(No Model.) 3 Sheets—Sheet 1.

G. D. RHINEHART.

APPARATUS FOR CARBONATING LIQUIDS.

No. 589,371. **Patented Aug. 31, 1897.**

Fig. 1.

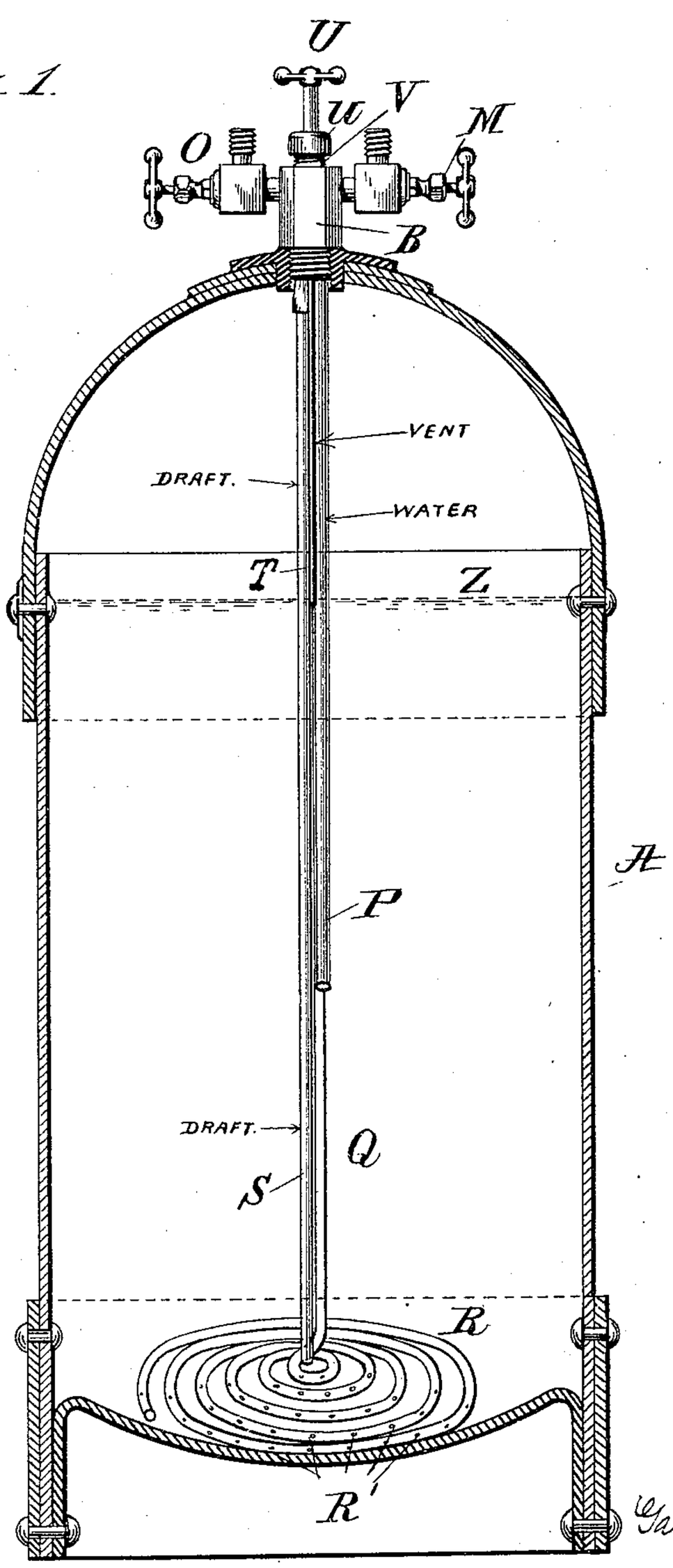

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Fig. 2.

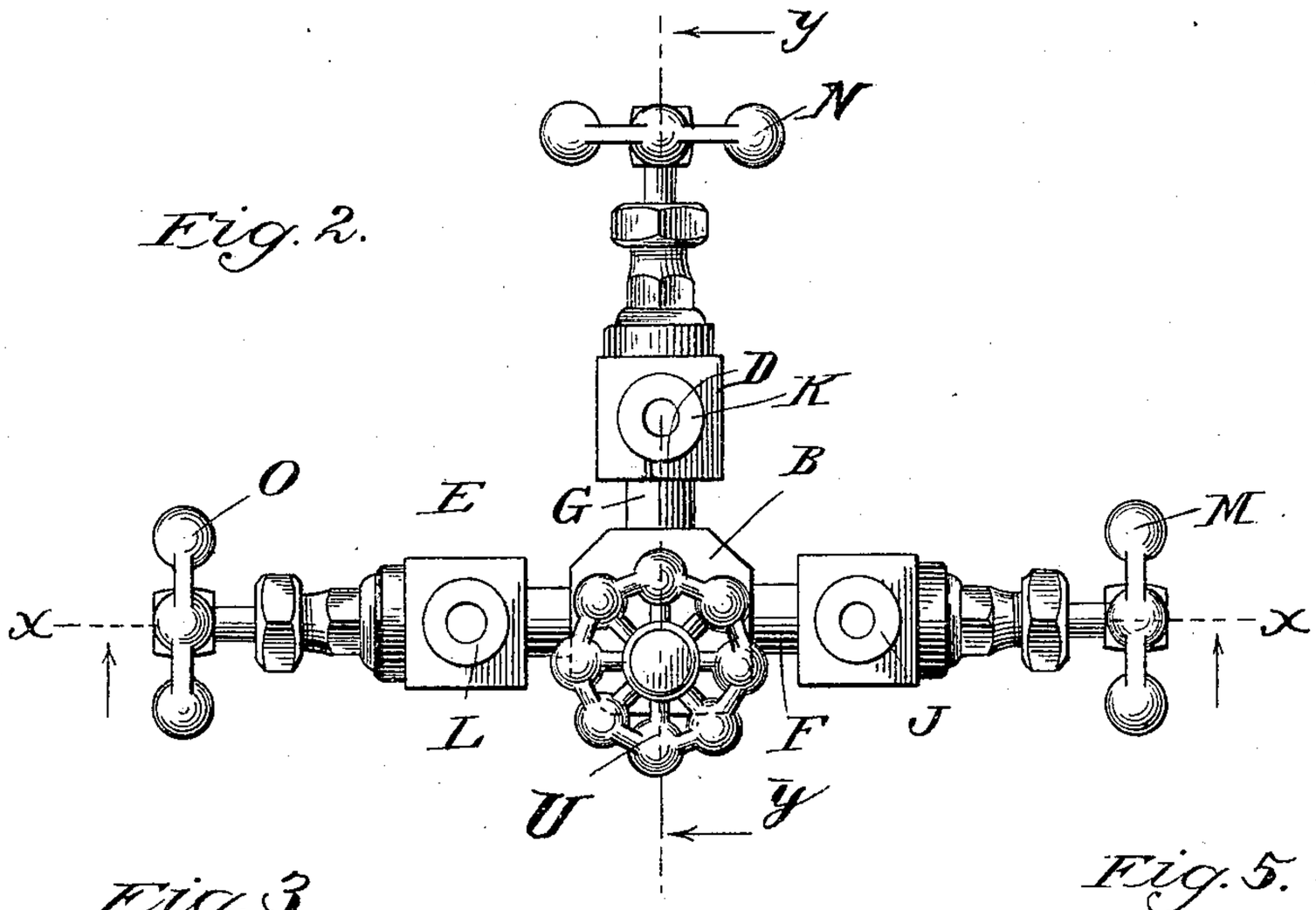


Fig. 3

Fig. 5.

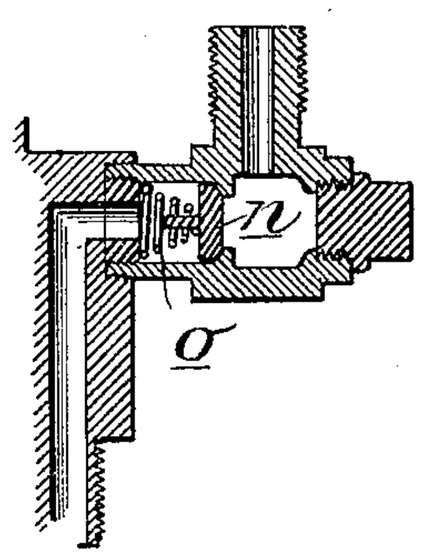


Fig. 4.

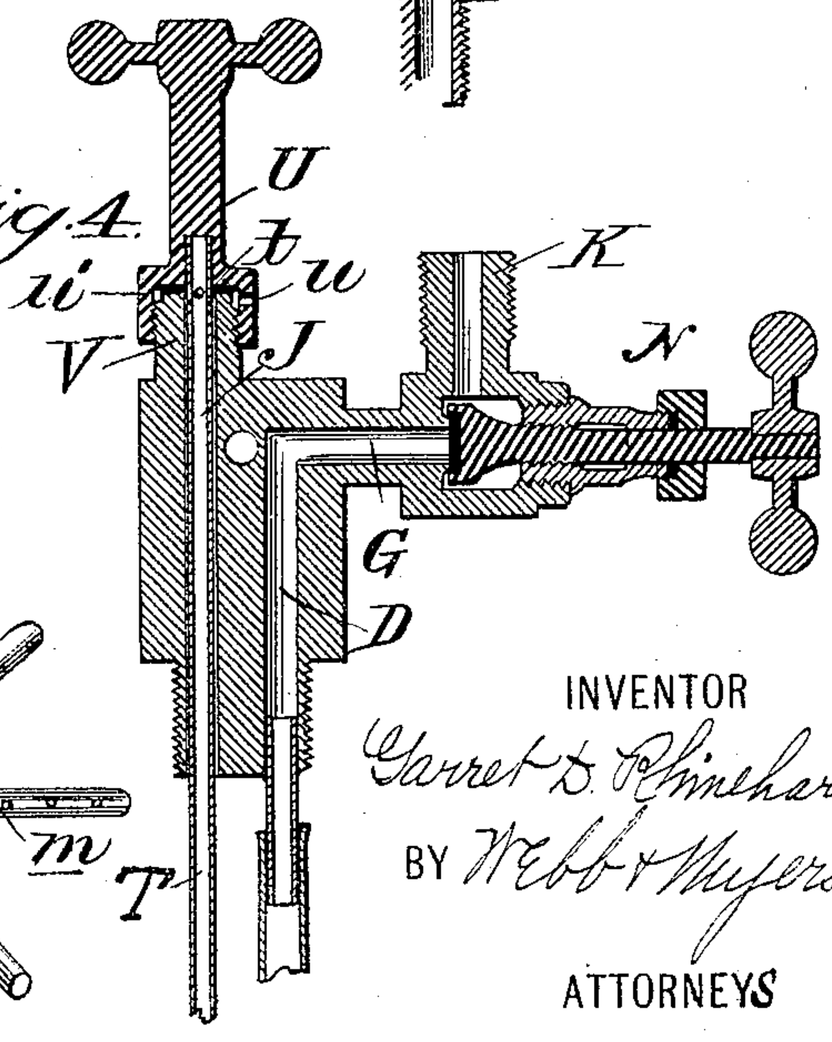
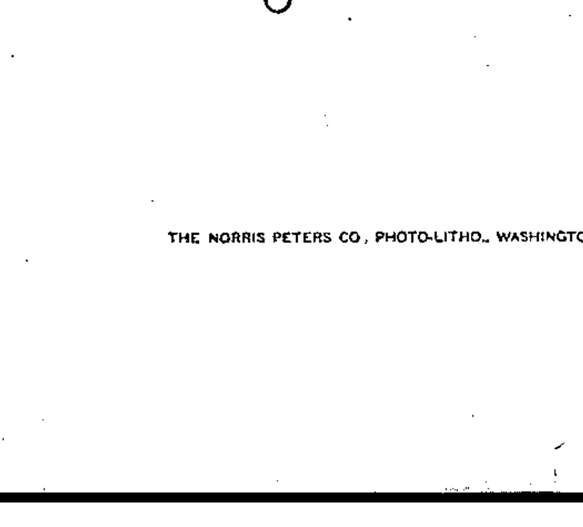


Fig. 6



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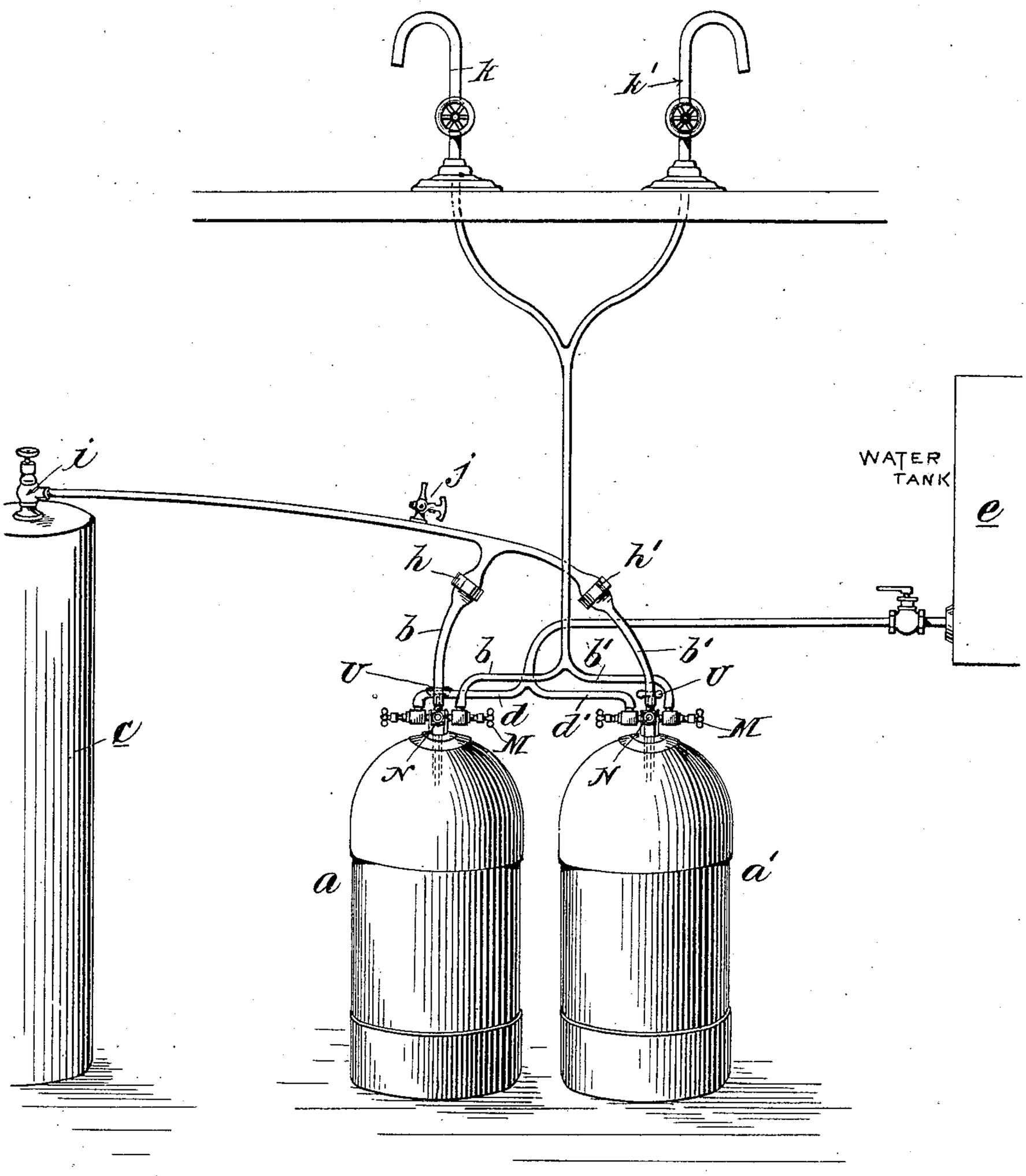
APPARATUS FOR CARBONATING LIQUIDS.

No. 589,371. Patented Aug. 31, 1897.

Fig. 4



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UNITED STATES PATENT OFFICE.

GARRET D. RHINEHART, OF NEW YORK, N. Y.

APPARATUS FOR CARBONATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 589,371, dated August 31, 1897.

Application filed June 22, 1896. Serial No. 596,380. (No model.)

To all whom it may concern:

Be it known that I, GARRET D. RHINEHART, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a new and Improved Apparatus for Carbonating Liquids, of which the following is a specification.

This invention relates to certain new and useful improvements in means for carbonating water; and it consists, substantially, in such features thereof as will hereinafter be more particularly described.

Prior to my invention the carbonated waters were delivered to retailers, who dispensed the same in tanks known in the trade as "fountains." These fountains, because of the enormous pressure exerted by the highly-charged water and the constant handling to which they are subjected in transportation, must be of very strong construction. They are usually made of iron or steel lined with sheet block-tin, the joints of the iron or steel shell being both sweated and strongly riveted together. To provide for convenience in handling by the manufacturer of the carbonated water and the retailer or dispenser, and also for convenience in transportation from place to place, these fountains are usually limited to a capacity of ten gallons, as a vessel of the necessary construction of larger capacity would be too large and heavy to handle. In dispensing soda and mineral waters, the fountains containing the carbonated water are connected with the draft apparatus, and when the carbonated water in the connected fountain is exhausted it must be disconnected, replaced by a full fountain, and the empty fountain returned to the manufacturer to be refilled and charged. This necessitates constant handling of the fountains every day and is a considerable item of cost to both the manufacturer and the retailer. In addition to these objections to the present system of making and dispensing carbonated water a further objection is that the retailer frequently receives a fountain which is only partially full and frequently finds a considerable variation in the quality of the water from different fountains—that is to say, the contents or one fountain will be more highly charged than another, and occasionally the water drawn from a fountain will be very flat. A further objection is the price which the retailer has to pay for the carbonated water, which of course is largely governed by the cost to the manufacturer of the fountains and the cost of transportation and handling.

It is the object of my invention to obviate all these objections and enable the retailer to manufacture the carbonated water on his premises, and to manufacture it continuously by means of substantially fixed or stationary apparatus, whereby the cost of the supply-fountains is dispensed with and the retailer is enabled to produce a better article of carbonated water at a very much lower cost.

Referring to the accompanying drawings, illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a sectional view of a soda-fountain provided with means for carrying out my invention. Fig. 2 is a plan view of the three-way bung shown in Fig. 1. Fig. 3 is a vertical section thereof, taken on the line $x\,x$, Fig. 2. Fig. 4 is a similar view taken on the line $y\,y$, Fig. 2. Fig. 5 is a section of an automatic valve which may be used in connection with my invention. Fig. 6 is a view of a modified form of carbonator, and Fig. 7 is a view of the complete apparatus ready for use.

Referring to Figs. 1 to 6, A is a soda-fountain of the usual construction and provided with a metal bung B, adapted to be screwed into the top of the fountain. The bung B is provided with four channels, three of which, C, D, and E, run vertically to near the top of the bung B, and then horizontally to three sides of the bung, as shown particularly in Figs. 3 and 4. The bung B is provided at these three sides with the extensions F, G, and H, which are centrally bored and respectively form continuations of the passages C, D, and E. The fourth channel I extends vertically through the bung to the top thereof, as shown in Fig. 4, for a purpose hereinafter described. The extensions F, G, and H are provided with the nipples J, K, and L, which are also bored and also form continuations of the passages C, D, and E, and are suitably screw-threaded at the top to connect with the piping, hereinafter described. The passages or channels C, D, and E are provided with the valves M, N, and O to control

the quantity of gas or liquid passing through the same. These passages are connected at the bottom of the bung B to pipes extending into the fountain A, and these pipes and their purposes I will now proceed to describe.

The water-pipe P is connected with the passage C and extends downwardly for about two-thirds the depth of the fountain. In use the pipe leading from the supply-tank is connected with the extension J and the valve M opened, when the water will flow through passage C and pipe P into the fountain. The water should be allowed to enter until it reaches the height shown at Z, Fig. 1, and when the fountain has been filled to this extent the fact will be automatically indicated to the operator, in a manner hereinafter described.

I have found in practice that if the gas is introduced in the form of fine jets at the bottom of a tank or fountain of water the water will take up the gas and become thoroughly carbonated in a very short period of time, and in the drawings I have shown means for accomplishing this result. One device for this purpose consists of a coil of metal R, having a series of perforations R′, attached to or forming part of the tube Q, which leads to the channel D of the bung. In use the pipe leading from the gas-cylinder is connected with the nipple K, and the gas is then turned on, passing through the channel D and the tube Q to the coil R, whence it is projected in fine jets into the body of the water. The gas-cylinders used in the manufacture of carbonated waters are charged with carbonic-acid gas at a very high pressure, and the gas is forced out of the coil R with considerable force, and, being distributed in the form of fine jets, causes a thorough agitation of the water, which takes up and becomes thoroughly impregnated with the gas. The length of time consumed in carbonating the water by this method is very much less than by the methods commonly employed. I have found in practice that a fountain containing the usual quantity of water can be thoroughly carbonated in less than six minutes.

The passage E is connected at the bottom of the bung B with the draft-pipe S, the exit of the charged water being controlled by the valve O.

The vertical passage I of the bung B, hereinbefore referred to, is designed to receive the tube T, which extends a short distance into the fountain, as shown in Fig. 1. The tube is fixedly secured to a valve U, which screws upon the nipple V. The tube T is provided near its top with a vent *t*, and the valve U is provided with a vent *u*. When the fountain is to be filled, the valve U is unscrewed a short distance and the water admitted. The air contained in the fountain being displaced by the water entering it passes up through the tube T, through the vent *t* in said tube, and the vent *u* in the valve to the outer air. This continues until the water reaches the bottom of the tube T and forms a water seal therefor, when the air, having no outlet, will be compressed by the incoming water and will force a portion up through the vent of the valve U. When this occurs, it will indicate to the operator that the fountain has been filled to the desired extent. The valve M is then closed, cutting off the supply of water, and the valve U is screwed down until the valve-seat *u′* is forced against the top of the nipple V and the vent closed. The gas is then admitted and the water carbonated, as before described. When it is desired to make mixed beverages with my apparatus, the valve U is wholly unscrewed from the nipple V and the valve and tube T removed from the fountain, when the syrup or other mixture may be poured into the same through the channel I.

In Fig. 7 of the drawings I have shown my apparatus connected to form a complete plant capable of making and dispensing carbonated waters. With this plant, which I will now proceed to describe in detail, the retailer can make the carbonated water as rapidly as may be necessary to meet the requirements of his trade.

Referring to Fig. 7, *a a′* are two fountains having suitable pipe connections *b b′* to the gas-cylinder *c* and connections *d d′* to the water-tank *e*, and also connections *f f′* to the draft apparatus *g g′*. The pipes *b b′* are preferably provided with the check-valves *h h′*. In case there should be any leak in the valve *i*, controlling the gas in the cylinder *c*, the check-valves will prevent the water from passing up through the gas-pipe and blowing out through the leak. The gas-pipe is also provided with the petcock *j*, which is kept open after the fountains are charged with gas to allow any gas remaining or leaking into the pipes to escape without straining or bursting the pipe.

The operation of this plant is as follows: Assuming that both fountains are empty and that all the valves are closed, the water-valve M is first opened in one of the fountains—for instance *a*—together with the vent-valve U, and the water is allowed to enter the fountain until it blows out of the vent-valve. The water-valve M and the vent-valve U are then closed. The valve *i* of the gas-cylinder is opened, and also the gas-valve N of the fountain, when the gas will flow through the pipe *b* into the passage D of the bung, thence through the tube Q and the coil R into the fountain, carbonating the water contained therein, as hereinbefore described. The gas may be allowed to flow continuously into the fountain, or by manipulation of the valve *i* of the gas-cylinder or the valve N of the fountain it may be caused to flow in a series of shocks. After the carbonating operation has been carried on for about five minutes the valves *i* and N are closed and the petcock *j* opened. The water in the fountain thus charged is then ready for use, and

the draft-valve O is turned on, after which the water may be drawn from the dispensing-faucets *g* and *g'*. After the fountain A has been properly charged and while it is in use the second fountain *a'* is filled and charged in the same manner. When the fountain *a* is exhausted, its draft-valve O is turned off and the draft-valve of the second fountain *a'* is turned on and the fountain *a* again filled and charged. By this alternate charging of the fountains a practically-continuous supply of water is obtained, so that the retailer is always prepared for any demand. By this system the retailer can save in the neighborhood of seventy-five per-cent. in the cost of the carbonated water, in addition to which he is enabled to have not only a continuous supply, as stated, but there is practically no variation in the quality of the water.

In a plant of the character just described the tanks or fountains may be of any desired size or capacity, as they are stationary and do not have to be handled. Moreover, when the apparatus is once in place there is no necessity for disconnecting any of the pipes, with the exception of the single connection to the gas-cylinder.

In Fig. 6 I have shown a modified form of carbonator, consisting of the hollow central portion *l*, provided with the radial arms *m*, each of which has a series of apertures.

Instead of using hand-controlled valves for the gas-inlet I may employ an automatic valve for this purpose, and in Fig. 5 I have shown a form of valve suitable for this purpose. In this figure *n* is the valve, held normally in its seat by the spring *o*. The pressure of the gas will open the valve and keep it open until the pressure within the tank or fountain is equal to the pressure in the gas-supply pipe, when the spring *o* will operate to close the valve.

Many modifications may be made of the apparatus herein shown and described. For instance, instead of placing the valves controlling the water, gas, and draft in the bung itself I may locate these valves in the pipes leading to the bung.

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

1. In a fountain or tank for carbonated water, a bung provided with a channel for the gas, a channel for the water, and a channel for the exit of the charged water, valves controlling the three channels, in combination with an automatic vent adapted to be operated by a suitable valve, substantially as described.

2. In apparatus for carbonating water, the combination with a fountain or tank, of a bung or casing provided with a channel for the gas, a channel for the water, and a channel for the exit of the charged water, a controlling-valve for each of said channels, a pipe connected with the gas-channel and extending into the tank, pipes connecting with the water and exit channels and also extending into the tank, and means connecting with the gas-pipe for discharging the gas into the water in the form of jets, substantially as described.

3. In apparatus for carbonating water, the combination with a fountain or tank, of a bung or casing provided with a channel for the gas, a channel for the water, a channel for the exit of the charged water, and a vent-channel, a controlling-valve for each of said channels, a pipe connecting with the said gas-channel and extending into the tank, pipes connecting with the water, the exit, and vent channels, and also extending into the tank, and means connecting with the gas-pipe for discharging the gas into the water in the form of jets, substantially as described.

4. In apparatus for carbonating water, the combination with a fountain or tank, of a bung or casing provided with four channels three of which run vertically to near the top of the bung, and thence horizontally to three sides of the bung, and the fourth channel running through the bung at the top, extensions at the three sides of the bung forming continuations of the said three channels, and each extension having a nipple for a pipe connection, a valve controlling each of said channels, a water-pipe, a gas-pipe, and an exit and a vent pipe, and means connecting with the gas-pipe for discharging the gas into the water in the form of jets, substantially as described.

5. In apparatus for carbonating water, the combination with a fountain or tank, of a bung or casing provided with a channel for the gas, a channel for the water, and a channel for the exit of the charged water, a valve controlling each of said channels, a pipe connecting with the gas-channel and extending into the tank, pipes connecting with the water and exit channels, and also extending into the tank, and a coil connecting with the gas-pipe and having a series of perforations, substantially as described.

6. In apparatus for carbonating water, the combination with a fountain or tank, of a bung or casing provided with a channel for the gas, a channel for the water, a channel for the exit of the charged water, and a vent-channel, a valve controlling each of said channels, a pipe connecting with the gas-channel and extending into the tank, pipes connecting with the water, the exit, and the vent channels, and also extending into the tank, and a coil connected to the gas-pipe and having a series of perforations substantially as described.

7. A plant or apparatus for the manufacture of carbonated water, comprising a draft apparatus, a gas and a water supply, two tanks or fountains, a bung or casing fitting in each tank and each provided with a channel for the gas, a channel for the water, a channel for the exit of the charged water, and a vent-channel, a valve controlling each of said channels, pipes or tubes leading from said

channels into the tank, means connecting with the gas-pipe for discharging the gas into the water in the form of jets, pipe connections between the tanks and the gas and water supplies, and similar connections between said tanks and the draft apparatus, substantially as described.

8. A fountain or tank for carbonated water having a bung provided with a channel for the gas, a tube leading from said channel to the bottom of the fountain, and being provided with a coil having a series of perforations; a channel in said bung for the admission of water, having a tube leading into the fountain; a draft-channel in said bung; a tube from said channel to the bottom of the fountain; a vent-channel in said bung having located therein a tube having a vent to the air, whereby when the water reaches the bottom of the tube, a portion thereof will be forced out of the fountain, all combined and adapted to operate in the manner and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 4th day of June, 1896.

GARRET D. RHINEHART.

Witnesses:

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