the human condition. Miller, Heller and O'Neill were at first skeptical, but bowed to the inevitable when Cottrell –leading practitioner in the art of designing precipitators –decided to depart the University of California for the U.S. Bureau of Mines.

A larger problem was finding an organization that could receive patent rights, develop a business in electrostatic precipitation, and then use any profits for scientific inquiry. Although the University of California was considered, Cottrell decided that direct industry-academic links would eventually work to the detriment of independent research. Another alternative was suggested by Cottrell's new employer at the Bureau of Mines, Joseph A. Holmes. It was his idea that the Smithsonian Institution might agree to be recipient and administrator.

Although Charles D. Walcott, Secretary of the Smithsonian, was won over by Cottrell's enthusiasm, the Institution's Board of Regents ruled against directly accepting the proffered patent rights. On the other hand, the Regents suggested, the Secretary could lend his help in establishing a new organization. Any resources generated by it could then be devoted to scholarly research at educational and scientific institutions, the Smithsonian among them. With Walcott's backing young Cottrell was introduced to Washington's political and scientific elite. Alexander Graham Bell provided letters of introduction, and–according to some sources–President William Howard Taft suggested the form a charter might take for the proposed organization.

Bolstered by this support, an effort in New York to recruit a board of directors was spectacularly successful. Included were such men as General T. Coleman Du Pont, former president of Du Pont Powder Co.; Frederick A. Goetze, dean of engineering at Columbia University; Arthur D. Little, consulting chemist and president of the American Chemical Society; Elihu Thompson, founder of the company out of which grew General Electric, and Charles A. Stone of the engineering firm Stone and Webster and an M.I.T. trustee.

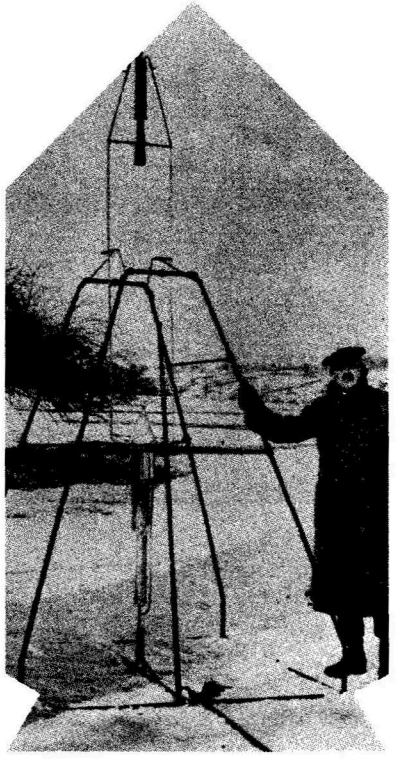
This "high seas fleet" as several termed it, was the foundation's only asset aside from patent rights. Research Corporation was chartered in New York as a stock corporation that eventually would own all of its stock and never pay dividends, an unusual arrangement subsequently ratified by a special act of the state legislature. A small operating fund was created–limited to $10,100 at Cottrell's insistence–by directors who subscribed to stock from charitable motives (the foundation repurchased all shares at the selling price three years later).

The public administration of patents

The good that Research Corporation could do by serving as an intermediary between industry and the academic community was primary in Cottrell's mind in 1912; new resources for academic science would be a highly desirable by-product. "The rapid growth of education, coupled with a general awakening to the commercial importance of research, has brought about a persistent demand the world over for closer and more effective cooperation between universities on the one hand and the industrial plants on the other," said Cottrell in a speech before the Eighth International Congress of Applied Chemistry held in New York in 1912.

His further comments, read in light of today's discussions of industry-university relationships, again prove that the more things change the more they remain the same. "A new form of university-industry cooperation has been introduced," Cottrell noted, "by industrial fellowships through which university laboratories undertake the investigation of certain problems for individual commercial firms. These (firms) bear the expenses and receive the first fruits of the investigations, but under restrictions as regards final publication and use intended to justify the universities in taking part in the work.

"A difficulty," Cottrell continued, "is that these methods are open to the objection of introducing too direct



The experiments of "father of rocketry" Robert H. Goddard benefited from one of the first foundation grants, this through the Smithsonian Institution. The $5,000 award in 1923 furthered the device at right, the first liquid fuel rocket to fly. Other early Research Corporation awards supported research in cryogenics and a fellowship in applied science.



The huge terminals of the first large Van de Graaff generator crackle with high voltage arcs in a 1933 demonstration. Constructed in a blimp hanger at Round Hill, Mass. with the aid of Research Corporation grants to M.I.T., the device provided 20 times the output of any machine then known. It became the heart of one of the first powerful particle accelerators for probing matter.

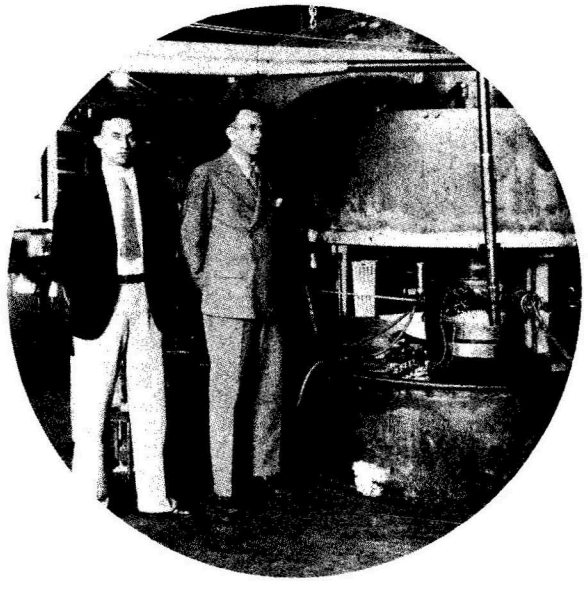
business relations between the academic institutions or the members of their faculties and individual financial interests." He elaborated some years later in explaining why he had not simply donated his precipitator patent rights to the University of California. "Successful patents held by an academic institution might well have lead to emulation," he then commented. "The danger this suggested to me was the possibility of growing commercialism and competition between institutions, and *an accompanying tendency for secrecy in scientific work.*"

Research Corporation was to be an experimental laboratory for the public administration of inventions; a middleman between industry and the academic community. The electrostatic precipitator was to serve as "kindling to start the fire under the boiler"—a fire, however, that took time to ignite. While it had been anticipated that Research Corporation would simply license the precipitator to industry, the device proved too unpredictable for inexperienced engineers to build and operate. It was necessary for the foundation to go into precipitator design and fabrication to realize its promise.

As for other inventions, the publicity accompanying the founding of Research Corporation brought forth a stream of ideas, many of doubtful merit. Even Secretary Walcott recommended one: a soluble beef extract created by an acquaintance. The beef bouillon, called "Meatox," had its drawbacks—a bitter taste, a foul smell and cases of gastric distress—as did most of the other inventions.

Although a few successful discoveries were handled on a case-by-case basis or were donated to the foundation by public-spirited researchers, a program for administering large numbers of inventions in the public interest awaited two developments: creation of resources to evaluate, patent and license them, and the forging of agreements with academic institutions. The first formal effort was launched in 1935 at the urging of Karl Compton and Vannevar Bush of M.I.T., and continues, with modifications, to this day. The foundation evaluates inventions submitted to it, and patents and attempts to license to industry the most promising. Services are provided at foundation expense, with royalties shared according to prior agreement.

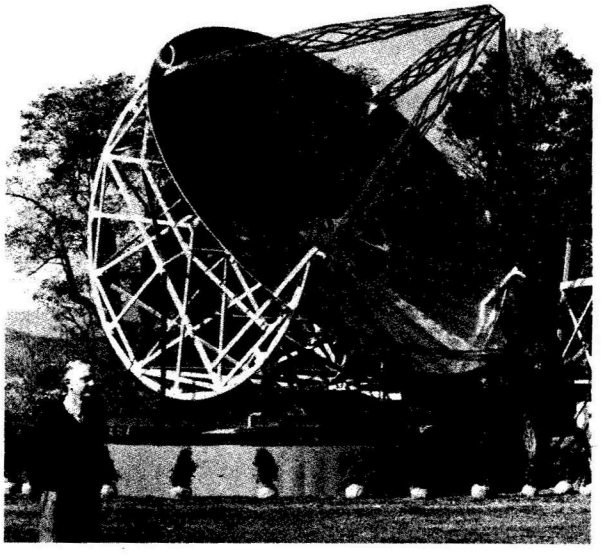
(Continued on page 6)



Ernest O. Lawrence, shown in this 1934 photo (right figure) with his first large cyclotron, greatly impressed Cottrell who supported his requests for funds. In the depression of 1931 Research Corporation borrowed money to move the magnet for the machine, and continued its grant support through the decade. Neutrons were studied with the new cyclotron, and studies were initiated in biology and medicine with the radioisotopes it created.



Among inventors who gave their patents to the foundation to advance science were Donald F. Jones (above) and Paul C. Mangelsdorf who developed a method for producing hybrid seed corn. Other donors included Robert R. Williams and Robert E. Waterman (synthesis of vitamin B_1); Rachel F. Brown and Elizabeth L. Hazen (first antifungal antibiotic), and Charles H. Townes (maser-laser concept).



Radio astronomy owes much to Research Corporation grants beginning in 1951 to pioneer Grote Reber, who designed and built the first radiotelescope (shown above installed at the National Radio Astronomy Observatory). His intensive observations from Hawaii and Australia did much to establish the science of radio astronomy in the U.S. and other countries, and to direct its early evolution.