

O. KROPFF.

Improvement in Apparatus for the Manufacture and
Bottling of Aerated Waters.

No. 128,494.

Patented July 2, 1872.

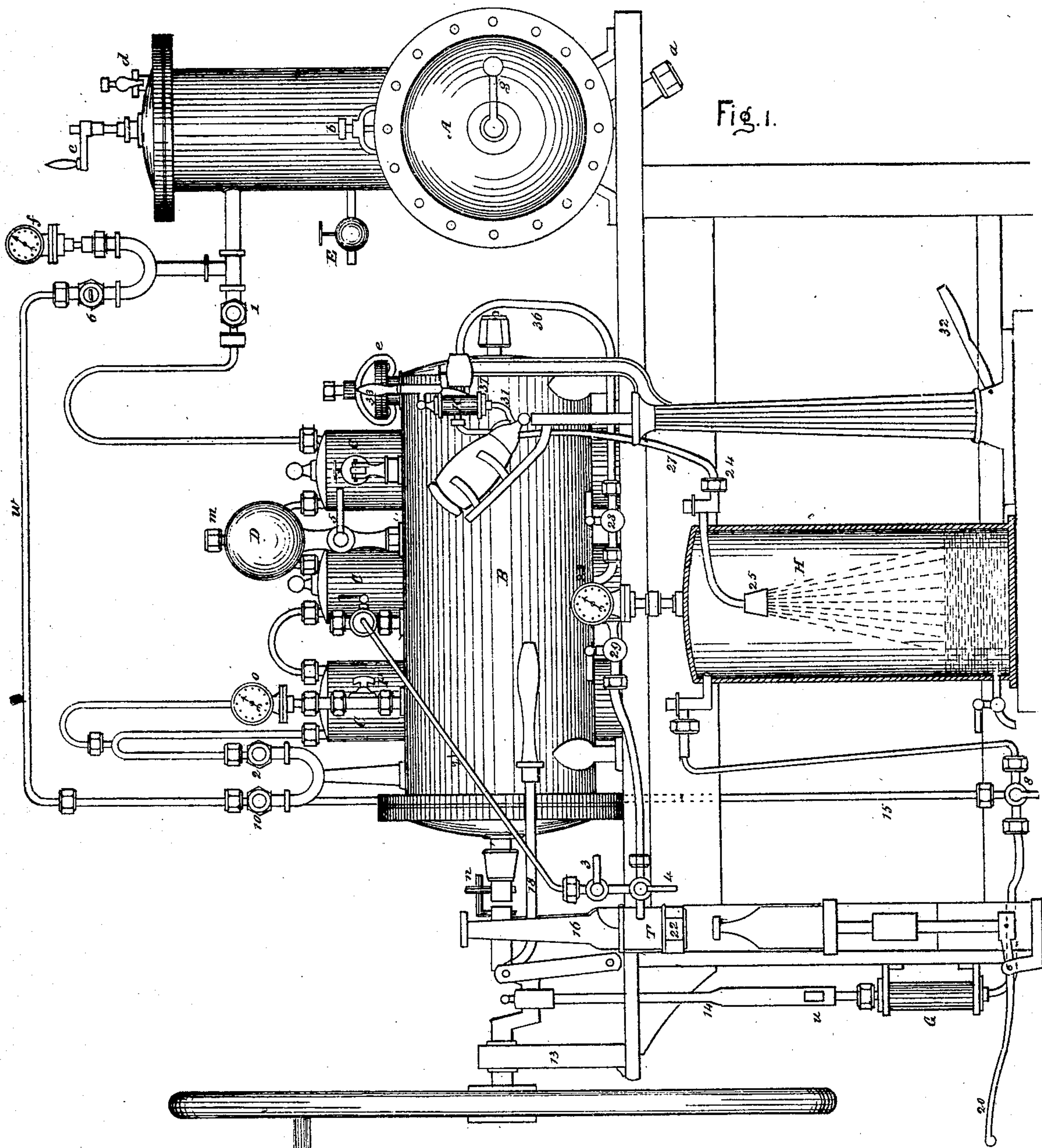


Fig. 1.

Witnesses

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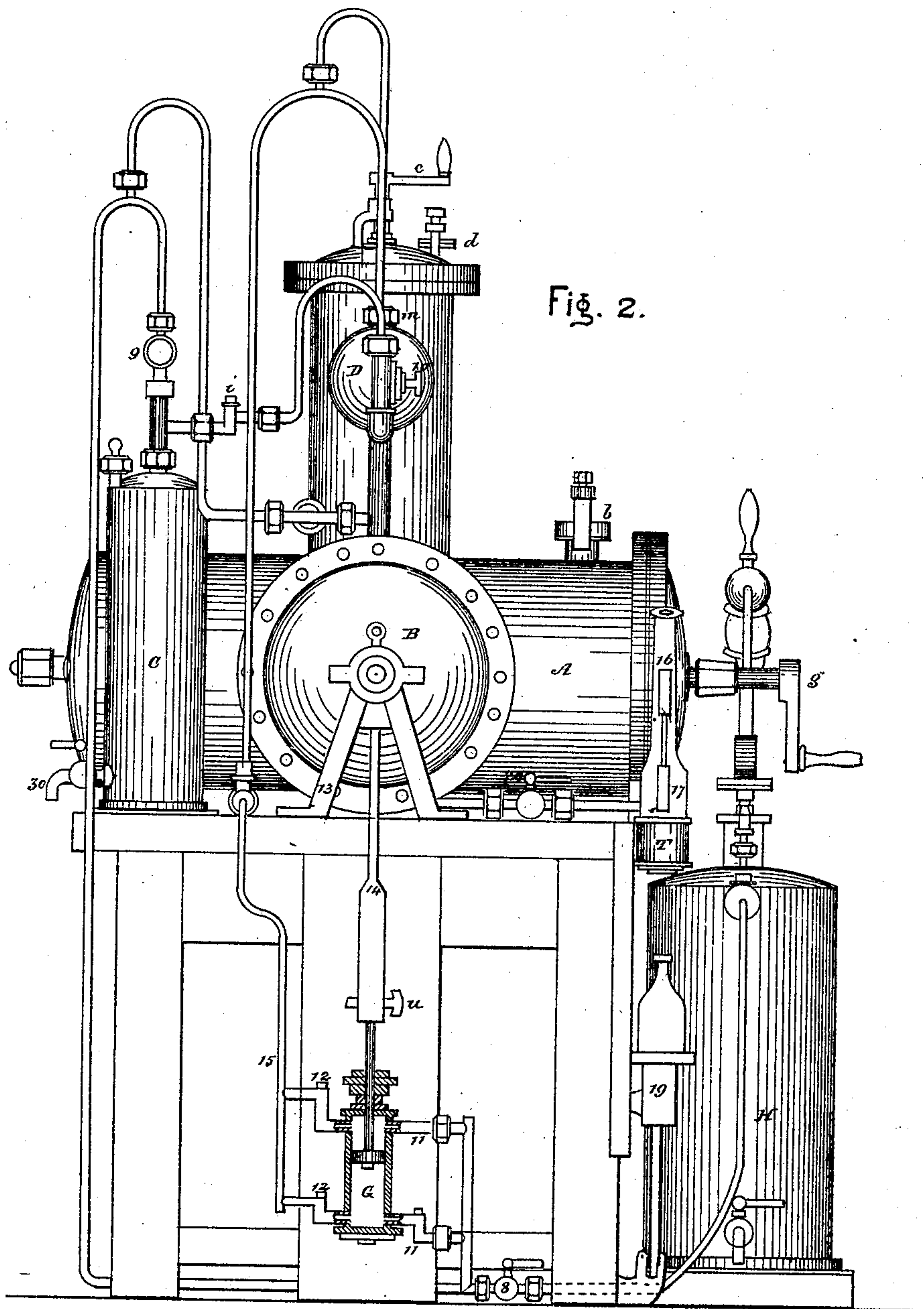
Oscar Kropff.
By Adolph Ott,
His Attorney in fact.

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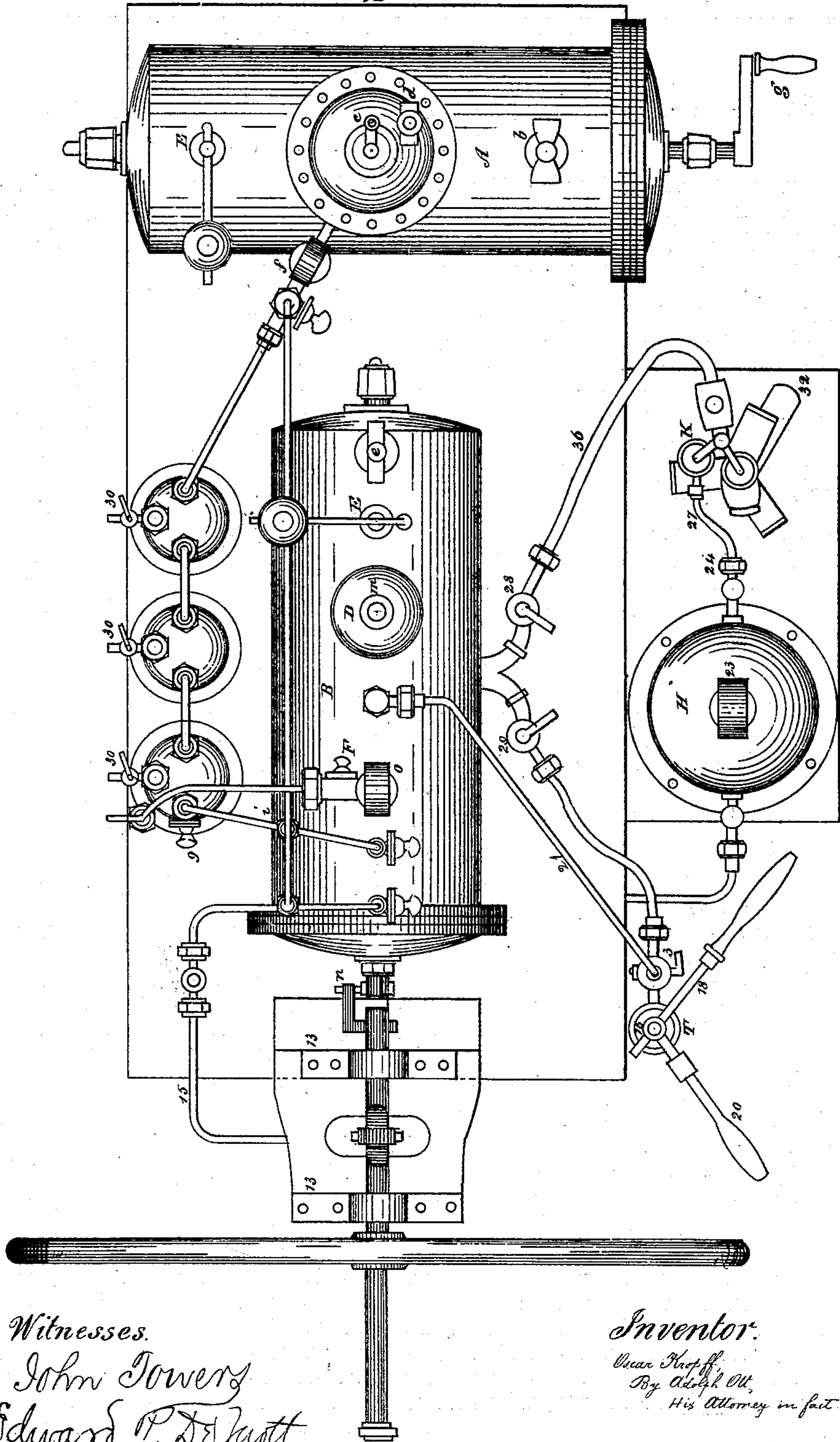
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Improvement in Apparatus for the Manufacture and Bottling of Aerated Waters.

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Fig. 3.

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UNITED STATES PATENT OFFICE.

OSCAR KROPFF, OF NORDHAUSEN, PRUSSIA, EMPIRE OF GERMANY:

IMPROVEMENT IN APPARATUS FOR THE MANUFACTURE AND BOTTLING OF AERATED WATERS.

Specification forming part of Letters Patent No. 128,494, dated July 2, 1872.

Specification describing certain Improvements in Apparatus for the Manufacture of Aerated Waters, by OSCAR KROPFF, of Nordhausen, Kingdom of Prussia, Empire of Germany.

My apparatus differs from any other heretofore invented, that the carbonic-acid gas now usually wasted in filling bottles or siphons is utilized, and that it can either be conducted into the fountain or into the generator, as may be desirable. This end is attained by the combination of a receiver, H, with a double-acting pump, G, and other apparatus, as will hereafter be explained.

Figure 1 is a side elevation of the machine embodying my invention. Fig. 2 is an elevation, showing that end of the machine without the fly-wheel, which is at the left hand of Fig. 1. Fig. 3 is a plan of this machine.

A is the generator. B is the fountain. C C are gas-washers. D is a receptacle for the salt solutions used in the making of mineral waters. E and F are safety-valves. G is a double-acting pump. H is a receiver for the carbonic-acid gas, which, by filling the siphons, is now generally lost. T is a bottling-machine. K is a receiver for filling siphons.

a is the screw of the discharging-pipe. *e* and *b* are screws with plates for closing the charging-holes. *c* is the valve for admitting acid into the generator. *d* is a blow-off valve. *o* and *f* are pressure-gauges. *g* is an agitator. *i* is a return-valve. *m* is a screw to give access to receptacle D. *n* is a crank-pin. *u* is a wedge. *w* is a pipe. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 28, 29, and 30 are stop-cocks. 11 11 are suction-valves of the pump. 12 12 are discharging-valves of the same. 13 is a support for the shaft, with crank. 14 is a shaft. 15, 21, 36, and 27 are pipes, the purpose of which will hereafter be explained. 16 is a cork-cylinder. 17 is a punch or stamp. 18 is a lever. 19 is a bottle-lever. 20 is a pedal. 22 is the mouth-piece of the cork-cylinder. 23 is a pressure-gauge. 24 is a return-valve. 25 is a nozzle in which is placed a sieve to separate carbonic acid from water as it enters the receiver. 31 is a nipple for the bent siphon-tube. 32 is the pedal of the machine for filling siphons. 33 is a lever for regulating the supply of the aerated water to the siphons.

The manufacture of aerated waters consists

in two operations, namely: first, in the production of carbonic-acid gas in the generator A; and second, in the impregnation of the water in the fountain B with this gas. The first operation is commenced with by introducing the requisite amount of ground chalk, magnesite, dolomite, or ground marble, with its fourfold quantity of water, into the generator.

My improved apparatus requires for one hundred bottles soda-water only three and one-third pounds of each of the materials (oil of vitriol and marble) or its substitute, instead of five pounds. The generator A must be large enough to produce sufficient gas to impregnate the liquid three times in succession, one hundred pounds of marble and forty pounds of water being necessary to produce one hundred bottles each time. When all the stop-cocks have been closed and screw *a* has been drawn tight the marble is introduced through *b*, sufficient water being added to fill the cylinder to three-fourths, or at most to seven-eighths. Hereupon ten pounds of oil of vitriol are poured into blow-off valve *d* of the generator. The fountain B is then filled with water through *e*, the agitator being turned a few times, so that the atmospheric air contained in the water may escape, when the plate of the charging-hole is fastened down by means of the screw. After this the three wash-bottles C C C are filled to overflowing, namely, the first bottle (next to the generator) with a solution of sulphate of iron; the second with one of carbonate of soda; and the third with pure water. After they have been well closed the generation of carbonic acid may be proceeded with; but, to that end, it is necessary to blow off the atmospheric air yet contained in the generator. By opening the valve *c* a small amount of oil of vitriol is allowed to flow upon the chalk until gauge *f* indicates a pressure of one atmosphere. Valve *c* is then closed while *d* is opened. The agitator *g* is turned several times, so that the air may escape from *d*; afterward the latter is closed. The gas-washers are first filled to overflowing, so that no atmospheric air may remain in them; but, in order to set the machine in operation, it is necessary that they contain only three-fourths or seven-eighths at most, so that the empty space may be filled with carbonic acid and that the solutions may not be pressed over to the fountain. To empty the gas-washers to

three-fourths of their capacity, stop-cock 1 is opened and the generation of carbonic acid is being continued by opening valve *c* a little and turning agitator *g*. The carbonic acid passes through stop-cock 1 into the first washer; discharging-cock 30 is therefore opened and one-quarter is allowed to flow out, the same being repeated with the second and third washer. In order that there be also space for the impregnation of the liquid in the fountain stop-cock 2 is opened. The gases rise then from the last washer through return-valve *i* (*vide* Fig. 2) into the fountain, press upon the water, and, after the vent stop-cock 3 has been shut, from six to eight pounds of water are drawn off through stop-cock 4. *D* is then filled with the necessary salt solutions which are to characterize the different waters, the solution being kept therein until used. For the further generation of carbonic acid oil of vitriol is allowed to flow upon the marble or other material, the agitator *g* being slowly turned in the mean time. After the crank-pin *n* has been brought in connection with the agitator of the fountain, and the pump has been set out of motion, the fly-wheel is turned rapidly in order to facilitate impregnation. As soon as gauge *o* indicates one atmosphere pressure vent-cock 3 is opened and the carbonic-acid gas, which is mingled with atmospheric air, is allowed to escape, the fly-wheel being turned in the mean time. Hereupon the water is impregnated anew until the gauge indicates a pressure of four atmospheres, which, for complete saturation, is absolutely necessary. Faucet 5 is now opened so that the mineral solution in *D* may flow into the fountain, when it is again closed. Since the now thoroughly-saturated water could not be drawn into bottles without exposing them to the danger of bursting, a sufficient amount of gas is allowed to return into the generator, so that in the fountain there will only be a pressure of one and a half atmosphere. Stop-cock 1 is therefore shut, while 6 and 7 are opened. Stop-cock 8, which leads to the pump, and faucet 9, are also opened. To set the pump in motion wedge *u* is inserted and the connection between the agitator and the fly-wheel is broken. By setting the pump in motion the carbonic acid is forced through pipe *w* and stop-cock 6 from the fountain to the generator. After this manipulation gauge *f* shows a higher, gauge *o*, however, a lower, pressure, and when the latter shows a pressure of one and a half atmosphere the pump is set out of motion. The soda-water is then ready to be bottled. For filling bottles by the bottling-machine *T* vent-cock 3 is opened, so that the air from the bottles may be conducted to the fountain. Being lighter than carbonic acid, the air is being collected in the upper part of the vessel, and is not absorbed by the product of manufacture. The filling of soda-water into bottles by means of a bottling-machine being well known, I will only remark that after the pressure in the fountain has decreased stop-cock 2 is opened, so that sufficient carbonic acid may enter that the

pressure of one and a half atmosphere remains constant until the last bottle is filled. After bottling, the mixture of gas and atmospheric air is allowed to escape by opening stop-cock 3. The fountain is filled anew with water and closed, the operation of impregnation being repeated, as described. For the third filling there would not be sufficient carbonic acid that, by its own pressure, could pass into the fountain. Equal pressure is therefore established, which will be indicated by the gauges *f* and *o*. Wedge *u* is then inserted, and when the stop-cocks 1, 9, 10 have been opened and 2, 6, and 7 closed, pumping is commenced, with the gas being thus drawn from the washers and pressed into the fountain while the agitator is turned. When, now, valve *c* is completely opened the last remainder of sulphuric acid flows upon the marble, and when, by stirring, gas ceases to be generated, which will be indicated by gauge *f*, stop-cocks 6 and 1 are closed. Communication between the generator and the fountain will then be interrupted. The generator may then be charged again. The rule is, however, that as long as gauge *f* indicates pressure to use the surplus of carbonic acid for impregnation.

The gas-washers are recharged every week or two, and the generator is well rinsed with pure water as often as it has been discharged.

Should the pressure rise too high, be it in the fountain or in the generator, it will easily regulate itself by the safety-valves *E* and *F*.

The pump *G* is double-acting, closed with a cover on the top and with a bottom below, both parts being screwed on. On the cover there is a stuffing-box, in which the shaft moves airtight. The cylinder is provided with feet below and above, whereby the pump may be screwed to an iron support. The suction-valves 11 11 on the right hand and the discharging-valves 12 12 on the left hand effect communication between the gas-washers and the fountain. The pump-piston is of one solid piece, and packed with leather. The valves are hexagonal in form, and can be screwed off whenever they have to be cleaned. 13 is the support of the shaft for the agitator and fly-wheel. The pump is set in motion by means of reciprocating vertical motion imparted to rod 14 by means of the crank on the main shaft. By withdrawing wedge *u* the agitator is turned; however, pump and agitator may be moved together. Pipe 15 serves to lead the carbonic acid from the gas-washers to the pump. This new pump is especially serviceable for my purpose, not only because it is double acting, but also because it can be kept clean more readily, which is attributable to the position of the valves. The valves are packed with India rubber, and are therefore more solid and durable than valves of metal. What renders the pump especially valuable consists in that it is double acting; that it draws gas from below the piston as well as from above, and discharges it into the fountain; it allows a rapid passage, and furnishes

larger quantities of gas than any other pump used for this purpose. As can be seen from the drawing, the pump can readily be set in motion, and the agitator can as well be turned by a simple attachment of the crank-pin.

The bottling-machine T consists of different parts, 16 being the cork-cylinder, 17 the punch or stamp, 18 a lever. 19 is the bottle-lever, 20 the pedal. On the right hand of the upper part there is the bottling-cock 4 and the vent-cock 3, with a conduit-pipe, 21, to the fountain B. On the mouth-piece 22 (which may be screwed off) there is a disk of India rubber, which offers a packing for the mouth of the bottle.

The filling of the siphons is carried out in the following manner: After the water in the fountain has been impregnated until the gauge shows a pressure of seven atmospheres, stop-cock 28 is opened and 29 closed. The water will then rise through pipe 36 into receiver K. When the siphon and the bent tube of the same have been set into piston 31, one must step on the pedal, whereby the bottle will be well secured. By now seizing lever 33 with the right hand and pressing it toward the right side the water will rush into the bottle; but it will only be filled to one-half, since the remaining space will be filled with carbonic acid of the same tension as in the fountain. Lever 33 must now be turned, for a moment, toward the left side, when the carbonic acid, with the water in the siphon-faucet, will pass, through pipe 27, return-valve 24, and nozzle 25, into receiver H. Nozzle 25 serves for a rapid separation of the carbonic acid from the water. The more siphons have been filled the higher will be the pressure indicated on gauge 23. When the pressure has reached three atmospheres it is difficult to fill the siphons. The cock 8, which effects communication between the receiver and the pump, is therefore opened; so is stop-cock 10; and the pump is worked, whereby the gas contained in the receiver is

propelled back into the fountain. If the gas is to be sent from the receiver into the generator, stop-cock 10 is closed and 6 is turned open, and the pump is worked until gauge 23 indicates zero. In filling siphons, the pressure in the fountain must always be retained at seven atmospheres, for which purpose the gas is either taken from the generator or from the receiver. At seven atmospheres the siphons will ordinarily be filled after the gas has been allowed to escape twice into receiver H. The receiver H consists of a copper cylinder, tinned inside, and resting with the machine for filling siphons on one plank. To the upper part of the receiver gauge 23 is attached, which indicates the pressure of carbonic acid present. Return-valve 24 is combined with nozzle 25. The carbonic acid, which is being lost by using the old machines for filling siphons, passes through pipe 27, through return-valve 24.

I claim as my invention—

1. The utilizing of the carbonic-acid gas, usually wasted in filling siphons, by means of receiver H, in combination with the pump G and receptacle K, constructed and arranged substantially as described.

2. The utilizing of the carbonic-acid gas, now usually wasted in bottling, by means of the combination of pipe 21 provided with stop-cock 3, with the corking-machine T and fountain B, substantially as described.

3. The combination of receiver H with the pump-valve 8 and pipe 15, stop-cock 10, for the purpose of conducting the waste gas into fountain B, as set forth.

4. The combination of receiver H with the pump-valve 8, pipes 15 and *w*, and stop-cock 6, for the purpose of conducting the waste gas into the generator, substantially as described.

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Witnesses:

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