G. TRUESDELL.

BOTTLE WASHING APPARATUS.

APPLICATION FILED OCT. 15, 1908.

910,882.

Patented Jan. 26, 1909.

3 SHEETS—SHEET 1.

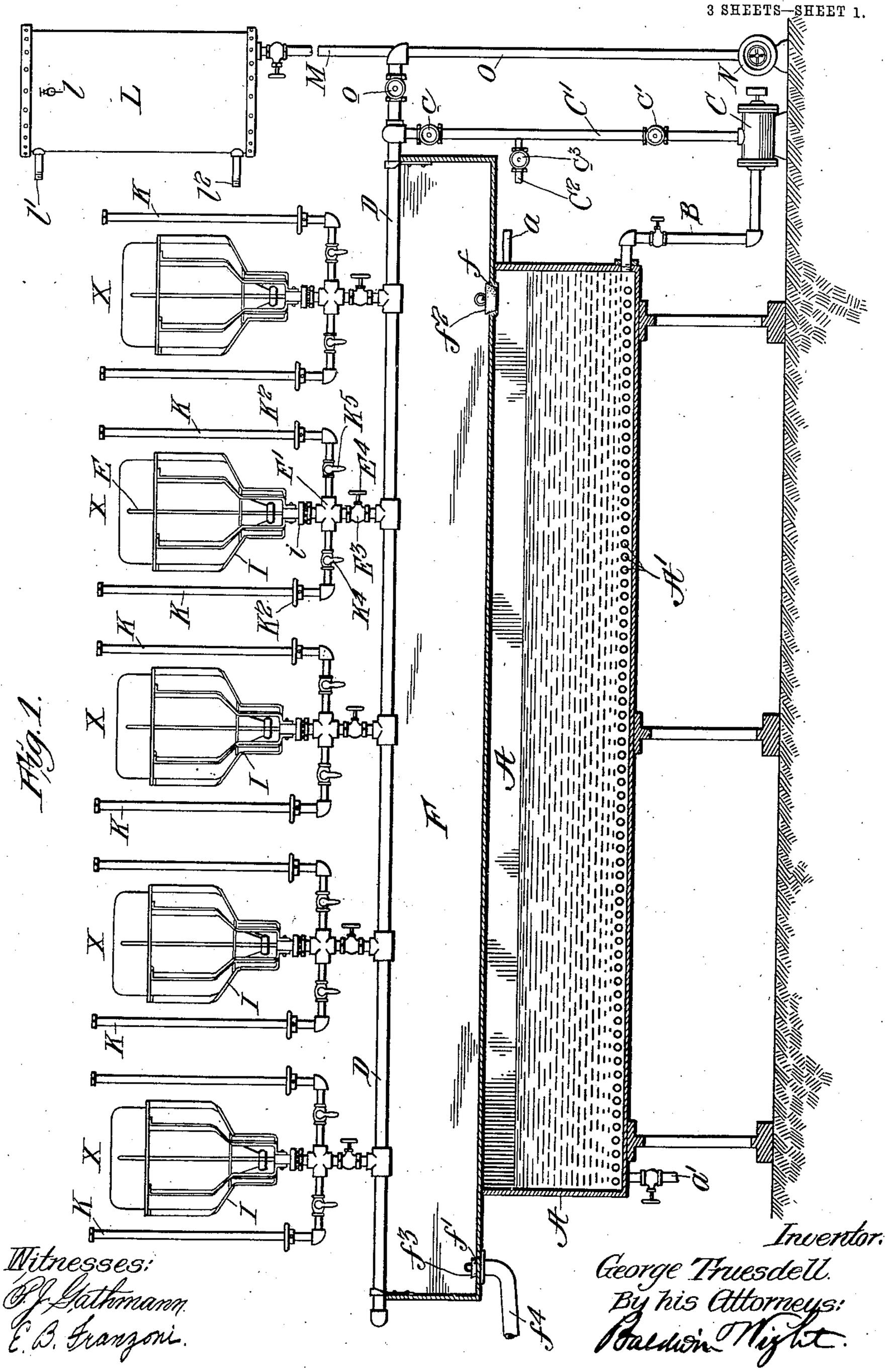

Fig. 1.

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3 SHEETS—SHEET 2.

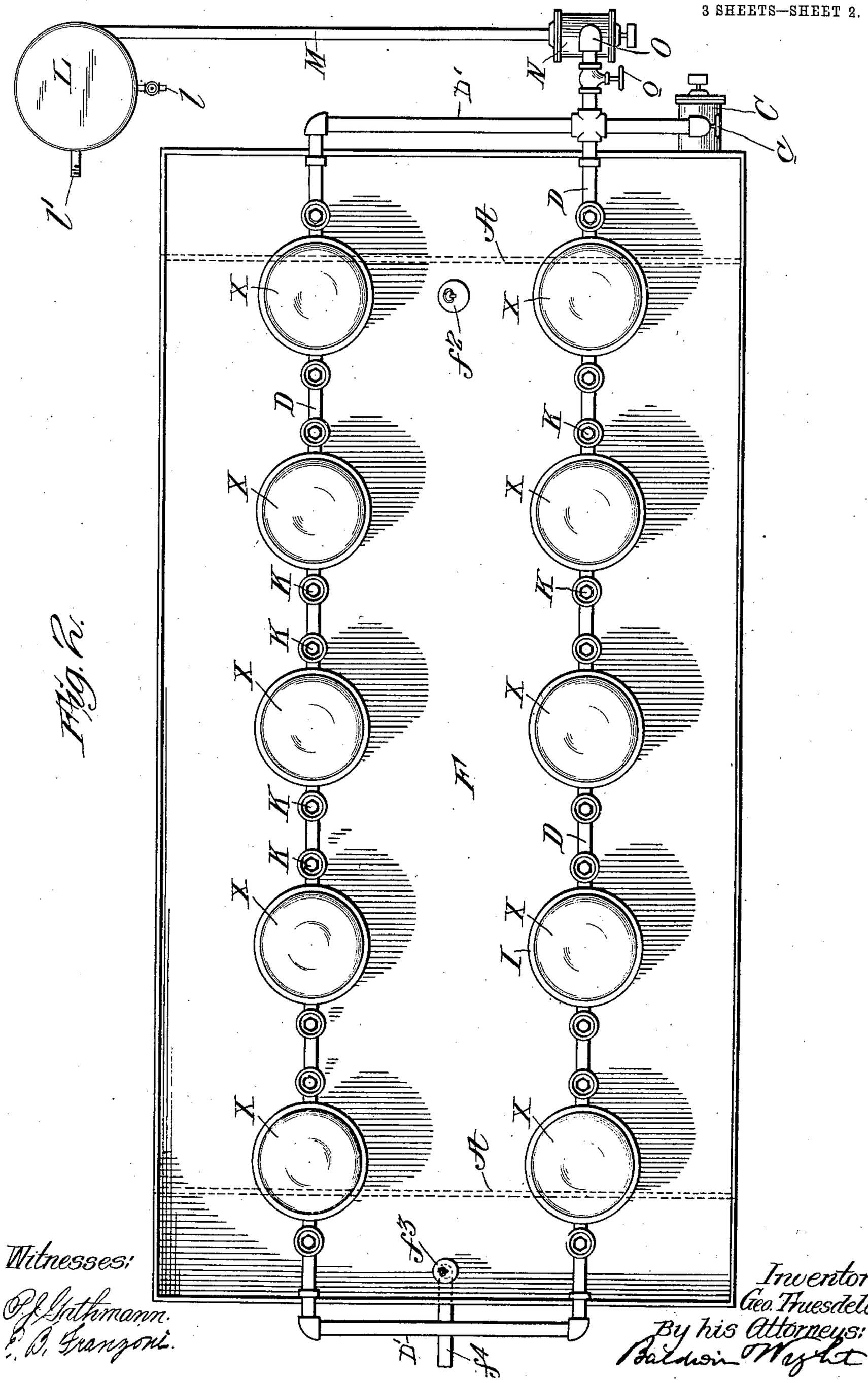

Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 4.

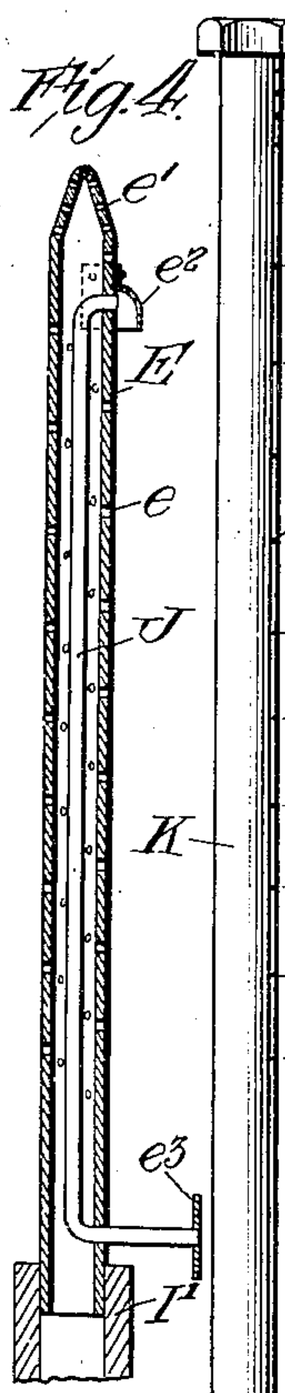

Fig. 5.

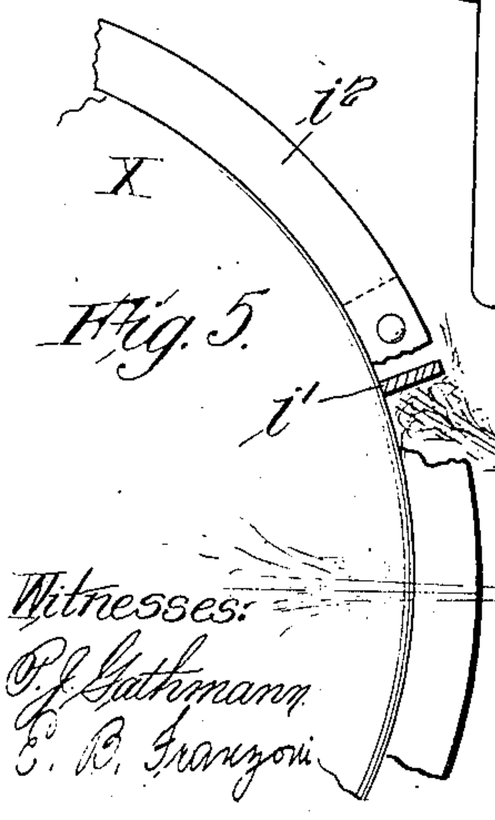

Fig. 3.

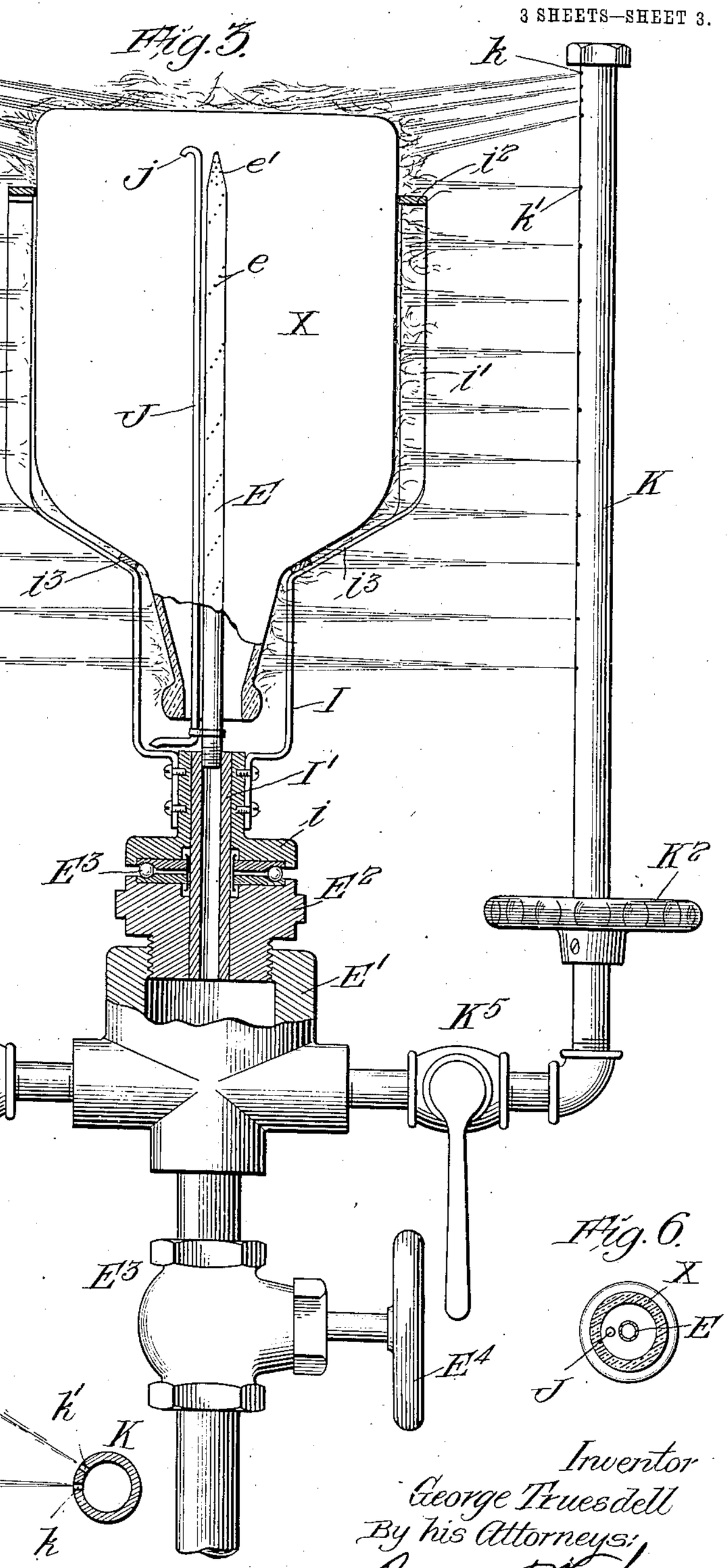

Fig. 6.

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UNITED STATES PATENT OFFICE.

GEORGE TRUESDELL, OF WASHINGTON, DISTRICT OF COLUMBIA.

BOTTLE-WASHING APPARATUS.

No. 910,882. Specification of Letters Patent. Patented Jan. 26, 1909.

Application filed October 15, 1908. Serial No. 457,877.

To all whom it may concern:

Be it known that I, GEORGE TRUESDELL, a citizen of the United States, residing in Washington, in the District of Columbia, have invented certain new and useful Improvements in Bottle-Washing Apparatus, of which the following is a specification.

The primary object of my invention is to provide simple and efficient apparatus for thoroughly cleaning and sterilizing bottles of large size, such as demijohns of the kind commonly used for packing drinking water and the like. My improvements may, however, be embodied in apparatus for cleaning and sterilizing bottles of small sizes and other vessels of various kinds.

As it is important that all parts of the bottles should be thoroughly cleaned and sterilized before being filled and sealed, I provide means whereby both the inside and the outside thereof are first scoured or washed with a suitable hot solution of soda, or the like, and then thoroughly rinsed by pure hot water while the bottles are inverted so that when the washing operation is completed, the bottles will be filled with warm air, in which condition they are ready after being allowed to cool to some extent to receive the drinking water or other liquid with which they are packed.

My improvements are hereinafter described and they are illustrated in the accompanying drawings in which—

Figure 1 is a view partly in elevation and partly in vertical section of an apparatus for washing bottles constructed in accordance with my invention. Fig. 2 is a top plan view thereof. Fig. 3 is a view on an enlarged scale partly in section and partly in elevation of one set of the washing devices. Fig. 4 is a detail view in vertical section of a modified way of introducing air into the bottles while being cleaned. Fig. 5 is a detail view in plan and partly in section showing the manner in which the scouring or rinsing liquid is directed against the outside of the bottle and against its supporting frame. Fig. 6 is a detail view in horizontal section through the neck of the bottle and through the liquid-spraying tube and the air inlet tube when arranged as indicated in Fig. 3.

I preferably arrange to simultaneously scour or rinse a number of bottles at the same time, and I therefore provide a tank A for a suitable scouring solution (such as a solution of soda) which may be filled by a supply pipe *a* and which is connected by a pipe B with a pump C. I preferably employ two supply pipes D connected as shown in Fig. 2 by short lengths of pipes D′ and these pipes D are connected with the pump C, by a pipe C′. From the pipes D project upwardly two series of spraying tubes E hereinafter more particularly referred to. The liquid in the tank A may be heated to the desired temperature by steam pipes A′, and when desired the tank may be emptied through a discharge pipe *a*′.

Beneath the pipes D is a tray F which receives the waste liquid, and this tray is provided with two discharge openings *f*, *f*′, which may be closed by plugs or valves f^2, f^3. The opening *f* is arranged directly over the tank A and when the plug f^2 is removed and the opening *f*′ closed, the water received by the tray will pass into the tank, but when the opening *f* is closed and the opening *f*′ is opened, the liquid flows from the tray through a discharge pipe f^4 and is not reused. Each spraying tube E is connected by suitable couplings to the pipe D. The coupling E′ is provided with a support E^2 for the base *i* of the bottle-supporting frame I. Between the base *i* and the support E^2, a ball-bearing E^3 is arranged in order to provide for the easy rotation of the bottle-supporting frame. Each bottle-supporting frame I comprises the base *i*, before referred to, side bars, *i*′, a top ring i^2 connecting the side bars at their upper ends and a ring i^3 connecting the lower portions of the side bars. The skeleton frame thus constructed is shaped to closely fit the bottle, the lower portions of the side bars being inclined, as shown, in such manner as to hold the lower end or mouth of the inverted bottle above the base piece of the frame in order to permit the waste liquid to freely discharge from the bottle.

Each spraying tube E is much smaller in diameter than the neck of the bottle so as to leave a clear space for the discharge of water therefrom, and each tube E extends nearly to the bottom of the inverted bottle, as clearly indicated in Fig. 3. The tube *e* is provided with perforations *e* which are preferably arranged spirally about the tube, as indicated, in order that the desired number of openings may be used without weakening the tube, and through these perforations the cleansing liquid is sprayed forcibly against the interior of the bottle so as to cleanse the same not only by the washing action of the

liquid, but also by the force of the liquid which strikes the surface of the bottle under considerable pressure. Preferably the upper end of each tube is tapered, as indicated, and provided with perforations *e'* for directing the spray against the bottom and the sides contiguous to the bottom of the bottle. After the liquid is sprayed into the bottle it descends to the bottle neck and is discharged through the mouth thereof.

As a vacuum tends to form in the bottle, the atmospheric pressure tends to retard the discharge of the liquid. In order to prevent this I provide means for admitting air to the bottle above its neck and for this purpose I employ an air inlet tube J which may be arranged in the manner indicated in Fig. 3, or as shown in Fig. 4. In Fig. 3, the tube J, which is of quite small diameter, as shown in Fig. 6, is supported on the lower end of the tube E and extends upwardly therefrom parallel with said tube, and, as shown, it terminates close to the upper end of the tube, the upper end of the air inlet tube being preferably turned over, as indicated at *j*, in order that the cleansing liquids may not enter it. When a stationary air inlet tube, arranged as indicated in Figs. 3 and 6, is employed, it serves to retard the rotation of liquid in the neck of the bottle should there be such a tendency.

I have found that where no air inlet tube is employed and when the bottle is rotated very rapidly, the liquid which accumulates in the neck of the bottle is rotated at high speed and rises up along the sides of the bottle, and it is in order to prevent this accumulation of the liquid and to retard its rotation that the air inlet tube is employed. It may be said, however, that when the speed of rotation is properly regulated and air is introduced in any way above the neck of the bottle, the liquid is discharged without any objectionable accumulation of the liquid above the bottle neck and it is not essential that any means should be provided for retarding the rotation of the liquid. In Fig. 4 I have shown how the air inlet tube J may be arranged inside the spraying tube E. This construction has some advantages. In either case the spraying tube and the air inlet tube may be conveniently detached from their support and replaced by others should they become unfit for use by reason of rust or other impairment. In Fig. 4 e^2 indicates a shield or hood for the outlet of the air tube and e^3 is a collar on the inlet end of this tube. Practice has demonstrated that these devices prevent the water from interfering with the free passage of air through the tube.

On opposite sides of each bottle-supporting frame are arranged vertical spraying pipes K, each connected with the supply pipe D through the coupling E' and the connections E^3. Each spraying tube K extends vertically by the side of the bottle-supporting frame and is provided at its upper end with perforations *k* arranged radially with reference to the axis of the bottle and which direct the liquid upon the bottom of the inverted bottle X and upon the sides of the bottle contiguous thereto. Each tube K is also provided with a vertical series of perforations *k'* arranged tangentially with reference to the bottle, which direct the liquid against the sides of the bottle and against the side bars of the bottle-supporting frame, in the manner most clearly indicated in Fig. 5.

A single spraying tube K may be employed in connection with each bottle-supporting frame to cause the rotation of the frame and bottle and the cleaning of the outside of the bottle, but I prefer to use two spraying tubes K in connection with each bottle-supporting frame in order to more thoroughly and quickly clean the bottle and to insure rapid rotation thereof. Each tube K is provided with a hand wheel K^2 by means of which it may be turned about its longitudinal axis in order to adjust the angle at which the liquid is sprayed upon the bottle and its supporting frame. In this way the spraying tube on one side of the bottle may be employed to cause its rotation, while the tube on the opposite side thereof may be so arranged as to direct the liquid radially against the bottle, or in a direction opposed to that from the other spraying tube so as to impede the rotation of the bottle and its frame. By proper adjustment one of the tubes may thus be used as a brake and the speed of rotation may be very quickly and nicely adjusted, it being understood that if the bottle rotates too rapidly the discharge therefrom will be impeded, the centrifugal force tending to rotate the liquid at high speed and cause it to rise along the sides of the bottle. By means of suitable valves K^4, K^5, either of the tubes may be thrown into and out of operation and by means of a valve E^4 both tubes K and the spraying tube E may be disconnected from the supply pipe. After the bottles have been thoroughly scoured, the pump C may be stopped or thrown out of operation and the valve *c* closed. In order to rinse the bottles thus scoured, I employ perfectly pure hot sterile water which is made to pass through the spraying tubes, before mentioned, and operate in the manner before explained. The rinsing water may be conveyed to a tank L by a pipe *l* and may be heated by steam entering at *l'* and departing at l^2. The tank L is connected by a pipe M with a pump N in turn connected by a pipe O with the horizontal supply pipe D. A valve *o* may be employed for connecting the pipe O with the pipe D, or for disconnecting it therefrom. Suitable valves may be used in other parts of the pipes wherever it is found necessary.

Before commencing to rinse the bottles, the opening *f* is closed by the stopper f^2 while the stopper f^3 is removed from the opening *f'*. The pump N being now thrown into operation and the valves being properly set, the rinsing water passes to the pipe or pipes D and through the spraying apparatus and operates in the same manner as that described in connection with the use of the scouring liquid. After being rinsed and thoroughly sterilized, the bottles may be removed from their frames and a new set of bottles to be cleaned inserted in the frames. The cleaned and sterilized bottles are maintained in their inverted positions while filled with warm sterile air until they are cooled sufficiently to receive the liquid with which they are to be packed.

By my improved spraying devices the bottles are not only thoroughly cleaned, but there is little danger of their breakage because the liquids are sprayed to all parts of the bottles simultaneously and there is therefore no unequal expansion which often causes breakage in other forms of apparatus.

I have shown an apparatus adapted to simultaneously wash ten bottles, but it should be understood that my invention may be embodied in an apparatus designed to wash any desired number of bottles either simultaneously or successively. I may also use steam to aid in cleaning and sterilizing the bottles.

At C^2 I have indicated a steam inlet pipe provided with a suitable valve c^3 and communicating with the pipe C', and the pipe C' also contains a valve *c'*. The pipe C^2 communicates with the pipe C' between the valves *c*, and *c'*. After the bottles have been washed by the rinsing liquid, the valves *o* and *c'* may be closed and the valves c^3 and *c* opened. Steam may in this way be admitted to the pipe D and through the spraying tube to the bottles. The temperatures of the scouring and sterilizing fluids may be regulated as desired. Preferably the scouring liquid is first introduced into the bottle at a moderate temperature and this temperature is gradually increased. The rinsing liquid is introduced at quite a high temperature and the steam may be introduced at a much greater temperature.

Some features of my invention are novel apart from other features thereof and may be embodied in apparatus differing in organization and details of construction from that hereinbefore described. For instance, the bottle may be mounted to rotate in any suitable way and cleaned on the inside by any suitable devices, while a single vertical spraying tube is used to act on the outside of the bottle to clean and rotate it, said outside tube being adjustable about its vertical axis so that it may be set to direct the spray or jets in any desired direction to cause the bottle to rotate rapidly or more slowly. I have found that where the bottle is rotated rapidly in one direction and the cleaning liquid accumulates in the neck thereof and rotates rapidly therewith so as to impede the discharge, this may be readily corrected by turning the tube so as to direct the spray in the opposite direction, *i. e.*, so as to impede the rotation of the bottle, and, if desired, causing it to rotate in the opposite direction, thus reducing its speed, stopping the rotation of the liquid with the bottle and causing it to leave the bottle properly. It will thus be seen that by properly adjusting one of the outside spraying tubes the speed or direction of rotation of the bottle may be controlled and in this way the rate of discharge is also controlled.

I claim:—

1. Bottle washing apparatus comprising a rotatable bottle-supporting frame having vertically arranged side bars, a spraying tube adapted to extend into the bottle, a perforated tube adapted to spray a liquid upon the outside of the bottle and upon the side bars of the frame and means for supporting the bottle-supporting frame and the spraying tubes.

2. Bottle washing apparatus comprising a rotatable bottle-supporting frame having vertical side bars adapted to bear upon the side of the bottle and to act as propeller blades for the frame, a stationary perforated tube adapted to extend through the neck of an inverted bottle and up into the body portion thereof and to spray a cleaning fluid against the sides of the bottle and against the bottom thereof, a perforated tube adapted to spray a liquid against the bottom and sides of the outside of the bottle and to cause the rotation thereof and means for supporting the bottle-supporting frame and the spraying tubes.

3. Bottle washing apparatus comprising a rotatable bottle-supporting frame, a spraying tube for the interior of the bottle a spraying tube for the outside thereof having perforations arranged tangentially and other perforations arranged radially with reference to the axis of the bottle, for the purpose specified and means for supporting the bottle-supporting frame and the spraying tubes.

4. Bottle washing apparatus comprising a rotatable frame for supporting an inverted bottle, a spraying tube for the interior of the bottle, a tube for conveying air into the bottle means for rotating the bottle-supporting frame and means for supporting the bottle-supporting frame and the spraying and air-conveying tubes.

5. Bottle washing apparatus comprising a bottle-supporting frame, a stationary support therefor, a ball-bearing interposed between said support and the bottle-supporting frame, a spraying tube arranged centrally

within the bottle-supporting frame, and vertical perforated tubes on opposite sides of the frame adjustable about their longitudinal axes and which direct a cleansing liquid in a spray against the bottle and its frame and causes them to rotate at the desired speed.

6. Bottle washing apparatus comprising a tank for containing a scouring liquid, a tray above the tank having a communication therewith, means for closing this communication, another outlet for the tray, means for closing it, bottle spraying devices, means for drawing liquid from the tank and forcing it through the spraying devices, and means for conveying a rinsing liquid to the spraying devices after the supply of the scouring liquid has been cut off.

7. Bottle washing apparatus comprising a rotatable bottle-supporting frame, means for washing the inside of the bottle, a vertical perforated tube for directing jets of liquid against the bottle and having means for turning it about its vertical axis to vary or reverse the direction of the jets and thus vary the speed or rotation or change the direction thereof and means for supporting the bottle-supporting frame and said tube.

8. Bottle washing apparatus comprising a rotatable bottle-supporting frame, a spraying tube for the inside of the bottle, means for praying the outside thereof, an air inlet tube for the interior of the bottle, means for preventing the cleaning liquid from interfering with the discharge of air through the outlet of said air inlet tube and means for supporting the bottle-supporting frame and said tubes.

9. Bottle washing apparatus comprising a rotatable bottle-supporting frame, a spraying tube for the inside of the bottle, means for spraying the outside of the bottle, an air inlet tube for the inside of the bottle, means for preventing the cleaning liquid from interfering with the passage of air through the inlet end of the air inlet tube and means for supporting the bottle-supporting frame and said tubes.

10. Bottle washing apparatus comprising a rotatable bottle-supporting frame, a spraying tube for the inside of the bottle, means for spraying the outside of the bottle, an air inlet tube for the interior of the bottle, a hood inclosing the outlet end of the air inlet tube, a collar on the inlet end of said air inlet tube, for the purpose specified and means for supporting the bottle-supporting frame and said tubes.

In testimony whereof, I have hereunto subscribed my name.

GEORGE TRUESDELL.

Witnesses:
EFFIE L. TEULY,
EDGAR P. STERICK.