chinery, apparatus and equipment and instruments for control, precision, recording, gaging and measuring, and a thousand other items used in converting the raw materials into the finished products. The finished products themselves, whether they be organic, inorganic, solid, liquid, gaseous, or of any other form, are all to be there. Many new things upon which manufacturers were working when the war ended and which have been more leisurely perfected since will be shown for the first time. Industrial progress continually calls for greater advancement and perfection in manufacture, and each year sees many notable improvements upon the exhibits in the exposition. Counting only these, the time of technical and business men is well spent in inquiring into the exhibits. One exhibitor, who for the past few years has been devoting time to the perfection of a new form of apparatus, said the other day that it is now when men have time to spare for consideration of these things that he expects a considerably larger and more interested attendance in his booth. "When the plants are idle as they are now, the most progressive companies are examining into our apparatus, and a remarkable thing is that we are making some installations in plants which are now closed, so that when they begin work they will be in better position than ever and have an advantage in taking this opportunity to prepare to reduce their costs for the future. I'm looking for many more such openings through our exhibit and with considerable enthusiasm for the entire exposition."

The managers report that three full floors of the Grand Central Palace are already taken for the exposition and a part of a fourth. They expect all space will be engaged before the opening date. Already, 303 exhibitors have contracted for space.

The exposition will contain two interesting special sections: one upon the subject of fuel economy, where exhibits intended for the more efficient use of fuel, its combusion, distribution, or control will be made. The other will deal with shipping containers, including the container itself, whether of metal, wood, fiber, paper, glass or in cooperage products of slack and tight barrels, tanks and towers, and with machinery for packaging, labeling, handling, and conveying the packaged material and marking it ready for final shipment.

Work upon the program has not yet been actively undertaken but it may be expected to compare more than favorably with the high standards of the preceding expositions. The management have returned to the Grand Central Palace with their offices, and all inquiries should be directed there.

FELLOWSHIPS IN MINING RESEARCH

THE cooperative department of mining engineering of the Carnegie Institute of Technology, Pittsburgh, announces the offer of two fellowships in mining research, and two in teaching and research, in cooperation with the Pittsburgh Experiment Station of the United States Bureau of Mines. The fellowships are open to the graduates of universities and technical schools who are properly qualified to undertake research investigations. The value of each fellowship is $750 per year of ten months beginning on July 1 for the position of research fellow and on August 1 for teaching fellow.

Investigations will be on the following subjects: (1) Acid Mine Waters: (*a*) physical-chemical study of the mechanism of corrosion in acid mine water; (*b*) neutralization with limestone, blast furnace slag, etc.; (*c*) recovery of iron oxide for gas purification and other purposes; (*d*) purification for use in boilers. (2) Shooting Coal: (*a*) factors in shot firing which favor the production of lump coal; (*b*) effect of location, size, and depth of bore holes; (*c*) kind of explosive; (*d*) sequence of firing; (*e*) method of charging and firing; (*f*) method of cutting coal. (3) Spontaneous Combustion and Coal Storage: (*a*) effect of size of coal; (*b*) effect of moisture; (*c*) effect of anthraxylon and attritus; (*d*) action of various forms of sulphur. (4) Geology: (*a*) relation of relative proportions of anthraxylon and attritus in coal to its coking properties and by-product yield; (*b*) correlation of coal seams by microscopic characteristics; (*c*) constitution of coal seams in western Pennsylvania. (5) By-products Coking: (*a*) determination of the heat of carbonization of coal; (*b*) determina-

tion of the volatile matter in coke at various temperatures. (6) Utilization of Coal; (*a*) study of the economic utilization of the roof coal of the Pittsburgh seam, including structure, composition, coking properties, and by-product yields. (7) Coal Mining: (*a*) determining the compressive strength of coal from various beds.

All the time of the research fellow is to be devoted to work in the Experimental Station of the U. S. Bureau of Mines which is located adjacent to Carnegie Institute of Technology. The position of teaching fellow includes ten hours each week devoted to teaching work in mining, and the balance to work in the Experimental Station.

EXCHANGE PROFESSOR TO FRANCE IN ENGINEERING AND APPLIED SCIENCE

DEAN JOHN FRAZER, of the Towne Scientific School of the University of Pennsylvania and professor of chemistry, has been chosen as exchange professor to France for the coming academic year, by the committee on exchange with France of professors of engineering and applied science, representing Harvard, Yale, Columbia, Cornell, Massachusetts Institute of Technology, the Johns Hopkins and the University of Pennsylvania.

The movement for the annual exchange with France of a professor of applied science had its origin as the result of a letter written shortly before his death by the late President Richard Maclaurin, of the Massachusetts Institute of Technology. The French administration responded very cordially to the offer for the annual exchange of a professor and selected for their first representative Professor Jacques Cavalier, rector of the University of Toulouse, and a well-known authority on metallurgical chemistry, who divided his time during the current academic year among the seven cooperating institutions, namely, Columbia, Cornell, Harvard, Johns Hopkins, Massachusetts Institute of Technology, Pennsylvania and Yale.

The American universities selected as their first outgoing representative for the first year Dr. Arthur E. Kennelly, professor of electrical engineering at Harvard University and the Massachusetts Institute of Technology. He has met with great success in his undertaking in France, and in addition to lecturing before numerous French technical schools was assigned by the French educational authorities, through M. Petit Dutaillis, minister of public instruction in France, to spend several weeks at the Universities of Paris, Grenoble, Lyons, Marseilles, Toulouse, Bordeaux, Nancy and Lille, giving in each a course of lectures, some technical and others of a more general character.

Dean Frazer in the course of his work of lecturing in French before the various universities and scientific societies of France, will have favorable opportunities of studying at close range French educational methods, especially as applied to science.

Dr. Frazer represents the fourth generation to be graduated from the University of Pennsylvania, and the third generation to be connected with its faculties. His grandfather, John Fries Frazer, from 1844 till his death in 1872, was professor of natural philosophy and chemistry in the University of Pennsylvania and vice-provost from 1855 to 1862. He was one of the incorporators of the National Academy of Sciences in 1863. His father, Dr. Persifor Frazer, became professor of chemistry in 1872, which chair he held until his appointment to the Second Geological Survey of Pennsylvania. He died in 1909. Dr. John Frazer was born in Paris, France, on February 5, 1882. In 1904 he was appointed instructor in chemistry, being later promoted to assistant professorship and subsequently to a professorship. In 1912, upon the reorganization of the old college, he became dean of the Towne Scientific School, which position he has held since, except while on leave of absence when in the service in 1918.

SCIENTIFIC NOTES AND NEWS

SIR AUCKLAND GEDDES was given the honorary degree of doctor of laws by the University of California at the recent Charter Day exercises celebrating the fifty-fourth anniversary of the university. The British ambassador was the main speaker on Charter Day, the subject of his address being 'Some of the effects