J. E. HENES.

BOTTLE FILLING MACHINE.

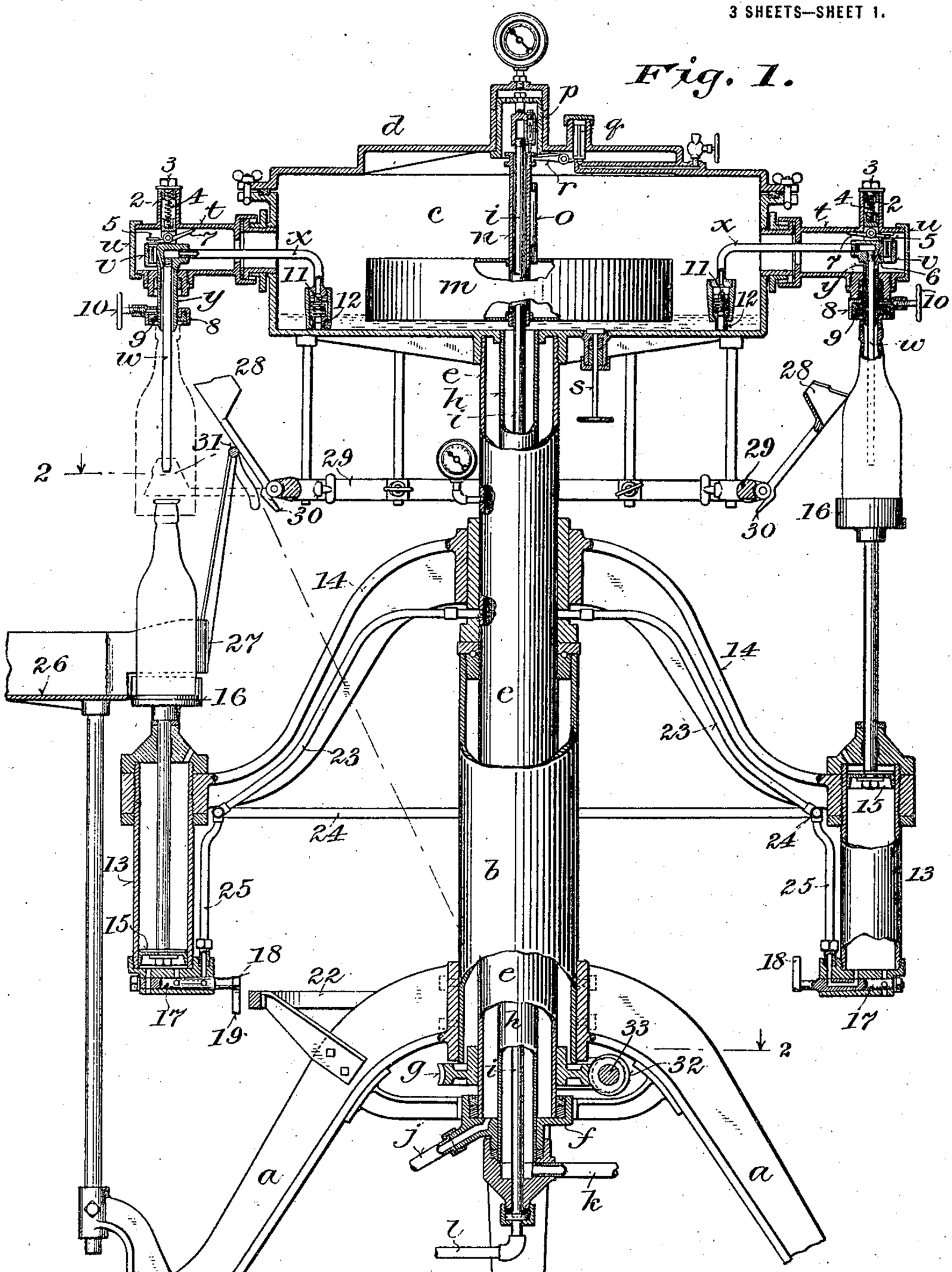
APPLICATION FILED AUG. 10, 1908. RENEWED MAR. 6, 1914.

1,166,520.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

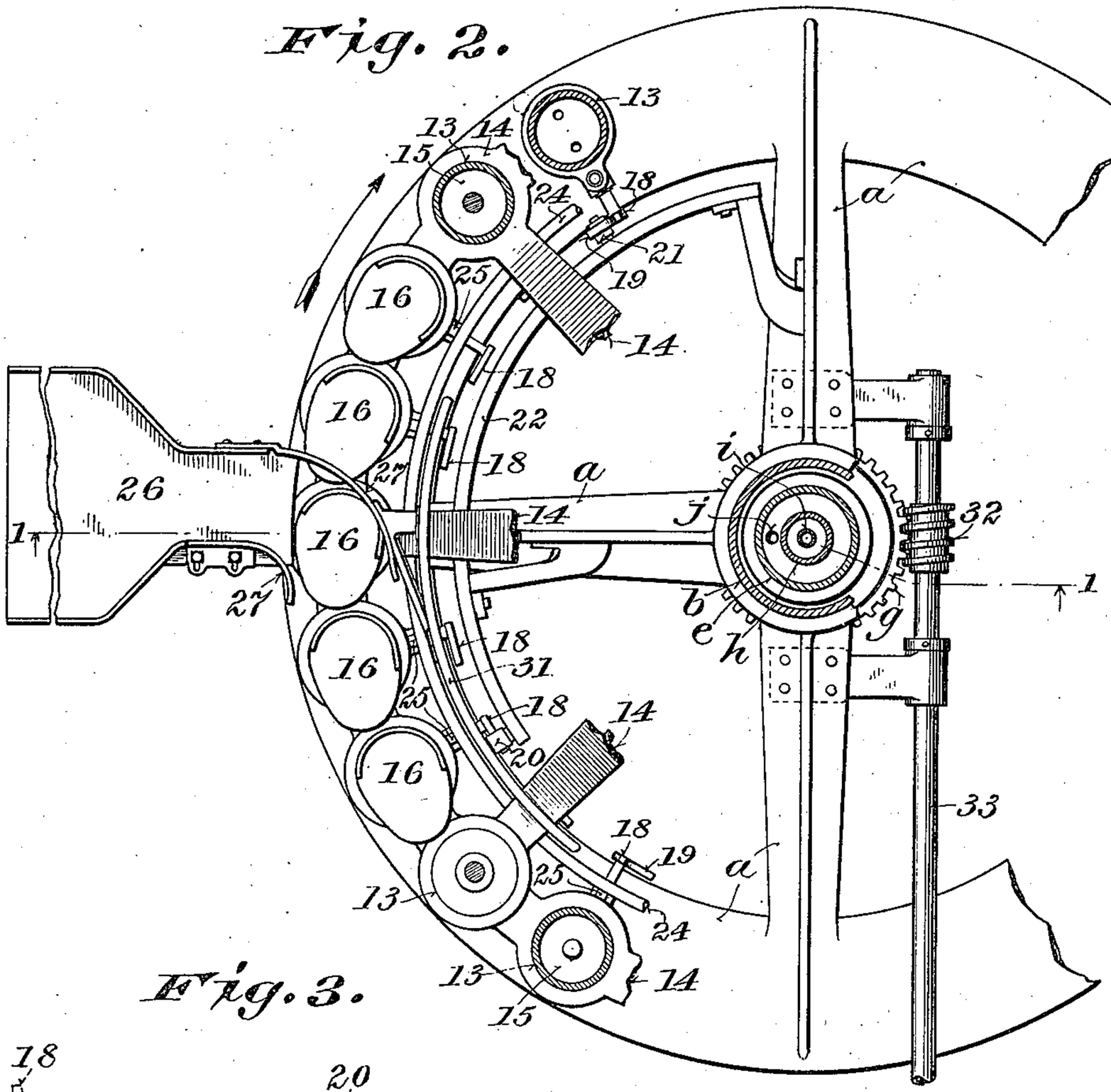


Fig. 3.

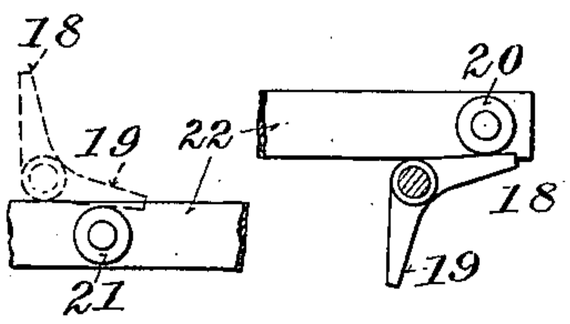
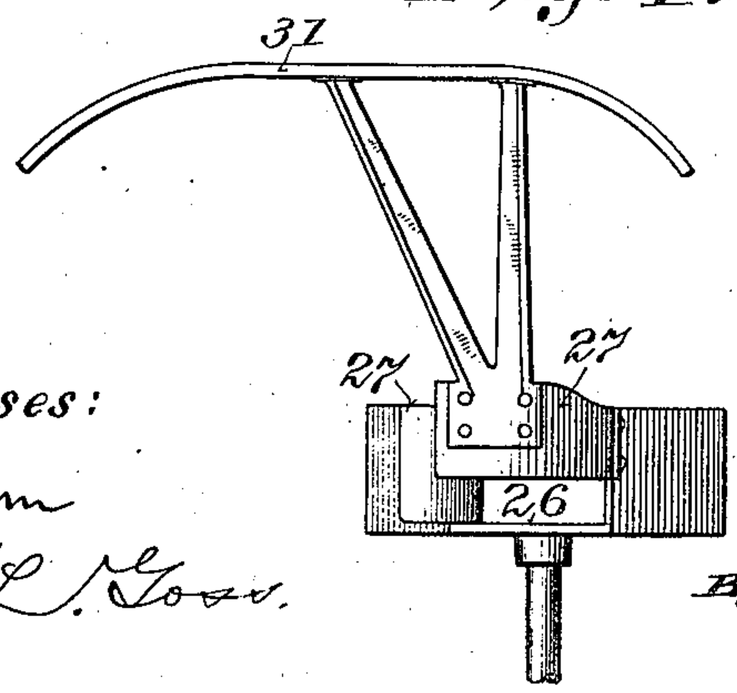


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

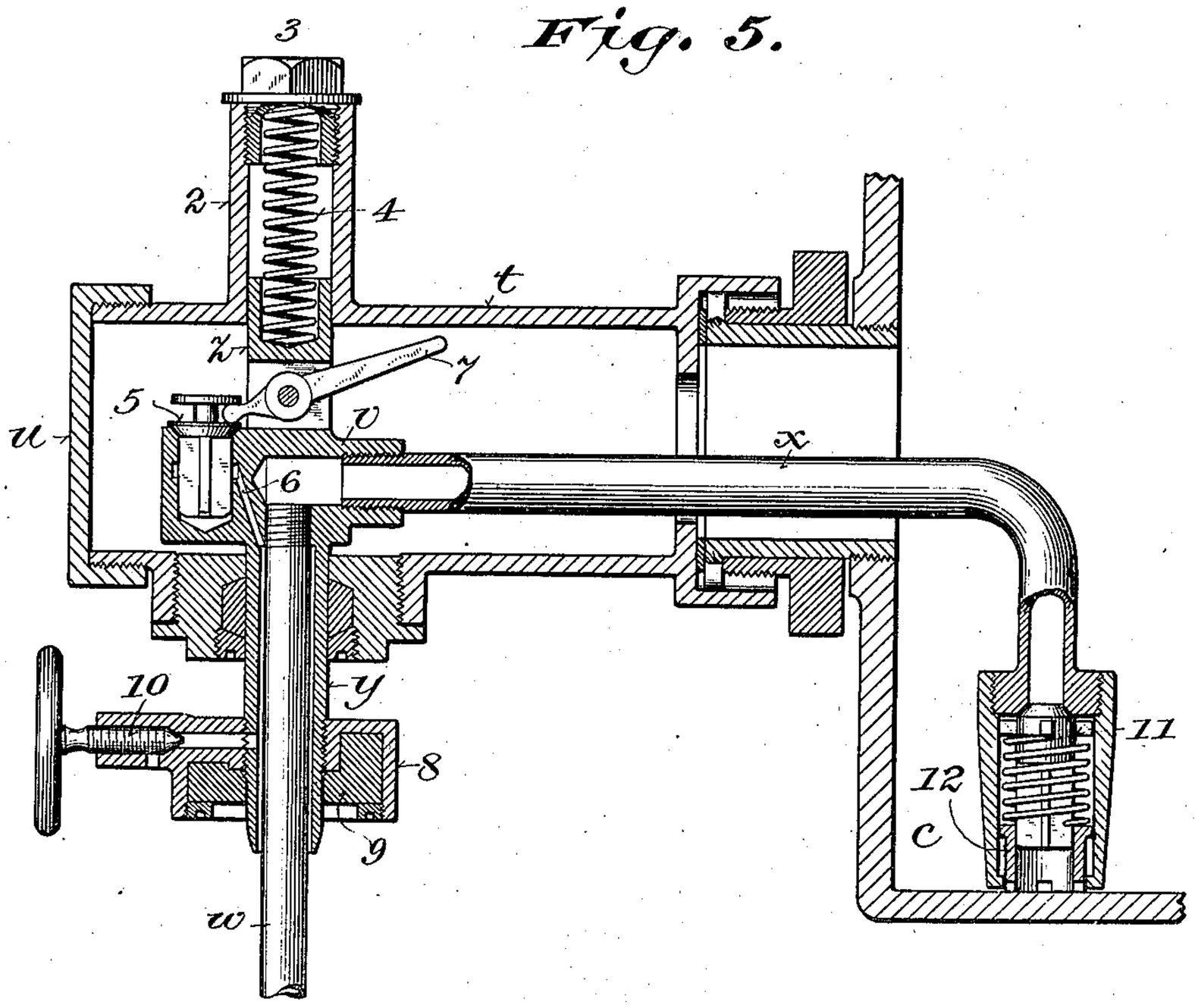
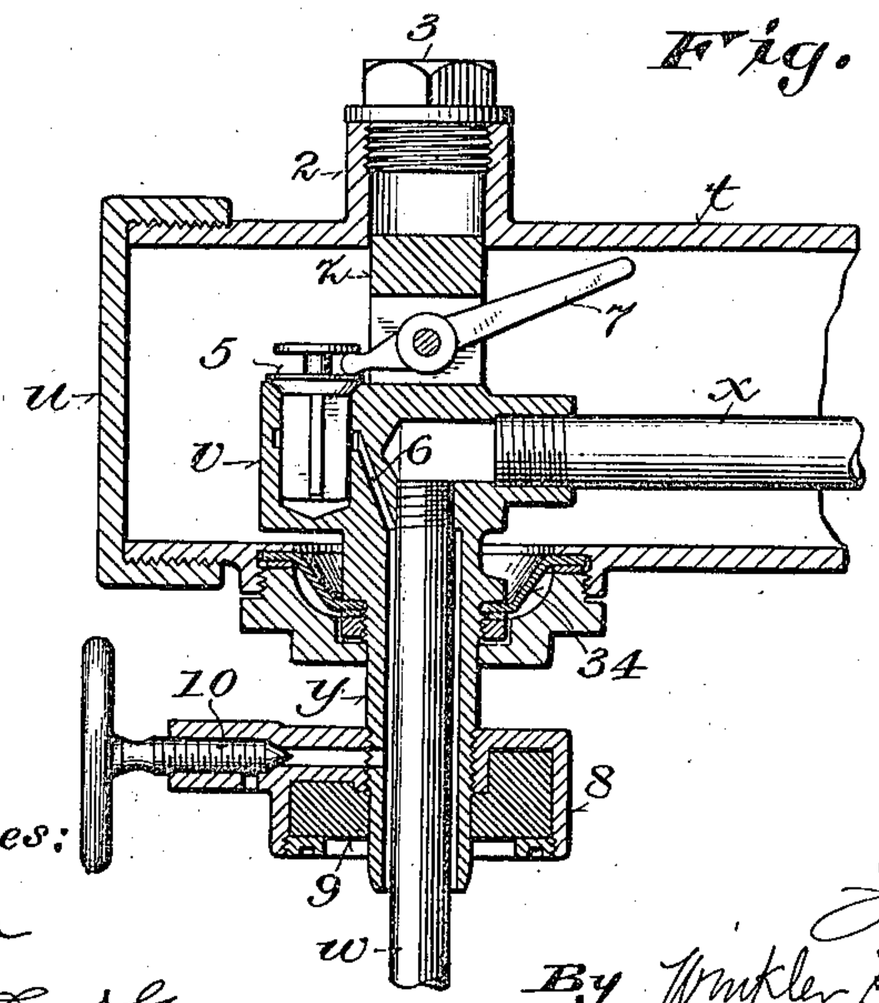


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN E. HENES, OF MENOMINEE, MICHIGAN, ASSIGNOR TO HENES & KELLER COMPANY, OF MENOMINEE, MICHIGAN, A COPARTNERSHIP COMPOSED OF JOHN HENES, ALFRED A. HENES, AND JOHN E. HENES.

BOTTLE-FILLING MACHINE.

1,166,520. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed August 10, 1908, Serial No. 447,669. Renewed March 6, 1914. Serial No. 822,957.

To all whom it may concern:

Be it known that I, JOHN E. HENES, a citizen of the United States, residing at Menominee, in the county of Menominee and State of Michigan, have invented certain new and useful Improvements in Bottle-Filling Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

This invention relates more particularly to machines of the class of that covered by United States Letters Patent No. 655,443, dated August 7, 1900. Its main objects are to increase the capacity and to make the operation of such machines more automatic, and generally to simplify and improve their construction and operation.

It consists in certain novel features of construction and in the peculiar arrangement and combinations of parts as hereinafter particularly described and defined in the claims.

In the accompanying drawing like characters designate the same parts in the several figures.

Figure 1 is a side elevation and partial vertical section on the line 1 1, Fig. 2, of a machine embodying the invention; Fig. 2 is a partial plan view and horizontal section on the broken line 2 2, Fig. 1; Fig. 3 is a detail view showing on an enlarged scale as viewed from the left with relation to Fig. 2, the trips and arms for operating the valves which control the operation of the bottle supports; Fig. 4 is an elevation as viewed from the right with relation to Fig. 2, of the inner end of the turnout conduit for removing filled bottles from the machine, and of the guard for holding the centering guides out of operative position as the filled bottles are removed; Fig. 5 is a central vertical section on an enlarged scale of a filling head; and Fig. 6 is a similar view of a modification.

Referring more particularly to Figs. 1 and 2, *a* is a stand or support having a tubular post or upright *b*, and *c* is a closed receptacle preferably of cylindrical form, for containing and distributing the liquid to be bottled. It is provided with a removable top plate or cover *d*, and on the under side with a central tubular stem *e* fitted to turn in bearings at the upper and lower ends of the post *b* through which it extends. Between the closed step bearing *f* in which it is suitably packed at its lower end to prevent leakage, and the lower end of the post *b*, it is provided with a worm gear *g*. A liquid supply pipe *h* leads upwardly from the step bearing in which it is suitably packed, through the stem *e* into the lower part of the receptacle *c*, and a gas supply pipe *i* leads upwardly from the step bearing through the pipe *h* into the upper part of the receptacle *c*. At it lower end the tubular stem *e* communicates with a fluid pressure supply connection *j*, the pipe *h* with a liquid supply connection *k*, and the pipe *i* with a gas supply connection *l*.

m is a hollow closed float having a central vertical sleeve *n* loosely guided on the pipe *i* within the receptacle *c* and an upwardly projecting vent tube *o*, to equalize the gas pressure inside and outside of the float.

A valve *p* controlling the admission of gas from the upper end of pipe *i* into the receptacle *c*, and a valve *q* controlling the escape of gas from said receptacle into the atmosphere, are arranged to be opened by the vertical movement of the float *m*, the valve *q* being operated by a lever *r* extending at one end between flanges on the upper end of the sleeve *n*, and the valve *p* by the engagement of the upper flange with its depending stem. The upward movement of the float beyond a certain limit, opens the valve *p*, while its downward movement to a certain position, permitting the valve *p* to close, opens the waste or vent valve *q*. In this way liquid is automatically maintained under gas pressure at a predetermined and substantially constant level.

When there is no liquid in receptacle *c*, the float will obviously sink and hold the waste valve *q* open. Under these conditions, to establish the requisite gas pressure in receptacle *c* for starting and operating the machine, a push rod *s*, passing through a stuffing box in the bottom of said receptacle, is provided, for lifting the float *m* and thereby closing the waste valve *q* and open-

ing the admission valve *p* until the required pressure is established in the receptacle preparatory to the admission of liquid thereto.

The receptacle *c* is provided with a number of filling heads arranged around its periphery in a circle concentric with the axis of said receptacle. As shown more clearly in detail in Fig. 5, each filling head comprises a hollow head or tube *t*, detachably secured to the receptacle and provided at its outer end with a removable cap or closure *u*. This head or tube when attached to the receptacle as shown, projects horizontally and radially therefrom, and is in open communication at its inner end with the interior of the receptacle.

In a fitting *v*, which is guided and vertically movable in the head or tube *t*, is threaded or otherwise secured, tubes *w* and *x*, forming the longer and shorter legs of a siphon. The fitting *v* has a tubular extension *y* passing through a stuffing box in the under side of the head or tube *s* and surrounding the upper part of the tube *w*, and an upwardly extending stem *z* guided in a tubular extension 2 on the upper side of the head or tube *t*. The extension 2 is closed at its upper end by a cap 3, and between this cap and the stem *z* is interposed a spring 4, which tends to move the siphon downward and holds it in its lower position. The fitting is provided with an upwardly opening valve 5, which normally closes a passage 6 leading from the interior of the head or tube *t* into the annular passage between the tube *w* and extension *v*. A lever 7 fulcrumed in the fitting *v* and engaging at one end with said valve, is adapted to open the same when the siphon is moved upward and the opposite end of the lever is carried thereby into engagement with the top of the head or tube *t*.

Fixed on the tubular extension *y* is a recessed cap 8, in which a ring 9 of rubber is inserted for sealing the mouths of bottles pressed against it. A vent passage which is normally closed by a valve 10 leads from the annular space or passage around the tube *w* to the atmosphere, to relieve the bottle of internal pressure and permit the filling of the siphon when the machine is started.

At its inner end the tube *x* is provided with an upwardly closing valve 11, adapted when the siphon descends to be closed and held against its seat by the engagement with the bottom of the receptacle *c* of a sleeve 12, which telescopes in the valve chamber and in which the valve stem is guided, a light spring being interposed between said sleeve and valve, as shown in Figs. 1 and 5. The valve 11 with its case moving downward relatively to the sleeve 12 compresses said spring when the tube *x* is lowered to its normal position. When said tube is lifted, as shown at the right in Fig. 1, said sleeve, remaining in contact with the bottom of receptacle *c* while the valve and its case move upwardly, maintains a connection for the outflow of liquid close to the bottom of said receptacle, and the spring is relieved of tension, permitting the valve to open at the proper time, as hereinafter explained.

Below and in line with the siphon tubes *w*, cylinders 13 are carried by a wheel or support 14, fixed on the tubular stem *e* so as to turn with the receptacle *c*. These cylinders are provided with pistons 15, and to the upper ends of the piston rods are attached the vertically movable bottle supports 16. These supports are provided on their inner and advancing sides with upwardly projecting flanges to facilitate locating the bottles and to hold them in place thereon.

An oscillatory or rocking valve 17, fitted in the lower head of each cylinder, controls the admission and release of fluid under pressure to and from the cylinder, the valve at the right in Fig. 1 being shown in position to admit pressure to the cylinder, and the valve at the left being shown in position to release pressure from the cylinder. These valves are arranged radially with relation to the axis around which the cylinders turn, and the inwardly projecting stem of each valve is provided with two arms 18 and 19, set at an angle to each other to engage alternately with trips 20 and 21 and turn the valve first in one direction into the position shown at the left in Fig. 1, and then in the opposite direction into the position shown at the right in Fig. 1. These trips, consisting in the present case of rollers to avoid friction and wear, are mounted in different vertical planes as shown in Fig. 3, on a curved bar 22, attached to the stand *a*. Compressed air or other fluid under pressure for operating the pistons 15 and bottle supports 16, is conveyed from the tubular stem *e* through radial pipes 23 to an annular pipe 24, and thence by branches 25 to the chambers of the several valves 17.

On one side of the machine between the trips 20 and 21, a turnout conduit or discharge chute 26 has curved guides 27 at its inner end, constructed and arranged to receive and divert filled bottles from the supports 16 as they pass in the direction indicated by the arrow on Fig. 2 between said guides.

To direct the mouths of the bottles as they are lifted on the supports 16 over the ends of the tubes *w*, conical centering guides 28 are provided. These guides are attached to the outer ends of radial arms which are pivoted at their inner ends to a ring or frame 29, carried by the rotary receptacle *c*, so as to be turned downwardly into operative position, as indicated by the dotted lines at the left in Fig. 1, and upwardly

and backwardly out of the way, as shown by full lines. They are slotted in their outer sides to pass the lower ends of the tubes *w* in swinging into and out of place, and are stopped and held in their operative relation to the filling tubes and bottle supports by the engagement of projections 30 at the inner ends of their supporting arms with the ring or frame 29.

A guard 31 attached to the inner guide 27 of the turnout conduit, and curved or inclined downwardly at its ends as shown in Fig. 4, is arranged to turn the centering guides 28 upwardly out of operative position, as shown in Fig. 1, just before the bottle supports 16 are lowered and as they pass the turnout conduit 26.

The receptacle *c* with its filling heads and the bottle carrier are turned by a worm 32 on the driving shaft 33.

The siphons of the filling heads instead of passing through stuffing boxes in the lower sides of the heads or tubes *t*, as shown in Fig. 5, may be connected therewith by flexible diaphragms 34, as shown in Fig. 6, and the springs 4 may be dispensed with.

The machine operates as follows: The beer or other beverage to be bottled, being admitted into the receptacle *c* through the supply connection *k* and pipe *h*, against counter pressure previously established therein and maintained by the admission of air or other gas under pressure through the supply connection *l* and pipe *i*, empty bottles are placed on the supports 16 as they pass between the turnout conduit 26 and the trip 21. The filling heads and bottle supports being turned together with the receptacle *c*, when the downwardly projecting arms 19 on the stems of the valves 17 pass the trip roller 21, they turn the valves into the position shown at the right in Fig. 1. The compressed air or other fluid under pressure is thus admitted into the lower ends of the cylinders 13, the exhaust ports being closed, and the pistons 15 are forced upwardly, carrying the bottles on the supports 16 upwardly through the centering guides 28 over the tubes *w*. The mouths of the bottles being thus forced against the rubber rings 9 in the caps 8, are closed and sealed while the siphons are moved upward with relation to the heads or tubes *t*. This upward movement of the siphons lifts the stems of the valves 11 away from the bottom of receptacle *c*, releases the tension of the springs between said valves and the sleeves 12, and causes the levers 7 to open the valves 5. Gas under pressure is thus admitted from receptacle *c* into the sealed bottles through the passages 6, and when the pressure in the bottles nearly reaches that maintained in said receptacle, the valves 11 automatically open by gravity.

In starting the machine, the siphons being lifted are first filled and rendered operative by temporarily opening the vent valves 10, thus reducing the counter pressure in the bottles and permitting the greater pressure in receptacle *c* to force the liquid into the siphons, the valves 11 being released and opened when the siphons are lifted, as hereinafter explained, and remaining open until the siphons are lowered into normal position. After they have once been filled in this way, they will remain filled while the machine continues in operation, the valves 10 being closed.

Falling by gravity through the siphons into the bottles against the counter pressure of air or gas produced and maintained therein, carbonated or effervescing beverages will not foam, and the gas with which they are carbonated will not be liberated and thus cause them to become flat or stale.

After the liquid in the bottles attains the level of the liquid in receptacle *c*, and the bottles are filled, the upturned arms 18 being brought into engagement with the trip roller 20, turn the valves 17 into the position shown at the left in Fig. 1, shutting off the fluid pressure supply through the branch pipes 25 and opening the exhaust ports in the lower ends of the cylinders 13. The pistons 15 with the filled bottles carried by the supports 16, are thus allowed to descend by gravity and as they descend, the valves 11 are closed by the compression of the springs between them and the sleeves 12. Before and during the descent of the filled bottles, the arms of the centering guides 28 ride upon the guard 31 and are turned and held back out of contact with the bottles so that they cannot catch on the shoulders on the bottles and thus interfere with the proper operation of the machine, break bottles or injure the machine.

As the filled bottles pass between the curved guides 27 they are directed thereby outwardly from the supports 16 into the conduit 26. As the supports 16 pass from the conduit 26 the arms of the centering guides 28 clear the guard 31, permitting them to descend into operative position with relation to the tubes *w*, as indicated by dotted lines at the left in Fig. 1.

The liquid in receptacle *c* is maintained at the desired level automatically by the operation of the float *m*, which regulates the gas pressure.

It will be observed that the operation of the machine is automatic, requiring no attention on the part of the attendant except to place the empty bottles to be filled on the supports 16 as they pass between the turnout conduit 26 and the trip roller 21.

Various changes in details of construction and arrangement of parts may be made without materially affecting the principle and mode of operation of the machine, and

without departing from the spirit and scope of the invention.

I claim:

1. In a bottle filling machine, the combination with a stand or support, of a closed liquid receptacle rotatably mounted thereon and having a number of filling siphons, liquid and gas supply connections and a gas waste passage, a valve controlling said waste passage, a vertically movable float adapted to operate said valve, and means accessible outside of said receptacle for lifting said float to operate said valve in starting the machine.

2. In a bottle filling machine, the combination with a stand or support, of a closed liquid receptacle rotatably mounted thereon and having a number of filling siphons, a liquid supply connection and gas supply and waste connections, valves controlling said gas supply and waste connections, a vertically movable float adapted to operate said valves, and means for manually lifting said float to operate said valves in starting the machine, substantially as described.

3. In a bottle filling machine, the combination with a stand or support, of a closed liquid receptacle rotatably mounted thereon and having a number of tubular heads and vertically movable filling siphons having their longer legs guided and movable lengthwise in said heads and provided at their inner ends with automatic valves adapted to close when the siphons descend to their lower positions, and to remain closed when the siphons are elevated until a certain counterpressure is established in the bottle to be filled, substantially as described.

4. In a bottle filling machine, the combination with a stand or support, of a closed liquid receptacle rotatably mounted thereon and having a number of tubular heads, and vertically movable filling siphons guided in said heads parallel with the axis of said receptacle and each provided with a bottle sealing cap and a gas passage extending from the interior of the head through said cap and with a valve controlling said passage and adapted to be opened by the upward movement of the siphon, substantially as described.

5. In a bottle filling machine, the combination with a stand or support, of a closed liquid receptacle rotatably mounted thereon and having tubular filling heads, vertically movable siphons guided in said heads parallel with the axis of said receptacle and each provided with a bottle sealing cap, and a gas passage leading through said cap from the interior of the head and provided with a valve adapted to be opened by the upward movement of the siphons, and automatic valves adapted to close the inner ends of the siphons when they are lowered, and to remain closed when the siphons are elevated until a certain counterpressure is established in the bottles to be filled, substantially as described.

6. In a bottle filling machine, the combination with a stand or support, of a closed liquid receptacle rotatably mounted thereon and having a number of tubular filling heads, siphons guided in said heads parallel with the axis of said receptacle and provided with bottle sealing caps, and gas passages extending from the interior of said heads through said caps and having vent openings to the atmosphere and valves for closing said openings, substantially as described.

7. In a bottle filling machine, the combination with a stand or support, of a closed liquid receptacle rotatably mounted thereon and having radially projecting tubular heads communicating with the interior of the receptacle and provided at their outer ends with removable closures, vertically movable siphons guided in said heads parallel with the axis of said receptacle independently of said closures and provided with bottle sealing caps and gas passages leading from the interior of the heads through said caps, automatic valves adapted to close the siphons at their inner ends when they are lowered and to remain closed when the siphons are elevated until a certain counterpressure is established in the bottles to be filled, and valves controlling said gas passages and adapted to be opened by the upward movement of the siphons, substantially as described.

8. In a bottle filling machine, the combination of a closed liquid receptacle having a tubular head extending horizontally therefrom, means for maintaining liquid under pressure at a substantially constant level in said receptacle, a vertically movable siphon having its longer vertical leg guided and movable lengthwise in said head and provided with a bottle sealing cap and its shorter leg extending into said receptacle and provided with an automatic valve which is adapted to close when the siphon is moved to its lower position and to remain closed when the siphon is elevated until a certain counterpressure is established in the bottle to be filled, the siphon having a gas passage leading from the interior of said head through said cap and a valve controlling said passage and adapted to be opened when the siphon is moved to its upper position, substantially as described.

9. In a bottle filling machine, the combination of a closed receptacle having a tubular head extending horizontally therefrom, means for maintaining liquid under pressure at a substantially constant level in said receptacle, a vertically movable siphon having its longer leg guided and movable lengthwise in said head and having a bottle

sealing cap, a gas passage extending from the interior of the head through said cap and a vent opening from said passage to the atmosphere, and a valve for closing said opening, substantially as described.

10. In a bottle filling machine, the combination of a closed liquid receptacle, means for maintaining liquid under pressure at a substantially constant level therein, a vertically movable siphon having its longer leg guided and movable lengthwise in said receptacle and provided on its longer leg outside of the receptacle with a bottle sealing cap and having liquid and gas passages extending through said cap, the gas passage terminating below and adjacent to the cap, and automatic valves controlling said passages, the valve controlling the liquid passage being closed by the downward movement of the siphon and remaining closed when it is moved upward until a certain counterpressure is established in the bottle and the valve controlling the gas passage being opened by the upward movement of the siphon, substantially as described.

11. In a bottle filling machine, the combination of a closed receptacle, means for maintaining liquid under pressure at a substantially constant level in said receptacle, a vertically movable siphon guided in said receptacle in a rectilinear direction parallel with its longer leg and having a bottle sealing cap on its longer leg and liquid and gas passages, a valve controlling the liquid passage and adapted to be closed by the downward movement of the siphon and to remain closed when the siphon is elevated until a certain counter pressure is established in the bottle, a valve controlling the gas passage and adapted to be opened by the upward movement of the siphon, and a vertically movable bottle support arranged below and in line with the longer leg of the siphon and adapted to lift the siphon with a bottle and thereby cause the operation of said valves.

12. In a bottle filling machine, the combination of a closed liquid receptacle, means for maintaining liquid under pressure at a substantially constant level therein, a vertically movable siphon guided in said receptacle in a rectilinear direction parallel with the longer leg of the siphon and having a bottle sealing cap on its longer leg and liquid and gas passages extending through said cap, a valve controlling said liquid passage and adapted to be closed by the downward movement of the siphon and to remain closed when the siphon is lifted until a certain counter pressure is established in the bottle, a valve controlling said gas passage and adapted to be opened by the upward movement of the siphon, a vertically movable bottle support arranged below and in alinement with the longer leg of the siphon and adapted to lift the siphon with a bottle and thereby cause the operation of said valve, and a guide movable into and out of position over a bottle on said support and adapted to center the mouth of the bottle with the longer leg of the siphon.

13. In a bottle filling machine, the combination with a stand or support, of a closed liquid receptacle rotatably mounted thereon, means for maintaining liquid under pressure at a substantially constant level in said receptacle, vertically movable siphons guided in said receptacle in a rectilinear direction parallel with their longer legs and having bottle sealing caps on their longer legs and liquid and gas passages extending through said caps, valves controlling said liquid passages and adapted to be closed by the downward movement of the siphons and to remain closed when the siphons are lifted until a certain counter pressure is established in the bottles, valves controlling said gas passages and adapted to be opened by the upward movement of the siphons, and vetically movable and rotatably mounted bottle supports arranged below and in alinement with the longer legs of the siphons and adapted to lift said siphons with bottles and thereby cause the operation of said valves.

In witness whereof I hereto affix my signature in presence of two witnesses.

JOHN E. HENES.

Witnesses:
CHAS. L. GOSS,
FRED PALM.