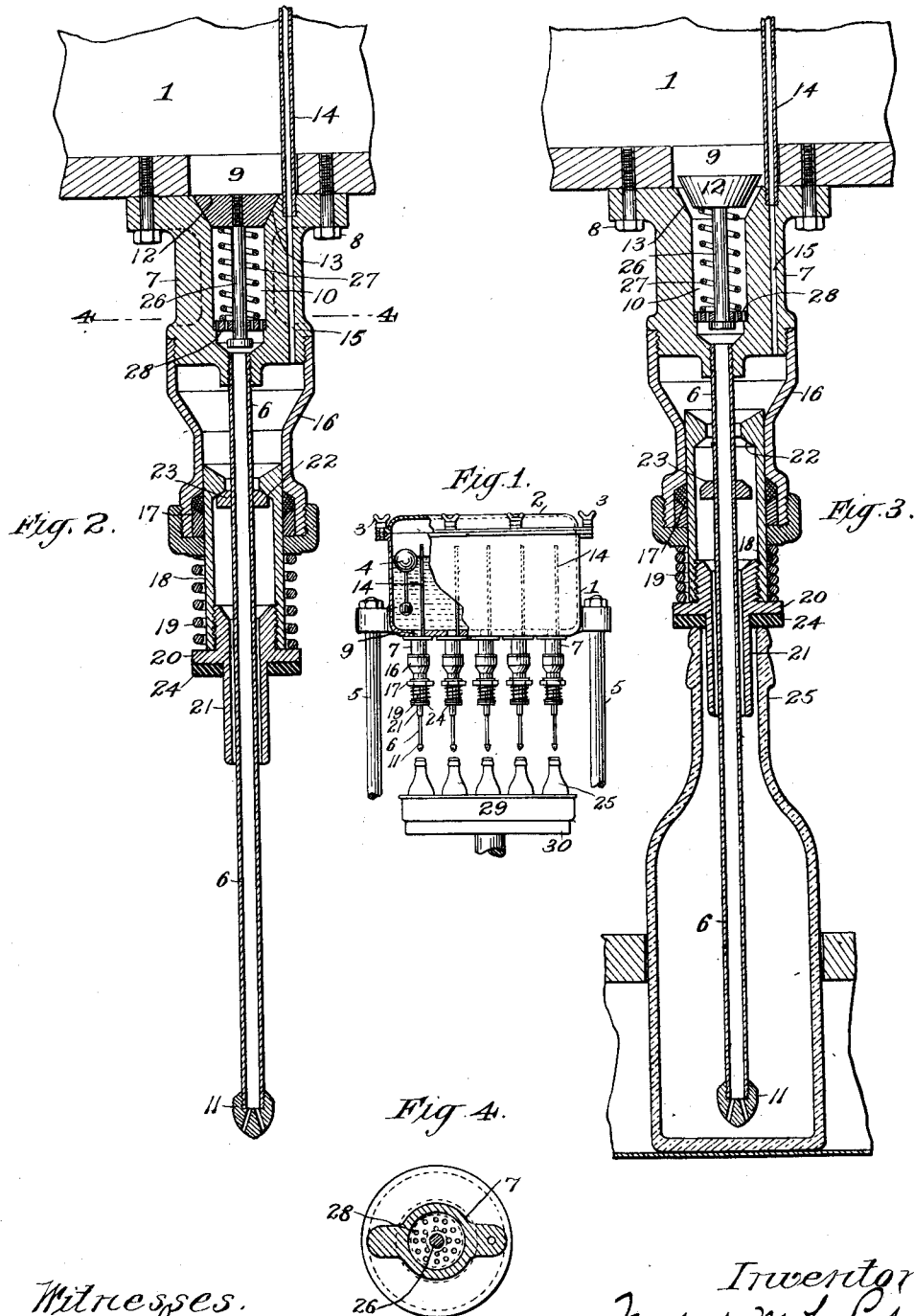


N. M. LA PORTE.
FILLING APPARATUS.
APPLICATION FILED JULY 28, 1911.

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Patented May 18, 1915.



Witnesses.
A. White
L. E. Brown.

Inventor:
N. M. La Porte
By his Attys:
Philip J. Lamm, R. H. Kennedy

UNITED STATES PATENT OFFICE.

ROBERT M. LA PORTE, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE CROWN CORK AND SEAL COMPANY OF BALTIMORE CITY, OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND.

FILLING APPARATUS.

1,140,169.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT M. LA PORTE, a citizen of the United States, residing at Baltimore, State of Maryland, have invented certain new and useful Improvements in Filling Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in filling apparatus for filling containers with liquids under pressure.

It is one of the objects of the invention to produce an improved apparatus for filling containers with liquid under pressure in which the various operations are effected by agencies which are positive and certain in their action and not liable to get out of order.

A further object of the invention is to produce an improved filling apparatus for filling containers with liquid under pressure in which the agencies by which the filling is effected are controlled by the container to be filled and in which an imperfection in the container of such a character as to interfere with the maintenance of a proper seal therein will prevent the filling operation.

With these and other objects not specifically referred to in view, the invention consists in certain constructions and in certain parts, improvements and combinations as will be hereinafter fully described and then specifically pointed out.

Referring to the accompanying drawings: Figure 1 is an elevation, partly in section, of so much of a filling mechanism as is necessary to an understanding of the invention. Fig. 2 is an enlarged sectional view of one of the filling tubes and the parts immediately connected therewith illustrated in Fig. 1. Fig. 3 is a section similar to Fig. 2 showing the container in operative relation with respect to the filling tube, and the position of the filling tube and the parts immediately connected therewith during the filling operation. Fig. 4 is a section on the line 4-4 of Fig. 2.

Referring to the drawings, 1 indicates a tank of any suitable construction for containing a supply of liquid under pressure which is to be packaged, the tank being shown as provided with a cover 2 held in position by wing nuts 3. In practical constructions embodying the invention, the liq-

uid will usually be kept at a constant level by means of a pipe, not shown, controlled by a float operated valve, the float being indicated at 4, the construction being a usual one in mechanisms of this character. In constructions embodying the invention the tank may be supported in any usual way, such, for instance, as on columns, indicated at 5.

Constructions embodying the invention will include a filling tube or tubes, it being understood that where a plurality of containers are to be simultaneously filled, there will be a tube for each container. Where, as will usually be the case, a plurality of filling tubes are employed they and the parts immediately connected therewith will be identical in construction.

The details of construction of the filling tubes may be varied. As shown, the filling tubes, marked 6, are threaded into perforated boxes or barrels 7 which are in turn secured by bolts 8 to the under side of the tank. The bottom or under side of the tank will be provided with openings 9 which register with openings 10 through the barrels or boxes, these openings in effect forming a continuation of the filling tubes. In constructions embodying the invention in which foamy liquids, such, for instance, as beer, are to be packaged, the tube will be long, so as to extend practically to the bottom of the container in which the liquid is to be introduced, and the bottom of the tube may be provided with a perforated ball 11, as usual in such constructions.

The flow of the liquid from the tank into the filling tube will be controlled by a valve which may be varied in construction and arrangement. In the best constructions embodying the invention, this valve will be constructed and arranged to be maintained closed by the pressure of the contents of the tank, and to open against the pressure of the liquid in the tank. In the particular construction illustrated, the filling tube controlling valve, marked 12, seats against a seat 13 formed in the upper end of the barrel or box 7.

Constructions embodying the invention will include means for effecting a balance per unit of area between the gas pressures in the tank and in the container to be filled. While the means employed for effecting this balance of gas pressures may be varied, in the best constructions embodying the inven-

tion a suitably arranged conduit will be employed for this purpose. In the particular construction shown, this conduit includes a pipe 14 which extends above the level of the liquid in the tank, the pipe being screwed into an opening in the barrel 7 and registering with a channel 15 passing through the barrel. The barrel, in the particular construction illustrated, has secured to its lower end a shell 16 with the interior of which the channel 15 communicates. This shell 16, in the particular construction illustrated, has secured to its lower end a stuffing box 17 through which moves a sleeve 18, the movement of the sleeve in one direction being effected by a spring 19 which is located between a flange 20 on the sleeve 18 and the under side of the stuffing box. In the particular construction illustrated, this sleeve 18 carries a nipple 21 arranged to enter the mouth of the container, the nipple being screwed into the sleeve and surrounding the filling tube 6. The diameter of the opening of the nipple is, however, greater than the diameter of the filling tube. In the particular construction illustrated, therefore, the conduit referred to is made up of the pipe 14, the channel 15, the opening through the interior of the shell 16, the opening through the sleeve 18 and the opening through the nipple 21. When a conduit is employed for effecting the balance of gas pressures per unit of area on opposite sides of the valve or for equalizing the pressures in the container and the tank, means should be employed for opening and closing this conduit. While these means may be varied, in the best constructions embodying the invention they will be of such a character as to be operated by the container to be filled. In the particular construction illustrated, the sleeve 18 is formed with a valve seat 22 at its upper end, this valve seat cooperating with a valve 23 mounted on the filling tube. The sleeve, in the particular construction shown, is arranged to be pushed up against the stress of the spring 19 by the mouth of the container and it will be readily understood that this movement pushes the seat 22 away from the valve and opens the conduit.

When the invention is embodied in constructions like that illustrated, means should be provided for maintaining a gas tight connection between the interior of the container and the filling tube and conduit. In the particular construction illustrated, this is effected by providing the lower end of the sleeve 18 with a gasket 24 which, when a container, such as a bottle, indicated at 25, is in operative position with respect to the conduit and the tube, is in contact with the lip of the bottle. While the character of the gasket employed may be varied, in the best constructions embodying the invention the gasket will be flat, as shown, so as to

reproduce the conditions which exist when the bottle or container after being filled is sealed, it being understood that it is now the general custom to seal bottles and similar containers holding liquids under pressure with the well-known crown cork the flat sealing disk of which contacts with the lip of the container when the container is sealed.

Constructions embodying the invention will include automatic means for opening the valve which controls the filling tube when the balance of pressure per unit of area on opposite sides of the valve is effected, or when the pressures in the container to be filled and in the tank are balanced. While the automatic valve opening means may be varied, in the particular construction illustrated the valve 12 is provided with a stem 26 surrounded by a spring 27 which bears against the under side of the valve and against a perforated grid 28 resting on a shoulder formed in the wall of the opening 11 through the barrel 7. In the construction illustrated, the valve is held closed against the force of the spring by the pressure exerted on the upper face of the valve due to pressure of the liquid in the tank and the pressure of the gas in the space above the liquid in the tank.

When a container is placed in operative position with respect to the filling tube and equalizing conduit, and the controlling valve 23 for the conduit is opened by the upward movement of the sleeve 18 gas from the gas containing space above the liquid in the tank will flow down through the conduit into the container or bottle and an upward flow of gas will be established through the tube 6. This flow will continue until the gas pressure per unit of area on the under side of the valve balances the gas pressure per unit of area on the upper side of the valve. When this balance is effected, the spring 26 which as before stated is strong enough to overcome the force tending to hold the valve closed exerted by the liquid, opens the valve against the pressure of the liquid in the tank. The liquid now flows down through the opening in the barrel and the filling tube into the bottle or container, the air and gas in the bottle being forced back up through the conduit.

When the container or bottle is filled, it is moved down, in the particular construction shown, to remove it from the filling tube. As the container is moved downward, the sleeve 18 is also moved down by its spring 19 so that the valve 23 is closed before the joint between the lip of the bottle or container and the gasket 24 is broken. When the joint is broken between the lip of the bottle and the gasket 24 the pressure in the bottle is immediately reduced to atmospheric pressure which unbalances the forces

acting on the valve 12 and this valve is, therefore, immediately seated against the force of its spring by the pressure in the tank. The operation heretofore described will take place when a gas tight seat is established by the contact between the lip of the bottle and the gasket 24. If, however, the lip of the bottle be chipped or imperfect for any reason to such an extent that a flat sealing disk such as that employed in the well-known crown cork will not make a tight seal therewith, a tight seal will not be established by the contact between the lip of the bottle and the gasket 24. With a chipped or imperfect bottle, therefore, when the conduit is opened by the operation of the valve 23 the gas flowing down into the bottle through the conduit will flow out between the lip of the bottle and the gasket 24 and the valve 12 will remain closed, because there will be no balancing of the pressures on its opposite faces. It is also obvious that if the container be cracked or imperfect in any other way so that its contents will not be sealed gas tight the filling operation will not take place.

It is apparent that the filling tube and nipple displace a certain amount of liquid in the container and also that gas will be trapped in the space around the nipple and between the mouth of the nipple and the gasket. The height at which the liquid will finally stand in the container will depend, therefore, upon the displacement due to the nipple and the filling tube and to the amount of gas trapped. In other words, the height at which the liquid will finally stand in the container will be determined or regulated by making the nipple adjustable, so that its mouth may be at a greater or less distance from the mouth of the container. It has been heretofore stated that the nipple is threaded into the sleeve 18. This threaded connection is an excellent one for enabling a ready adjustment of the nipple and consequently regulating the height at which the liquid will stand in the container after the filling operation has been completed, although it is of course obvious that any other suitable connection may be substituted for the screw thread, it being unnecessary that the joint between the nipple and the sleeve be a gas tight one.

A suitable source of liquid supply will be employed in connection with the tank, and the mounting of the support and the tank should be such as to enable a relative movement to take place between them in order to establish operative connection between the containers and the filling tubes. In the best constructions embodying the invention this movement will be effected by moving the support which may be accomplished by any of the mechanisms well-known in the art. In the particular construction illustrated,

the containers are placed in a tray or rack 29 which rests upon a movable table or head 30 which may be raised and lowered by suitable mechanism.

Changes and variations may be made in the construction by which the invention is carried into effect. The invention claimed is not, therefore, to be confined to the particular construction herein described and illustrated in the accompanying drawings.

What is claimed is:—

1. In a filling apparatus, the combination with a tank containing liquid under pressure, of a filling tube connecting with the tank, a conduit in communication with the gas containing space above the liquid in the tank, means for maintaining a container in gas tight relation with the tube and conduit, a filling tube controlling valve, a conduit controlling valve arranged to be opened by the insertion of the container when the gas tight relation with the container is established, the opening of said valve effecting a balance of gas pressures per unit of area on opposite sides of the filling tube controlling valve, and a spring for automatically opening the filling tube controlling valve when the balance of pressures is effected.

2. In a filling apparatus the combination with a tank, of a filling tube connecting with the tank, a filling tube controlling valve arranged to open against the pressure of the contents of the tank, a spring for opening the valve, a spring controlled sleeve surrounding the filling tube, a gasket carried by the sleeve and serving to seal the mouth of the container to be filled, and a conduit of which the sleeve forms a part and which is opened and closed by the movement of the sleeve, said conduit being in free communication with the gas containing space above the liquid in the tank.

3. The combination with a tank containing liquid under pressure, of a barrel secured to the under side of the tank and provided with a valve-seat, a valve located in said seat and arranged to open upward and to be closed by the pressure of the contents of the tank, a spring for opening the valve, a shell connected to said barrel, a sleeve movable in said shell and having a valve-seat, a conduit communicating with the interior of the shell and sleeve and opening above the liquid level in the tank, a filling tube connected with the barrel and extending through the shell and sleeve, a valve secured to said filling tube and cooperating with the valve-seat in the sleeve, and a container-operated means for moving the sleeve to open the valve whereby the conduit is put in communication with the interior of the container.

4. In a filling apparatus, the combination, with a tank, of a barrel secured to the under side of the tank and in open communication therewith, and a valve for controlling the

communication between the barrel and the tank, said valve being arranged to open against the pressure of the contents of the tank and to be closed thereby, of a spring for opening the valve, a conduit for admitting gas to the barrel, a sleeve movable longitudinally in the barrel, a packing device carried by the sleeve below the barrel and arranged to contact with the container to be filled, a valve seat carried by the sleeve, a fixed valve arranged to cooperate therewith, and means for producing a relative movement of the container and the barrel to bring the container in contact with the packing device and thereafter to move the sleeve, whereby the valve seat is moved from the valve and the gas-pressure is admitted to the container.

5. In a filling apparatus, the combination, with a tank arranged to contain liquid under pressure, a barrel secured to the underside of the tank and having its interior arranged to communicate with the tank, a valve located in the barrel and arranged to

open toward the tank, and a spring arranged to force the valve in the direction of opening, of a shell secured to the barrel and having its interior in communication with the gas space above the liquid in the tank, a filling tube secured to the barrel and extending downward through the shell and below the same, a valve fixed to the filling tube within the shell, a sleeve longitudinally movable in the shell and provided with a valve seat arranged to cooperate with the valve on the filling tube, and a nipple adjustably connected to the sleeve and extending downward around the filling rod, the interior diameter of the nipple being greater than the exterior diameter of the filling tube and opened to the interior of the sleeve.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

NORBERT M. LA PORTE

Witnesses:

E. VANDERHOEF,
W. H. KENNEDY.