No. 691,997. Patented Jan. 28, 1902.

H. A. WHITE.

APPARATUS FOR RACKING CARBONATED BEVERAGES.

(Application filed Feb. 9, 1901.)

(No Model.) 4 Sheets—Sheet 1.

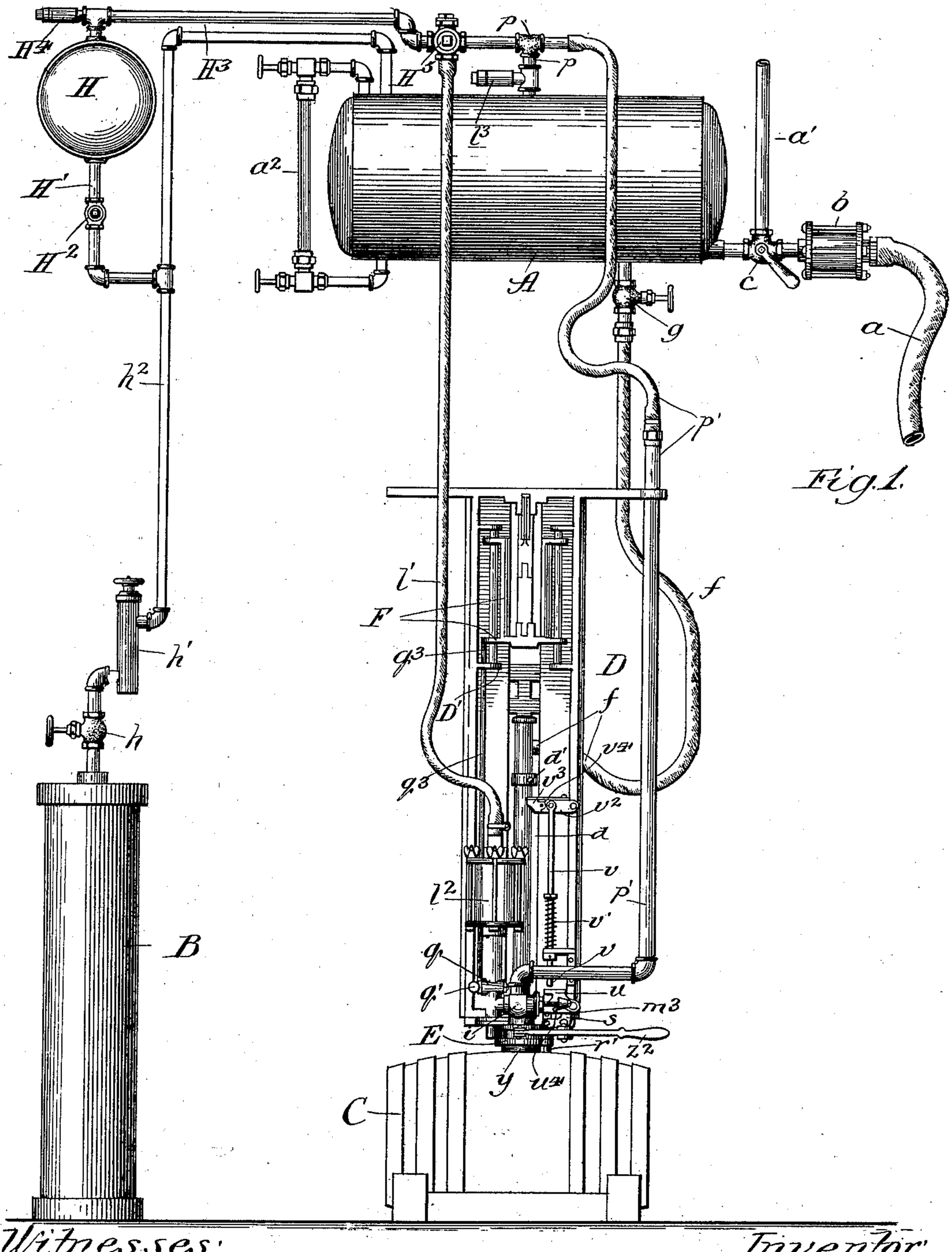

Fig. 1.

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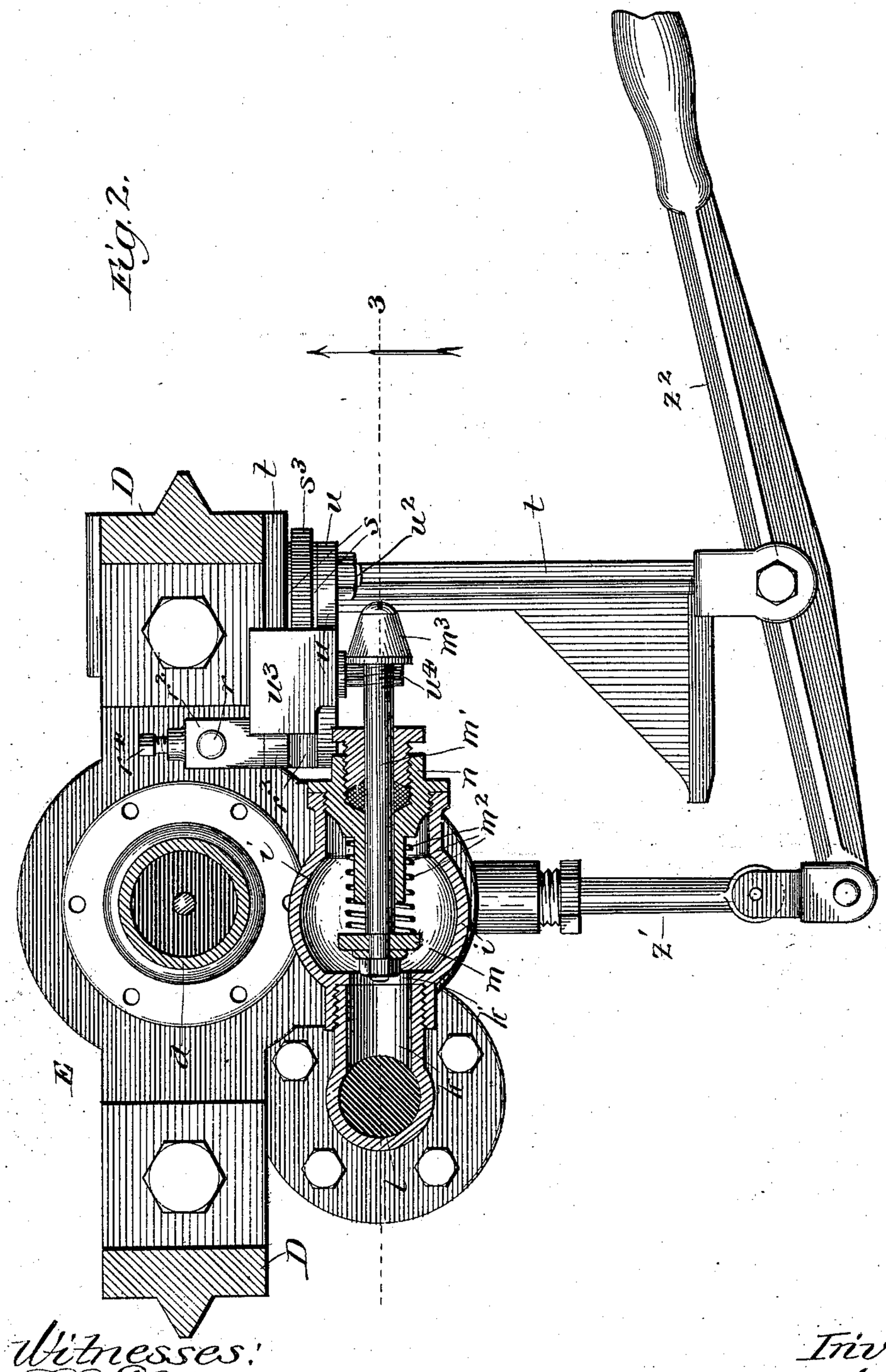
(No Model.) 4 Sheets—Sheet 2.



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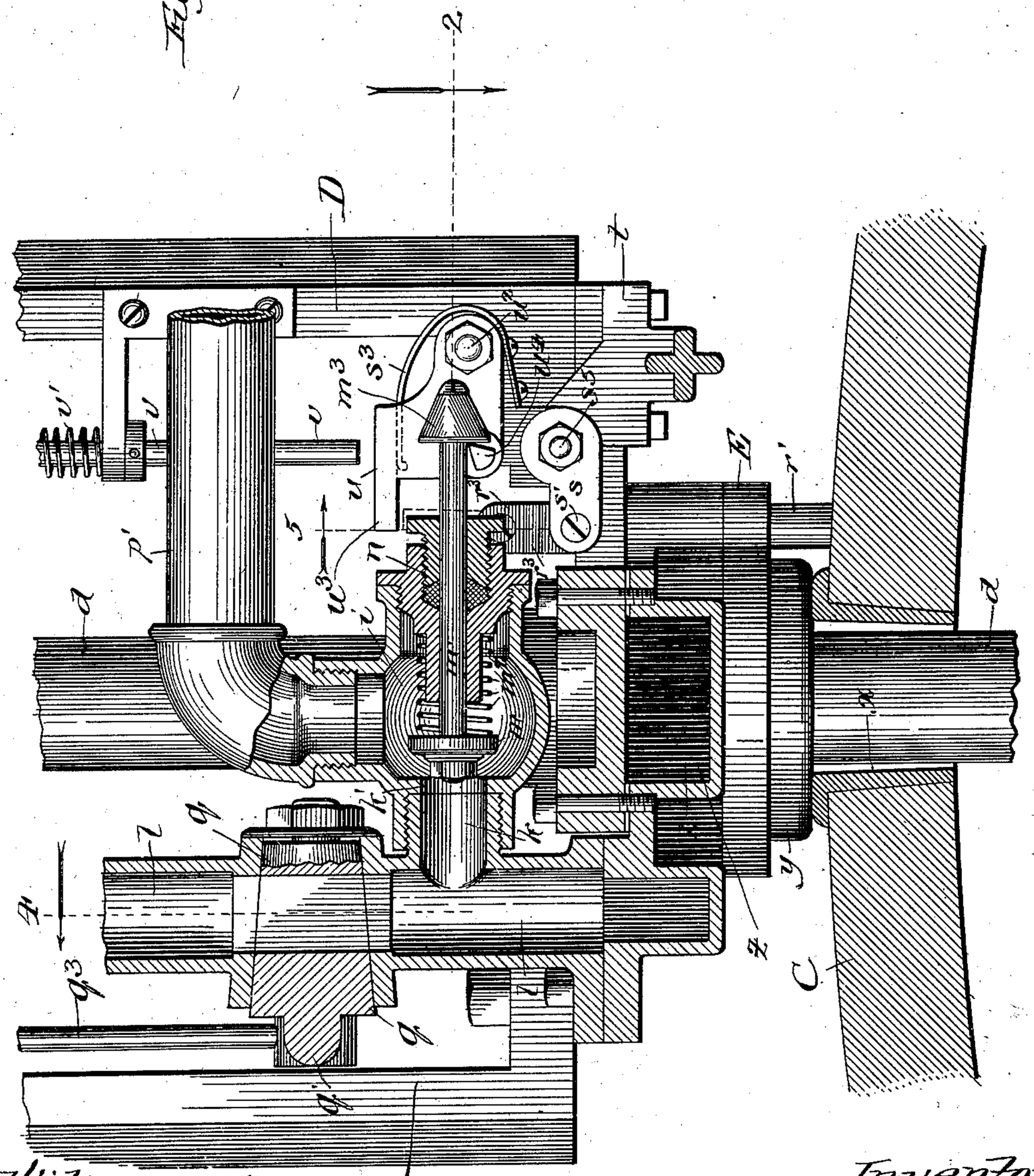
(No Model.) 4 Sheets—Sheet 3.

Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

Fig. 6.

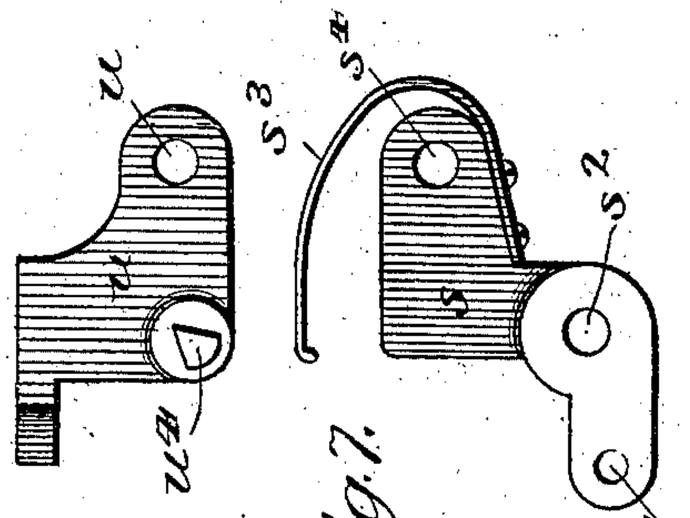


Fig. 7.

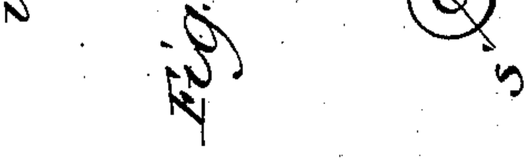


Fig. 5.

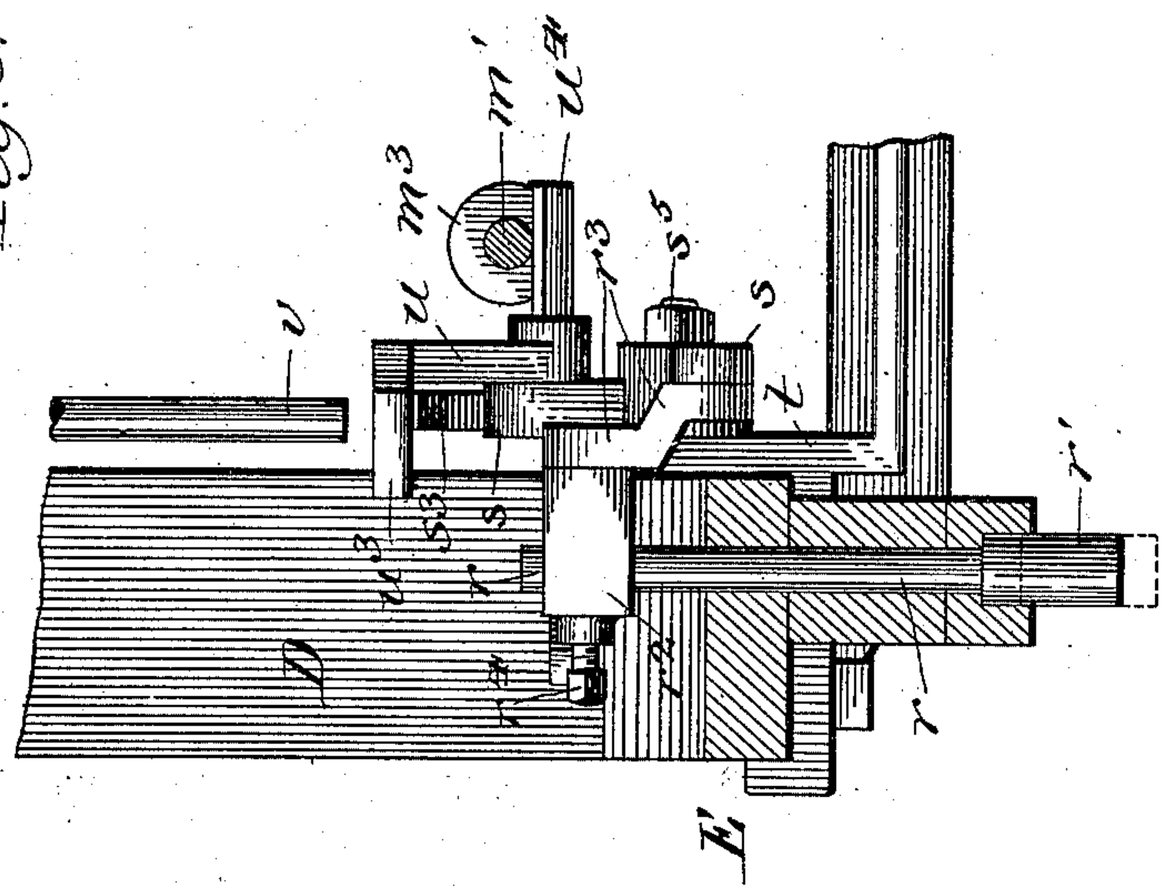
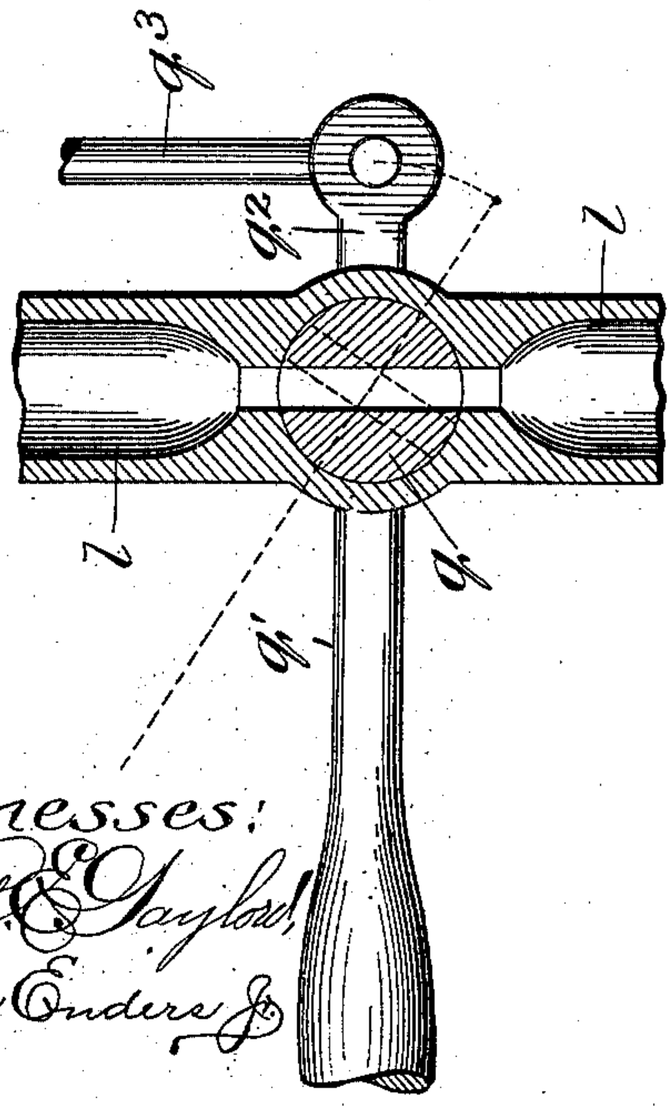


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY A. WHITE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE PFAUDLER VACUUM FERMENTATION COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

APPARATUS FOR RACKING CARBONATED BEVERAGES.

SPECIFICATION forming part of Letters Patent No. 691,997, dated January 28, 1902.

Application filed February 9, 1901. Serial No. 46,624. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. WHITE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Apparatus for Racking Carbonated Beverages, of which the following is a specification.

My invention relates to an improved apparatus for racking beer and other carbonated beverages by the action of gravity alone and in such a manner as effectually to prevent foaming and waste of the beverage. It has long been known that an advantageous system of racking such beverages is by creating an equilibrium of pressure between the supply-tank and the receiving vessel and having the former located at a higher level than the latter, whereby gravity alone acts in effecting the transfer of the liquid, and apparatus for carrying out this general process is shown and described in various United States patents which have been granted, particularly within the past fifteen years.

In the racking of beer and analogous liquids it is highly important that foaming in the receiving vessel shall be prevented as far as possible and that the receiving vessel shall be full when it is bunged. Probably no better general method of effecting these ends can be devised than by "gravity filling," as it is called, under an equilibrium of pressure; but much depends upon the apparatus which is employed.

The object of my invention is to overcome the defects of previous apparatus intended for the same general purpose.

In the accompanying drawings I have shown my improvements applied to a beer-racker of the type manufactured by the Pfaudler Vacuum Fermentation Company, which is shown and described in application for Letters Patent, Serial No. 668,298, filed by David O. Paige January 28, 1898. The drawings are copied from the Paige machine as modified to accommodate my improvements, and in the views I have shown no more of the machine than is necessary to illustrate the working of those parts which embody my improvements and render their operation clear.

Figure 1 represents a diagrammatic view in elevation of apparatus suitable for carrying out my invention with parts of the machine left out where it is thought they would encumber and complicate the drawings without being necessary for a clear understanding of my improvements. Fig. 2 is an enlarged horizontal section through the filling-head of the racking apparatus, the section being taken upon line 2 of Fig. 3; Fig. 3, a broken vertical section taken on line 3 of Fig. 2 in front of the filling-tube and viewed in the direction of the arrow; Fig. 4, a broken section taken on line 4 in Fig. 3; Fig. 5, a broken section taken on line 5 in Fig. 3 and viewed in the direction of the arrow, and Figs. 6 and 7 details of construction of parts shown in Figs. 1, 2, 3, and 5 and which belong to the mechanism for originally raising the pressure in the receiving vessel to that of the supply-tank.

As employed in practice my apparatus forms part of a somewhat elaborate system of mechanism, frequently including an automatic bunging device and frequently also fluid-pressure agencies, liquid or aeriform, by which through the medium of suitable mechanical devices various moving parts and valves may be automatically actuated at the proper times for effecting the desired results in the way of sealing the receiving vessel and establishing and maintaining an equilibrium of pressure between the supply vessel and the receiving vessel and for opening and closing the liquid-conduit. The particular mechanisms illustrated in the drawings are of the form adopted in the racking device shown; but the particular types of automatic valve-actuating devices may be changed without departing from my invention to adapt them to any other racking device in which they may be employed.

I shall describe my apparatus as applied to the racking of beer after it has passed the filter, since this is its primary purpose, though it will be obvious that it may be employed for the racking of other carbonated beverages and that the interposition of a filter has nothing to do with the operation.

Referring to the drawings, A is a tank for receiving beer from the filter through the

pipe a, which is provided with a glass section b and valve c and which enters the tank near and in the plane of the bottom. A branch pipe a' diverts the flow until the beer runs clear.

B is a reservoir for compressed carbonic-acid gas or compressed air. I prefer to employ the former, and if the latter is used it may be sterilized.

C is a receiving vessel for the beer, which in the present instance is a keg or barrel.

D is a raising and lowering frame, carrying at its lower end a filling-head E, having the usual (preferably rubber) gasket y at its lower side to fit air-tight upon the receiving vessel around the bung-hole. Passing vertically through the filling-head is a filling-tube d, mounted to reciprocate in the frame D and provided at its lower end with an automatic valve, (not shown,) which is opened by the descent of the filling-tube into the receiving vessel. A flexible pipe f leads from the upper end of the filling-tube to the valve connection g, extending from the bottom of the tank A.

Surmounting the reservoir B is a valved outlet-pipe h, leading into a pressure-reducing valve h', and from this pressure-reducing valve a pipe h^2 leads into the top of the tank A.

In the filling-head in front of the vertically-sliding filling-tube d is a chamber i, leading through a passage k to a vent-passage l. The lower end of the vent-passage l communicates in the usual way with a space in the lower part of the filling-head about the filling-tube and within the sealing-gasket, which in turn communicates directly with the annular space x about the filling-tube in the bung-hole of the receiving vessel C. The communication between the vent-passage and the receiving vessel is common to devices of this kind and does not, it is thought, require more detailed illustration.

In the chamber i, at the passage k, is a valve-seat k', and in the said chamber is a valve m on a stem m', which passes through a stuffing-box n in the side of the chamber. Surrounding the stem m' is a spring m^2, which tends normally to press the valve m to the seat k', and on the outer end of the stem m', beyond the stuffing-box, is a preferably frusto-conical head m^3. On the top of tank A is a pipe p, from which extends a pipe p' to the top of the chamber i. The pipe p' is in part flexible to permit the frame D to be raised and lowered, the tank being stationary. In the vent-passage l is a plug-valve q, provided with an operating-handle q'. Above the valve q and interposed between the vent-passage l and a flexible pipe l' is a glass section l^2. The pipe l' communicates with the top of the tank A through the pipe p.

The pipe p', chamber i, and passages k l x form a primary-charge conduit through which aeriform fluid-pressure flows from the tank A to the receiving vessel C when the frame D has been lowered to seat its gasket y around and seal the bung-hole of the receiving vessel. This communication between the tank A and the receiving vessel C need be but momentary to raise the pressure of the latter to that of the tank before the filling-tube is lowered into the receiving vessel to commence the filling of the latter. The object of the valve m is to open this passage as soon as the sealing is performed and then close the passage before the filling-tube is lowered and its valve opened for the discharge of beer. The means for opening and closing the valve m will be next described.

Passing loosely through a guide-opening in the filling-head E is a stem r, having a head portion r'. Normally the head r' projects downward to a plane somewhat below the sealing-gasket y, as indicated by dotted lines in Fig. 5. Adjustably fastened to the upper end of the stem r is a head r^2, which in turn is pivotally connected to one end of a link r^3. The opposite end of the link r^3 is pivotally connected to a bell-crank lever s. The bell-crank lever is a fulcrumed at s^2 upon a bolt s^5 on a bracket t on the filling-head. On the bell-crank lever is a spring s^3. At the side of the bell-crank lever s is a lever u, fulcrumed at u' to the lever s at s^4. A pin u^2 passes through the openings u' s^4 to form the pivotal connection between the levers. The levers s u extend side by side in a vertical plane, and the lever u carries a laterally-projecting plate or flange u^3, against the under side of which the spring s^3 bears. On one side of the lever u is a laterally-projecting pin u^4, triangular in cross-section. The tendency of the spring s^3 is to raise the lever u, and thereby raise the pin u^4 into the path of the head m^3 on the stem m' of the valve m. Mounted in guides on the frame D is a rod v, held normally in the raised position shown by a spring v'. The upper end of the rod v is attached to a lever v^2, Fig. 1, fulcrumed upon the frame D. The lever has an independently-swinging end portion v^3, which extends into the path of a pin d' on the filling-tube d. The swinging end portion v^3 is connected with the lever v^2 by a rule-joint and may swing upward from the position shown against the resistance of a flat spring v^4 on the lever v^2. Thus when the filling-tube descends the pin d' strikes the part v^3 of the lever and presses it and the rod v in the downward direction until the pin d' disengages itself from the lever. When thus disengaged, the lever and rod v are raised by the spring v'. In the subsequent upward movement of the filling-tube when raised out of the filling-receptacle the pin d' raises the part v^3 of the lever, which swings upon its rule-joint against the resistance of the spring v^4, permitting the pin d' thus to wipe past the lever without raising the part v^2 thereof. In the descent of the filling-tube when the pin d' presses down the lever v^3 v^2 and rod v the latter impinges against the flange u^3 of the lever u and turns the same on its fulcrum u' to move the pin u^4 downward out of engage-

ment with the head m^3 of the valve-stem m', permitting the valve m to be closed by the spring m^2. The opening of the valve m is produced by the upward movement of the stem r when the filling-head is lowered against the filling vessel. Just before the gasket y engages the surface of the vessel around the bung-hole the head r' and its stem r, which are in the lowered position indicated by dotted lines in Fig. 5, are raised by impingement of the head against the surface of the vessel to the position shown in full lines in Fig. 5, causing the stem r to raise the head r^2 to draw up the link r^3 and swing the bell-crank lever s upon its fulcrum s^2. This movement of the bell-crank lever s causes the lever u to be swung in the arc of a circle, so that the pin u^4 at the point of its triangle engages the head m^3 of the valve-stem and moves it in the outward direction to the position shown in Fig. 3, thereby opening the valve m from the seat k'. The stem r passes through the head r^2 and is fastened thereto by means of a set-screw r^4, whereby the head and stem are adjustable with relation to each other. The head m^3 may also be adjustable upon the stem m', as indicated by the threads on the stem at the head. This adjustability of parts is desirable in order that the rise of the stem r may be caused to effect proper engagement of the pin u^4 with the head m^3 and open the valve m sufficiently when the filling-head is pressed down upon the filling vessel to seal the bung-hole.

On the handle q' of the valve q is a backwardly-extending arm q^2, pivotally connected with the lower end of a vertical rod q^3, which extends upward through a guide D' in the frame D. The upper end of the rod q^3 is in the path of a cross-head F, which at the proper time presses down upon the upper end of the filling-tube to drive the bung. In the downward movement of the cross-head F in its bung-driving operation it strikes the top of the rod q^3 and presses it downward to turn the handle q' and close the valve q.

Beneath the chamber i in the filling-head in front of the path of the filling-tube d is a bung-receiving pocket z, and entering said pocket is a plunger z', operated by a lever z^2. This construction is shown and fully described in the aforesaid application of D. O. Paige and requires no further description in the present connection.

The operation is as follows: As a preliminary to introducing beer into the tank A the valve h on the reservoir B is opened, all the other valves being closed. The pressure-reducing valve h' is set to about nine or ten pounds pressure, so that this pressure is introduced into the tank A. Beer is then admitted to the tank by way of the pipe a until the tank is shown by the glass gage a^2 to be about half-full, at which level it should be approximately maintained. When the receiving vessel is placed in position to be filled, the frame D is lowered in the usual way to cause the gasket y of the filling-head E to press around the bung-hole of the receiving vessel and seal the same. In the downward movement of the filling-head to its sealing position the head r' on the stem r impinges against the surface of the receiving vessel at one side of the bung-hole and is raised from the position shown in dotted lines in Fig. 5 to the position shown in full lines at that figure, causing the valve m to be opened, as before described. The opening of the valve m permits pressure from the upper part of the tank A to pass through the pipe p', chamber i, passage k, and vent-passage l to the receiving vessel. In practice the valve m need be opened but momentarily to raise the pressure in the receiving vessel to that of the tank A, and just as soon as this equilibrium is established and before beer is permitted to flow into the keg this passage should be closed in order to permit the vent-passage l to perform its function. In the initial downward movement of the filling-tube d the pin d' thereon operates the lever v^2 v^3 to effect closing of the valve m, as before described. When the filling-tube is moved in the downward direction into the receiving vessel or before this takes place, the operator presses down the handle q to establish communication between the receiving vessel C and the tank A through the vent-passage l and the pipe l'. Any beer in the vent-passage left over from the preceding operation will immediately flow by gravity into the receiving vessel through the space x in the bung-hole about the filling-tube. As beer flows from the lower end of the filling-tube into the receiving vessel the air or gas displaced by the liquid rises through the space x, vent-passage l, and pipe l' to the tank A. As soon as the keg is filled the beer will commence to rise through the space x and vent-passage l to the glass section l^2. When the beer commences to rise in the glass section, the operator may shut off the supply of beer by raising the filling-tube out of the receiving vessel in the usual way. The beer exposed in the glass section will at the same time flow down into the receiving vessel to fill out the space vacated by the filling-tube. When the filling-tube has been raised to its elevated position, whereby its lower end is just above the plane of the pocket z, a bung previously placed in the said pocket is moved by means of the lever z^2 and its plunger z' to force the bung into the path of the lower end of the filling-tube, after which, as explained in the aforesaid Paige application, the bung-driving mechanism is operated to force the filling-tube downward and press the bung into the bung-hole of the receiving vessel. In this downward movement of the bung-driving mechanism its cross-head F, as before explained, presses down the rod q^3 and closes the valve q of the vent-passage.

It is not necessary that the operator shall shut off the supply of beer by raising the fill-

ing-tube as soon as he notices the beer rising in the glass section l^2, because under the equilibrium of pressure the beer may rise past the glass section to a point on a level with the beer in the tank A, when the flow will naturally stop. In this event as the filling-tube is withdrawn from the filling vessel enough beer will flow down into the vessel to fill the space vacated by the filling-tube, after which the valve q will be closed by the bung-driving mechanism, as described. As the valve q is not opened by the operator until the equilibrium of pressure has been established between the next receiving vessel and the tank A, the beer flowing from the vent-passage to the receiving vessel will be under a pressure which will prevent its foaming. In practice the pipe p' may connect with the pipe h^2 instead of with the pipe p, because both are in communication with the supply-tank and contain the same aeriform fluid-pressure. If desired, the vent-pipe l' may connect with the pipe h^2 instead of the pipe p, preferably above the level of the liquid beverage in the tank A.

As has been indicated, the automatic devices described above are not intended as limitations, but are intended to be suggestive of the general fact that these agencies are to be operated at the proper times, preferably, from one or more moved parts of the apparatus. If desired, a pressure-relief valve l^3 may be provided upon the pipe l or p or upon the tank A or one of its pipe connections. A suitable pressure-gage may also be provided. It will be obvious that aside from the automatic features for operating the valves my apparatus may be variously modified in matters of detail without departing from the spirit of my invention as defined in the claims.

As stated, the vent-pipe l' may connect with the pipe p or the pipe h^2, and in either such case it would be in open communication with the supply-tank A, whereby the air displaced by the liquid entering the filling vessel C would be so discharged as to mingle with the aeriform fluid-pressure in the tank A. Such communication may be regarded as objectionable, for the reason that the air from the receiving vessel might carry disease-germs which would infect the liquid beverage. To overcome this objection, I have shown in Fig. 1 an auxiliary or vent tank H, communicating through a pipe H′, having a check-valve H^2, with the pipe h^2. Extending to the tank H is a pipe H^3, and on the said tank or interposed in the pipe H^3 is a suitable pressure-relief valve H^4. Interposed between the pipe l' and the pipes H^3 p, I show a valve H^5, through which communication may be established between the pipe l' and either the tank A or tank H, as desired. When the valve H^5 in the drawings is turned to cause the pipe l' to communicate with the pipe H^3, air forced from the receiving vessel C through the vent-pipe l' during the filling operation will be conducted to the auxiliary tank H and escape at the relief-valve H^4. The check-valve H^2 will prevent the contaminated air from ever passing to the pipe h^2. When the tank H and relief-valve H^4 or their equivalents are provided, any connection between the vent-pipe l' and tank A, such as shown and described, may be dispensed with.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for racking carbonated beverages, the combination of a beverage-supply tank above the receiving vessel or package, a filling-head, a filling-tube movable through the filling-head into the package said filling-tube communicating with the tank, an aeriform fluid-pressure supplier communicating with the tank, a valved vent-pipe extending from the filling-head, means maintaining a counter-pressure in the vent-pipe approximating the pressure in the tank, a glass section in the vent-pipe, a separate primary discharge-supplying conduit communicating with the fluid-pressure supplier and extending to the filling-head below the glass section, and a valve in said separate primary conduit adapted to be automatically operated in advance of the movement of the filling-tube in the manner and for the purpose substantially as set forth.

2. In an apparatus for racking carbonated beverages, the combination with a beverage-supply tank at a level higher than the receiving vessel, filling-head for sealing the receiving vessel around the bung-hole, and a filling-tube, communicating with the beverage-supply tank, and movable through the filling-head into and out of the receiving vessel, of an aeriform fluid-pressure supplier communicating with the beverage-supply tank, a vent-pipe extending from the filling-head, a cut-off valve in the vent-pipe close to the filling-head, a glass section in the vent-pipe above the said valve, means maintaining a counter-pressure in the vent-pipe approximating the pressure in the beverage-supply tank, a separate primary-charge-supplying conduit communicating with the fluid-pressure supplier and extending to the filling-head below the said vent-pipe valve, a cut-off valve in the said primary-charge conduit, and means actuated from moving parts of the machine for closing the vent-pipe valve when the filling-tube is withdrawn from the receiving vessel, whereby the surplus overflow will be held in the vent-pipe and discharged into the next succeeding receiving vessel, substantially as set forth.

3. In an apparatus for racking carbonated beverages, the combination of a beverage-supply tank at a level higher than that of the receiving vessel, aeriform fluid-pressure-supplying means communicating with the said supply-tank, means for sealing the receiving vessel, a valved liquid-conduit leading from the supply-tank and adapted to be inserted into the interior of the sealed receiving vessel, bung-driving mechanism, a valved aeri-

form fluid-pressure conduit communicating with the receiving vessel and operative to supply the same with pressure equaling that in the supply-tank before the racking operation begins, a separate vent-conduit controllably connecting the upper portions of the supply-tank and receiving vessel, to maintain an equilibrium of pressure between the two during the filling operation and for discharging the surplus overflow into the next succeeding receiving vessel, a cut-off valve in the lower end portion of the vent-conduit, and means for closing the said valve actuated by movement of the bung-driving mechanism, substantially as set forth.

4. In an apparatus for racking carbonated beverages, the combination of a beverage-supply tank above the package to be filled, a filling-head, a filling-tube movable through the filling-head into the package and connected with the tank, aeriform fluid-pressure means communicating with the upper part of the tank, a primary charge-conduit communicating with the pressure means and leading into the filling-head, a valve for said conduit opened in the sealing movement of the filling-head in advance of the movement of the filling-tube, and a separate vent-conduit leading from the filling-head.

HENRY A. WHITE.

In presence of—
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D. W. LEE.