

Jan. 17, 1933.

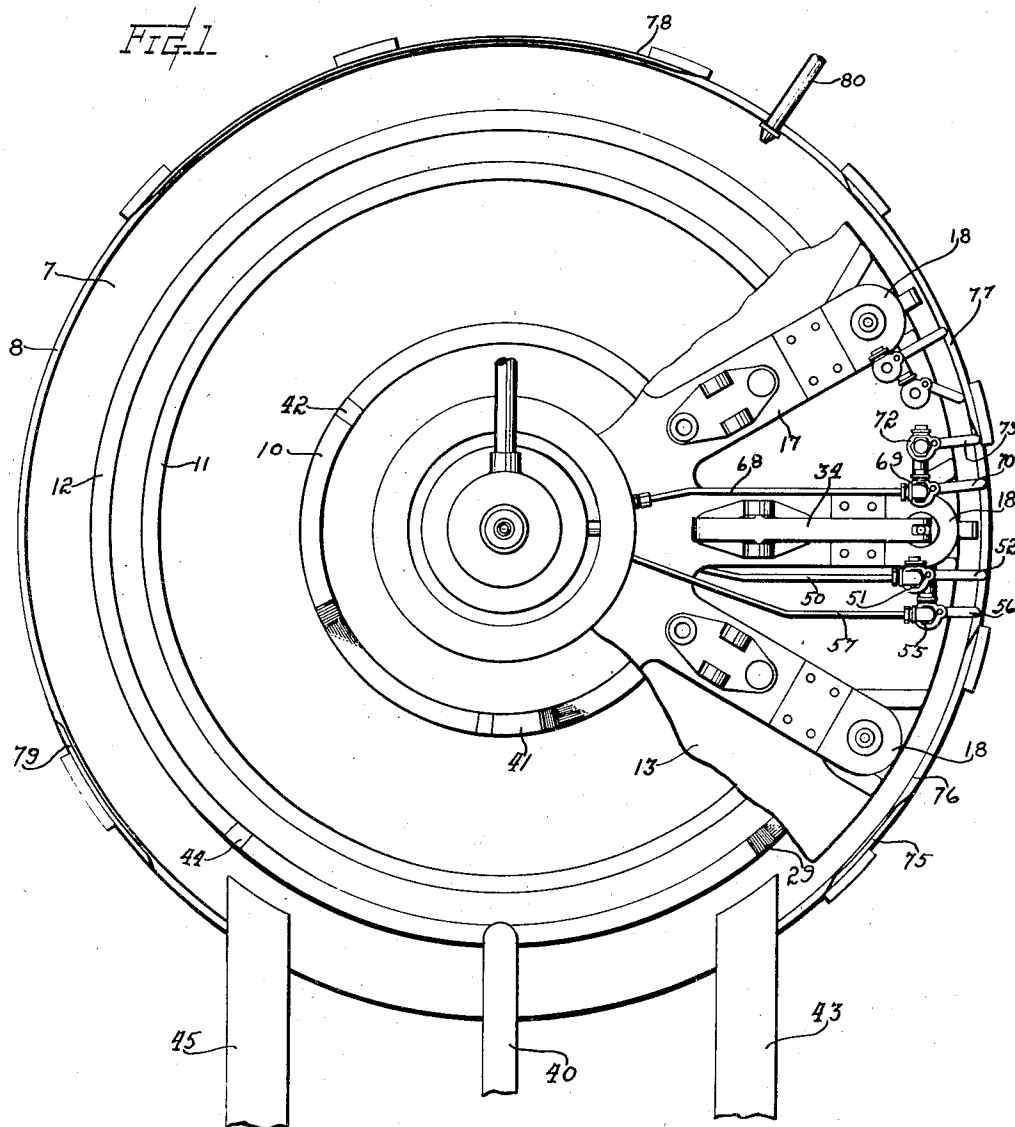
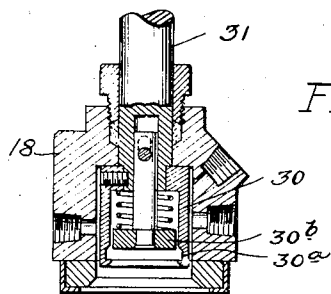
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2 Sheets-Sheet 1



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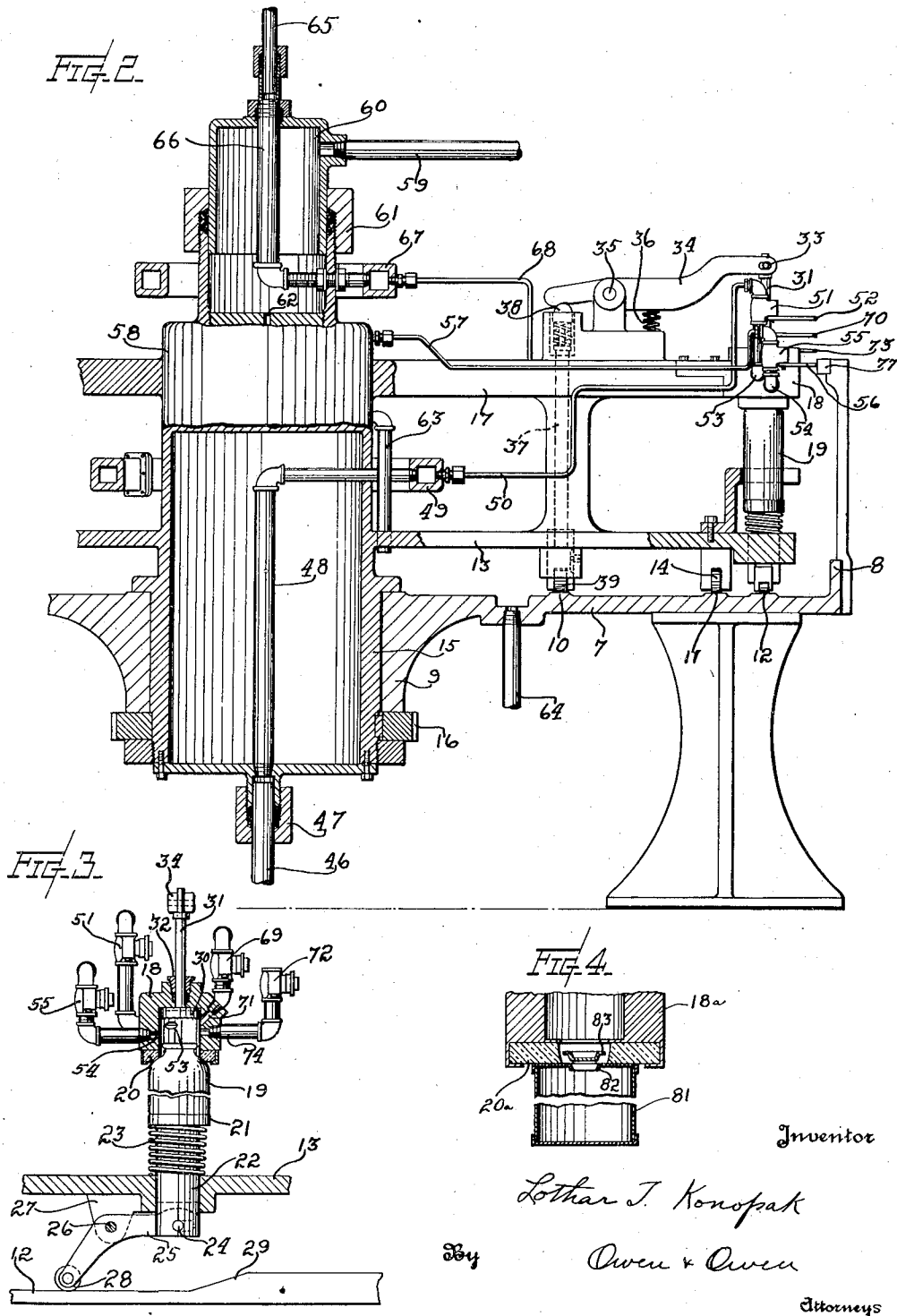
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UNITED STATES PATENT OFFICE

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MACHINE FOR FILLING CONTAINERS WITH FLUID

Application filed June 17, 1930. Serial No. 461,820.

This invention relates to the filling of containers with liquid, with special reference to the sterilization of both the container and its cap and the filling of the former under a vacuum.

One object of the invention is to provide a method for filling containers, in which the mouth of the container and a cap therefor are sealed off and sterilized, the container being then filled with sterilized fluid and capped while they are thus sealed and protected against any unsterilized influence.

Another important object of the invention is to provide a machine for the purpose stated, which is of practical construction, reliable in its operation, and in which the successive steps take place automatically in proper sequence.

The invention, in its preferred embodiment, will be particularly described in connection with the accompanying drawings, in which

Figure 1 is a plan view with parts broken away illustrating the course of the containers as they are being filled.

Figure 2 is a vertical central section through one side of the machine.

Figure 3 is a detail sectional view enlarged illustrating the position of the container underneath the hood during the process of sterilizing and filling the same.

Figure 4 is a view similar to Figure 3 illustrating the adaptation of the invention to the filling of cans.

Figure 5 is an enlarged sectional view of the capper element.

As illustrated in the drawings, the mechanism to which the invention relates is for the most part supported upon a stand 7 which is formed with a peripheral upstanding rim 8 and a central bearing member 9. The upper face of the stand 7 is formed with concentric tracks 10, 11 and 12. A circular table 13 is rotatably supported on the track 11 by suitable rollers 14 and has a central hub 15

mounted in the bearing member 9. The table is rotated by means of a gear 16, secured to the hub 15 and driven by any suitable mechanism.

Located above the table 13 and rigidly connected therewith are a number of radial arms 17 each of which has a hood 18 secured to its end and adapted to receive the upper end of a container 19 to be filled, such container being represented in Figures 2 and 3 as a bottle, which is preferably preheated. The lower edge of the hood 18 carries a gasket 20, within which the neck of the bottle is received. The bottle rests upon a seat 21 which is provided with a stem 22 reciprocally mounted in the table 13 and the top of the bottle is held against the gasket 20 by the pressure of a spring 23 underneath the seat 21. For lowering the seat 21 to receive or to discharge the bottle, the lower end of the stem 22 has a pin and slot connection 24 with one end of a bell crank 25 which is pivoted at 26 to lugs 27 extending downwardly from the bottom of the table 13. The other end of the bell crank 25 is provided with a roller 28 adapted to ride upon the track 12 which is provided with a raised portion 29 in the sector where the bottle is delivered to the seat 21 underneath the hood 18.

Prior to the introduction of a bottle underneath the hood 18 the bottle cap is picked up by a capper 30 which is mounted within the hood and has a stem 31 extending upwardly from the hood through a packing gland 32. As shown in Figure 5, the capper has a seat 30a for supporting the cap against the spring pressed head 30b while the head of the bottle is placed beneath the same. Since no novelty is claimed for the capper element per se, a further description thereof is deemed unnecessary. The upper end of the stem 31 has a pin and slot connection with one end of a lever 34 which is intermediately fulcrumed at 35 to a block secured to the arm 17. The lever 34 is normally held with

the capper 30 retracted by means of a spring 36 or the like. For depressing the capper 30 to pick up a cap or seal and to apply the same to the bottle, a vertical rod 37 is reciprocally mounted on the arm 17 and is provided at its upper end with a yieldable head 38 adapted to engage the inner end of lever 34. The lower end of the rod 37 carries a roller 39 which rides on the track 10. The caps may be placed in the capper 30 by hand or they may be fed by a suitable feeder indicated at 40 into position to be picked up by the capper 30 which is moved downwardly at the proper time to receive the cap by means of a raised portion 41 of the track 10. After the bottle has been sterilized and filled the capper 30 is again moved downwardly to cap the bottle by a raised portion 42 of the track 10, which, however, is not as high as the raised portion 41.

As the table 13 rotates, therefore, the capper 30 first receives a cap as it passes the cap feeder 40. Subsequently the seat 21 is lowered to receive a bottle from the conveyor 43 as it passes the same. Then as the table continues to rotate steam under pressure is introduced into the bottle for sterilizing the bottle and cap while the air originally contained in the bottle is allowed to escape therefrom. After the bottle and cap are sterilized, the steam is allowed to escape therefrom and is condensed, while a vacuum is formed in the bottle and hood. The bottle is then filled and capped and air is admitted to the hood to relieve the vacuum. At this point in the operation the roller 28 engages a raised portion 44 of the track 12 whereby the seat 21 is lowered and the bottle is delivered to an outgoing conveyor 45.

During the operation as briefly outlined above, the steam under pressure is introduced through a stationary pipe 46 located axially of the table 13 and connected to a pipe 48 mounted within the hub 15 by a suitable packing gland 47. The pipe 48 is connected to a circular manifold 49 which extends about the hub 15 and has branch pipes 50 leading toward the respective hoods 18. Each pipe 50 leads through a valve 51, the opening of which is controlled by an arm 52, and is connected to an inlet 53 into the hood 18.

After a sufficient time has been allowed for the proper sterilization of the bottle and the cap, the valve 51 is closed and the steam is allowed to escape therefrom through a port 54, valve 55, which is opened by an arm 56, and a pipe 57, which leads to a condenser chamber 58, which is herein shown as an upward extension of the hub 15. Cold water or other fluid for cooling the condenser is introduced through a pipe 59 and a stationary cap 60, which is connected to the upper end of the condenser by a packing gland 61. This cooling fluid passes downwardly through a port 62 into the condenser

and thence is discharged through a pipe 63 onto the stand 7 from which it drains through a pipe 64.

The fluid with which the containers are filled is supplied through a stationary pipe 65 and passes thence through a pipe 66, which rotates with the table, into a circular manifold 67 from which branches 68 lead toward the various hoods 18. From each pipe 68 the fluid is discharged through a valve 69 which is opened by an arm 70 and passes through a downwardly inclined passage 71 into the hood 18.

After the bottle has been filled and capped the air valve 72 is opened by means of an arm 73 to permit air to enter the hood at 74 and relieve the vacuum so that the bottle will be free to be delivered to the conveyor 45.

It will be understood that valves 51, 55, 69 and 72 are all maintained in closed position, preferably by springs, except when the respective arms 52, 56, 70 and 73 are actuated to open them. Since no novelty is claimed for the valves per se, a detailed representation thereof is deemed unnecessary.

As a convenient means for actuating the arms 52, 56, 70 and 73 at the proper time for opening the respective valves, cams 75, 76, 77, 78 and 79 are supported from the rim 8 in proper position to effect the operation desired. For example, after the bottle is in proper position beneath the hood, the arms 52 and 73 are engaged substantially simultaneously by the cams 76 and 75 respectively to open the valves 51 and 72. This admits steam to the bottle and allows cold air to escape therefrom. As the arm 73 leaves the cam 75 the air valve 72 closes but the valve 51 remains open as long as the arm 52 engages the cam 76, thus subjecting the interior for a considerable time to the action of steam under pressure. Subsequently the arm 56 engages the cam 77 to open the valve 55 leading to the condenser 58 or to a vacuum pump or other means for exhausting the steam from the bottle and hood and creating a vacuum therein. After this, it is advisable to spray the bottle with cold water which may be supplied by a pipe 80. Then as the table continues its rotation, the arm 70 engages the cam 78 and opens the valve 69 to admit the fluid with which the bottle is to be filled. After this, the bottle is capped and then the valve 72 is again opened for a short time by the engagement of the arm 73 with the cam 79. This relieves any vacuum remaining in the hood before the bottle is to be discharged upon the conveyor 45.

In the modification shown in Figure 4, the hood 18^a and gasket 20^a are arranged to receive the upper end of a tin can 81 which is formed with a filter opening having a sloping edge 82 adapted to receive the corresponding shoulder of the cap 83. The operation of the filling and closing of such a can will be

exactly as that described in connection with the bottle 19. The engagement of the cap 83 with the edge of the opening 82 will be sufficiently tight to exclude air temporarily from the inside of the can and it is desirable to previously provide the rim of the cap 83 or edge of the opening 82 with a coating of solder which may be electrically heated to complete the sealing of the can after the latter leaves the filling machine.

While I have shown and described in considerable detail the construction of the machine in its preferred form, and the operation thereof, it is apparent that the same may be modified in many respects without departing materially from the scope of the invention as defined in the claims. It is also to be understood that the term "cap" is herein used to denote any type of closure which may be used for capping or sealing a container of any kind and that the capper 30 represents any element which may be used for applying such a cap.

What I claim is:

1. In a machine for filling a container with fluid, the combination with a hood, of means for effecting a temporary sealing engagement between the top of the container and the hood, means for then admitting a sterilizing medium under pressure to the hood and container for a predetermined period of time, means for allowing air to escape from said container during the first part only of said period, means for subsequently removing and condensing the sterilizing medium to create a partial vacuum in the container and hood, and means for then admitting fluid to said vacuum.

2. In a machine for filling a container with fluid, the combination with a hood, of a capping element within the hood, means for actuating said capping element to pick up a cap, means for subsequently effecting a temporary sealing engagement between the top of the empty container and the hood, means for sterilizing and creating a partial vacuum within the empty container and hood while so engaged, means for subsequently admitting sterilized fluid to be preserved to said vacuum, and means for then actuating the capping element to cap said container before it is released from the hood.

3. In a machine for filling a container with fluid, the combination with a hood, of a capping element within the hood, means for actuating said capping element to pick up a cap, means for subsequently effecting a temporary sealing engagement between the top of the container and the hood, means for filling the container and hood with a sterilizing medium under pressure while so engaged, means for subsequently removing and condensing the sterilizing medium to create a partial vacuum in the container, means for then filling the container with fluid, and

means for then actuating the capping element to cap said container before it is released from the hood.

4. In a machine for filling a container with fluid, the combination with a hood, of a capping element within the hood, means for actuating said capping element to pick up a cap, means for subsequently effecting a temporary sealing engagement between the top of the container and the hood, means for admitting a sterilizing medium under pressure to the hood and container for a predetermined period of time while it is so engaged, means for allowing air to escape from said container and hood during the first part only of said period, means for subsequently removing and condensing the sterilizing medium to create a partial vacuum in the container and hood, means for then filling the container with fluid while the cap and the interior of the container are still sterilized and under a partial vacuum, and means for then actuating the capping element to cap said container before it is released from the hood.

5. In a machine for filling a container with fluid, the combination with a hood, of means for supporting a cap within the hood, means for actuating the cap supporting means to pick up a cap, means for subsequently effecting a temporary sealing engagement between the rim of the hood and the wall of the container about its filler opening, means for admitting a sterilizing medium under pressure to the hood and container for a predetermined period of time during such filling engagement, means for allowing air to escape from said container and hood during the first part only of said period, means for subsequently removing and condensing the sterilizing medium to create a partial vacuum in the container and hood, means for then filling the container with fluid while the cap and the interior of the container are still sterilized and under a partial vacuum, means for then actuating the cap supporting means to cap said container before it is released from the hood, and means for then admitting air to said hood and removing the container therefrom.

6. In a machine for filling a container with sterilized fluid, a hood, means for receiving a container cap within the hood, means for temporarily sealing the hood to the container with the cap and mouth of the container inside the hood, means for then sterilizing the interior of the hood, the cap and the interior of the container, and means for filling the container and sealing the same with the cap, while the container is thus held and while the cap and the interior of the container are completely sterilized.

7. In a machine for filling a container with fluid to be preserved, the combination with a hood, of means for receiving a container cap within the hood, means for subse-

quently engaging the top of the empty container with the hood to form a temporary seal, with the interior of the hood in free communication with the interior of the empty container, means for sterilizing the empty container and hood while so engaged, means for subsequently directing sterilized fluid to be preserved into said container, and means for capping said container while such sterilization remains effective.

In testimony whereof I have hereunto signed my name to this specification.

LOTHAR T. KONOPAK.

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