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IMPROVEMENTS IN THE MANUFACTURE OF NITROPHOSPHATE COMPOUND FERTILIZERS

by

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In all known processes of manufacturing nitrophosphate compound fertilizers, that is to say processes where the fertilizer passes through a liquid phase before it is granulated, there is always an operation where the liquid fertilizer is mixed with the fines of the same fertilizer being returned after screening.

This operation has a double purpose:

1) to redistribute the fines after screening
2) to give a more solid consistency to the product which is about to enter the drier, and thus avoid the formation of awkward lumps.

These two purposes do not necessarily require the same quantity of fines and on the whole there is not usually enough genuine fines available to make a thick enough slurry from the liquid mass which leaves the saturation chambers. Thus, what usually happens is either that the less fine particles have to be crushed to supply more fines, or the coarser particles are used to make the slurry, with obviously unsatisfactory results.

In any case, if we work out the weight of fines needed to bring the liquid to the right degree of thickness, and if we compare this weight with what is actually used, we notice that the utilization coefficient of the fines is always low, no matter how they are obtained; in industry this coefficient is usually in the region of 30%.

We have been trying to raise this coefficient of utilization and we thought that the physical conditions which would give an increase in the apparent volume of the slurry should be those which favoured quick wetting of the fines by the slurry and that there would be a parallel increase in the utilization coefficient. We therefore set about dispersing the gas in the

slurry before mixing it with the fines and we were rewarded by a very definite improvement in the running of the granulation unit.

There are various ways of dispersing gas. Air may be introduced effectively by mechanical means in the slurry, but the method we found simplest and easiest to use was the following: it consists of adding to the slurry, which still contains small amounts of P_2O_5 in the form of monocalcium phosphate, a very little powdered calcium carbonate. The reaction of the calcium carbonate with the monocalcium phosphate causes CO_2 to be given off, and this is evenly dispersed throughout the mass. The slurry is bloated and aerated and is now ready to receive the fines. The action is very rapid when working with hot slurries. Naturally, the point at which the carbonate is introduced must be carefully timed to ensure that the CO_2 dispersion happens at just the right moment.

The following results are then found:

- the mixture of spongy slurries and fines is more homogeneous and the apparatus remains considerably cleaner;
- the evaporation action of the drier, that is, its output, is considerably increased;
- the dried products obtained do not foul the equipment, elevators, chutes, sieves, crushers, etc.
- the product just as it comes from the drier no longer contains hard, ill-dried lumps, its particle size is much more regular and a little finer;
- the crusher therefore has less work to do;
- the stored product no longer tends to cake;
- the stored product takes up less moisture, even in open storerooms where there is no air-conditioning, though so far no one has been able to offer a satisfactory explanation for this phenomenon.

Finally, examination of a section of the granules formed in this way shows that they exhibit a cellular structure, while the surface of the granules is perfectly smooth as the cells are very fine, though visible to the naked eye.

We think that the use of this process, which is very simple to operate, offers two alternative advantages:

either 1) to make better use of existing plants by increasing output and decreasing maintenance;

or 2) to allow the introduction of lighter units, taking up less space and cheaper to maintain than the existing units. This is why we thought that it would be helpful to make this improvement known to the members of I.S.M.A.