

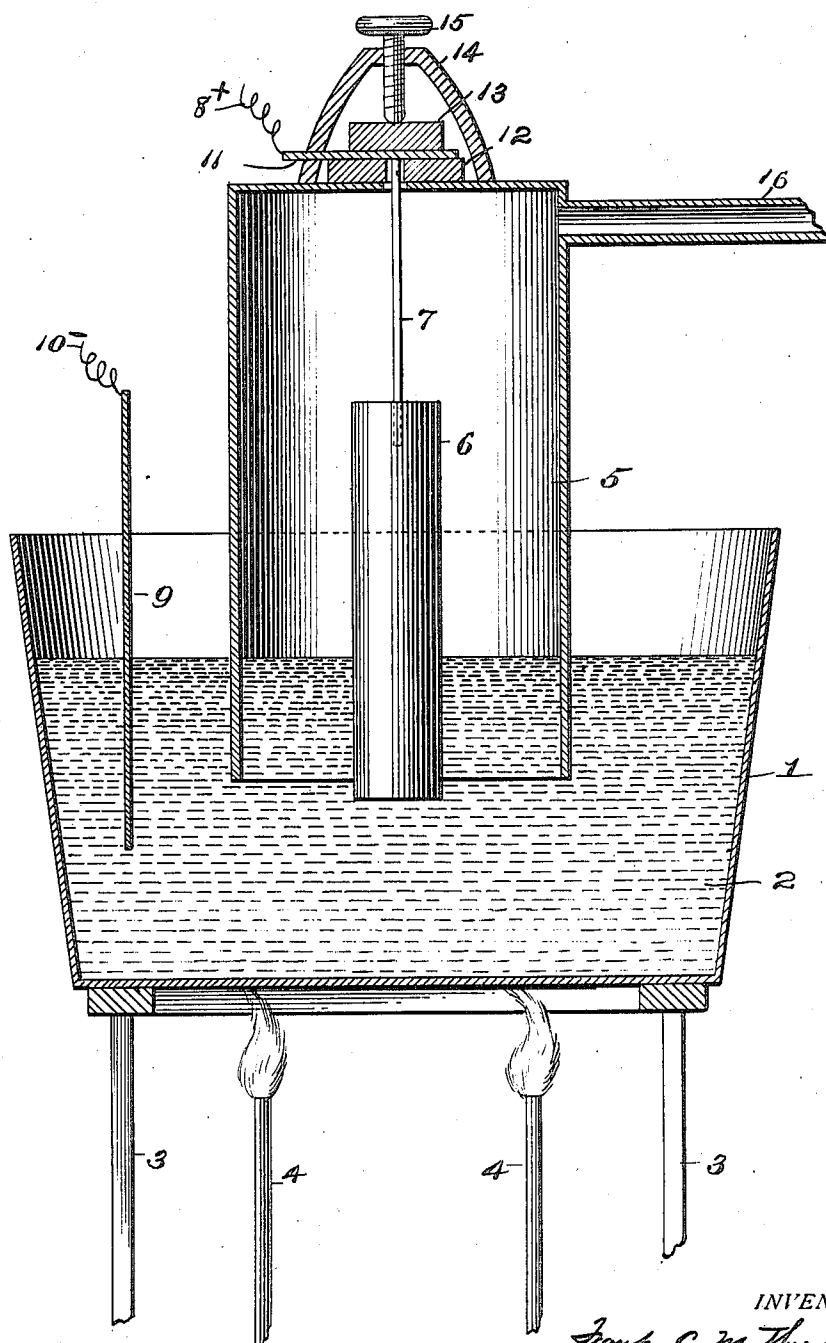
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METHOD OF MAKING FLUORINE

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INVENTOR

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METHOD OF MAKING FLUORINE.

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To all whom it may concern:

Be it known that I, FRANK C. MATHERS, a citizen of the United States, residing at Bloomington, in the county of Monroe and State of Indiana, have invented certain new and useful Improvements in Methods of Making Fluorine, of which the following is a specification.

This invention relates to a novel method of producing fluorine.

One of the objects of this invention is to provide an efficient method and apparatus for producing fluorine in large quantities.

Another object of this invention is to provide a method by which the cost of producing fluorine is reduced considerably.

In the former processes of making fluorine, electrolytical methods have been employed but the cost of producing the fluorine has rendered production on any large scale almost prohibitive; also, no efficient method has heretofore been used for producing large quantities of fluorine on a satisfactory basis.

My invention overcomes the difficulties incident to the prior processes for generating fluorine and enables the production of this substance on a large scale.

Reference is to be had to the accompanying drawing wherein is shown a cross section of an apparatus which may be used to carry out my invention. The apparatus consists of a vessel (1) containing the electrolyte (2) and supported upon standards (3). The electrolyte is heated by means of the burners (4). A diaphragm (5) extends into the vessel (1) and reaches below the surface of the electrolyte (2). Located centrally within the diaphragm (5) is the anode (6), the lower end of which projects into the electrolyte and the upper end is connected to a conductor (7) in electrical contact with the positive terminal (8) of the source of electrolyzing current. The cathode (9) extends into the electrolyte and is connected to the negative terminal (10) of the electrolyzing current.

It is necessary that the anode (6) be insulated and kept from electrical contact with the diaphragm (5), the vessel (1) and the cathode (9). This is accomplished by placing plate (11) which joins the conductor (7), with terminal (8), between insulating blocks (12) and (13). These blocks are preferably made of fluorite. The plate (11) and blocks of fluorite are held in position by means of the clamp (14) and screw (15).

By electrolyzing the electrolyte (2), fluorine is evolved at the anode (6) and passes out through the exit (16).

The preferred form of electrolyte which I use is acid potassium fluoride, but it should be understood that other fluorides or compounds of fluorine or mixtures thereof may be used which are not attacked by fluorine and which melt at a temperature at which the graphite anode and the containing vessel are not seriously attacked by fluorine. Anhydrous potassium acid fluoride melts at approximately 220° C. and at this temperature decomposes but slightly. The vessel (1) may be made of copper, in which event the cathode (9) may be dispensed with, the vessel (1) serving as a cathode. The diaphragm (5) is made preferably of copper. It should be understood that other material than copper may be used for the vessel (1), and in such cases a special cathode (9), made of a suitable material such as copper is employed.

A satisfactory current density has been found to be 10 amperes per square decimeter, and an E. M. F. of 12 to 15 volts.

The bath should not be heated so low that the electrolyte will be too viscous, neither should it be heated so highly that HF will distill off too rapidly. At higher temperatures the conductivity of the bath is increased appreciably, but the loss of HF offsets this advantage.

The present invention is not limited to the specific details set forth in the foregoing examples which should be construed as illustrative and not by way of limitation, and in view of the numerous modifications which may be effected therein without departing from the spirit and scope of this invention, it is desired that only such limitations be imposed as are indicated in the appended claims.

I claim as my invention:

1. In a method of making fluorine, electrolyzing a fused acid fluoride with an anode of hard carbonaceous material and collecting the evolved fluorine.

2. In a method of making fluorine, electrolyzing a fused acid fluoride with a graphite anode and collecting the evolved fluorine.

3. In a method of making fluorine, electrolyzing a fused acid alkali metal fluoride with an anode of hard carbonaceous material and collecting the evolved fluorine.

4. In a method of making fluorine, elec-

trolizing a fused acid alkali metal fluoride with a graphite anode and collecting the evolved fluorine.

5. A process comprising the electrolysis with an anode of hard carbonaceous material and a copper cathode of an acid alkali metal fluoride in a state of fusion and collecting the evolved fluorine.

10 6. A process comprising the electrolysis with a graphite anode and a copper cathode of an acid alkali metal fluoride in a state of fusion and collecting the evolved fluorine.

15 7. A process comprising the electrolysis with an anode of hard carbonaceous material of fused potassium acid fluoride and collecting the evolved fluorine.

8. A process comprising the electrolysis with a graphite anode of fused potassium acid fluoride and collecting the evolved fluorine.

20 9. In a process of making fluorine, electrolyzing a fused fluorine compound with an anode of hard carbonaceous material and a current having an electromotive force of approximately 12-15 volts and collecting the 25 evolved fluorine.

10. In a process of making fluorine, electrolyzing a fused fluorine compound with a graphite anode and a current having an electromotive force of approximately 12-15 30 volts and collecting the evolved fluorine.

FRANK C. MATHERS.