P. VIALLEIX & F. PERRIN.

APPARATUS FOR CONCENTRATING SULFURIC ACID.

APPLICATION FILED MAY 6, 1911.

1,066,557. Patented July 8, 1913.

Fig. 1.

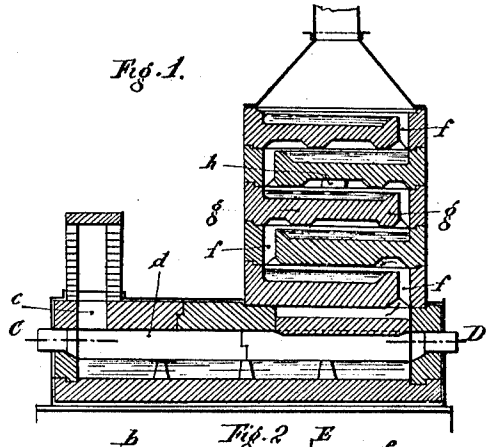


Fig. 2.

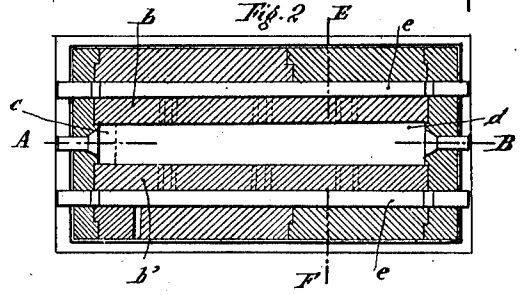


Fig. 3.

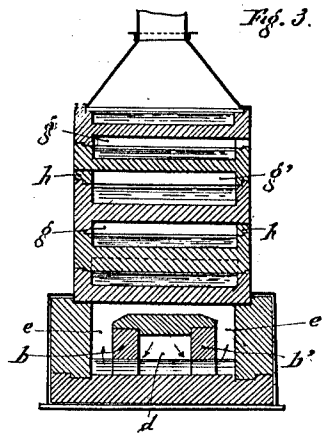
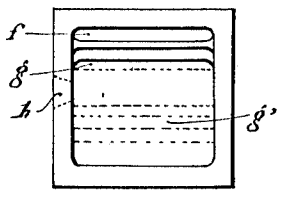


Fig. 4.



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UNITED STATES PATENT OFFICE.

PIERRE VIALLEIX AND FERNAND PERRIN, OF VOLVIC, FRANCE.

APPARATUS FOR CONCENTRATING SULFURIC ACID.

1,066,557. Specification of Letters Patent. Patented July 8, 1913.

Application filed May 6, 1911. Serial No. 625,625.

To all whom it may concern:

Be it known that we, PIERRE VIALLEIX and FERNAND PERRIN, citizens of the French Republic, residing at Volvic, Puy-de-Dome, France, have invented certain new and useful Improvements in Apparatus for Concentrating Sulfuric Acid, of which the following is a specification.

This invention relates to improvements in apparatus for concentrating sulfuric acid of the type in which the concentration is effected by hot gases which are drawn over and through the liquid while the latter is descending a series of trays or troughs the lowest of which contains a quantity of concentrated acid and is provided with baffle plates so that the entering gases are drawn through the liquid.

This apparatus is known as the Kessler type.

The improvements forming the subject of this patent comprise: modifications made in the construction of the lowest trough of the Kessler apparatus, the use of a new generator for this apparatus which does away with the use of porcelain, the combination of the said generator with the improved lower trough forming a new apparatus which is stronger, cheaper and more economical than the existing apparatus.

The modifications made in the construction of the lower trough consist in obviating the use of pumice stone for the inner packing, and in the reduction of the blast and other flues formed by the baffles. These blast flues, to the number of three in the old apparatus, have been reduced here to one central flue, and the other flues to the number of four, have been consequently reduced to two. The excessive number of blast and other flues necessitated a very complicated construction which weakened the apparatus, as they were constituted by very thin pumice stone partitions, the lower parts of which deteriorated very easily either owing to cleaning or to the working of the apparatus itself This improvement makes possible the use of refractory materials other than pumice stone and of a sufficient thickness for insuring perfect strength, thus avoiding the trouble and expense caused by the frequent repairs of the old apparatus. Lava or sandstone for example, could be used.

The drawing accompanying this description shows the improved apparatus.

Figure 1 is an elevation in longitudinal section of the apparatus on the line A—B of Fig. 2; Fig. 2 is a horizontal section of the lower trough on the line C—D of Fig. 1; Fig. 3 is a cross-section in elevation on the line E—F of Fig. 2, Fig. 4 a plan of one of the regenerator plates.

As shown in Figs. 1–3 of the drawing, only the two longitudinal baffles b and b' with a central gas inlet at c, have been retained. The hot gases coming from the gas generator, are drawn in by means of a fan or blower of any construction, into the central flue d and discharged afterward into the two flues e e. It follows from this arrangement that the working of the apparatus is greatly simplified, while offering the greatest guarantee of strength. The cleaning of the apparatus is also easier, the number of flues being reduced to a minimum. On coming out from the lower trough the hot gases are drawn into a regenerator of novel form. In this regenerator, the use of porcelain parts such as supports, caps and retrogradation cups, has been done away with, while the surfaces of contact between the hot gases and the acid to be concentrated, have been increased, which is an essential condition for evaporation and for insuring high efficiency. In order to obtain that result, the device used comprises several superposed plates recessed so as to form each a cup intended to receive the acid to be concentrated. Each plate is moreover arranged in such a manner that its bottom portion acts in the same way as the porcelain caps of the plates in the old apparatus. The retrogradation of the acid from cup to cup, takes place through the gas inlet opening f. This admission of the gases into each cup takes place through a single orifice f (Figs. 1 and 4) situated at the side and alternating. Projections g and g' are provided in the bottom portion of each plate situated above and at the same time forming a cover. These projections g and g', while increasing the strength of the plates, touch the liquid in the plate below, thus forming the necessary contact surfaces, and replace the porcelain caps hitherto used for the purpose. The resulting economy can be easily seen. On the one hand, the plates no longer having any cut-out portions required for the passage of the porcelain supports, the number of which varied from 18 to 36 for each of them, thus offering guarantees of strength, cheapness and unusual durability compared

to those of the old system, the numerous porcelain parts of which were frequently broken by the action of sudden changes of temperature, thus rendering the use of the generator very precarious and necessitating frequent repairs.

Owing to the use of this new recuperator without special parts or joints of any kind, the durability of the apparatus will be not only greater, but there will be also a considerable saving of fuel, as the regenerator, always being in perfect condition, the concentration of acid in the same will be more active and will thus have a higher concentration, so that the acid will enter the lower trough at 65° B., which will greatly facilitate the work of the latter for obtaining acids at 96 to 97% of H_2SO_4 required more and more industrially.

Inspection and cleaning holes *h* are provided for each plate.

What we claim as our invention and desire to secure by Letters Patent is:—

1. Apparatus for concentrating sulfuric acid comprising a trough adapted to contain concentrated acid, baffles within said trough forming one central and two side passages only and having openings below the surface of said liquid through which gases are drawn, in combination with a regenerator comprising a series of superposed plates provided with projections and having orifices disposed on alternate sides, substantially as herein described.

2. Apparatus for concentrating sulfuric acid comprising a casing, a series of superposed plates within said casing and arranged to permit hot gases to be drawn therebetween, weirs on said plates adapted to retain acid thereon, projections on the lower side of each of said plates extending below the surface of the acid on the next lower plate, a lower trough adapted to contain acid two baffles projecting into said acid and a cover upon said baffles, for the purpose set forth.

3. Apparatus for concentrating sulfuric acid, comprising a trough adapted to contain concentrated acid, two longitudinally disposed baffles formed of refractory material and a cover for said baffles arranged to cause gases drawn between said baffles to pass below the surface of said acid, in combination with a casing, a series of superposed plates within said casing, weirs on the upper sides of said plates adapted to retain acid thereon through which hot gases may be drawn through openings between said plates and projections on the lower side of each of said plates extending below the surface of the acid on the next lower plate substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

PIERRE VIALLEIX.
FERNAND PERRIN.

Witnesses:
GEORGES TANGIER,
LOUIS DAINDUR.