

than one telephone conversation and to transmit several telegraph messages simultaneously over the same wires without the slightest interference or confusion. It is now possible for a man standing on the ground and speaking in his ordinary tone of voice to give orders to aeroplanes at a distance of ten or fifteen miles. These, among others, are recent advances made in the laboratories over which Dr. Jewett presides. The research workers in these laboratories number more than three hundred and the expenditure on research for the year 1918 was approximately \$2,500,000.

At Wilmington on the way from New York to Washington are located the research headquarters of the Dupont Company. For the current year I was informed that the expenditure on chemical research was \$2,000,000. A certain amount was also being expended on research in physics and engineering. There are four chemical laboratories employing in all 200 research workers. Associated with each of these laboratories is an analytical division whose chemists make analyses and do other routine work for the research chemists in order that the time of the latter may be spent to best advantage. There are also forty-four chemists who are experts on the different processes in which the Dupont Companies are interested. All told there are 1,100 chemists employed in various capacities in the works. The total number of employees at the time of my visit was 65,000.

The bonus system has been introduced among the research workers and a bonus may run as high as \$50,000. The policy of the Dupont Companies in this regard is somewhat in contrast with that of a large manufacturing concern, cited by Professor Stieglitz of Chicago, which added a little over \$200 a year to the salary of the Director of its research work for a device of his which netted the Company a profit of \$80,000 annually.

Another great research establishment whose upkeep for the year 1918 cost \$2,000,000 is the Bureau of Standards maintained by the Federal Government in Washington, D.C. Besides the current expenditure just indicated \$1,500,000 was being expended on new buildings. At the time of my visit there were 785 research men employed in the laboratories besides which there were 75 men in the field. Of the 785 men here referred to 300 had been detailed to do research work and were in uniform. I was told that about 600 problems a month were presented to the Bureau of Standards by the military services alone. Practically all the work of the Bureau last year had a bearing on the war. Of the problems handled 65% were direct war problems. The remaining 35% had an indirect bearing on the war.

Confidential reports were issued in bulletin form several times a month. These were sent to a limited number of persons all of whom with a few exceptions were heads of military, naval or aeronautical departments or organizations. Each bulletin indicated in a general way the progress made on a number of problems.

The Bureau of Mines is also a federal institution whose activities are largely those of research. Its appropriation jumped from \$1,250,000 in 1917 to \$3,000,000 in 1918. Nearly all of the latter sum has been spent in connection with the gas warfare service. The Bureau had begun its investigations in connection with the gas warfare in February 1917, that is to say, before the United States declared war. Its first investigations had to do with gas masks. These were later extended so as to include all sorts of materials and apparatus employed in gas war-