(No Model.) 3 Sheets—Sheet 1.

S. B. SMALLWOOD.

BOTTLE FILLING MACHINE.

No. 523,013. Patented July 17, 1894.

Fig: 1.

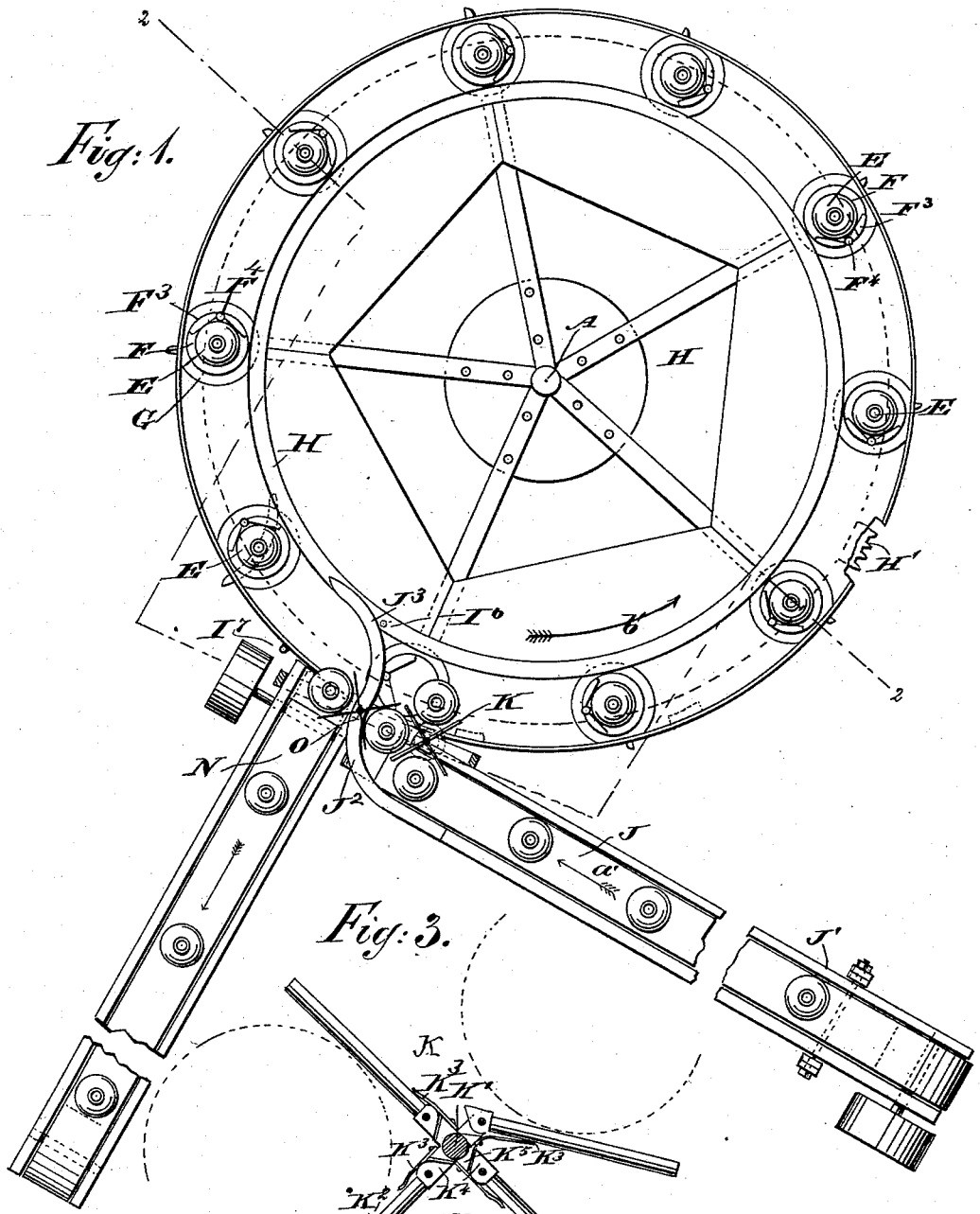

Fig: 3.

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(No Model.) 3 Sheets—Sheet 2.

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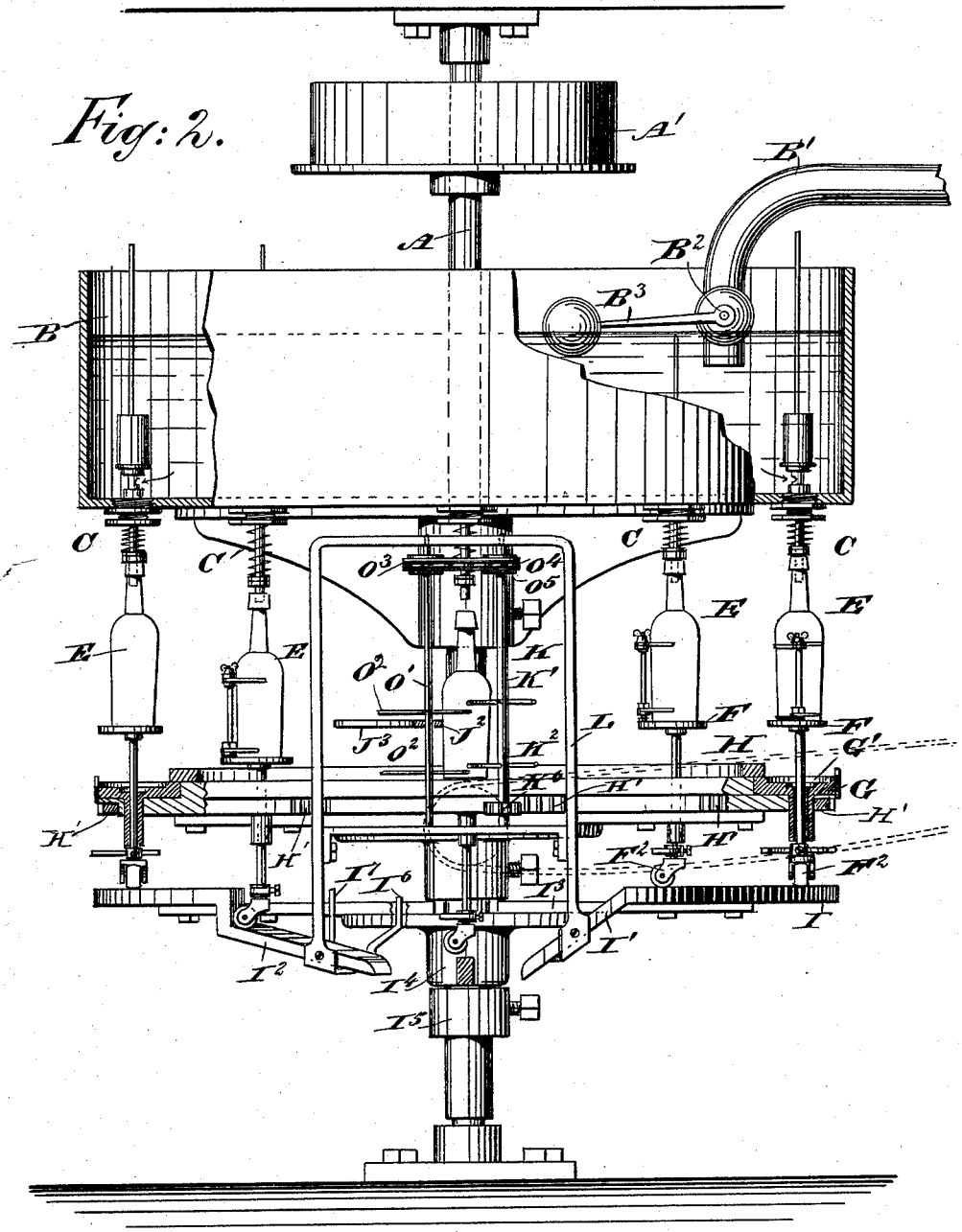
Fig: 2.



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S. B. SMALLWOOD.

BOTTLE FILLING MACHINE.

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Fig: 4.

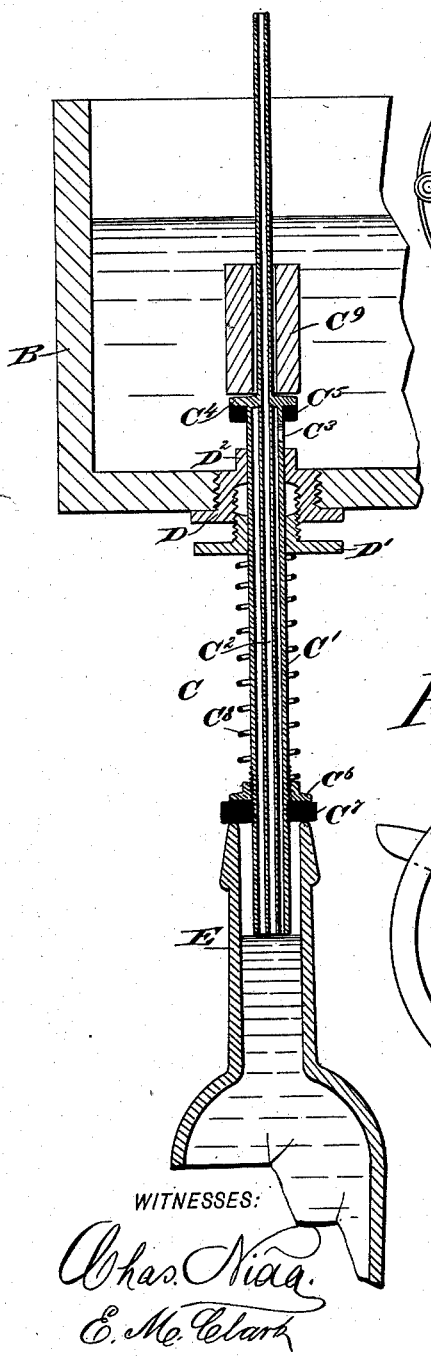


Fig: 6.

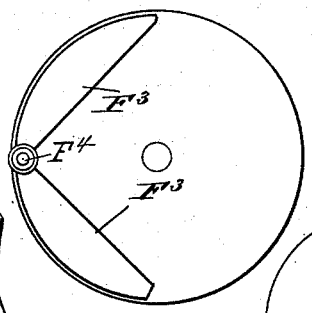


Fig: 5.

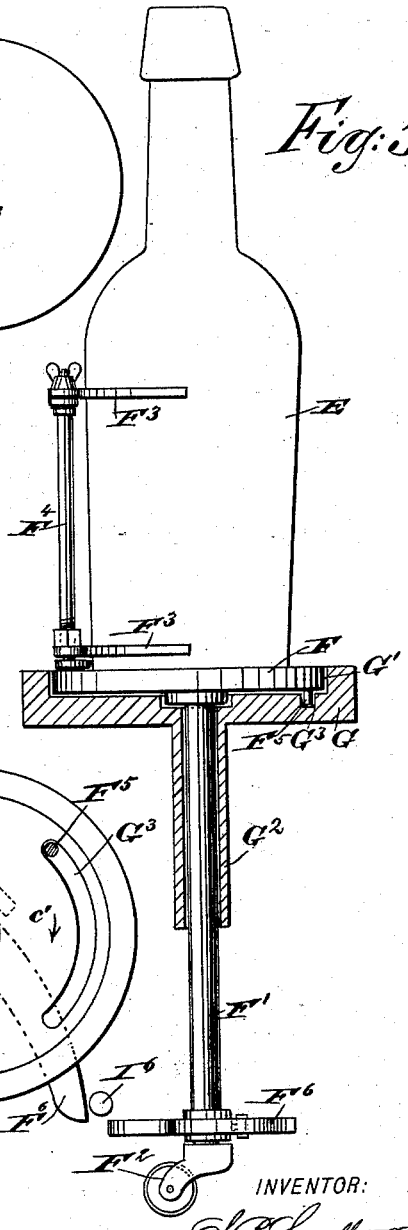
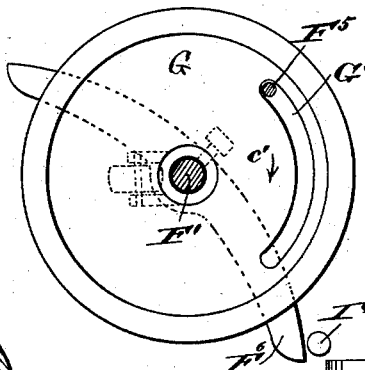


Fig: 7.



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UNITED STATES PATENT OFFICE.

SAMUEL B. SMALLWOOD, OF LONG ISLAND CITY, NEW YORK.

BOTTLE-FILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 523,013, dated July 17, 1894.

Application filed February 16, 1892. Renewed January 13, 1893. Again renewed July 25, 1893, and again renewed February 2, 1894. Serial No. 498,926. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL B. SMALLWOOD, of Astoria, Long Island City, in the county of Queens and State of New York, have invented a new and Improved Bottle-Filling Machine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a a new and improved bottle filling machine, which is simple and durable in construction, entirely automatic in operation, and arranged to permit a ready escape of the air from the bottle during the time of filling the same.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of the specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement with the tank, the filling and the air discharging tubes removed. Fig. 2 is a sectional side elevation of the machine on the line 2—2 of Fig. 1. Fig. 3 is an enlarged sectional plan view of one of the turnstiles for moving the bottles from the endless belt onto the revolving disk. Fig. 4 is an enlarged sectional side elevation of one of the filling and air discharging tubes with the tank containing the liquid and the bottle for receiving the same. Fig. 5 is an enlarged sectional side elevation of the bottle supporting platform and disk. Fig. 6 is a plan view of the bottle supporting platform; and Fig. 7 is a plan view of the disk for supporting the platform.

The improved bottle filling machine is provided with a vertically arranged shaft A, mounted to turn in suitable bearings and carrying, near its upper end, a pulley A′ connected by a belt with suitable machinery for imparting a rotary motion to the said shaft A. On the latter is secured a tank B adapted to receive the liquid to be filled into the bottles from a supply pipe B′, provided with a valve B^2 controlled by a float B^3 extending in the tank B, so as to shut off the supply of liquid whenever the desired height is reached in the tank B. The latter revolves with the shaft A and supports, in its bottom, a series of filling and air discharging devices C, preferably arranged in the arc of a circle and placed equal distances apart, as will be readily understood by reference to the drawings.

Each of the combined filling and air discharging devices is preferably made of two tubes C′ and C^2, of which the exterior tube C′ is fitted to slide vertically in a bearing D secured to the bottom of the tank B and provided with a suitable stuffing box D′, to prevent leakage of the liquid from the tank B.

Near the upper part of the exterior tube C′, is formed an inlet opening C^3 affording entrance of the liquid in the tank B, when the said tube is in an uppermost position, see Fig. 4. The liquid in the tank B can then pass through the opening C^3 into the exterior tube C′ and down the same to flow into the bottle E to be filled and engaged by the lower end of the said exterior tube, as is plainly illustrated in Figs. 2 and 4.

When the tube C′ is in a lowermost position, the opening C^3 is carried into the upper part D^2 of the bearing D, which latter thus cuts off the supply of liquid from the tank B to the exterior tube C′. On the extreme upper end of the tube C′ is formed an annular flange C^4 on the under side of which is held a rubber gasket or ring C^5 adapted to be seated on the upper end of the projection D^2 of the bearing D, so that leakage is prevented when the filling tube C′ is in a lowermost position.

Near the lower end of the exterior tube C′, screws a flanged nut C^6, on the under side of which is held a gasket or rubber ring C^7 adapted to be seated on the neck of the bottle E for the purpose hereinafter more fully described. On the exterior tube C′ is coiled a spring C^8, resting with its lower end on the flanged nut C^6 and abutting with its upper end against the stuffing box D′, the said spring serving to hold the exterior tube C′ in a lowermost position, that is, to seat the gasket C^5 on the projection D^2. By adjusting the nut C^6 and its gasket the depth of the liquid filled into the bottle can be conveniently regulated. In order to make a very tight joint between the said gasket C^5 and the projection D^2, a weight C^9 is placed on top of the flange C^4 to

assist the spring C^8 in keeping the gasket on its seat. The interior tube C^2 extends from the lower end of the exterior tube C′ and projects above the flange C^5 a suitable distance above the top of the tank B. This interior pipe C^2 serves to permit the air contained in the bottle E to readily escape at the time the filling tube C′ connects the tank B with the bottle, as is illustrated in Fig. 4.

I do not limit myself to any particular construction regarding the filling devices, the principal point, however, being two compartments of which the filling compartment is formed with an inlet adapted to be cut off and the other extends above the level of the liquid in the tank.

The bottles E, during the time of filling the same, rest on platforms F, each made in the shape of a disk adapted to be seated in a seat G′ formed in the top of a disk G supported on a spider wheel H secured to the shaft A and located below the tank B. The several disks G have their vertical axes arranged in line with the vertical axes of the several filling devices C, so that the platforms F, in moving up and down, bring the respective bottle in engagement with the lower end of the tube C′. Each of the platforms F is formed with a downwardly extending stem F′ engaging a hub G^2 formed on the under side of the corresponding disk G. Each bottle E is held in position on its platform F by suitable sets of arms F^3 located one above the other and secured on a post F^4 projecting from the top of the platform F. Each set of arms F^3 is provided with two single arms extending at about right angles to each other and adapted to stand with their inner edges tangential to the exterior surface of the respective bottle.

On the under side of each platform F is secured a downwardly extending pin F^5, engaging a segmental slot G^3 formed in the disk G and serving to guide the platform F when the latter is to be turned at the time of receiving and discharging the bottle.

On the extreme lower end of each stem F′ is held a caster F^2, the wheel of which is adapted to travel up an incline I′ formed on one end of a track I provided, at its other end, with a similar incline I^2, as is plainly shown in Fig. 2. The track I is supported on a spider wheel I^3 formed with a hub I^4 held loosely on the shaft A and supported at its under side by a collar I^5 secured by a set screw or other means to the shaft A. By adjusting the collar I^5 vertically on the shaft A, the track I can be raised or lowered according to the height of the bottles to be filled.

The platform F is turned in its seat G′ at the time the caster F^2 travels from the incline I^2 toward the incline I′, and for this purpose the incline I^2 is provided with two arms I^6 and I^7, adapted to be alternately engaged by a double cam arm F^6 secured on the lower end of the stem F′, directly above the caster F^2.

The bottles to be filled are moved onto the platforms F of the wheel H by means of an endless carrier belt J having a traveling motion in a suitable frame J′, the said belt being actuated by suitable mechanism to travel in the direction of the arrow a', as illustrated in Fig. 1. At the forward end of the endless carrier belt J is arranged a turn stile K, adapted to move the bottles from the belt J onto the wheel H at regular intervals so as to locate a bottle on a corresponding platform F. This turn stile K is provided with a vertically arranged shaft K′ mounted to turn in suitable bearings in a frame L supported from the inclines I′ and I^2 of the stationary track I, see Fig. 2.

On the shaft K′ are arranged sets of arms K^2 pivoted to projections extending from the said shaft and pressed on by springs K^3 so as to assume a radial position. A bottle is engaged between two adjacent arms K^2, as soon as the bottle reaches the forward end of the belt J, the said two arms then moving the bottle in a circle to finally pass it onto the corresponding platform F then held in a lowermost position on the spider wheel H. Each of the arms K^2 is provided near its fulcrum end with an incline K^4 engaging a correspondingly shaped bevel K^5 fixed on the shaft K′, so that each arm is closed in one direction but is free to open in an opposite direction, as will be readily understood by reference to Fig. 3. This is necessary to permit each arm to open, as shown at the right in Fig. 3, after the bottle has been delivered onto the platform F and the latter moves forward on the rotation of the spider wheel H.

It is understood that the top or carrying part of the belt J is in line with the top surface of the disks G, so that the bottles readily pass from the belt onto the respective platform F then seated in its seat G′ of the corresponding disk G.

In order to prevent the bottles from moving in the wrong direction at the time they pass from the belt J to the respective platform F, a curved arm J^2 is provided extending from the frame J′ of the carrier belt across the top of the spider wheel H, the forward or inner end J^3 of the said arm J^2 being curved to the left so that the entire arm is **S**-shaped, and the forward end serves as a guide to move the bottles from the respective platform F onto a carrier belt N by means of a turn stile O, after the bottles are filled and as hereinafter more fully described. This turn stile O is provided with a shaft O′ arranged vertically and mounted to turn in suitable bearings in the frame L which also carries the turn stile K. On the shaft O′ are secured sets of rigid arms O^2, and on the upper end of the said shaft is secured a sprocket wheel O^3 over which passes a sprocket chain O^4, also passing over a sprocket wheel O^5, secured on the upper end of the shaft K′. Near the lower end of the latter is secured a gear wheel K^6 adapted to engage segmental racks H′ formed on the periphery of the spi-

der wheel H, so that when the latter revolves with the shaft A the said racks H′ impart a rotary motion to the shaft K′ and the latter, by the sprocket wheels O^5 and O^3 and the chain O^4, rotates at the same time the shaft O′ of the turn stile O. Thus the two turn stiles K and O are actuated simultaneously and intermittently, at the proper time, one to move the bottle from the carrier belt J onto its corresponding platform, and the other turn stile to move a filled bottle from the platform onto the carrier belt N, to be discharged at one side of the machine. As shown in Fig. 1, the two carrier belts J and N are arranged at right angles to each other.

The operation is as follows:—When the shaft A is set in motion and a traveling motion is imparted to the belts J and N, then the empty bottles placed on the carrier belt J are moved from the front end of the latter at the proper time onto a platform F on the spider wheel H to be carried forward in the direction of the arrow *b′* by the revolution of the said spider wheel. The sets of arms F^3 hold the bottle in place on the platform F on the forward motion of the spider wheel H, and at the same time the bottle opens the corresponding arm K^2 as illustrated in Fig. 3, to permit a free passage of the said bottle on the forward motion of the wheel H. As soon as the bottle has passed this arm, the latter returns to its normal position by the action of the spring K^3. At this time the caster of the platform supporting the bottle travels up the incline I′, thus raising the stem F′ and the platform F with the bottle E on top. By this upward movement the neck of the bottle is brought into engagement with the lower end of the filling tube C′ which latter thus partly enters the neck of the bottle, and the latter finally engages the gasket C^7, and on the further upward sliding of the platform F and bottle E the latter exerts an upward pressure on the tube C′ so that the latter slides upward against the tension of the spring C^8 at the same time carrying the weight C^9 in a like direction and bringing its opening C^3 to register with the liquid in the tank B. The liquid now flows through the said opening C^3 into the tube C′, and from the latter into the bottle, the air escaping from the latter through the inner tube C^2 the upper end of which extends above the tank, as before described. When the bottle is filled then the wheel H has nearly completed its revolution, the caster F^2 then dropping off the track I onto the incline I^2, so that the spring C^8 and the weight C^9 suddenly close the tube C′ by moving the latter downward carrying the opening C^3 within the bearing D. The lower end of the tube C′ then still extends into the neck of the bottle so as to hold the same in position until the bottle reaches the end J^3 of the arm J^2 and is taken hold of by the turn stile O to be moved onto the carrier belt N to be carried off. The above described operation is repeated with each bottle, it being understood that the filled bottles after being completely disengaged from the tubes C′ turn with their platforms F. The latter movement is derived from the cam F^6 striking successively the arms I^7 and I^6, whereby the sets of arms F^3 turn the bottle with the platform F to readily discharge the bottles into the turn stile O to be delivered to the carrier belt N. The arm I^7 by engaging the cam F^6 causes the platform F to turn in the direction of the arrow *c′*, see Fig. 7, so that the arms F^3 stand opposite the belt N to permit the turn stile O to readily move the bottle out of the said arms onto the belt N. At this time the cam F^6 engages the other arm I^6, and the platform F is caused to revolve in the inverse direction of the arrow *c′* to assume its normal position. When the caster F^2 of a platform F passes off the lower end of the incline I^2, then the platform is seated in its seat G^2 in the disk G and remains therein until after an empty bottle is again passed on the platform by the other stile K, as above described, after which the caster engages the lower end of the incline I′ and the raising of the platform and its bottle begins, to finally engage the bottle with the filling tube C′ in the manner above referred to. The above described operation is then repeated.

It will be seen that by this construction the air is readily discharged from the bottle during the time the liquid flows into the same, thus permitting a ready flow of the liquid and preventing accumulation of the compressed air within the bottle.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a filling machine the combination with a revolving tank for containing the liquid, of a series of filling tubes fitted to slide in the said tank, a series of platforms arranged in a circle and in line with the said filling tubes, the said platforms being adapted to support the bottles to be filled and move with the said tubes and tank, substantially as shown and described.

2. In a filling machine the combination with a revolving tank for containing the liquid, of a series of filling tubes fitted to slide in the said tank, a series of platforms arranged in a circle and in line with the said filling tubes, the said platforms being adapted to support the bottles to be filled and move with the said tubes and tank, and means for raising and lowering the said platforms to move the bottles in and out of contact with the said filling tubes, substantially as shown and described.

3. In a filling machine, the combination with a revolving tank for containing the liquid, and filling tubes held on the said tank and arranged in a circle, of a bottle carrier moving with the said tank and provided with movable platforms arranged in line with the said filling tubes and adapted to support the bottles, and means substantially as described for raising and lowering the said platforms to

move the bottles in contact with and raise the said filling tubes to open the latter in the said tank, substantially as shown and described.

4. In a filling machine, the combination with a revolving tank for containing the liquid, and filling tubes held on the said tank and arranged in a circle, of a bottle carrier moving with the said tank and provided with movable platforms arranged in line with the said filling tubes and adapted to support the bottles, and means for delivering the bottles into the said platforms, substantially as shown and described

5. In a filling machine, the combination with a revolving tank for containing the liquid, and filling tubes held on the said tank and arranged in a circle, of a bottle carrier moving with the said tank and provided with movable platforms arranged in line with the said filling tubes and adapted to support the bottles, and means for removing the said bottles from the said platforms after the bottles are filled, substantially as shown and described.

6. In a bottle filling machine, the combination with a shaft, of a tank containing the liquid and secured on the said shaft, a series of bearings held in the bottom of the said tank and arranged in a circle, filling tubes fitted to slide in the said bearings and each provided with an inlet opening adapted to register with the liquid or be cut off by the said bearing, a spring for holding the said filling tube in a lowermost position, and a wheel secured on the said shaft and provided with platforms arranged in a circle and in line with the said filling tubes, substantially as shown and described.

7. In a bottle filling machine, the combination with a shaft, of a tank containing the liquid and secured on the said shaft, a series of bearings held in the bottom of the said tank and arranged in a circle, filling tubes fitted to slide in the said bearings and each provided with an inlet opening adapted to register with the liquid or be cut off by the said bearing, a spring for holding the said filling tube in a lowermost position, a wheel secured on the said shaft and provided with platforms arranged in a circle and in line with the said filling tubes, and means, substantially as described, for raising and lowering the said platforms to move the bottles supported thereon into engagement with the said filling tubes, as set forth.

8. In a bottle filling machine, the combination with a revolving tank and a bottle carrier revolving with the said tank, of an endless belt for carrying the empty bottles to the said bottle carrier, and a turn stile for moving the bottles from the endless belt to the said carrier, substantially as shown and described.

9. In a bottle filling machine, the combination with a revolving tank and a bottle carrier revolving with the said tank, of an endless belt for carrying the empty bottles to the said bottle carrier, a turn stile for moving the bottles from the endless belt to the said carrier, and a second endless belt and turn stile for moving the filled bottles from the said carrier, substantially as shown and described.

10. In a bottle filling machine, the combination with a wheel mounted to revolve, of a series of platforms adapted to be seated on the said wheel, arranged in a circle and adapted to receive the bottles, of a circular track having inclined ends adapted to be engaged by the ends of the said platforms, to raise and lower the same or hold the same in an uppermost position during the time of filling the bottles, substantially as shown and described.

11. In a bottle filling machine, the combination with a wheel provided with a series of disks arranged in a circle, of a platform adapted to be seated in a seat in the said disk, a stem projecting from the said platform and passing centrally through the said disk, a caster held on the lower end of each stem, and a circular track provided with inclined ends adapted to be engaged by the said caster, substantially as shown and described.

12. In a bottle filling machine, the combination with a wheel provided with a series of disks arranged in a circle, of a platform adapted to be seated in a seat in the said disk, a stem projecting from the said platform and passing centrally through the said disk, a caster held on the lower end of the stem, a circular track provided with inclined ends adapted to be engaged by the said caster, a cam held on the said stem, and fixed pins projecting from the said track and adapted to be engaged by the said cam to turn the said platform in its seat, substantially as shown and described.

13. A bottle filling machine provided with a platform adapted to receive the bottle to be filled, the said platform being arranged to be raised and lowered and turned in its seat, substantially as shown and described.

14. A bottle filling machine provided with a platform having a central stem and adapted to be raised and lowered and turned in its seat, a post projecting from the said platform, and arms held thereon to hold the bottle in place on the platform, substantially as shown and described.

15. In a bottle filling machine, the combination with a bottle-carrying wheel provided with racks on its periphery, of a turn stile provided with a vertical shaft carrying a gear wheel adapted to be engaged by the said racks, substantially as shown and described.

16. In a bottle filling machine, the combination with a bottle-carrying wheel provided with racks on its periphery, of a turn stile provided with a vertical shaft carrying a gear wheel adapted to be engaged by the said racks, and a second turn stile connected with the first stile so that both are operated simulta-

neously and intermittently from the said bottle-carrying wheel, substantially as shown and described.

17. In a bottle filling machine, the combination with a disk formed with a seat, of a platform mounted to turn in the said seat and provided with a pin projecting into a segmental slot in the said disk, a stem projecting from the said platform, and a cam held on the said stem and adapted to be engaged by pins to turn the cam in opposite directions, substantially as shown and described.

18. In a bottle filling machine, a turn stile comprising a shaft mounted to turn, arms pivoted on the said shaft and each provided with an inclined end adapted to engage the corresponding bevel of the said shaft, and a spring pressing on each of the said arms, substantially as shown and described.

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