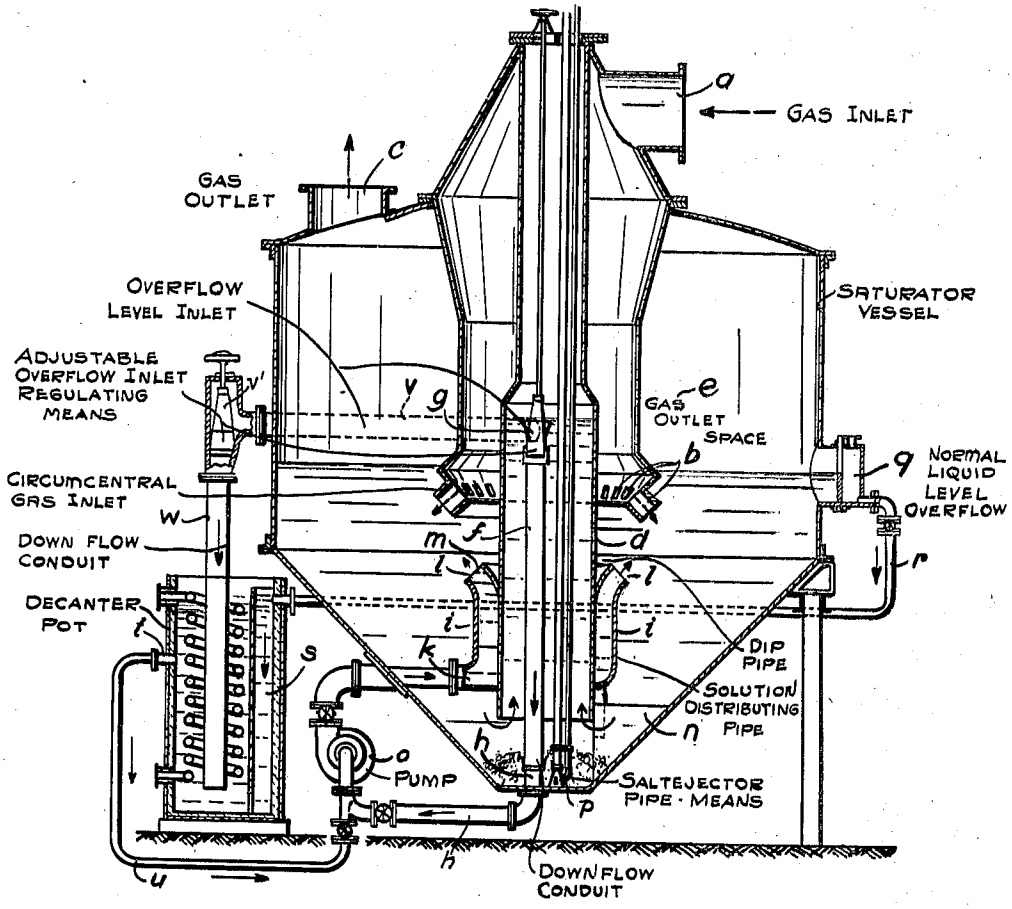
May 4, 1943. W. B. BUSSMANN 2,318,463

PRODUCTION OF COARSE CRYSTALLINE SALTS

Filed Aug. 3, 1940



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Patented May 4, 1943 2,318,463

UNITED STATES PATENT OFFICE

2,318,463

PRODUCTION OF COARSE CRYSTALLINE SALTS

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Application August 3, 1940, Serial No. 350,862
In Germany June 7, 1939

7 Claims. (Cl. 23—273)

The invention relates to the production of coarse crystalline salts and more particularly to the production of coarse crystalline ammonium sulphate by means of apparatus generally known as saturators.

It has been proposed to arrange mechanical whirling elements inside the saturator by means of which crystalline salt is produced. The former elements were designed in such a way that a propeller, supported vertically within the saturator, whirls the crystals accumulating on the bottom of the saturator up through a pipe, in a manner to bring said crystals into a zone of the saturator bath where the gas enters the bath and the liquor is highly supersaturated, so that the crystals may grow further in size. Apparatus are likewise known in which the salts are whirled up by a stream of compressed gas. The above mentioned apparatus offer, however, the disadvantage that they require a constant control, and moreover the initial costs are very high.

Now, this invention has for its object to overcome the above difficulties. It performs the task and attains the purpose aimed at without requiring use of mechanical whirling elements or of compressed gases.

The accompanying drawing shows by way of example how my invention may be practised.

The gas to be treated enters the saturator through the connecting piece *a* situated at the top of the saturator with a pressure of about 800 mm. of water, then it flows through the submerged circumcentral gas distributing inlet rim *b* of a gas inlet dip pipe into the top surface of the bath liquor which consists of sulphuric acid, and escapes through the exit branch *c* to undergo further treatment. A well known type of salt ejector dip pipe *d* is installed centrally within the saturator. The top of the pipe is open to the atmosphere through an aperture. On account of the gas pressure prevailing within the saturator space *e* the solution level within the pipe *d* will lie at a level above the normal liquid level in the saturator determined by the pressure of gas within the space *e* on the surface of the bath. A second pipe (down flow conduit) *f* is inserted into the lower part of the salt-ejector dip pipe *d*. At its upper overflow-inlet end the pipe *f* is equipped with an adjustable funnel-like top *g* and its lower end fits into a branch, situated in the conical bottom of the saturator, similar to a socket. The outer surface of the pipe *d* is surrounded at its lower part by a solution distributing pipe *i* which is constructed like a calyx. The pipe *i* is designed in such a way that the bottom has an inlet opening *k* and the rim *l* has several outlets *m*. The pipe *i* is supported independently of the pipe *d* on several supports *n* fastened to the bottom or conical part of the saturator. If the rim of the adjustable top *g* of the pipe *f* is lowered below the liquid level present in the pipe *d* the liquid flows into the pipe *f* and is caught by the solution pump *o* which is connected with the pipe *f* by the branch *h*. It is forced through the branch *k* into the distributing pipe *i* from where it is delivered through the outlets *m* disposed in the upper part of the solution into the zone of crystallization. This solution is forced countercurrent to the gas stream escaping from inlet *b* by the pump *o* directly into the path of the gas issuing from the branches *b* of the submerged circumcentral gas inlet in the crystallization zone, where the newly formed crystals may combine with those already present. The heavy, large sized salt remains on the bottom of the funnel due to its gravity. It is lifted in the well known manner by the ejector *p* to the top of pipe *d* and then delivered from the top to the usual centrifuging machines outside the saturator vessel.

The known normal liquid level overflow *q* arranged at the periphery of the saturator jacket allows so much solution to flow over as is necessary for the extraction of the tar. The solution then passes through the pipe line *r* into the solution decanter pots *s*. It leaves by the branch *t*, reaches the pipe line *u*, and is taken up by the pump *o* which delivers it to the bath through the distributing pipe *i*.

In accordance with the operating conditions, the overflow of the solution from within the pipe *d* may likewise be effected outside the saturator. The solution in this event then flows through the connecting pipe (overflow level inlet) *v* and the down-flow pipe *w* into the solution decanter pot *s* from which it flows out through *t* and *u*, and it is delivered in the usual way by the pump *o* and pipe *i* into the bath inside the saturator. The flow through pipe *v* is regulated by valve v^1.

I have now above described my present invention on the lines of the accompanying drawing but my invention is not limited in all its aspects to the mode of carrying it out as described and shown since the invention may be variously embodied within the scope of the following claims.

I claim:

1. In saturator apparatus for the production of coarse crystalline salts, comprising: a saturator vessel adapted to contain a reactant bath;

a gas inlet arranged in said vessel around its vertical axis at a level above the bottom of the vessel; salt ejector-pipe means extending from the bottom of the vessel upwardly above the gas inlet and centrally thereof; a dip-conduit extending from above the gas inlet downwardly through the gas inlet and terminating in open communication with the vessel at a level below the gas inlet, said dip pipe being interposed between the gas inlet and the salt-ejector pipe means; and a gas offtake from the vessel at a level above the gas inlet; the combination of a solution down-flow pipe having an adjustable overflow level inlet thereto disposed inside the dip-conduit with the overflow inlet at a level above the level of the gas inlet; a solution distributing pipe surrounding the dip-conduit and having a liquid inlet at its lower part and liquid outlet means at its upper part, disposed to discharge liquid into the bath in the path of gas from the gas inlet; and liquid circulation conduit-means including a pump connecting the bottom of the overflow downflow pipe with the inlet of the distributing pipe for forcing liquid overflowing into the overflow pipe from inside the dip-conduit back into the bath in the path of gas issuing from the gas inlet.

2. In saturator apparatus for the production of coarse crystalline salts, comprising: a saturator vessel adapted to contain a reactant bath; a gas inlet arranged in said vessel around its vertical axis at a level above the bottom of the vessel; salt-ejector pipe means extending from the bottom of the vessel upwardly above the gas inlet and centrally thereof; a dip-conduit extending from above the gas inlet downwardly through the gas inlet and terminating in open communication with the vessel at a level below the gas inlet, said dip-conduit being interposed between the gas inlet and the salt-ejector pipe means; and a gas offtake from the vessel at a level above the gas inlet; the combination of a solution distributing pipe surrounding the dip-conduit and disposed to discharge liquid into the bath into the path of gas issuing from the gas inlet; a decanter pot outside the saturator vessel; a solution overflow conduit having an overflow level inlet thereto disposed inside the dip-conduit at a level above the level of the gas inlet, said solution overflow conduit extending laterally at a level above the level of the gas inlet from the dip-conduit to outside the saturator jacket; a downflow conduit with flow regulating means both outside the saturator and connected to receive solution from said solution overflow conduit and discharge in said decanter pot; and liquid circulation conduit means including a pump connecting the decanter pot with the distributing pipe for forcing liquid that overflows into the decanter pot, from inside the dip-conduit, back into the bath in the path of gas issuing from the gas inlet.

3. In saturator apparatus for the production of coarse crystalline salts, comprising: a saturator vessel adapted to contain a reactant bath; a gas inlet arranged in said vessel around its vertical axis at a level above the bottom of the vessel; salt ejector pipe means extending from the bottom of the vessel upwardly above the gas inlet and centrally thereof; a dip-conduit extending from above the gas inlet downwardly through the gas inlet and terminating in open communication with the vessel at a level below the gas inlet, said dip-conduit being interposed between the gas inlet and the salt-ejector pipe means; and a gas off-take from the vessel at a level above the gas inlet; the combination of a solution overflow means, with adjustable means for regulating the level of overflow, communicating directly with the inside of the dip-conduit at a level above the level of the gas inlet; a solution distributing pipe surrounding the dip-conduit and having a liquid inlet at its lower part and liquid outlet means at its upper part, disposed to discharge liquid into the bath in the path of gas from the gas inlet; and liquid circulation conduit-means including a pump connecting the solution overflow means with the inlet of the distributing pipe for forcing liquid overflowing into said overflow means from inside the dip-conduit back into the bath in the path of gas issuing from the gas inlet.

4. In saturator apparatus for the production of coarse crystalline salts, comprising: a saturator vessel adapted to contain a reactant bath; a gas inlet arranged in said vessel around its vertical axis at a level above the bottom of the vessel; salt-ejector pipe means extending from the bottom of the vessel upwardly above the gas inlet and centrally thereof; a dip-conduit extending from above the gas inlet downwardly through the gas inlet and terminating in open communication with the vessel at a level below the gas inlet, said dip-conduit being interposed between the gas inlet and the salt-ejector pipe means; and a gas offtake from the vessel at a level above the gas inlet; the combination of a solution distributing pipe surrounding the dip-conduit and disposed to discharge liquid into the bath into the path of gas issuing from the gas inlet; a decanter pot outside the saturator vessel; a solution overflow conduit having an overflow level inlet thereto disposed inside the dip-conduit at a level above the level of the gas inlet and connected to discharge in said decanter pot; and liquid circulation conduit means including a pump connecting the decanter pot with the distributing pipe for forcing liquid that overflows into the decanter pot, from inside the dip-conduit, back into the bath in the path of gas issuing from the gas inlet.

5. Saturator apparatus as claimed in claim 1, and in which the solution downflow pipe that is arranged inside the dip-conduit is connected to the liquid circulation conduit-means by a socket connection with a connecting piece therefor disposed in the bottom of the saturator.

6. Saturator apparatus as claimed in claim 1, and in which the dip-conduit extends to the top of the saturator, and in which a screw spindle having a hand wheel at the top of the saturator extends from the top thereof down through the dip-pipe to the overflow inlet for adjusting the level of the overflow inlet.

7. Saturator apparatus as claimed in claim 1, and in which the distributing pipe is supported upon several supports fastened to the bottom of the saturator, for supporting the distributing pipe separately from the dip-conduit it surrounds.

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