ANNOUNCEMENT The purpose in issuing the Industrial Bulletins of Arthur D. Little, Inc., is to place before bankers, investors, and industrial executives early and authoritative information bearing upon the present status of industrial development or indicative of its probable trend. The Bulletins will be published monthly and mailed free upon request.

NEW ENGLAND CONFERENCE

At the second annual New England Conference, recently held in Hartford, Connecticut, research was stressed to such an extent as to dominate the proceedings.

The Council, which prepared the 1926 program, was probably as representative a body as ever convened in New England, and its findings are worthy of careful consideration by all those seriously interested in the prosperity of any section of the country.

The report of the Research Committee of the Council is specific in its recommendations. Copies may be obtained, at fifty cents each, from the New England Council, 201 Devonshire Street, Boston.

The Committee concludes that “Above all things — New England needs research” for the creation of new products, the utilization of wastes, the addition of new lines of manufacture, the extension of markets through the development of new uses for products — all to the end that the industrial base may be broadened and the slack time of its factories changed to running time.

CELL CONCRETE

A new and interesting type of structural material known as “Cell Concrete” has been developed in Sweden, where it has already found extensive application in side walls, roof and floor slabs, and as insulating material for cold-storage rooms, boilers and steam pipes. Cell Concrete is a light-weight concrete, made by mixing a tenacious foam into a mortar of cement, sand, and water, and is permeated with small, separate air bubbles. It is made in weights ranging from 18 to 75 pounds per cubic foot, the insulating capacity varying with the specific gravity, and becoming greater as the material is made lighter. In tests on heat transmission and fireproofness maintenance for an hour of a temperature of 1380° F. on one side of a slab 6 centimeters thick resulted in a temperature of only 130° F. at the other side of the slab.

ANTI-FREEZE COMPOUNDS

As a consequence of open roads during the winter months, and the marked shift from open to closed cars, driving is no longer seasonal. This fact, coupled with the rapid increase in registration, has created a large market for radiator anti-freeze compounds.

Completely denatured alcohol has thus far almost monopolized this market, and the result is reflected in the increase in production from 42,033,824 gallons in 1921 to an estimated figure of 106,000,000 gallons for the fiscal year ending June 30, 1926.

Contrary, perhaps, to popular opinion, this demand for anti-freeze compounds is the largest single factor among those responsible for the growth of the industrial alcohol business during the last five years. The distribution of denatured alcohol for radiator use has risen in round numbers from 8,000,000 gallons in 1921 to 50,000,000 gallons for the 1925-26 season.

Further analysis of the situation shows, however, a healthy increase in the consumption by
the industries, nearly all of which have at some stage a legitimate and essential use for alcohol. It is not anticipated that the present winter will show as large an increase in radiator requirements as that of last year, although verification of the prediction of an exceptionally severe winter can readily upset all estimates. As affecting the anti-freeze market in the future, it should be recognized that the slack previously represented by the number of cars laid up at the beginning of freezing weather has very largely been taken up, and the alcohol industry has also to reckon with substitutes which the size of the present market attracts as competitors. Chief among these is glycerine, a by-product of the soap industry, but available only in limited amounts, which is approximately equivalent to two-fifths of the total consumption of anti-freeze compounds; and of this total amount probably not more than twenty-five per cent could be diverted from present and essential uses to this new market.

ETHYLENE GLYCOL

Another article that is gaining some prominence in the field is ethylene glycol, a compound closely related to glycerine, and of reputed higher efficiency in use. The basic material for its preparation is ethylene, which, as a component of coal gas and the waste gases of petroleum refineries, and so capable of direct production, is potentially available in large quantities.

Thus far denatured alcohol has more than held its own. With the prevailing low prices of molasses, the proven and established position of alcohol as a satisfactory anti-freeze, and the facilities that have been developed for its widespread distribution, it may be expected that denatured alcohol will maintain its position. Competition may, however, cut into the annual increase in this special demand, which has so favorably affected the growth of the industry in recent years.

PITTSBURGH CONFERENCE

The proceedings of the recent notable International Conference on Bituminous Coal should be available for distribution about February 1. About 1800 delegates were registered, including many distinguished fuel technologists from foreign countries. What follows is derived from a few of the numerous important papers presented and discussed.

We have used to date in the United States 16.8 billion tons of coal, and have wasted 8.0 billion tons. There remains now available 3419 billion tons, most of which is of low quality.

Sale of gas by the therm (100,000 B.t.u.) has had a profound effect on the gas industry in Great Britain, in that it permits suitable adaptation of process to the character of coal available.

Smokeless processed fuels, as semi-coke and artificial anthracite, must, in England at least, be sold at practically the price of raw coal in spite of shrinkage during conversion.

OIL VERSUS COAL

The amount of fuel oil consumed in the United States in 1925 was equivalent to 200,000,000 tons of coal. The consumption of coal itself that year was 600,000,000 tons. Economies in the use of coal have further reduced its consumption.

In a new method of coking high volatile coal the finely ground coal is dropped through a hot tube and instantaneously carbonized. In the discussion it was pointed out that there is plenty of coke breeze already available without devising a process for making more.

There are over 200 Tulley plants in operation in England for the complete gasification of coal. Domestic heaters are chiefly responsible for the smoke problem in cities, yet there is little demand for smokeless apparatus, and the statement was made that there has been little advance in the design of household furnaces in twenty years.

The papers which aroused the greatest interest and comment were those of Bergius and Fischer, of Germany, and that of General Patart, of France.

BERGIUS PROCESS

In the process described by Bergius pulverized coal made into a paste with oil is heated to about 450° C. in an atmosphere of hydrogen under a pressure of 1800 pounds or more to the square inch. The coal is thereby largely converted into oil and tar, from which motor fuel, Diesel oils, lubricants and heavy fuel oil are recovered. The crude yields and the character of the products obtained are largely influenced by the variety of coal used, and vary from 93 to 140 gallons per ton of dry, ash-free coal.

Powerful financial interests are said to be behind the Bergius process and great sums have been expended in its development. The plant is obviously very expensive and estimates of its cost vary greatly. It has been pointed out elsewhere that the Bergius process may be applied still more readily to the treatment of heavy petroleum residues for their conversion into lighter oils and motor fuel.

PATART AND FISCHER

The problem of producing motor fuels and heavier hydrocarbons from coal was attacked from another angle by Dr. Fischer, who uses as his raw material carefully purified water gas made
by passing steam through a bed of incandescent coke. The gas is passed over highly heated metallic oxides, which serve as catalysts, and high pressure is not necessary, though desirable under some conditions. Paraffin hydrocarbons ranging from methane to solid paraffin are obtained, but the yields thus far would seem to be too low to justify commercial exploitation. By a closely similar process, Fischer is, however, producing in Germany substantial amounts of methanol (wood alcohol), much of which is coming to this country.

Also working with water gas as his raw material, General Patart, by the use of appropriate catalysts at high pressures, has succeeded in producing numerous series of important organic compounds, including alcohols, acids, ethers and liquid hydrocarbons of the most diverse kinds. He gives $400,000 to $500,000 as the cost in France at the present time of the equipment necessary for a production of twenty tons of methyl alcohol per day.

RAYON OUTPUT

The world's output of artificial silk, or rayon, in 1926 is authoritatively estimated at 240,000,000 pounds, about 76 per cent of which was produced by the viscose process. For this type of rayon the usual raw material has been wood fibre made from spruce by the sulphite process, but cotton linters yield a product which is softer and superior for some purposes, and preferred for knitting. The consumption of linters in the industry is, consequently, rapidly increasing.

PAPER MAKING IN THE SOUTH

The next decade will see a great development of paper making in the South, where pulpwood — now, elsewhere, increasingly scarce and costly — is still abundant and relatively cheap.

It was long contended by Northern paper makers that Southern pines were not suitable for the industry because of their high pitch content, and there was little attempt to utilize the hardwoods. It is true that these pines cannot be advantageously utilized by the processes commonly employed for pulping conifers in the North, but when the more recent sulphate process was tentatively applied to Southern pine a pulp of satisfactory grade for kraft papers was produced, and already more than one-third of the wrapping papers of this type consumed in this country is made in Southern mills, while new mills now definitely projected will increase this production about fifty per cent.

Kraft pulp from Southern pine is well adapted to the manufacture of container and other boards, and a large increase is to be expected in the already substantial Southern production of such board.

A beginning has been made in the manufacture of papers of higher grade, and it has been fully demonstrated that Southern pines, gumwood, and willow are admirably suited for book, bond, and writing papers.

The next impending development, and one of the first importance, is the production of newsprint from Southern pine and gumwood, a process for which has already been demonstrated in Northern mills.

CHEMICAL PRODUCTS

INDUSTRIAL opportunities are constantly being created and readjustments of industrial practice made obligatory, by the incessant sequence of chemical products formerly unavailable because of rarity or price and now obtainable in quantity at moderate cost. Low viscosity nitrocellulose and cheap butyl alcohol have recently revolutionized the lacquer industry and saved many millions to the automobile manufacturers by cutting to a few hours the time formerly required for the finishing of cars. Nitrogen fixation processes are bringing the price of ammonia to constantly lower levels. Furfural, which, prior to 1922, was a laboratory curiosity obtainable if at all at prices ranging from $6.50 to $30.00 a pound, may now be had in quantity at fifteen cents or less as the result of the development of processes for its production from oat hulls. It is finding its principal uses in the production of synthetic resins, as a solvent in shoe dyes and leather dressings, as a flavoring for tobacco, and as a wood preservative. It is a good solvent for nitrocellulose, but its use in lacquers is limited by its tendency to darken on exposure to light.

NEW RAZOR BLADES

Blades to fit the various types of safety razors and made in England from a new Cobalt steel are coming on the American market. It is claimed that they hold their edge far longer than the blades now commonly supplied, and their advent may consequently have a direct bearing upon the number of blades sold annually.

THYROXIN

From England also comes the announcement of the latest triumph of organic chemistry, the synthesis of thyroxin, the active principle of the thyroid gland, which exercises an extraordinarily potent influence upon growth and mentality. The present limited supply is furnished by the meat packers, by whom it is extracted from the thyroid glands of slaughtered animals.
FREIGHT-TON-MILEAGE

One of the most important of the factors affecting the industrial situation of the future, and one whose significance is seldom noted, is the remarkable increase in the per-capita freight-ton-mileage of our railroads. In 1880 they hauled about 640 tons of freight a mile for each inhabitant; in 1925 they hauled 3617. Part of this increase is due to the more lavish consumption of goods by our people, part to the growth of population in districts more remote from centers of production, and part to the depletion of reserves of raw material, which compels the manufacturer to go farther afield for his supply. With the per-capita tonnage steadily rising and a population as steadily increasing, the time is not far distant when no readily conceivable expansion of our transportation system will suffice to handle the traffic. We cannot, then, continue indefinitely to haul Hood River apples from Oregon to Maine, or transport crude and low-priced materials thousands of miles by rail, only to return them to their point of origin in forms not greatly enhanced in value. We are in consequence about to witness a gradual decentralization of industry. Today nearly half the industrial activities of the country are concentrated in a narrow zone extending along the Atlantic seaboard from Boston to Washington. That proportion is destined to change.

FORMALDEHYDE

The pungent and chemically active gas, formaldehyde, which has long been sold in aqueous solution under the name Formalin, is now commonly made by the oxidation of methanol (wood alcohol) vapors with air in the presence of copper, and its price has depended upon that of methanol.

A new process in which formaldehyde is produced by the oxidation of natural gas, using oxides of nitrogen as catalysts, should permit of much lower costs, and may be expected to extend the use of this versatile chemical. It unites with carbolic acid to form bakelite, which finds wide application as an insulating material and plastic. The compound of ammonia and formaldehyde is largely used in medicine, and other compounds of formaldehyde are important intermediates in the manufacture of magenta, indigo and other synthetic dyes. The gas itself is a powerful germicide and disinfectant and finds many uses in agriculture and sanitation. Its property of hardening glue and casein, the protein of milk, is utilized in the paper industry and in the production of galalith, a good substitute for celluloid, made by treating casein with formaldehyde.

NEW USE FOR ROD MILLS

The rod mill, which has long been a standard type of equipment for grinding ores and minerals, has recently been applied to the disintegration and beating of paper stock. In special instances it is proving more efficient than the beaters commonly employed for this purpose, and its use in paper mills is likely to extend.

A new type of highly purified wood fibre known as Alpha-Cellulose is now available, and is finding use as a substitute for cotton in high-grade papers, and as a preferred raw material for artificial silk.

HIGH STEAM PRESSURES

Practice in large steam plants, and especially in those of central stations, is steadily moving toward higher pressures. Steam pressures of 500 pounds to the square inch will soon be common, and already pressures of 1200 and 1500 pounds are cautiously being tried. They present new problems in the behavior of steam at temperatures near its critical point, and the effect upon it of flue gases and those dissolved in water. Turbines are being built to operate at these extremely high pressures and to exhaust into headers, supplying other turbines with steam at 250 to 350 pounds.

About every so often something new is discovered which has great commercial possibilities. The men who have foresight enough to note the significance of these discoveries and invest in the companies which are in a position to reap the profits from them are the ones who make the real money in the stock market. It has been this way from time immemorial.

(Edson B. Smith)