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**In 1982, the name of the International Superphosphate Manufacturers' Associations (ISMA) was changed to International Fertilizer Industry Association (IFA).*

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THE MODIFICATION OF BROADFIELD ACIDULATING UNITS IN EGYPT.

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The Society Financiere et Industrielle d'Egypte, has started up to make superphosphate in 1937 adopting at that time the continuous method for manufacturing superphosphate, and using the Broadfield Acidulating unit.

The Society Financiere started with a 5 ton unit and then with a 10 ton per hour unit.

During war time communications between Egypt and England were not so easy and we suffered much from lack of spare parts.

The Egyptian phosphate is containing a high percentage of chlorides and fluorides, making during the reaction a severe attack on most of the metallic parts during the acidulation process. The main mixing shaft was badly affected and could not last over a few months unless lined with lead sheets to protect the steel from the attack of gases. The same has been observed on the bolts and nuts holding the mixers with the mainshaft.

The addition of lead to the main shaft increased its weight, and together with the attack of gases, the main shaft used to break every now and then. This made us think of some way or other to get over these troubles, especially if we had to import these shafts from abroad.

Taking into consideration the above points and at the same time the difficulty of casting the body of the mixer or importing it from abroad, the following modification has been tried:-

- a) Making the body of the mixer from iron sheet.
- b) Protecting the iron sheet with anti-acid bricks.
- c) Shortening the mixer gradually from 4 metres down to 1.7 metres, and accordingly shortening the main shaft.

This also led to the decrease of the number of paddles from 30 to 9.

This modification was first started with the 5 ton unit, and in order to obtain a thorough mixing of the phosphate and the acid,

we increased the speed of the mixer from 150 to 425 r.p.m. The speed of the table feeder and the number of holes in this feeder have also been increased, and the speed of the den has been brought from 8" to 11" per minute.

In this way the output of this machine was raised up from 5 tons per hour to 15 tons per hour, and the product obtained was coming out as granules but of different sizes and granules were not hard.

The advantage of obtaining a granular product was so big to us, because on storing for some time the fine superphosphate used to stick together and become very hard for filling in the sacks, while in this granulated form it is very easy to manipulate.

This machine has been running for twelve months without any trouble, where the above mentioned advantages could be traced.

A typical analysis of the phosphate and the fresh superphosphate produced is the following:-

| | |
|-------------------------------|--------|
| Phosphate : Sibayia type | |
| Tricalcium phosphate | 64.26% |
| Fineness through No.100 sieve | 91.00% |

| | |
|--|--------|
| Superphosphate : Good mechanical condition | |
| Moisture | 11.20% |
| Free Acidity P ₂ O ₅ | 4.12% |
| Water soluble | 15.76% |
| Total P ₂ O ₅ | 18.75% |
| Recovery | 84.00% |

It may be thought that the recovery figure is poor. This is really our practice in the superphosphate manufacture, as we regard a higher recovery as a mere waste of acid.

The Superphosphate in Egypt is often marketed as 15/16% grade, no credit being paid for extra water soluble units. By the application of more acid, as much as 93% recovery could be obtained which does not give us any profit.

In the same way, a 10 ton per hour unit has been modified to produce 25 to 30 tons per hour.

This unit is running satisfactorily after overcoming all the difficulties met with.

Our future aim is to go further with the increase in the mixer speed, for the purpose of more improvement in the quality of superphosphate produced.
