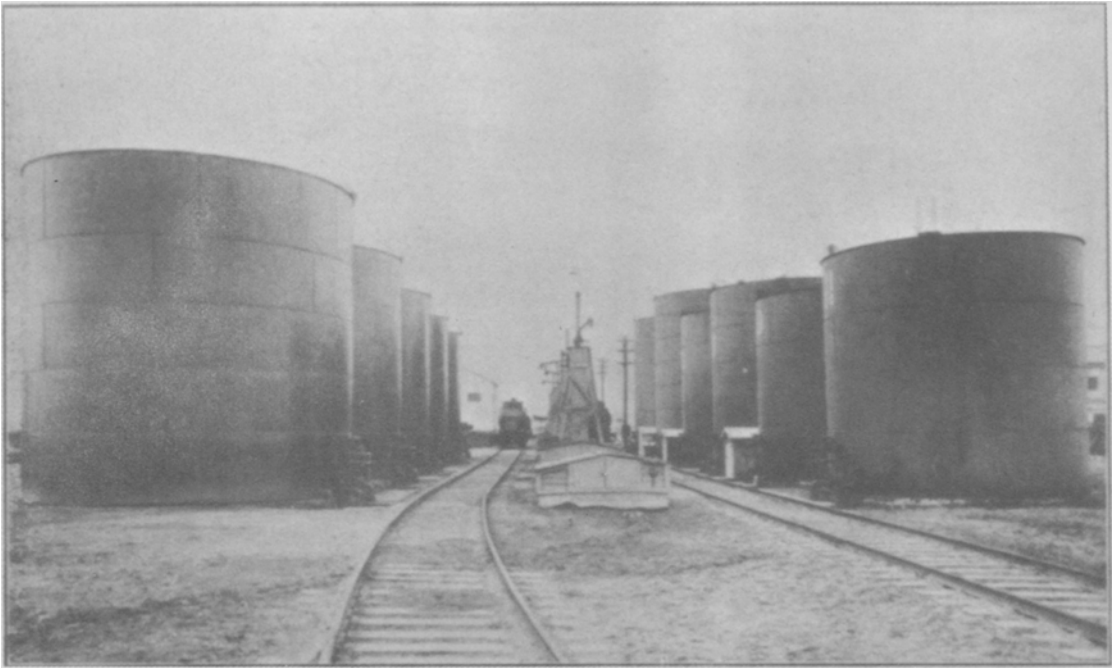


Vegetable Oil Storage Methods

*Discussing Types of Tanks Adapted to
Particular Storage Problems*

By ALAN PORTER LEE



Modern Seaboard Oil Terminal

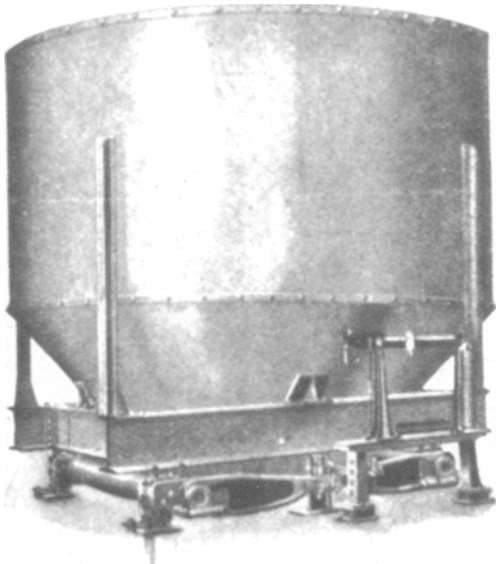
THE storage of fatty oils would appear at first glance to be the simplest factor in the business of manufacturer, importer or dealer in these commodities, but upon examination it is found that experience has shown the necessity for careful planning of storage facilities in order to avoid serious losses from waste, contamination or deterioration.

The requirements of storage installations vary over an extremely wide range, from the largest steel tanks for crude oils, to the smallest container of non-corrosive material for fine edible oils and their derivative products. The materials to be stored include products of the greatest diversity of melting and solidifying points, of viscosity, and of other properties, such as susceptibility to light and air, tendency to deposit sediment or to thicken, inflammability under certain conditions, etc.

Oil Receiving Stations

WE WILL consider first the requirements of a seaboard unloading plant for handling oils received from abroad. These may arrive in ships' tanks, in barrels or drums, or in wooden cases containing one or more tins per case. The grade of oil received is generally crude, but the kind may be any one of a number, including coconut oil, palm kernel oil, olive oil foots, soya bean oil, peanut oil, linseed oil, perilla oil, china wood oil, rapeseed oil, castor oil, whale oil, fish oils and many others. If the oil arrives in barrels or drums it is generally sent on to its ultimate destination without change of package, but if the containers are cased tins, they are usually emptied at the receiving wharf and the contents transferred to storage tanks to be dispatched in tank cars or barrels to the purchaser.

The first requisite then, of an unloading station, is a set of suitable dumping tanks for receiving case oil. These should be located under cover for protection from the weather and equipped with steam coils to facilitate liquefaction of their contents in cold weather. There should be a sufficient number of such tanks in the battery to enable simultaneous dumping of several kinds of case oil without fear of mixing or contamination. Each dumping tank should be provided with a bottom outlet toward which the entire tank bottom



Courtesy The Albright-Nell Co.

Scale Tank of Steel

should slope and the outlet should have a connection for drainage of water when the tank is being washed out. These dumping tanks are conveniently constructed of steel plates, riveted or welded.

The main storage tanks of the unloading station are generally constructed of sheet steel, riveted *in situ*, and must be of such number and such variety of size as will permit handling oil received in bulk in steamers' tanks as well as that dumped from cases. These storage tanks may be located in the open or under cover. In either case they must be equipped with individual steel covers, manholes in covers and at bottom of shell, ladders inside and out, continuous steam coils and bottom outlets with pump and drain connections. Such tanks are conveniently arranged as shown in the accompanying illustration of a typical seaboard vegetable oil terminal. It will be noted that the tanks, of varying size, are located adjacent to trackage, with tank car loading racks between the tracks and with loading pumps in individual houses between the tanks.

Storage at Oil Mills

THE OIL miller has important storage problems, including those relating to untreated seed, beans, copra; to cake and meal residuals from the pressing operations; as well as oil storage problems. The latter class only will be considered herein.

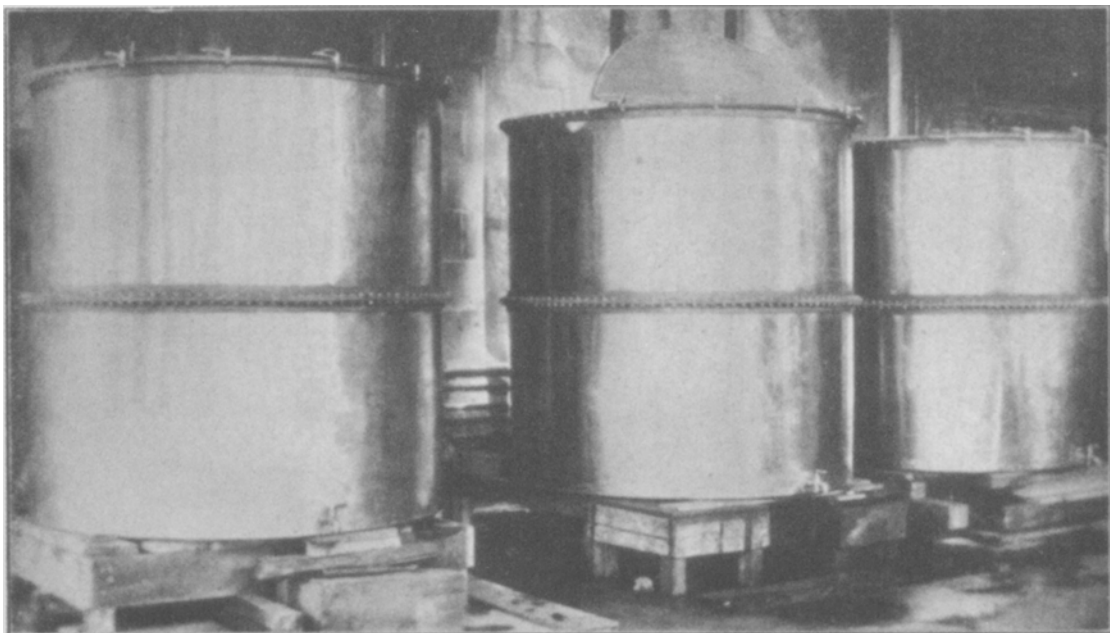
In most mills oil flowing from hydraulic presses, or from expellers, contains more or less sedimentary material (meal and albuminous matter), which must be removed as quickly as possible in order to prevent its fermentation and consequent deterioration of the oil. The general custom is to permit the oil to flow from the presses or expellers by gravity into shallow rectangular tanks of large cross-sectional area. The design of these tanks as affecting size and shape is more important than the material of which they are constructed, the obvious necessity being to obtain as great surface area in proportion to the depth of the tank as the space available will permit. Such tanks are universally constructed of riveted or welded steel plates and should be equipped with movable suction pipes for discharge of contents from any level of the tank, (to facilitate pumping off oil above the sediment level). The tanks should also be provided with bottom cleanout discharges and when the oil is of high melting point or the mill is located in a cold climate, these tanks must be provided with steam heating coils, which should be of the continuous welded flat-coil type.

From the receiving and settling tanks the oil is generally pumped through filter presses into bulk storage tanks of design entirely similar to those used in the seaboard terminal shown in illustration herewith, from which the product may be loaded into tank cars or barrels for shipment.

Oil Refineries

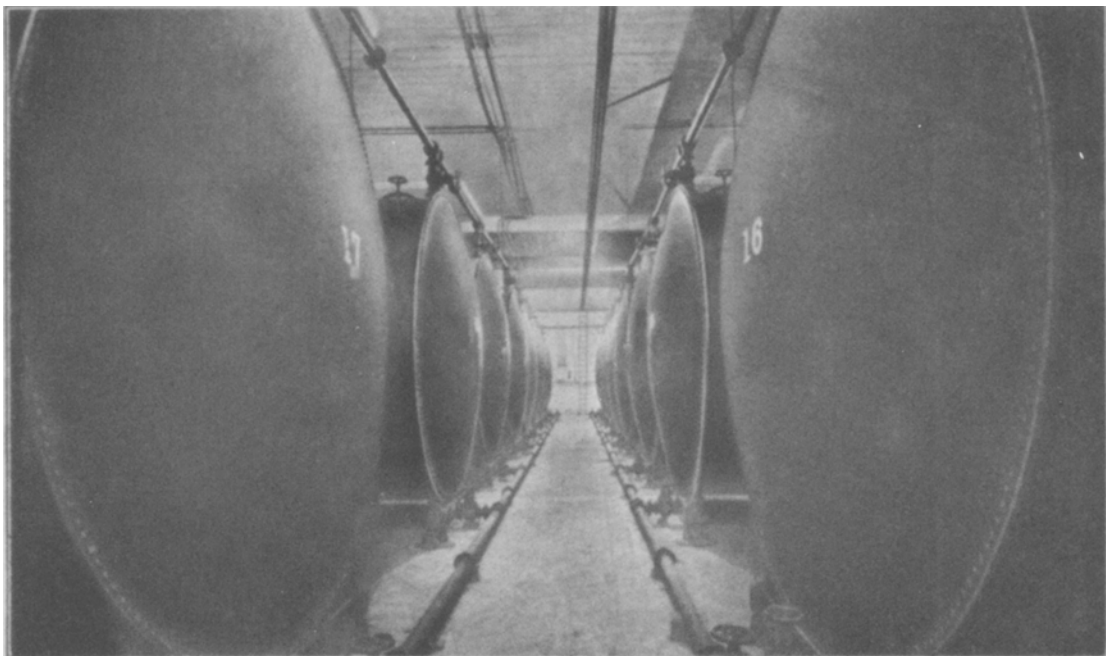
THE OIL refinery employs storage tanks of all varieties in the course of the many and varied operations which come under the head of refining. In many refineries it is the custom to unload tank cars of crude oil directly to the first process tanks, generally neutralizing tanks, in order to prevent deterioration of the crude material prior to refining treatment. In some cases, however, the nature of the crude oil is such that it may be safely stored and in such instances it is frequently unloaded from the tank cars to one or more standard bulk storage tanks to be held for refining as needed.

In any case, one of the refinery's most useful adjunct tanks is the scale tank, as shown in illustration on this page. Such a tank is used



Courtesy International Nickel Co.

Monel Metal Tanks for Storing Fine Oils



Courtesy Pfaudler Co.

Extensive Battery of Large Glass-lined Storage Tanks for Edible Oils

principally for the weighing of crude oil before refining, but may be adapted to the checking of weights of any intermediate or finished oils.

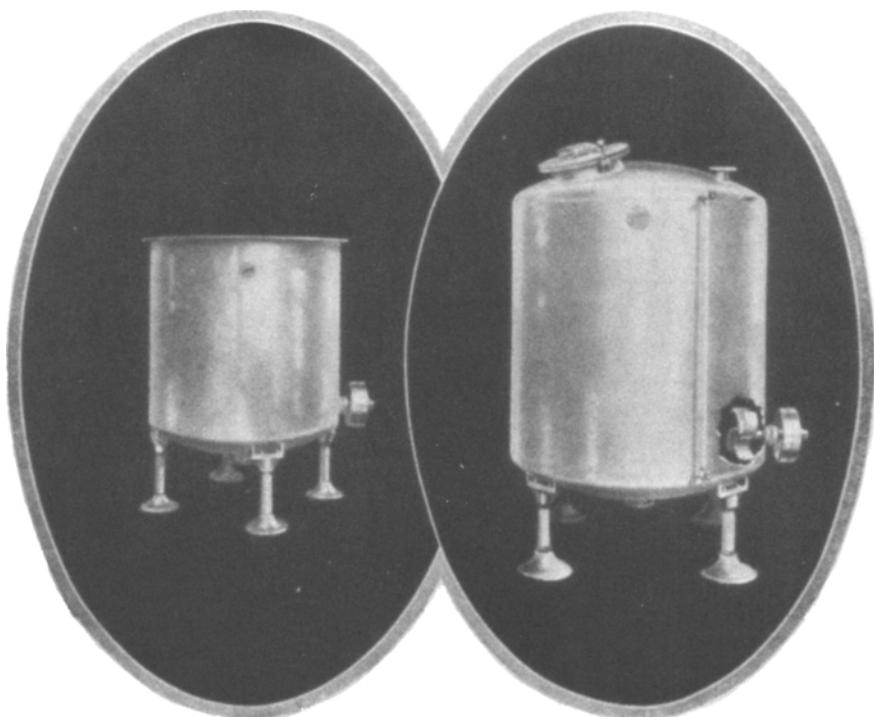
Intermediate Oil Storage

THE STORAGE of intermediate oil products in most refineries is accomplished with satisfactory facility by the use of steel equipment, with heating coils as needed, and with or without covers, depending upon conditions in each instance. Wherever there is danger of contamination of the tank contents by dust of bleaching materials or of alkali, a cover is imperative. Covers are preferably of steel, as wooden covers absorb oil and oil

exceptionally good absorbents of volatile matters.

Many non-corrosive materials are used in the fabrication of finished oil storage tanks, included among the list of suitable substances being monel metal, homogeneous glass-lined steel, aluminum, nickel, tin-coated steel, and high-chromium alloys of iron, such as incoloy. All of these materials are suitable for the purpose, the choice of each refiner being dictated by special considerations of cost, availability, superiority for the particular oil to be stored, or personal preference.

A good specification for a finished oil storage tank requires that the tank material be free of any substance which will readily combine



Courtesy Pfandler Co.

Open and Closed Glass-lined Tanks with Agitators

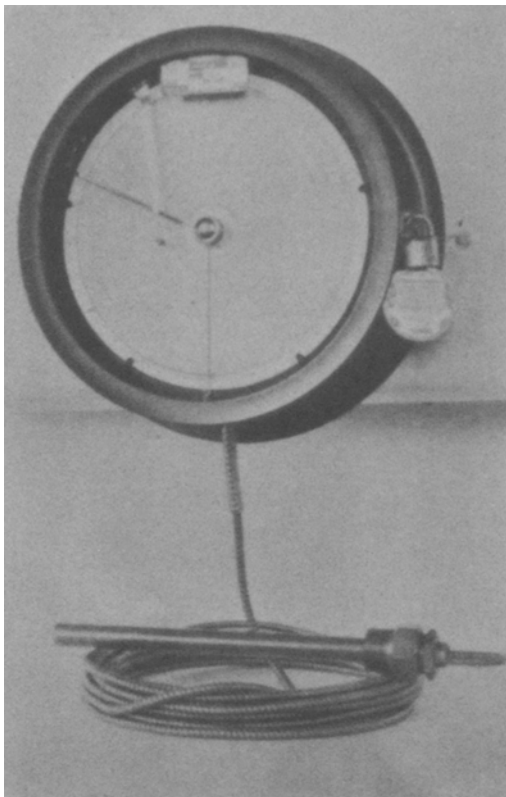
vapors, thus quickly becoming greasy and unsanitary. Tanks and their covers should be thoroughly protected by exterior painting.

Finished Oils Storage

WHEN the refiner has completed his treating processes he is immediately confronted with the problem of storing his valuable finished products in such way or ways as to avoid contamination or spoilage. Most refined oils, particularly edible oils, are delicate products, particularly susceptible to contamination from unclean containers or from containers made of improper materials. They are also peculiarly subject to damage from foreign odors, being free from odors of their own and

with the small traces of free fatty acids in the oil, forming metallic soaps; that the interior surface of the tank be hard, smooth and easily wiped clean, that the tank and its outlets and heating connections are capable of being made tight without the use of objectionable gasket materials or the formation of pockets or recesses which are difficult to keep clean.

Some manufacturers have attained most satisfactory results in the storage of fine edible oils through the use of vacuum, or of the pressure of inert gases, such as nitrogen or carbon dioxide, in the vacant space above the oil in air-tight tanks, thus avoiding any contact of air or of foreign odors with the product.



Courtesy The Foxboro Co.

Recording Tank Thermometer

The oil is filled into packages from such storage tanks by building up increased pressure by means of the inert gas.

Tank Auxiliaries

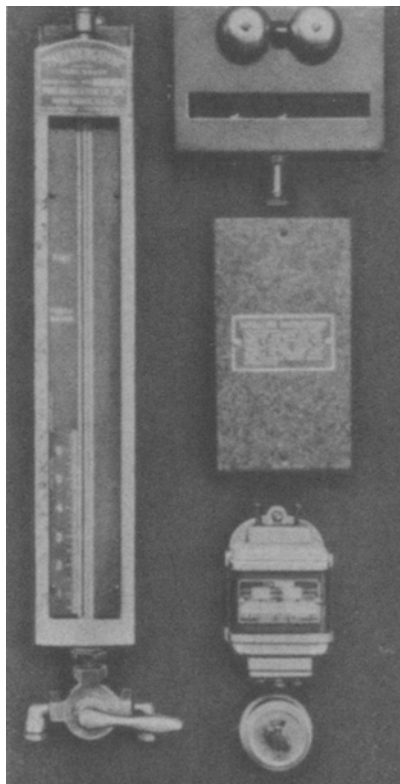
ANY DISCUSSION of oil storage methods would be incomplete without consideration of the many valuable instruments and accessories by means of which the oil storage terminal, mill or refinery may control the condition and check the amount of oil on hand at all times. Recording thermometers furnish the plant managers with visual records showing that oils have been maintained at proper temperatures day and night, and thermostatically controlled steam valves automatically maintain those proper temperatures. The temperature of oils in storage is of vital importance to all handlers of oils as it is a well known fact that many oils have a tendency to overheat when stored in bulk with serious consequent damage to quality. Recording vacuum and pressure gauges give the desired facts concerning pressure and vacuum storage tanks.

The amount of oil in large storage tanks may be observed at any time, and at any distance from the tanks, by means of distance-

reading gauges such as the telegage or pneumericator. The volume delivered into or out of storage tanks is generally measured by means of integrating meters, which are employed thus as a check against scale-tank or track-scale weights.

Derivative Products

IN THE establishments making derived products from oils, such as shortening, mayonnaise, margarine, varnishes, sulfonated oils, etc., the same storage rules must be applied as those used by the oil refiner in relation to his finished oils. The containers must be kept scrupulously clean and must be constructed of such non-corrosive material as will be inert in its reaction to the particular oils and other materials to be handled. They should be so built that cleaning is accomplished with facility and they are subjected to cleansing frequently, daily in most cases. For this reason they are generally planned of such size and number as will most readily fulfill these requirements.



Courtesy Pneumericator Co.

Distance Tank Gauge Electrically Controlled