In the experiments made I collected first in the evening and afterwards in the morning. The plants used for the two experiments belonged to two different localities. The results of both investigations showed slightly more pentosans in the morning, but the differences found do not exceed the limits of experimental error. The seeds of tropaeolum majus contain a pentosan that is soluble in boiling water and conducts itself also in other respects as starch. I therefore experimented also with this plant. The plants contain but little pentosan, the leaves 4 per cent., and the stems 6.5. The leaves are very thin, and therefore I was obliged to take 300 leaves in order to obtain enough substance for the estimation of the pentosans. These leaves were cut during several evenings and nights in succession. One square meter of leaves lost during the night 2.742 grams of dry matter, but only fourteen mgms. of pentosan.

All these investigations show that an accumulation of pentosans in the day time and transportation of the same during the night does not take place. The pentosans therefore are not formed by the assimilation process, unless in such imperceptible quantities as can not explain the large amounts that plants contain.

The theory of Fischer, according to which a formation of pentoses by the assimilation process is improbable, thus receives unexpected support.

IMPROVEMENTS IN THE MANUFACTURE OF SULPHURIC ACID.

By Peter S. Gilchrist.

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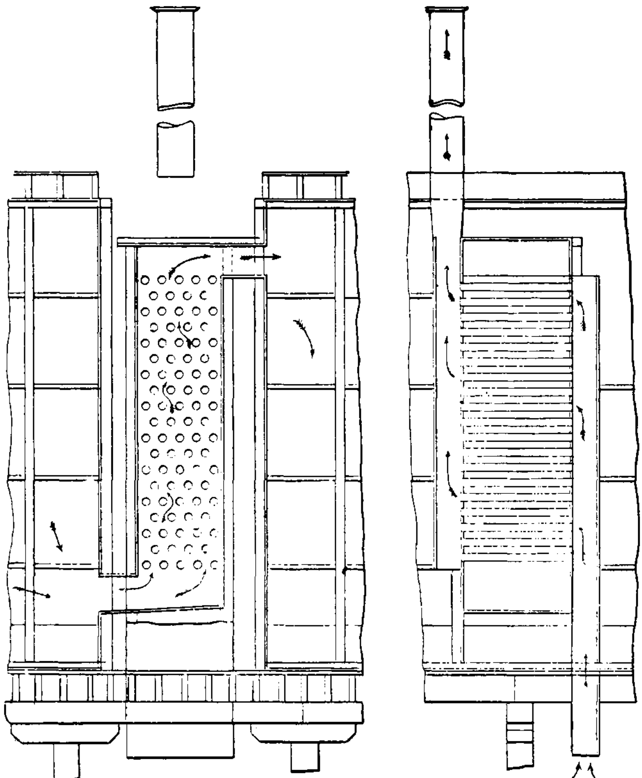
ANYTHING tending towards cheapening the cost of producing sulphuric acid has now become of vital importance to chemical manufacturers. The chief source of improvement lies in the reduction of the large chamber space necessary for condensation, owing to its cost and maintenance. This has been attained in several ways.

A simple but very effective method has been devised by Hacker and Gilchrist, which has been attended with very satisfactory results, their device having been covered by patents in this country and in England.

DEVICE FOR SAVING CHAMBER SPACE.
Hacker & Gilchrist's Patent.



The gases in passing from one chamber to another, are drawn through a leaden tower, called a pipe column. This column is filled with horizontal lead pipes burnt to the sides, and so placed as to continually break the course of the gases, but at the same time allow them to pass.

Through the horizontal pipes, air of ordinary temperature is drawn, by means of a chimney, or preferably by artificially cold air forced through by means of an air pump.

During the passage of the gases through these columns they are thoroughly mixed, a strong reaction resulting, consequently heat is evolved. This heat is carried off by means of the cold air passing through the pipes. Moisture is supplied by steam entering into the column along with the gases, or by running weak acid down the column.

These towers or pipe columns can be placed between the Glover and the first chamber, between the several chambers, and between the last chamber and Gay-Lussac towers. The object of this last position is to cool the gases, and remove the last traces of sulphuric acid before entering the Gay-Lussac tower, so that it can be used fully for absorption, for in so many instances the lower part of the tower is simply lost for the recovery of the nitrous gases.

At the works of the Wando Phosphate Company, of Charleston, S. C., these columns have been adopted. The chamber capacity is 246,400 cubic feet. The plant consists of four chambers, the first three being each of 78,400 cubic feet capacity, and the last one 11,200 cubic feet capacity, with Glover, and two Gay-Lussac towers. There are thirty-eight lump pyrites burners, each of 750 pounds capacity per twenty-four hours of fifty-two per cent. ore, making the chamber space for sulphur actually burnt a little under seventeen cubic feet per one pound of sulphur, per twenty-four hours.

There can be readily added six additional furnaces to thirty-eight, increasing them to forty-four, as chambers three and four are simply storages for nitre, almost all the acid being made in the first and second chambers. This would bring the capacity down to fifteen cubic feet per one pound of sulphur burnt.

The yield of acid has been in the neighborhood of 4.75 pounds of 50° B. acid per one pound of sulphur. As the pipe columns were added to a plant already built, they could not be placed to the best advantage; the first three chambers being 160 feet long, the pipe columns are at too great a distance from each other, so are not as effective as if in conjunction with smaller chambers.

These pipe columns need little attention, as the steam being regulated by the strength of the drip, when once regulated need not be touched, if the steam for the chambers is supplied through a self-regulating pressure gauge.

The advantage of the pipe columns in warm climates is very great, the yield of acid per chamber space being largely increased, thirty to forty-five per cent., according to the number of pipe columns used. The yield of acid per quota of sulphur is also increased, and a saving of nitre is effected. These towers being made of lead, are not very expensive, so are likely to become adjuncts to many chambers, especially as they can be added to existing plants.

Since this paper was written, I have planned two new acid plants, saving chamber space by means of the foregoing device; these two plants are now under course of construction.

CHARLESTON, S. C.

THE EDUCATION OF INDUSTRIAL CHEMISTS.[1]

By Henry Pemberton, Jr.

SOME years ago a chemical firm in one of our eastern cities was desirous of obtaining the services of a chemist, who should take charge of the factory. Accordingly, advertisements were inserted in the industrial journals, for a man who should not only be familiar with the analytical work necessary, but who could also assume the responsibility of overseeing the plant, checking the running of the various processes, and meeting the emergencies that are constantly arising in operations of this kind.

A large number of answers were received. Interviews were requested with those who, from their letters, appeared to be the most likely to suit. But as a result, it soon appeared that the securing of a competent man was by no means an easy matter. Some of the applicants, whose letters were most assuring, turned out to have been simply laboratory boys. Others, more promising, were of foreign birth, but unfamiliar with the language and customs of this country. Some were undesirable on account of their personal manner or character. But, by far the most general objection, was that the knowledge and experience of these chemists were limited to the field of analytical chemistry, and to the work of the laboratory. They were entirely familiar with the handling of beaker glasses and funnels, plati-

[1] Read before the Worlds' Congress of Chemists, August 26, 1893.