Soyabean Oil Industry in Manchuria

A Review of Pressing and Extraction Methods in the Far East

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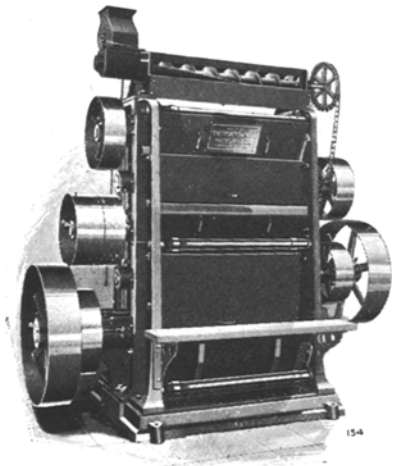
IN the September issue of OIL AND FAT INDUSTRIES, Mr. E. Govier gives us some information on the European methods of crushing Soyabeans. In this connection it may be opportune for the writer to relate some of his experiences pertaining to the Bean Oil Industry, particularly as observed during his stay in South Manchuria some seven years ago.

Solvent Extraction Popular in Europe

The description Mr. Govier gives of the equipment used in Europe seems to indicate that it is of English manufacture, but it is doubtful if at the present time there are many mills to be found in Europe which are still using hydraulic presses for extracting Soyabean oil; at least when the writer was in Europe in 1922 the more important mills had all adopted the chemical extraction process, on account of the greater yield of oil obtainable when solvents are used.



Crushing Rolls †

I had the opportunity of visiting the STETTINER OELWERKE, STETTIN, Germany, and also The DANSKE SOYAKAGEFABRIK, COPENHAGEN, Denmark*. The Danskesoyakagefabrik, at one time, had 32 plate presses of the type mentioned by Mr. Govier, for pressing soyabeans; now however they use a German built Extraction Plant which gives them a yield of 17 per cent of oil when dealing with 250-300 tons of beans every twenty-four hours. Their loss of benzine is only 1 per cent based on the raw material handled. Inasmuch as all the beans have to be imported, it stands to reason that it is more profitable to extract the oil with solvents than by the use of presses, particularly in European countries where highly skilled labor is available at low cost, including the services of expert chemists and chemical engineers. To operate a chemical extraction plant successfully it is indispensable to carefully supervise at all times the working of the machinery and to keep the same in first class condition so that solvent loss is kept at

† *Illustrations courtesy of French Oil Mill Machinery Co.*

*Both these concerns are among the largest producers of soyabean oil on the European continent and now use chemical extractors in preference to hydraulic presses. It can be said, incidentally, that soyabeans are one of the very few oil bearing materials which can be dealt with successfully in a chemical extraction plant.

a minimum and all operations are carried out as minutely as in a chemical laboratory. In this country we find that extraction plants have been unable to compete with the simpler and more reliable pressing method, which observation applies even more to foreign countries such as the Far East, where bean oil production is classed among the most important manufactures.

Pressing Plants in Manchuria

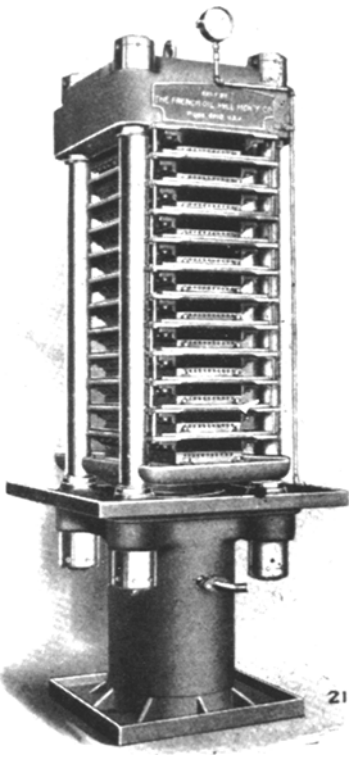
I was called upon in 1920 to design and equip two large Soyabean Oil Mills, one being erected in Yokohama and the other in Dairen, S. Manchuria. All the press room machinery was furnished by a large American manufacturer and in 1921-1922 I had the opportunity of visiting both mills which had been operated only a short time, but which were giving very good results. The presses used were and are standard cotton seed box presses, as shown in cut, which have proven to be far superior for soya bean pressing to the open Anglo-American plate presses as built by European manufacturers.

The mills in Dairen and Yokohama were equipped with French 4-high Vertical Automatic Continuous Cookers, each feeding a hydraulic automatic former which molded cakes for 6 16-Box Presses. Automatic Cake Strippers and Trimmers were installed to remove the press cloth and trim or pare the short oily sides of the cakes.

The great advantage a box press has over Anglo-American plate presses is the fact that the long sides of the cakes are hard and do not need trimming or paring, the short ends only being soft and oily, also the press cloth cannot creep the way it does with open plate presses. Press cloth consumption is thus greatly reduced with the use of the box presses.

Cleaning Equipment

For cleaning the beans, we installed a Howes Elevator Separator, working in conjunction with a magnetic separator to eliminate any iron and other metal, which are al-



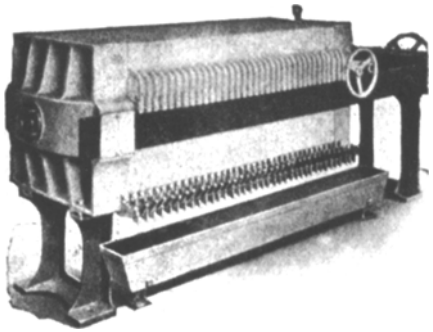
Box Press

ways found among the beans. The beans were reduced and ground into coarse meal in Bauer Bros. motor driven Attrition Mills and then further ground and flaked in standard French 5-high Crushing Rolls, the same style as are used in all the cottonseed oil mills in this country.

The pressed oil was of course immediately filtered and sold as crude oil, although part of it was

subjected to a refining process and converted into edible oil, of which large quantities were and still are exported to Europe.

We found that the necessary weight for forming one cake was not much less than 20 lbs., a 16-



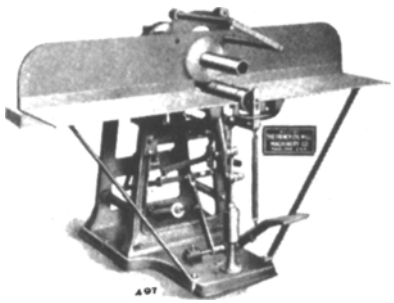
Filter Press

box press being capable of holding about 310 lbs. of material. A press was filled twice every hour and left 25-27 minutes under pressure, yielding from 40-44 lbs. of oil. The cakes from one press would weigh 250-260 lbs. We got thus a yield or crude oil of 13-14 per cent which was considered very good in view of the fact that in the old mills, using locally built presses and machinery the yield was rarely over 10 per cent.

Some Chinese Accounting

While the oil extraction left nothing to be desired, we were confronted with one difficulty and objection which was hard to overcome, namely the fact that one ton of beans would not produce the same amount of oil and cake as previously. In the Chinese way of crushing beans, there is no cleaning process. The resulting cake contains up to 15 and more per cent of oil, the tendency being to add as large a quantity of water as possible so as to increase the weight of the cake and make the sale more profitable. With our American machinery we were compelled to thoroughly clean the raw material, removing all dust, impurities and metallic parts, which cleaning process resulted in a loss of 5 per cent in weight. The slab cake made on our presses would contain from 9-10 per cent of moisture and it was not possible or feasible to increase this moisture content to any extent without seriously damaging the press cloth. For these reasons, when the tonnage of oil and cake produced in a month was totalled up, there was a shortage of anything from 5-10 per cent based on the weight of beans bought. Our Chinese and Japanese customers found this rather a drawback, as they had been accustomed to get 102-103 tons of oil and cake out of every 100 tons of beans.

Even so, they found the greater yield of oil far offset any loss in weight of oil and cake compared



Power Cake Stripper

to the quantity of beans delivered to the mill, and as far as the writer knows our machinery has been in continuous operation for the last seven or eight years, and having received no complaint whatever from the users, we can assume it to be giving good results and entire satisfaction.