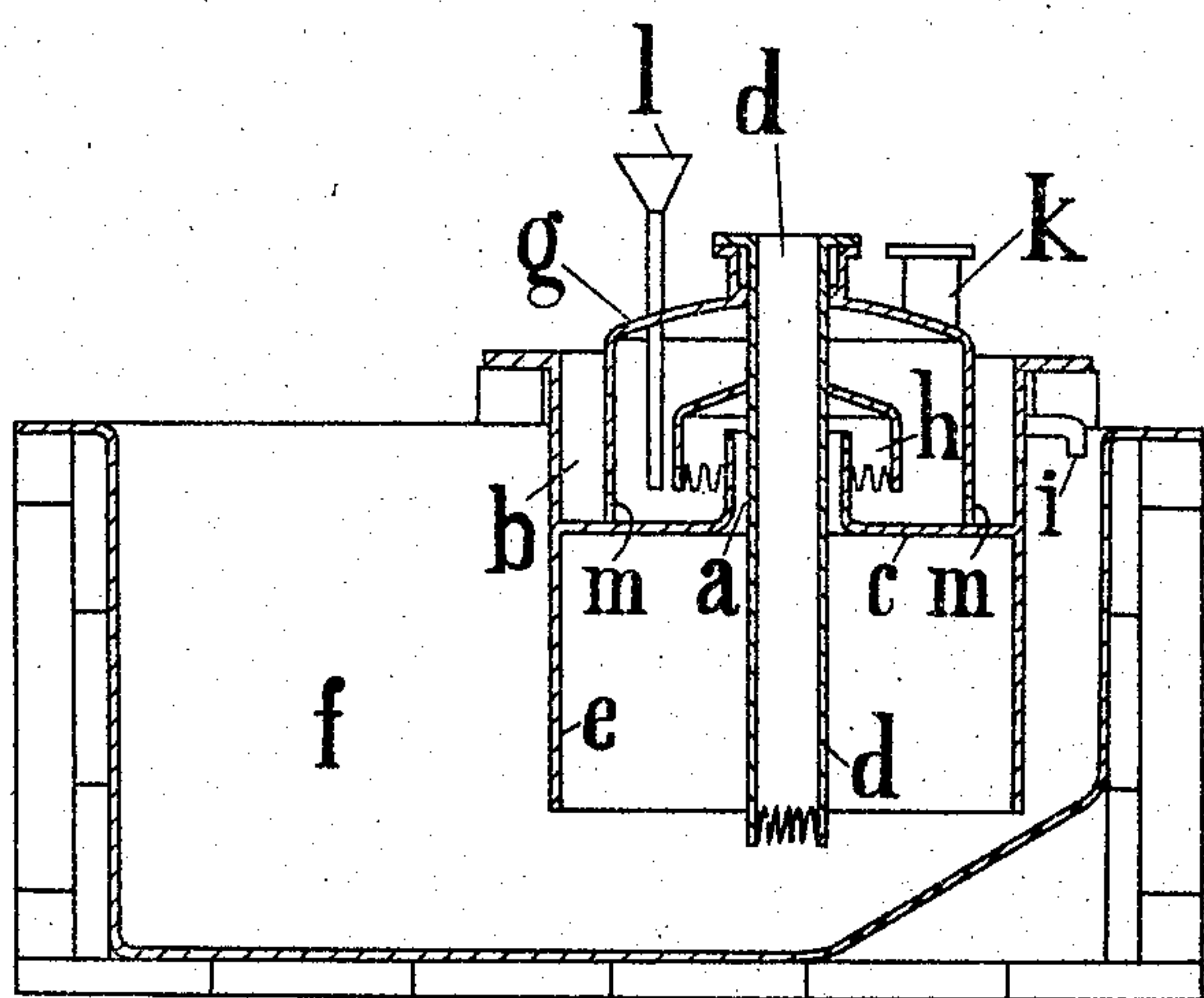


No. 782,637.

PATENTED FEB. 14, 1905.

K. ZIMPELL.
AMMONIUM SULFATE SATURATOR.
APPLICATION FILED NOV. 17, 1904.



Witnesses:

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UNITED STATES PATENT OFFICE.

KARL ZIMPELL, OF STETTIN, GERMANY.

AMMONIUM-SULFATE SATURATOR.

SPECIFICATION forming part of Letters Patent No. 782,637, dated February 14, 1905.

Application filed November 17, 1904. Serial No. 233,169.

To all whom it may concern:

Be it known that I, KARL ZIMPELL, a subject of the German Emperor, and a resident of Stettin, in the Kingdom of Prussia, German Empire, have invented new and useful Improvements in Sulfate-of-Ammonia Saturators, of which the following is a full, clear, and exact specification.

In a former application of mine, Serial No. 210,533, filed May 31, 1904, an ammonium-sulfate saturator is described wherein the unabsorbed gases collected in the bell of the main saturator pass into an auxiliary saturator built in the said bell. In this arrangement the unabsorbed gases come in contact with the wall of the bell, which is surrounded by atmospheric air, before they pass into the auxiliary saturator. Thus under some circumstances these gases are cooled to some extent. Moreover, the apparatus being closed, the progress of the saturation cannot be seen, and the density, and therefore the absorbing power of the acid, cannot be watched or can be watched only with aid of special appliances. Again, a deposit of salt, that often happens, cannot be recognized, so that the gas inlets and overflow are liable to be stopped by the deposited salt without the attendant observing it, whereupon working must cease until the salt has been removed.

The present invention relates to improvements in the said saturator whereby these objections are removed.

The accompanying drawing is a vertical section of a saturator constructed according to this invention.

In the saturator-tank *f* is suspended the bell *e*, the cover *c* of which forms the bottom of the auxiliary saturator-tank *b*. The latter is open at the top and has a short central pipe *a* extending upward from its bottom, thus making communication between the bell *e* and the tank *b*. This pipe *a* is covered by a bell *h*, connected with the pipe *d*, which conducts the gases into the main saturator. The lower edge of this bell *h* is serrated for the better subdivision of the gases. A second bell, *g*, covers the bell *h* and is provided with an escape-pipe for gases *k* and a funnel *l*, extending nearly to the bottom *c*. The bell *g*

is fitted gas-tight to the pipe *d* and has gaps *m* in its lower edge. The tank *b* has an overflow *i*, wherethrough the excess of acid passes into the main saturator-tank *f*. In the example shown the cover *c* of the bell *e* is a partition in a cylinder, the portion of which above this partition constitutes the tank *b*.

The ammoniacal gases delivered through pipe *d* beneath the surface of the acid in the tank *f* are in great part absorbed, the unabsorbed portion collecting in the top of the bell *e*, where they warm the bottom *c* of the tank *b* and pass up the pipe *a* into the bell *h*, which dips beneath the acid in the tank *b*. From this bell they pass through the acid into the bell *g*, parting with the last portion of their ammonia. The waste gases then escape through the pipe *k*.

The gaps *m* in the lower edge of the bell *g* allow of a constant interchange between the acid outside the bell and that within it, and as the tank *b* is open the concentration of the acid therein can readily be ascertained. By addition of fresh acid down the funnel *l* the concentration or quantity of the acid may be maintained. These gaps *m* also insure that the boiling movement of the acid under the bell *g*, caused by the rising gases, is not transmitted to the acid outside the bell, whereby a quiet and uniform overflow of the acid through pipe *i* is obtained.

What I claim is—

1. The combination with a sulfate-of-ammonia saturator comprising a saturator-tank, a bell, having a cover, suspended therein, and means for conducting the gases into the saturator, of an auxiliary saturator comprising an auxiliary saturator-tank having a bottom formed by the said bell-cover, a pipe extending upward from said bottom and connecting the space in the above-mentioned bell with that in the auxiliary saturator-tank, a bell covering said pipe, and means for leading off unabsorbed gases from the space outside said bell substantially as and for the purpose set forth.
2. The combination with a sulfate-of-ammonia saturator comprising a saturator-tank, a bell, having a cover, suspended therein, and means for conducting the gases into the saturator, of an auxiliary saturator comprising an

auxiliary saturator - tank having a bottom formed by the said bell-cover, a pipe extending upward from said bottom and connecting the space in the above-mentioned bell with that in the auxiliary saturator-tank, a bell covering said pipe, a second bell covering the latter bell, and means for leading off the unabsorbed gases from the said second bell, substantially as and for the purpose described.

3. The combination with a sulfate-of-ammonia saturator comprising a saturator-tank, a bell, having a cover, suspended therein, and means for conducting the gases into the saturator, of an auxiliary saturator comprising an auxiliary saturator - tank having a bottom formed by the said bell-cover, a pipe extending upward from said bottom and connecting the space in the above-mentioned bell with that in the auxiliary saturator-tank, a bell having a serrated lower edge covering said pipe, and means for leading off unabsorbed gases from the space outside said bell, substantially as and for the purpose set forth.

4. The combination with a sulfate-of-ammonia saturator comprising a saturator-tank, a bell, having a cover, suspended therein, and means for conducting the gases into the saturator, of an auxiliary saturator comprising an auxiliary saturator - tank having a bottom formed by the said bell-cover, a pipe extending upward from said bottom and connecting the space in the above-mentioned bell with that in the auxiliary saturator-tank, a bell covering said pipe, a second bell covering the latter bell and having a lower edge provided with gaps, and means for leading off the unabsorbed gases from the said second bell, substantially as and for the purpose set forth.

5. The combination with a sulfate-of-ammonia saturator comprising a saturator-tank, a bell, having a cover, suspended therein, and means for conducting the gases into the saturator, of an auxiliary saturator comprising an auxiliary saturator - tank, having a bottom formed by the said bell-cover, and provided with an overflow-pipe *z* leading into the main saturator-tank, a pipe extending upward from said bottom and connecting the space in the

above-mentioned bell with that in the auxiliary saturator-tank, a bell covering said pipe, and means for leading off unabsorbed gases from the space outside said bell, substantially as and for the purpose set forth.

6. The combination with a sulfate-of-ammonia saturator comprising a saturator-tank, a bell, having a cover, suspended therein, and means for conducting the gases into the saturator, of an auxiliary saturator comprising an auxiliary saturator - tank having a bottom formed by the said bell-cover, a pipe extending upward from said bottom and connecting the space in the above-mentioned bell with that in the auxiliary saturator - tank, a bell covering said pipe, a second bell covering the latter bell and having a lower edge with gaps and provided with a gas-escape pipe *k* and an acid-inlet funnel *l* extending nearly to the bottom of the auxiliary tank, and means for leading off the unabsorbed gases from the said second bell, substantially as and for the purpose described.

7. The combination with a sulfate-of-ammonia saturator comprising a saturator-tank for containing acid, a bell, having a cover, suspended in said tank, and a pipe *d*, passing through said bell, for conducting the gases into the saturator, of an auxiliary saturator comprising an auxiliary saturator-tank for containing acid and having a bottom formed by the said bell-cover, a pipe *a*, extending upward from said bottom and connecting the space in the above-mentioned bell with that in the auxiliary saturator - tank, said pipe surrounding the pipe *d* for conducting the gases into the main saturator, a bell connected with said pipe *d* and covering the pipe *a*, and means for leading off unabsorbed gases from the space outside said bell, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

KARL ZIMPELL.

Witnesses:

JOHANNES REDLIN,
HANS HILDEBRAND.