

## TWO WAR-TIME MEASURES.

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Owing to the difficulty of maintaining supplies of essential raw materials, a search was made to minimise imports, and in two instances we have met with very encouraging results.

### 1.—ANIMAL CHAR.

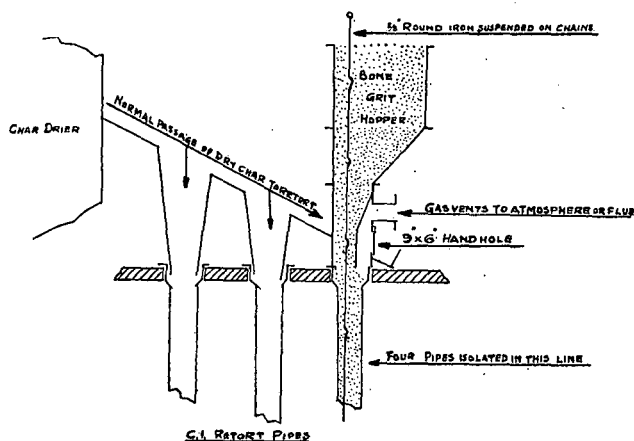
Our supplies of this material were imported and arrived at Bulawayo at a cost of £35 per ton. Our average yearly consumption is approximately 30 tons. After some research we have now achieved a satisfactory and easy means of producing this from degreased bone grit ground and graded to our specification by the local Cold Storage Commission. This is done by isolating four of the cast-iron retort pipes in our char revivifying furnace and passing the bone grit through.

A rough diagrammatical section of the arrangement shows the modification necessary in a conventional pipe kiln revivifier. The hopper through which the grit is fed is provided with a baffle and gas vent pipes, and the grit passes through the retorts and cooler pipes to the rocker valve gear and thence to a small bin built into the corner of the main char bin under the furnace. The partially charred grit is returned to the feed hopper and passed through again until its physical appearance and pH are satisfactory. Two or three passages are required, depending upon the temperature control of the furnace. Rods of  $\frac{1}{2}$ -inch round iron with kinks every three feet or so are suspended from chains above the hopper and pass through the four retorts and cooler pipes to within 6 inches of the rocker. It was thought that there might be a tendency for the grit to choke owing to tar liberation, but in actual practice we have seldom had cause to use the agitation that can readily be obtained by the use of these suspended bars.

No attempt is made to recover the gases and tar which issue from the hopper vent pipes. This could be readily done with suitable scrubbers. Slight alterations are necessary at the valve rocker to prevent admixture of partially burnt bone grit issuing from the fourth tube of the isolated bank with normal revived char emerging from the fifth tube of the row. This is a simple mechanical alteration that can be made in several ways. Tubes at the back end of the furnace, i.e., furthest from the actual fire, are more readily isolated than any others, and these tubes have been selected by us, although the temperature at this point is lower than elsewhere in the furnace.

The bone char as produced above is stored until a char filter has been "sweetened off." It is then put on top of the exhausted char immediately before washing off. In this way the new char gets eight hours washing with hot water before being put into use.

It then passes in the normal way into the revivifying furnace together with the old char. The loss in weight from bone grit to finished char is approximately 25 per cent. As stated, above four tubes have been isolated in a standard 80-tube kiln, and this gives us more than enough char for normal make up, so that if we use the apparatus continuously we shall quickly accumulate new stocks of char. We estimate the cost to be £14 per ton.

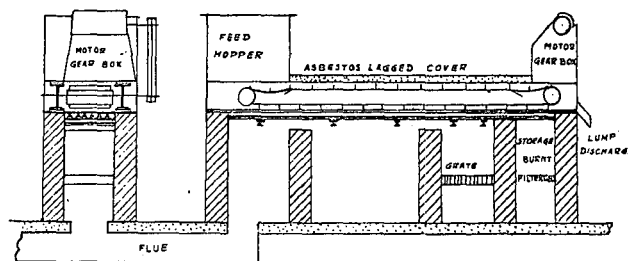


### 2.—REVIVIFYING "HYFLO SUPER-CEL."

For this purpose the cake from the Vallez filters is washed in the normal way and the sludge from the filters is passed through the sedimentation tanks where the mud settles. The supernatant liquid is drawn off at the week-end and the mud spread out and air-dried. The dry substance, which is quite friable, is fed into a continuous furnace, where the organic matter is partially burnt off. In this manner we recover some 60 per cent. of our "filter-cel," and more efficient sedimentation would considerably increase this proportion. The "filter-cel" thus revived has a higher filtering rate than the original substance. This may be due in part to the addition of spongy carbonaceous matter due to charring the organic matter in the used "filter-cel," and in part to the elimination of the finer amorphous-like particles in the sedimentation process. We have found that the actual ignition of the organic impurities is not necessary, although we did attempt this in our original experimental furnace.

Rough diagrammatical sketches of the furnace show the simple working principle. The apparatus consists essentially of a  $\frac{1}{2}$ -inch mild steel plate solidly stiffened to minimise buckling by welding 12-lb. rails longitudinally and transversely to the under side. This plate is then secured to two 10-inch by 5-inch R.S. joists. Two leys 45 chains connected with slats of 1-inch angle alternating with slats of loosely hanging light trek chain convey the material over the  $\frac{1}{2}$ -inch plate at the rate of 1 foot per minute. The counter-flow principle is used so that the "filter-cel" reaches the hottest part of the plate last. The plate is maintained at a very low red heat just above the furnace and partial ignition of the organic matter takes place at this point. The hot material then passes through a  $\frac{1}{2}$ -inch mesh screen to a storage bin, when it is drawn cool. Considerable quantities of dust are evolved due to minor explosions which take place where the organic matter ignites. The whole apparatus is, therefore, closed and so constructed that there is a gentle draught through the  $\frac{1}{2}$ -inch mesh screen at the discharge end to the flue at the back end of the furnace. The cost in fuel is almost negligible, and two natives on each shift easily handle the whole process from beginning to end. A  $\frac{1}{2}$ -h.p. motor suitably geared provides the motive power for the conveyor.

Rhodesian Sugar Refinery,  
Rhodesia.



Mr. HENDRY mentioned that during the last war some animal charcoal was made in Madras by heating bones in earthenware pots out of contact with air.

About twenty years ago the amount of charcoal required to decolorize the sugar in a refinery was about equal to the sugar itself. To-day very much less was used. This was due to better quality sugars being sent to the refineries and to the use in certain overseas refineries of the carbonation process. This process consisted of the fractional addition of about 0.4 per cent. calcium oxide on the melt and the passing through of washed and cooled flue gases. The syrup is brought to about pH 9 and then filtered and passed over the charcoal. Animal charcoal worked better on an alkaline solution, in contrast to most decolorizing carbons, which operated best in slightly acid solutions.

According to Lyle, in his book "Technology for Sugar Refinery Workers," there was a considerable improvement in the quality of sugar produced by the charcoal carbonatation process. Less than half the quantity of charcoal was used. This more than compensated the slight destruction of invert sugar.

Mr. Hendry said he had tried to apply this process to an ordinary sugar mill, but it was not a success as the carbonate formation was too slow on account of the low carbon dioxide content of the flue gases.

Mr. JOHNSTONE remarked that the washing period described by Mr. Martindale seemed very short. At the South African Refinery washing of new char was carried out for the

better part of a week. Even char in circulation was washed from 16 to 30 hours.

Mr. Johnstone pointed out that even at the C. & H. Refinery in California, where the super-cel was produced and was consequently much cheaper than in Rhodesia, they found it advantageous to revivify all the super-cel they used. They were, of course, doing it on a much bigger scale.

He thought it rather unusual that a faster rate of filtration should be obtained from revivified hyflo. Their experience at the refinery was that working with paper pulp a new charge would not give a clear filtrate. As the pulp became contaminated, however, a clear filtrate was obtained and old pulp was therefore preferred, but the rate of filtration was slower than with fresh filter medium.