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METHOD OF MAKING CALCIUM POLYSULPHIDE

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Fig. 1.

Fig. 2.

Fig. 3.
This invention relates to methods of making calcium polysulphide, commonly called lime-sulphur solution, said solution being employed as an insecticide on vegetable growths.

5 An important object of the invention is to overcome the danger of explosion during the operations that are performed in making the calcium polysulphide.

Another important object is to effect maximum reaction between the lime and sulphur, thus economizing in the use of these materials.

Another object is to prevent, to a high degree, the formation of insoluble compounds of the nature produced by air contact during the reaction between lime and sulphur.

Another object is to provide for a continuously operated process and one which requires in its performance very little labor, thus reducing the cost of manufacture.

The accompanying drawings illustrate an apparatus built in accordance with the provisions of the invention and capable of performing the various operations of the process.

Figure 1 is a plan view of the apparatus.

Figure 2 is a front elevation of Figure 1.

Figure 3 is a side elevation from the left of Figure 2.

It is to be understood that the method may be performed in different apparatus than that now to be described, said described apparatus being typical of those that may be employed to perform the new method.

Referring to the drawings, there are provided hoppers or bins 4, 5, one for sulphur and the other for lime. In this particular instance, the hopper 4 contains lump sulphur and the hopper 5 lump lime. The sulphur and lime are elevated to the hoppers by suitable elevators 6, 7, respectively.

The lower ends of the hoppers are provided with mechanically operated feeders 8, 9, respectively. These mechanically operated feeders need not be described in detail herein as they are well understood in the art relating to such devices.

The sulphur and lime discharge from the hoppers 4, 5, into a mechanical mixer 10 which, in this instance, is in the form of a screw conveyor that not only serves to preliminarily mix the lime and sulphur but to convey the mixture into a tube mill 11. This tube mill 11 need not be described in detail herein as the construction of tube mills is well understood in the art relating thereto. The tube mill, in this instance, serves to grind the lump sulphur and to mix the ground sulphur and the lime with steam and hot water admitted to the tube mill through a nozzle 12 inserted into one end of the tube mill. To the nozzle 12, hot water is supplied through a pipe 13 and steam is supplied through a pipe 14. The discharge spout of the tube mill is indicated at 15, and positioned to receive the mixture that discharges from the tube mill is a tank 16, in which further boiling of the mixture may take place. A stirring device 17 may be provided for the tank 16 operated by miter gears 18 from a prime mover 19.

Near its lower end, the tank 16 is provided with a discharge pipe 20 connected with a pump 21 whose discharge pipe 22 may be connected with a filter, as it is generally desirable to filter the solution.

The tube mill 11 is provided near one end with a ring gear 23 turned by a pinion 24 that is operated by a prime mover 25. The shaft 26 of the screw conveyor 10 connects through driving connections 27 with a shaft 28 from which each of the feeders 8, 9 is operated by a pitman 29 connected with a rotary member 30 on the shaft 28. Driving connections 31 connect the shaft 28 with the elevator shaft 32.

The method is performed in the above described apparatus as follows: Lump sulphur is discharged by the elevator 6 into the bin 4 and, from the calcining plant and in the lump form that it issues from said plant, is discharged by the conveyor 7 into the bin 5. The motors 10, 25 being set into operation, the mechanical feeders 8, 9 which are set to feed the sulphur and lime in the desired proportions, discharges the sulphur and lime into the conveyor 10 where they are mixed. From the conveyor 10, the lime and sulphur discharge into the tube mill 11. The water and steam will be turned into the tube mill so as to produce a wet mixture for grinding. Rotation of the tube mill grinds the lump sulphur and at the same time thoroughly mixes the same with the hot water and lime.

The grinding being done while the ingredients are wet prevents explosion and the steam admitted to the tube mill substantially prevents air from entering the tube mill and combining with the sulphur to form insoluble compounds. The steam, hot water and the heat...
generated by the reaction between the lime and sulphur produces boiling of the mixture and this boiling continues while the mixture discharges from the spout 15. As the grinding and mixing proceeds from the left end of the tube mill to the right end thereof in the drawings, when the mixture discharges through the spout 15, said mixture is partly converted into calcium polysulphide.

The boiling mixture discharges into the tank 16 where it is agitated by the stirrer 17 and permitted to remain until the reaction is complete, the solution then being pumped to the filter, not shown.

The feeders and the valves 33, 34 on the water and steam pipes, respectively, will be properly adjusted to produce the desired product. Preferably the lime content of the finished product will be about 9 per cent, and the sulphur content about 24 per cent, and the solution 32° Bé.

The chemical reactions occur between the sulphur and lime particles in a manner readily understood in this art and I apprehend that an important advantage of this method arises from the fact that the grinding of the sulphur occurs while the polysulphide is being formed, since the sludge that remains when the reactions are completed contains only about one and one-half per cent of sulphur.

I claim:

1. The method of making calcium polysulphide consisting in grinding sulphur in the presence of lime and hot water.

2. The method of making calcium polysulphide consisting in mixing together lump lime and lump sulphur, adding hot water to the mixture, and grinding the sulphur in the mixture.

3. The method of making calcium polysulphide consisting in grinding sulphur in the presence of lime and hot water in an enclosed space, and discharging steam into the enclosed space to virtually exclude air.

4. The method of making calcium polysulphide consisting in grinding sulphur in the presence of lime and hot water in an enclosed space, and stirring the mixture for a period of time after the grinding operation is completed.

5. The method of making calcium polysulphide consisting in continuously moving lime and sulphur into contact with each other to form a mixture, continuously grinding the sulphur in the mixture, continuously adding hot water to the mixture while the grinding is being effected, and continuously drawing off the resulting product.

6. The method of making calcium polysulphide consisting in continuously moving lime and sulphur into contact with each other to form a mixture, continuously grinding the sulphur in the mixture, continuously adding hot water to the mixture while the grinding is being effected, continuously drawing off the resulting product, and continuously stirring the product thus drawn off.

7. The method of making calcium polysulphide consisting in boiling together lime, sulphur and water, and grinding the sulphur in the water while boiling.

Signed at Los Angeles, California, this 20th day of August, 1926.

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