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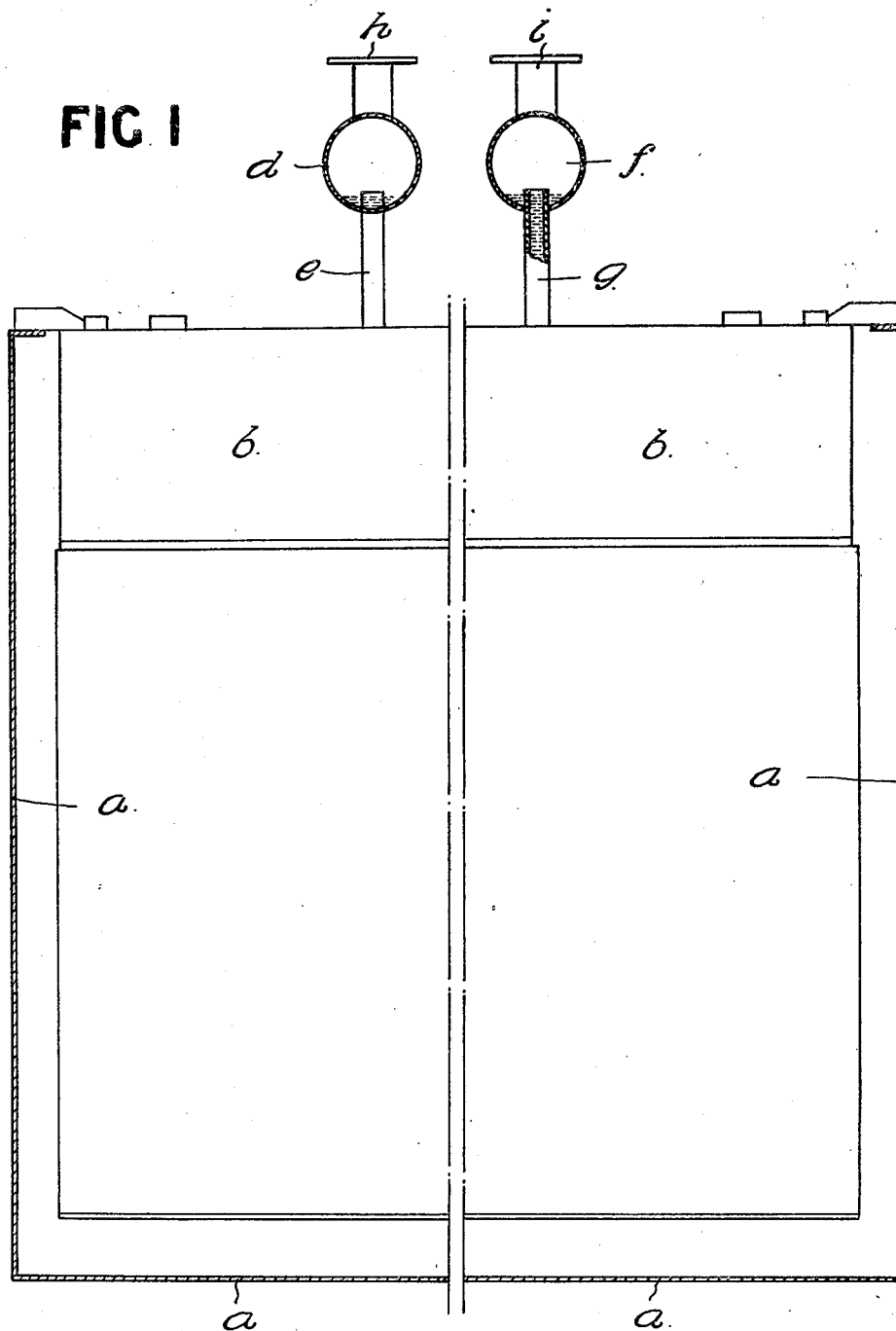
A. E. KNOWLES

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ELECTROLYTIC APPARATUS

Filed May 27, 1930

2 Sheets-Sheet 1



INVENTOR.
A. E. KNOWLES.
By *J. E. M. Fetherstonhaugh*
ATTY.

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A. E. KNOWLES

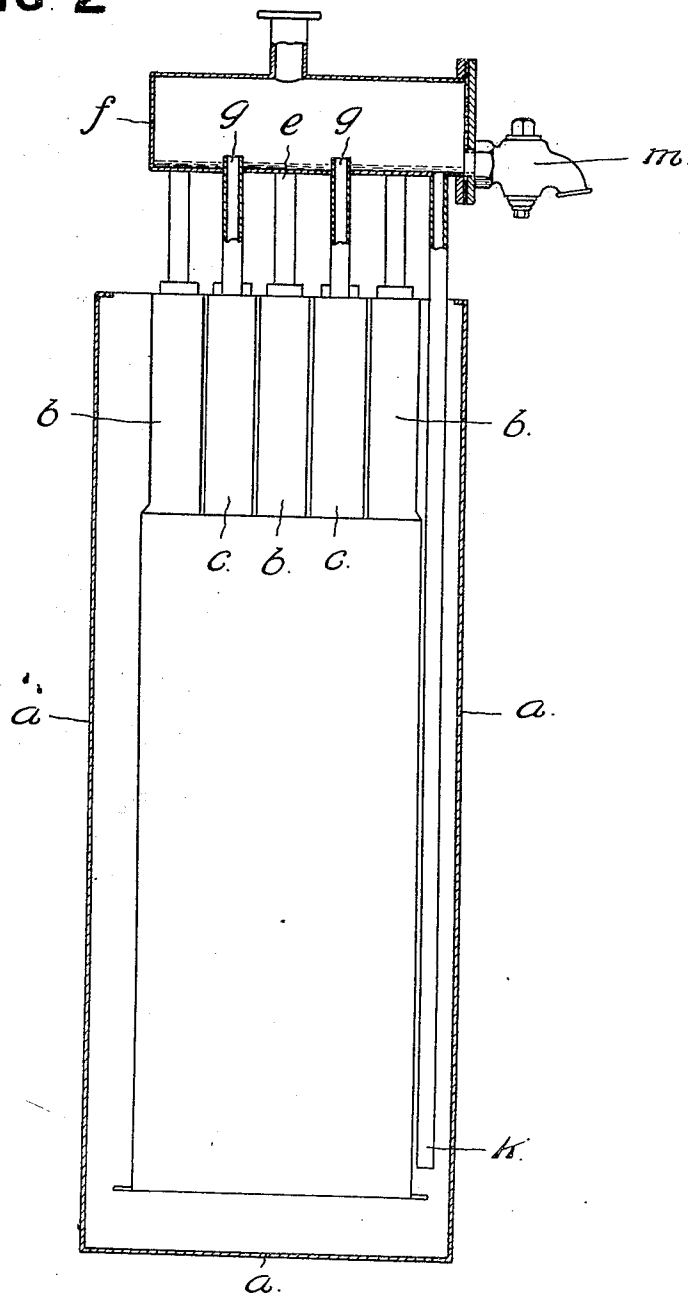
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FIG. 2



INVENTOR.
A. E. KNOWLES.
By
J. E. M. Witherspoon
ATTY.

UNITED STATES PATENT OFFICE

ALBERT EDGAR KNOWLES, OF HESWALL, ENGLAND

ELECTROLYTIC APPARATUS

Application filed May 27, 1930, Serial No. 456,047, and in Great Britain July 6, 1929.

This invention relates to electrolytic apparatus particularly to cells employed on the electrolysis of liquids for the production of gases.

5 In the electrolysis of water for the production of hydrogen and oxygen sodium hydroxide (NaOH) or potassium hydroxide (KOH) are usually dissolved in the distilled water with which the cells are filled so that
10 a suitable electrolyte shall be provided and the internal resistance of the cell shall be as low as possible. Distilled water is fed automatically to replace the water consumed in the production of the gases, but the loss of
15 the caustic alkali is small under correct conditions of working.

Two difficulties are commonly met with in working such electrolyte cells commercially:

20 Electrolyte in the form of a spray of minute globules of liquid is carried off by the gas and condenses or collects in the gas collecting pipes which are arranged in communication with the gas bells above the electrodes of the cell. To avoid loss of alkali and
25 reduction of the density of the solution the electrolyte should be returned to the cell; usually it is left to find its way back against the flow of gas through the offtake pipes from the bells.

30 Froth or scum is often present in addition to the electrolyte spray, and the presence of these in the offtake and collecting pipes for the gas imposes serious back pressure on the gas and causes trouble in the running of
35 the cells. The spray is of course a normal condition of working of these cells, but the froth is not.

The electrolyte is very liable to have minute traces of saponifiable matter present in it. In any case I have found that this froth
40 always contains soap and is really composed of minute soap bubbles. If, therefore, care is taken that no impurity is added to the cells with the distilled feed water, the trouble
45 can soon be eliminated by blowing away the froth or scum and not allowing it to return to the cell.

To avoid both difficulties: the spray running back in opposition to the gas flow and
50 the presence of this froth, I employ for each

main collecting pipe a pipe which, in addition to serving as a gas passage or space provides a liquid channel along it having no return to the gas offtake pipes leading from the bells.

As a preferred arrangement I make the main collecting pipes large relatively to the offtake or connection pipes from the bells, and I arrange each of the offtake or connection pipes so that it projects within and well
55 above the bottom of its collecting pipe so that the separate liquid channel is formed in the bottom of the collecting pipe. The separate liquid space could be partitioned off by means of a perforated diaphragm if desired; but this is unnecessary.

At the one end of the collecting pipe an outlet pipe for the liquid is provided with its opening flush with the bottom of the pipe, and this outlet pipe is carried down into the electrolyte outside the gas bells but inside the cell casing or tank. In the end closure of each main collecting pipe a suitable cock is provided having the bottom of its inlet bore
60 level with the bottom of the collecting pipe. The gas connection from each collecting pipe is in the upper wall thereof and usually is arranged near the middle of its length.

In the explanatory drawings, Figure 1 is a longitudinal sectional view of a cell with the invention applied, in which a large part of the middle of the cell is broken away. Figure
65 2, is a transverse section.

In these drawings no details are given of the cell construction which may follow on any suitable lines. *a* is the tank or casing, *b*, *b'* the gas collecting bells for one gas and *c*, *c'* the bells for the other gas. *d* is the main gas collecting pipe into which the connection
70 pipes *e* from the bells *b* are led. *f* is the main gas collecting pipe into which the connection pipes *g* from the bells *c* are led. The gas outlet connections are at *h* and *i* respectively. Near the end of each collecting pipe *d* and
75 *f*, is the liquid return pipe *k* leading down inside the cell tank and in the end wall is the blow or draw-off cock *m*.

In operation, with this arrangement in use, the spray carried over with the gas is mostly separated out and collected in the bottom of
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the collecting pipes *d* and *f* instead of in the subsequent gas main.

Instead of the collected liquid flowing back down the offtake connection pipes *e* and *g* against the gas flow, it now flows along the collecting pipes *d* and *f* below the gas space therein and is returned by the drain pipe *h* to the cell *i* outside the bells *b, c*. This allows a free flow of gas from the bells.

The provision of the cock *m* in the end of each collecting pipe renders it possible to blow off any scum or froth which may collect therein thus eliminating a cause of back pressure on the gas and at the same time getting rid of soapy matter in the electrolyte.

I claim:—

1. Electrolytic apparatus having means for decomposing an electrolyte contained in the apparatus, gas bells for receiving the gas thereby released, gas offtake connections from the bells and main gas collecting means common to a number of bells for each gas, said collecting means being in direct communication with the offtake connections; the main gas collecting means serving both as a gas passage and also as a liquid channel for any electrolyte carried over by the gas, which liquid channel has no return connection with the gas offtake pipes.

2. Electrolytic apparatus having means for decomposing an electrolyte contained in the apparatus, gas bells for receiving the gas which is thereby released, gas off-take connections from the bells, and main gas collecting pipes common to a number of bells for each gas, said collecting means being in direct communication with the off-take connections, the main gas collecting pipes each being of large diameter in relation to the off-take connections and the ends of the off-take connections entering and projecting well above the bottom of the respective collecting pipes so as to form a gas space and also a liquid channel in each of said main collecting pipes for any electrolyte carried over by the gas, which liquid channel has no return connection to the offtake means

3. Electrolytic apparatus having means for decomposing an electrolyte contained in the apparatus, gas bells for receiving the gas which is thereby released, gas off-take connections from the bells, and main gas collecting pipes common to a number of bells for each gas, said collecting means being in direct communication with the off-take connections, the main gas collecting pipes each being of large diameter in relation to the off-take connections and the ends of the off-take connections entering and projecting well above the bottom of the respective collecting pipes so as to form a gas space and also a liquid channel in each of said main collecting pipes, which liquid channel collects any electrolyte or froth carried over with the gas up the off-take connections into said

pipes and conveys it to a return drain pipe arranged near the end of each main collecting pipe and leading to the cell tank.

4. Electrolytic apparatus having means for decomposing an electrolyte contained in the apparatus, gas bells for receiving the gas which is thereby released, gas offtake connections from the bells, and main gas collecting pipes in communication with the off-take connections, the main gas collecting pipes each being of large diameter in relation to the off-take connections and the ends of the off-take connections entering and projecting well above the bottom of the respective collecting pipes so as to form a gas space and also a liquid channel in each of said main collecting pipes, a drain pipe in each main collecting pipe leading to the cell tank and a cock on each of said collecting pipes leading outside the apparatus.

5. Apparatus for the electrolytic production of gases by the decomposition of an electrolyte, in which the usual gas off-take pipes for the different gases from the gas receiving bells are carried up into and project well above the bottom of the respective main collecting pipe which is relatively large in diameter, and in which a return drain pipe opens from the bottom of each collecting pipe and leads back to the apparatus while a cock on each collecting pipe leads outside the apparatus.

6. Apparatus for the electrolytic production of gases by the decomposition of an electrolyte comprising in combination means for receiving the gases, gas off-take means thereon, main collecting means in communication with said off-take means and means for collecting liquid or froth which may be carried over with the gas up the off-take means in said main collecting means, means preventing return of such liquid or froth to said off-take means and means for returning said liquid to said apparatus and for blowing said froth out of said collecting means.

In testimony whereof I affix my signature.

ALBERT EDGAR KNOWLES.