physical-chemical properties of Portland cement by the National Bureau of Standards and the Portland Cement Association include the following projects: 1. A study of cement clinker made from pure compounds and from pure compounds with admixture of the impurities found in natural materials. 2. Petrographic studies to determine the optical characteristics of cement mineral constituents and the quantitative petrographic analysis of clinker. 3. A study of the hydration of cement in all its phases. 4. The crystalloidal behavior of silicic acid. Thus far the work has included principally the development, construction and standardization of equipment and methods of testing. It is hoped that the studies can be extended into other fields beyond those already projected. This work will continue and extend the bureau's studies, which for several years have been under the direction of P. H. Bates; Dr. R. H. Bogue, formerly at Lafayette College, will be directly in charge of the association's group of workers who are stationed at the bureau.

UNIVERSITY AND EDUCATIONAL NOTES

A SIX-STORY building to house teaching and research in the departments of physiology, physiological chemistry and pharmacology is being planned at the University of Chicago as a unit of the group of buildings for medical education which will be erected in the near future. Funds have been provided independently of the university's $17,500,000 development program.

THE Arkansas legislature, which recently adjourned, appropriated $650,000 for new buildings to be erected at the University of Arkansas in the next biennial period.

THREE gifts totaling $360,000, to complete the $5,000,000 endowment fund for Hampton and Tuskegee institutes, have been received by the committee. Edward S. Harkness gave $250,000; Mrs. Stephen V. Harkness, $100,000, and Mrs. E. H. Harriman, $10,000.

GLASGOW TECHNICAL COLLEGE, England, has received the sum of £50,000 from an anonymous donor.

DR. AGNES L. ROGERS, of Smith College, has been appointed professor of education and psychology at Bryn Mawr College.

W. R. HALLIDAY and S. R. Lott, formerly assistant professors in the department of machine design at Stevens Institute of Technology, have been advanced to the rank of associate professors. J. C. Wegle has been made assistant professor in the same department. Professor Wegle has also been appointed acting dean of student activities.

DR. ALFRED P. LATHROP has resigned his position in Queens University, Canada, to accept a position as associate professor of organic chemistry in Oberlin College.

ARTHUR CLARK TERRILL, for the past four years professor of mining engineering at Pei Yang University, Tientsin, China, is now lecturer in geology at the California Institute of Technology.

AT the University of Aberdeen, Dr. A. Bowman has been appointed to the lectureship on the scientific study of fisheries, in succession to Dr. T. Wemyss Fulton, resigned.

DISCUSSION AND CORRESPONDENCE

MARKET CHARTS AND THE LAW OF SUPPLY AND DEMAND

IN general when the price of a commodity is lowered the demand for it increases, slightly or considerably, as the case may be. This response of demand to price changes is, of course, vital in all marketing problems. Although not very precise relations between price and demand are known, curves may be drawn showing their general trend and salient characteristics.

Such plotted curves—market charts—may also be drawn showing the production of a given commodity (*e.g.*, automobiles) at each price. This curve, together with the corresponding curve showing demand as a function of price, give a direct relation between supply and demand in mathematical terms as exact as the data from which they are drawn, namely, the slopes of the price-supply and demand-price curves. Finally, areas under the curves are volumes of business, actual or to be expected, as the case may be.

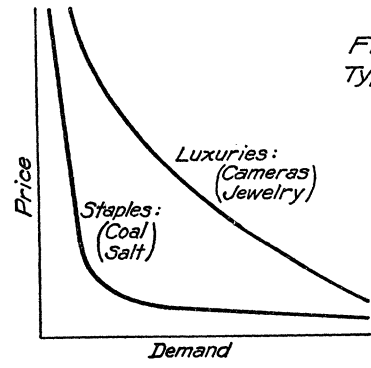

Fig. 1. Types

These characteristics are illustrated in the accompanying figures. Fig. 1 shows two extreme types of curves, namely, for staples and for luxuries. The consumption of coal, salt and the like would be very little affected by price. If the price dropped to one

tenth its present value, the consumption would probably not be doubled. On the other hand, every slight decrease in the price of candies, cameras or jewelry is reflected in increased consumption.

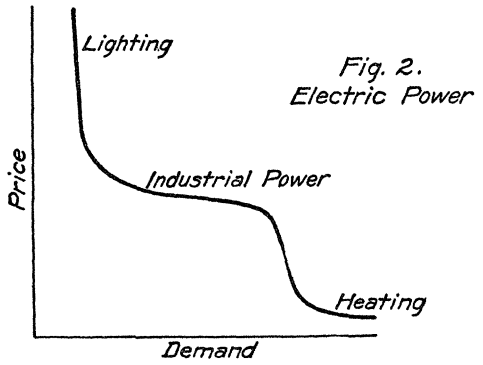

Fig. 2. Electric Power

Many market curves show a pronounced shoulder at certain price levels. Electric power (Fig. 2) is a case in point. The demand for electricity for lighting is not sensitive to price. Electricity for industrial power is in rapidly increasing demand at prices below 5 cents per kw. hr. The electrochemical industries require a still lower rate (0.5 to 2 cents) before extensive use begins. Finally at rates below 1 mill per kw. hr. an almost unlimited demand would arise for electricity for heating. Obviously a small depression in price near a shoulder of the curve would result in a greatly increased volume of business and in profits.

It may be noted that the mathematical form of these curves is roughly that of a hyperbola, $xy =$ constant. Hence if the price is in, say, dollars per pound and the consumption (demand) is in pounds, the product dollars per pound times pounds is dollars, and is roughly constant, independent of both price and demand. It follows, therefore, that if the market chart for a commodity approaches a hyperbola in form, the market will absorb a fairly constant *value* of that commodity, irrespective of either price or demand.

The *slope* of any price-demand curve is evidently a measure of the *stability* of the market for the commodity in question. The market for coal is relatively very stable, while that for luxuries is more sensitive to price changes, but not susceptible to breaks, since the slope is nearly uniform. On the other hand, the market for electric power is very sensitive to price changes at certain price levels where the slope is nearly parallel with the demand axis. In mathematical terms, the derivative of the curve is a measure of the sensitiveness of the market.

Other interesting deductions suggest themselves to one versed in mathematics. For example, let dD/dC represent rate of change in demand with change in cost, *i.e.*, the slope of the demand-cost curve. Let dC/dS be the rate of change of price with supply, then dD/dS, the rate of change of demand with supply is the product of the above ratios, $dD/dS = dD/dC \times dC/dS$. This ratio is evidently a measure of the degree of *saturation* of the market. If supply just balances demand the ratio $dD/dS = 1$. At the shoulder of the electric power curve (Fig. 2) dD/dC may be as high as 10. If now the supply-cost curve were smooth, a ratio $dC/dS = 1$ would be reasonable and therefore $dD/dS = 10$. The interpretation of this is evidently that the market for electric power can only be stabilized by making the cost-supply curve similar in form to the cost-demand curve. This is done in practice by establishing higher rates for service involving greater installation and maintenance costs. This note is intended merely to call attention to some simple applications of higher mathematics to market analysis. The viewpoint which it provides is believed to be new and has already proven useful in certain limited fields and may well be of service in other fields.

P. G. NUTTING

WASHINGTON, D. C.

TWO FATAL CASES OF POTATO POISONING

THE common white potato, *Solanum tuberosum* L., has long been regarded as poisonous, although the toxic principle, the alkaloid *solanin* ($C_{52}H_{93}NO_{18}$) seems to be confined to the green parts of the plant.

Reports of stock losses due to eating either the tops or the tubers that have turned green after exposure to light, are not rare. In one case, 64 cows became ill and exhibited symptoms of poisoning after eating liberal quantities of potato tubers, an Iowa veterinarian reports the poisoning of a cow due to eating potato parings, Chesnut and Wilcox of the United States Department of Agriculture record the loss of six pigs due to eating sprouted, uncooked potatoes, while the writer investigated a case in southern Indiana in which thirty chickens died shortly after eating a large quantity of green potato sprouts. Macfadyen demonstrated that old sprouted potatoes are poisonous to horses.

Reports of human potato poisoning are comparatively rare. According to one account 56 soldiers in Berlin were seriously affected several years ago with potato poisoning, but all recovered when the feeding of the potatoes was stopped. Pammel states in his "Manual of Poisonous Plants" that some persons can not eat potatoes because poisonous to them, and further remarks that the water in which potatoes have been boiled contains a poisonous substance. County Agent Fred I. Hoover of New Albany, Indiana, informed the writer that the illness of a family of five