ENGINEERING AND SCIENCE
Monthly

Vol. VII No. 2 February, 1944

The Month in Focus

George Washington, the Engineer

IT IS appropriate in this February issue of *Engineering and Science Monthly* to take recognition of the birthday of a great man, not for the part he played in the formation of the government of the United States, but for his engineering approach. While it is not usual to think of George Washington as an engineer, his whole life is characterized by those traits for which every engineer strives.

In December, 1748, at the age of 16, Washington went to William and Mary College to take a course in surveying. The course was undoubtedly simple, involving geometry and trigonometry as well as common practices in the then so-called art of surveying. He obtained his field training under the tutelage of his brother's brother-in-law and was appointed county surveyor in 1749. According to the records, his work was accurate and complete. This work continued for about three years, during which time he became familiar with personnel problems involving the employment of assistants. At the age of 19 he was given command of the local militia composed of several hundred men whom he had to organize, equip and drill for the protection of interests in Ohio. Later, the governor of Virginia employed Washington to assemble men and to build a fort at the head of the Ohio River. Although he did not have a background of formal courses in structures, he did have good judgment and ability to organize. It was these abilities and his eagerness to take responsibility that led him further into civil engineering as it was known then.

Washington's engineering career continued until he became Commander-in-Chief of the forces of the united colonies. His work included, in addition to the management of his wife's and his own plantations, the drainage and reclamation of some 40,000 acres of swamp land containing valuable timber. He was the manager of the company operating the project. In 1769 he was active in "clearing and making navigable the River Potomac from the Great Falls of said river up to Fort Cumberland." The plans for construction and financing the canal project were well along when Washington's civil engineering and business careers were interrupted by the commencement of the Revolution. But even in these new activities he displayed the characteristics which had made him successful in engineering. This was recognized by Patrick Henry at the first Continental Congress in 1774, at which Washington was in attendance. Henry, in specifying the greatest man in Congress, referred to Mr. Rutledge of South Carolina as being the greatest orator, "but if you speak of solid information and sound judgment, Colonel Washington is unquestionably the greatest man on that floor."

After the war he returned to the canal project, planning the work, marking its location and tending to administrative matters. The necessity of cooperation between states bordering on the Potomac led to the formation of a commission under Washington's sponsorship. The discussions of the commission had more far-reaching importance than merely the settlement of problems in interstate commerce, for they ultimately led to the Constitutional Convention in 1787 at Philadelphia. In 1789 Washington became the President of the United States, having come to that position as an engineer rather than as a statesman or a lawyer.

The words spoken by Patrick Henry about Washington could well be used to describe the qualities required of an engineer today—"solid information and sound judgement." With the complexities of present-day structures, machines, and processes which have been brought about by the application of scientific developments, the simple training of Washington's era is no longer adequate for the procurement of "solid information." The engineer now requires an extensive technical training in those subjects which are fundamental to his future work. This training is only the beginning and lays the foundation for professional development and guidance in establishing "sound judgment." Further "solid information and sound judgment" are obtained by experience and more study.

It is not until the engineer has acquired experience in his particular field in conjunction with his fundamental training that he becomes a professional engineer. In this connection, attention is directed to a paper presented before the Michigan Section of the Society for the Promotion of Engineering Education and reported in the Journal of the Society in November, 1943. Dean Freund, in his paper, "Back to the Professional Degree," admirably discusses the status of engineering as a profession. He suggests that the professional degree (C.E., M.E., E.E., Ch.E., etc.), should be awarded to those who have had a certain amount of experience in engineering subsequent to receiving the bachelor's

(*Continued on Page* 17)

It was very important to the Los Angeles gas dispatcher to know the probability of the pipeline being broken at the river. A truck with a 15-watt two-way radio set was stationed at the river bank to observe the flood conditions. At regular intervals this information was relayed through the Edison Company's stations to Los Angeles through the system illustrated by Fig. No. 1. Fortunately, the river did not rise sufficiently to carry away the pipeline. In cases of this kind, the gas dispatchers and the operating crews can work with confidence, since they know at all times the conditions at the vulnerable points in their supply system.

In another district during this same storm, a repair crew was standing by, with men stationed at opposite sides of a river where rising waters threatened to break the pipeline. These repair crews were supplied with equipment for quickly installing a temporary bypass across the stream, should the main line be carried away. Two-watt portable radio sets were used to communicate between the parties on the opposite sides of the stream. Fortunately, the storm subsided before any damage was done.

The radio equipment has been very useful in providing communication between different field crews who may be taking a portion of a major transmission line out of service for a short time in order to install a valve, clean the interior, repair leaks, etc. Since it is imperative that service to the consumers be uninterrupted at all times, valves at each end of the section to be taken out of service are closed to isolate it from the main line. Consumers served normally by the section which will be out of service are supplied with gas from small portable high-pressure storage tanks which are similar to welding gas tanks. Consumers downstream from the section of transmission out of service are supplied through the "line pack" or gas stored in the line. Naturally, when the main line valves are closed, the gas pressure in the section downstream from the closed valves gradually drops. If the repair party does not complete the repair operation in the scheduled time, there is danger that the downstream pressure will drop so low that service to the consumers is interrupted. Here again the emergency radiotelephone equipment fills an urgent need, since main transmission pipelines are frequently located in undeveloped territory far removed from good roads and public telephone service. Information concerning the pressure at the downstream side of the closed valve can be relayed rapidly to the crews working on the pipeline, and if the pressure becomes so low as to endanger the service to the consumer, repair operations can be halted and orders dispatched by radio to the valve crew at the upstream end of the section.

There are innumerable other ways in which a small emergency communication system can be helpful to a public service company. The emergency radio system described in this article was planned long before the present war started; therefore, it was not designed particularly for war emergency service. It is indeed fortunate that this system was built up prior to the war, since it will be invaluable in case of actual trouble in this area. When peace comes to this country, and civilians are permitted again to purchase items that are now reserved for the fighting forces, the gas companies plan to continue the growth of their emergency radio system by adding mobile units and a few fixed stations. Until the happy day of victory arrives, however, it will be necessary to continue to make the best use of the equipment on hand.

SYMPOSIUMS ON SYNTHETIC RUBBERS AND PLASTICS

THE increased production of synthetic rubbers has led to a demand for authoritative technical data and information on the applications and uses of these materials. In answer to this need the spring meeting of the American Society for Testing Materials will feature a symposium on this subject at Cincinnati, Ohio, on March 2. Many experts will present papers dealing with development, properties, testing, specifications, processing and uses of synthetic rubbers. Except in so far as necessary for background information the speakers do not plan to deal with the chemistry or manufacture of the crude synthetics.

On the evening following the A.S.T.M. meeting J. L. Collyer, president of The B. F. Goodrich Company, will speak before the Technical and Scientific Society Council of Cincinnati. He will discuss the development of synthetic rubbers and some of the economic and industrial aspects of this field.

The A.S.T.M. Philadelphia District Committees are to hold meetings on February 21 to 24 to discuss the subject of plastics. This is the first symposium on plastics since 1938 and there have been many notable developments in the field since that time. Many leading technical people in the industry will participate in the symposium, and a feature of the program will be the presentation of data on the leading plastic families by Dr. G. M. Kline, of the National Bureau of Standards. His paper will be based upon data obtained by seven technologists. Many important topics concerning the properties, testing, and uses of plastics will be presented by technologists of several industrial concerns and research laboratories.

The Society has announced that it is planning to issue the symposiums in the form of bound publications.

George Washington, Engineer

(*Continued from Page* 3)

degree and after having submitted a satisfactory thesis describing engineering work performed. Examination of the candidate by a board of examiners also is recommended.

The possession of a degree does not make a man something that he is not. If high standards are maintained by the degree-giving institution, the degree may be a symbol of true attainment. However, many who do not possess degrees are as competent—if not more so—than some who insist on placing letters after their names. A true measure of professional ability might lie in "solid information and sound judgment" as this phrase was exemplified in Washington.

ERRATUM

Attention of the editors of *Engineering and Science* has been called to an error in the item appearing on page 19 of the January issue. Aristotle D. Michal was elected associate secretary, not vice-president, of the American Mathematical Society.

The secretary, J. R. Kline, has also requested that a statement of the aims of the Society should read as follows:

"The American Mathematical Society is an organization to encourage and maintain an active interest in mathematical science. Its primary object is the promotion of mathematical research. To attain this, it conducts meetings for the presentation of research papers and maintains a publication program of mathematical journals and books on current research."