

(May 2, 1926)

WORK SHOPS OF SCIENCE

Discovery and Invention  
At the Bureau of Standards

How the Industries are Enabled to Maintain Research Workers in the Research Laboratories of our National Bureau.

The interesting plan by which the Bureau of Standards of the Department of Commerce opens up its research facilities to the industries is little known. Thirty-six national organizations have research associates in the Bureau laboratories engaged in experimental research. It all began with the act of Congress which authorized the use of the Government's facilities for study and research. Out of this has grown to its present size and usefulness a unique system of cooperative research.

A list of typical results thus obtained showed some 75 subjects ranging from the structure of atoms and the rays characteristics of the chemical elements to building construction and packing box standardization. They comprise fundamental science and its applications to very practical problems of industry. Research associates at the Bureau of Standards are pioneers in new fields of discovery. To extend the frontiers of knowledge by scientific research and discovery is a fascinating and enduring public service. When such discoveries save industrial waste, ensure high quality, minimize failure, they become profit-bearing assets to industry which business men understand and appreciate.

The cordial cooperative relations between the Bureau of Standards and American industry are well shown by its research associate plan. This is designed to aid any industry as a whole, saving waste which benefits none and harms all, and to ascertain the scientific principles and data upon which the industry rests. This helps establish such a measured control of production as will assure uniformly high quality and lower costs, in which both producer and the public share.

Through this plan the Bureau links science and industry under their joint auspices in a purely helpful, constructive plan of experimental research. Some problems science alone can solve. The scientific laboratories of the Bureau are unsurpassed in supplementing research facilities of those conducting research and in affording facilities for those who have none. It has some sixty specialized laboratories, each equipped with modern facilities and trained staff ready to focus cooperative effort on industrial problems. Its library is rich in texts in physics, chemistry, and the special technologies within its field, especially in journals publishing research results. All these are at the disposal of research associates.

Washington is a great center of scientific research. Its facilities, bureaus, and institutions are notable, in their ensemble unsurpassed. Their fine collections of technical literature are accessible for reference by associates. The Library of Congress has a collection of 3,000,000 volumes and in

Washington are also many specialized libraries in fields pertinent to the Bureau's work, with an additional 1,000,000 volumes. The Patent Office has available for reference 1,500,000 patents, with the drawings, specifications, and correspondence relating thereto. The Census Bureau and the Bureau of Foreign and Domestic Commerce are also among the many helpful sources of data concerning industry and its products.

A unique feature of the work at the Bureau of Standards is its educational work for its staff and its associates. This keeps alive an interest in advanced study and enables associates to work toward advanced degrees. Its courses, given outside official hours, are credited for graduate degrees by leading universities. Local universities also offer evening courses especially for Government day workers. Scientific and other meetings, conventions, and lectures at the Bureau and elsewhere in Washington afford further scope for advanced education. All together ample facilities conspire to keep associates in stimulating touch with technical progress and fundamental study.

The research associate staff comes from various industries and sciences,--trained physicists or chemists, industrial experts, technologists, skilled artisans. A metallurgical company maintains chemists to develop new methods of analysis. A national textile organization has research associates busy on fundamental problems for the hosiery industry, results of which are reported to have saved \$28,000,000. From Czechoslovakia comes an expert in sugar research, working on the foundations of sugar chemistry--a field of world-wide interest. He was appointed on the recommendation of and with the support of the International Educational Foundation. From Germany comes a physicist highly skilled in research on the distinctive spectra of the atoms, working side by side with Bureau experts already famous in this field. The results help science to work-out the structure of atoms, a subject in which truly remarkable progress is being made.

In making an exact science of color, means are found for defining any tint or shade of any hue so that it can be identified and produced exactly from definition. The Bureau's work in this field is fundamental. The importance of color measurements and standards in the industries is well recognized. A leading color laboratory maintains research associates for experimental color research at the Bureau. The automotive engineers have cooperated by advice and the support of associates on many important researches, fuel research, brake tests, crank-case-oil dilution, starting tests, performance measurements, and the like. The group of technicians interested in walk-way surfaces, their efficiency and safety, maintains an associate at the Bureau who has developed apparatus for measuring the slipperiness of walk-ways and made complete series of measurements on types of shoe soles in common use.

The interesting array of research reads like an encyclopedia of science: the structure of sugar molecules, synthesis of the sugars; microstructure of portland cement and metals, prevention of corrosion and tarnish; strength, absorption and freezing resistance of hollow building tile; dimensional changes in dental amalgams; malleability of nickel; variations in glass caused by heat treatment; bulking of pigments and liquids used in paints; sound-insulating properties of partition walls; properties of gypsum tile and the effect of composition on the properties of gypsum plasters; relative merits of cotton and jute cement sacks; the properties of artificial silk and the cleaning of silk fabric.

### Work Shops of Science--3.

These are typical researches in which science and industry conspire to save incredible losses, preventable if the fundamental science involved can be mastered, to enhance the quality of products, and to add science to the production process. Research associates are thus on the firing line of industrial advance and their work is helping to create the more efficient industries of tomorrow.

Progress is reported to the industries monthly through the director and more fully as results justify. Research achievements are for the immediate benefit of the entire industry. Their prompt use is vital. They may be broadcast through the technical journal of the industry or through Bureau publications. The automotive research associate reports cooperative fuel researches on internal combustion motors to the Society of Automotive Engineers and the results are printed in its journal. An account of the use of glue for coated paper found its natural outlet in the Paper Trade Journal. Results of the research on dental materials (wrought gold alloys) were described at the annual meeting of the American Dental Association and published in its journal. Results on the adhesion of gypsum plaster to various backings appeared in the Journal of American Architects. Results on a new method of measuring the color and intensity of daylight and incandescent lights were naturally issued in the journal of the Optical Society of America. Many of the reports, however, are published by the Bureau. This gives a certain prestige which facilitates their prompt introduction into industrial practice.

Some years ago, at the request of the clay products industry, the Bureau conducted short-term schools for clay workers in the industries. Here new technical methods were demonstrated. A similar plan was tried out with respect to radio, aeronautic instruments, and certain phases of aviation. Recent schools for the cleaning and dyeing industry are in line with this early experiment. During the past year the Bureau's research associated representing the cleaning and dyeing industry prepared a manual for technical methods of cleaning, and has conducted at key points throughout the country thirteen such short-term schools on new and scientific methods of cleaning. Among these may be cited as typical, the school at Atlantic City with 200 artisans, foremen, and managers; the school at Los Angeles with 600 attending to receive instruction in the most recent methods science can suggest in the cleaning art. The group hopes to extend the system to saturation so that the entire industry may pick up at once and apply new methods in their industry, saving losses, adding speed and accuracy in their work, and increasing the profits of industry while giving more efficient service to the public it serves.

One aspect not yet fully appreciated is the value of having the research associate serve as a contact officer of an industry, stationed at the Bureau much as a military attache in the diplomatic service. Such service enables the industry to make more effective use of the Bureau, and in turn aids the Bureau in its active cooperation with industry.

The publication about to appear gives lists of organizations and associates, examples of typical results, and the conditions under which research associates may be appointed. The system gives promise of expanding into a most effective means by which an industry may itself solve its difficulties and improve its efficiency in production, with the full cooperation of the Bureau of Standards staff and utilization of its unique facilities for research.







