

Willis Haviland Carrier

Father of Air Conditioning

VOLUME-2 Carrier in the Heritage Group Collection

Carrier, Willis Haviland 97-01
(E) Chief Engineer
Woodward Ave Buffalo N.Y.

Died 10/7/120 in
New York, N.Y.
10/50 C. D. Lien

Date of Birth: 11/26/74
Co. No. 1901

NAME: Carrier, Willis Haviland

HOME ADDRESS: D.W. Carrier
1350 Amherst St. Buffalo, N.Y.

TOWN: Buffalo N.Y.

STATE: N.Y.

ADDRESS: 483 Rhode Island St. Buffalo N.Y.

LOCATION: Buffalo N.Y.

DEGREE: M.E. (E)

SCHOOL LAST ATTENDED: High School

ENTERED C. U. '97

COURSE: M.E.S.S.E.S.

DATE OF INFORMATION:

1/3/12 Treasurer's list
4/8/13 Ballot + 4/7/14
5/10/15 Ballot
1/21/16 Director
6-19-20-At Reg. cand.
1/21/16 Ballot
4/11/17 Ballot
4/12/18 Ballot
5/26/18 Ballot
9/10/20 Ballot
5/33 Officer
1/31 Ballot
6/33 Ballot

610 Salem Ave. Elizabeth, N.J.
Res. # 2570 Valley Drive, Syracuse, N.Y.
Bus. # S. Geddes St. Syracuse, N.Y. Carrier Corp. 11th

NAME AND ADDRESS OF A PERSONAL FRIEND

2.9 Press Cuttings Relating to Willis Carrier

W. H. Carrier. Cornell Alumnus, Dies

Funeral services will be held at 11 a.m. Tuesday in Syracuse for Dr. Willis Haviland Carrier, who was known as the "father" of airconditioning.

The 73-year-old engineer was an alumnus of Cornell and a trustee from 1940 to June, 1950. He entered the Cornell Medical Center in New York City about 2 weeks ago for a physical checkup and died there of a heart ailment Saturday, Oct. 7, 1950. A service will be held at Park Central Presbyterian Church, Syracuse, and burial will be in Forest Lawn Cemetery, Buffalo.

Carrier was born at Angola, near Buffalo. He was graduated from the School of Mechanical Engineering at Cornell in 1901 and received honorary degrees from Lehigh and Alfred Universities.

Retired in 1948

He was chairman emeritus of the board of Carrier Corporation which he and several other engineers organized in 1915 to manufacture air-conditioning equipment. He was president of the firm from 1915 to 1931, when he became chairman of the board. He retired in 1948.

Carrier patented his first air-conditioning unit in 1902. It controlled temperature and humidity to solve the problem of a Brooklyn lithographing plant, where varying weather had caused paper to expand and contract.

His "rational psychrometric formulae," presented to the American Society of Mechanical Engineers in 1911, still are used for air-conditioning calculations. Developed Air Control

By his experiments, he proved that air could be humidified or dried through control of water temperature.

One of Carrier's inventions was the centrifugal refrigeration machine, which made air conditioning possible for large plants, tall buildings, ships and mines. He perfected this in 1922.

His most recent development was an air-conditioning system for skyscrapers—to force conditioned air through the tall buildings under pressure and at high velocity. The 40-story Secretariat Building of the United Nations in New York City has the system, with each of its 4,000 windows carrying an individual Carrier weathermaster unit.

Honored by British

He was American representative at the World Engineering Congress in Japan in 1930. The National Association of Manufacturers named him "modern pioneer of American invention" in 1940. Friends of Carrier said the tribute he found most meaningful came from the Newcomen So-

NEW YORK

Dr. Willis H. Carrier Is Dead; Pioneered in Air Conditioning

Founder of Carrier Corp.; His Research Provided a Basis for the Industry

Dr. Willis Haviland Carrier, seventy-three, chairman-emeritus of the Carrier Corporation, of Syracuse, N. Y., whose research was the basis of most of the techniques in modern air conditioning, died Saturday in the Cornell Medical Center of New York Hospital, where he had been a patient for two weeks. He lived at 2570 Valley Road, Syracuse.

Mr. Carrier formed the Carrier Engineering Corporation with J. Irving Lyle and others in 1915, becoming its president. The firm later became the Carrier Corporation. He served as president until 1931, when he became chairman of the board, serving until 1943. He was named chairman-emeritus in 1948.

Mr. Carrier's interest in air conditioning had its origin in the problems of a Brooklyn color processor in 1902, when Mr. Carrier was employed as an engineer by the Buffalo Forge Company. The color processor found that his paper was distorted by humidity.

As a result of his inquiries into this problem, Mr. Carrier developed in 1903 what was known as a spray-type air washer, and in the course of this became interested in the general problem. In 1905 he devised a spray-type air conditioner capable of heating, cooling, humidifying air, an apparatus that provided the basis for those which are on the market today.

It was as a result of this development that he left the Buffalo Forge Company, where he had become chief engineer in 1908, to pursue the studies that led him to the organization of the Carrier Corporation in 1915. In 1907 he had patented what was known as "dew-point control," a method regulating humidity by controlling the temperature of the spray-water in a washer or conditioner of air.

His researches led Mr. Carrier to an exhaustive study of the psychrometric phenomena, including the numerous factors related to the dehumidification of air by the use of mechanical refrigeration. He completed this study in 1911 and presented to the American Society of Mechanical Engineers a paper, "Rational Psychrometric Formulae," which was ranked as



Dr. Willis H. Carrier

fundamental engineering doctrine and upon which was built the science of air conditioning.

Further studies brought about in 1914 the publication of "The Engineers' Handbook, Fan Engineering," which he edited, containing many tables and much data of basic importance. In 1912 he had produced a self-contained air-conditioning unit, a combination of motor-driven fan and pump to send air through a spray of controlled temperature, which was probably the first such unit designed for railroad use.

In the ensuing years, Mr. Carrier made numerous contributions to air conditioning. These included the ejector system, first developed in 1916 for the tobacco, food, textiles and other industries, and many of the principles used in conditioning the air in theaters and other large public gathering places.

Mr. Carrier was born in Angola, N. Y., and was educated in the district schools of Erie County and Central High School, Buffalo, N. Y. He was graduated from Cornell University in 1901, and joined the Buffalo Forge Company as a research engineer.

He was a member of the American Society of Mechanical Engineers and a past president of the American Society of Refrigerating Engineers and of the American Society of Heating and Ventilating Engineers.

Dr. Carrier Dies Of Failing Heart

Dr. Willis Haviland Carrier, a graduate of Cornell and a member of the Board of Trustees, died of a heart ailment Saturday in the Cornell Medical Center, New York City, according to an

The New York Times November 12 published details of a secret anti-submarine weapon manufactured during the war by Carrier Corp., of which Alumni Trustee Willis H. Carrier '01 is chairman of the board. Designed in Great Britain, drawings of the Anti-submarine Projector were sent to Carrier Corp. in June, 1942, there to be adapted to American production.

Press Cuttings 2

[Department of Manuscripts and University Archives, Cornell University]

Pioneering Ingenuity of Willis H. Carrier Laid Basis For Industry in Air-Conditioning as Comfort to Millions

By VINCENT LYONS,

World-Telegram Financial Writer.

Willis H. Carrier sat hunched against the seat as his train rode over the rails one day late in the autumn of 1905. He was deep in thought. Suddenly he straightened up, squinted his eyes and peered through the window at the forbidding cold murkiness outside.

"If I can find some means of producing such a fog artificially in a stream of air, controlling the temperature of the fog and then removing all free moisture," he soliloquized, "then I shall have the ideal solution of my problem."

And the problem which gave him so much concern was air-conditioning of which he is now a recognized leader. His mathematical investigations, experimental and development work produced numerous basic and fundamental inventions which have contributed to the comfort of millions.

Several hundred different industrial processes in more than 200 industries depend upon air-conditioning. It is estimated that the sciences has returned net savings in excess of

\$20,000,000 a year to industry, largely through economies of production.

The fact is that Mr. Carrier freely disclosed his discoveries and, as a consequence, a large scale commercial development took place rapidly. It was of great importance to the mining industry, allowing operations to be conducted at depths close to two miles below the surface, a distance which once was believed unconquerable.

Willis Carrier was born in Angola, N. Y., on Nov. 26, 1876, and was educated in nearby schools. It was while attending the Central High School at Buffalo that he decided to become an engineer, although realizing that the wherewithal posed a problem for his farmer-father. Thus he taught for two years after being graduated from high school and then entered a competitive examination for Cornell University and was successful.

In the fall of 1897 the youth arrived at Ithaca with a state scholarship and \$5. He waited on tables, tutored and tended furnaces. In his senior year he and a classmate purchased a laundry route and established a college laundry service

which is still in operation at Cornell today. It was a Klondike for the two boys, each netting \$1000 in profits in that year of 1901.

Imbued with confidence and a zest Mr. young Carrier got a job with the Buffalo Forge Co. as research engineer. Immediately he went to the laboratory and within a short time had devised an ingenious method of testing and rating fan system heaters and utilizing the results in estimating heating plants.

As a result of his tests scientifically conceived rating tables were computed at various steam pressures and air velocities. Further research led in 1903 to development and installation in a Brooklyn lithographing plant of the first air-conditioning system, a system which allowed the lithographer to control production in summer.

In 1905 he developed the spray-type air washer, and when the dramatic encounter with the fog came he improved the basic apparatus and produced the spray-type air-conditioner.

This new machine was capable of heating, cooling, humidifying and

dehumidifying — a system which stands today as one of the most efficient types of apparatus available for air treatment. But Mr. Carrier was still unsatisfied. In 1907 he developed and patented Dew-Point Control, a machine which was finally designated air-conditioner which he showed that it performed the four functions essential for controlling conditioned air—cooling, humidifying in winter, dehumidifying in summer and air movements.

In 1911 he presented to the American Society of Mechanical Engineers his Rational Psychrometric Formulae, a fundamental engineering doctrine translated in many languages which constituted the foundation of the science of air-conditioning.

In 1915 Mr. Carrier, in association with others, founded the Carrier Engineering Corp. Since then the word "engineering" has been dropped from its title. Mr. Carrier is board chairman, and J. I. Lyon, early associate, is president.

Mr. Carrier's patents and contributions are actually too numerous to mention, but his basic contribution resides in the original concept which established a new science.

NY - July 1905 - 2/2/05
E.Y.

CORNELL ALUMNI NEWS

101 ME (CP) (22)

Willis H. Carrier, Chairman of the Board, The Carrier Corporation, Syracuse, New York.

Submitted by: George E. Hulse, Chief Engineer, The Safety Car Heating and Lighting Company, Inc. Dixwell and Putnam Avenues, New Haven, Conn.

His patents and contributions are too numerous to mention. The best known publication is a paper on "Rational Psychrometric Formulae" which is a part of the Transactions of the American Society of Mechanical Engineers.

Evaluation

Mr. Carrier's work has been one of the largest factors in the development of air conditioning; the supply of the materials and machinery required by the use of air conditioning has expanded business, and created employment; its application to industrial processes has enhanced the quality of products, and lowered the cost of production; its application to homes, business offices, and places where people congregate for work or entertainment, has aided materially to human comfort.

3/44
P88

Dr. Carrier

(Continued from page 80)

Engineers in 1940, representing the first two organizations at the World's Engineering Conference in 1929 and 1930. He was awarded the John Scott Medal for the invention of the processes and apparatus for air conditioning and refrigeration, the F. Paul Anderson gold medal for distinguished scientific achievement in the same field. In 1934, he was awarded the medal of the American Society of Mechanical Engineers, and the Brown Medal of the Franklin Institute, in 1941. In 1935, Lehigh University conferred on him the degree of Doctor of Engineering and, in 1942, Alfred University conferred on him the degree of Doctor of Science. He was elected to the Sigma Xi in 1914, and to Tau Beta Pi in 1938, and the Phi Kappa Phi in 1940. The National Association of Manufacturers honored Mr. Carrier by selecting him as one of the 19 Modern Pioneers whose achievements have made our American industrial system the envy and example of the world.

1944

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New Valve Invented By Cornellian

Among patents recently issued is one covering what might be called a "thinking valve" for air conditioning systems, invented by Willis H. Carrier of Syracuse, a Cornell graduate in 1901, and university trustee. The new device is said to turn on heat or cold, according to need, all by itself.

The new valve arrangement, particularly adapted for use in larger buildings, such as theaters, includes two thermostats and two valves so placed that they can be operated automatically to increase or decrease heat or cold.

Heretofore, such controls in conditioning systems could only control either more or less heat or more or less cold, but not both, neither automatically. The new system involves the use of cooling and warming agents in the system, and the valve arrangement can be said to determine beforehand which valves to operate to control the conditioning system so that temperature is adjusted to some predetermined degree.

Atmospheric conditions, within the building affect the thermostat so that, as an example, if it became suddenly cooler inside, one thermostat would open the valve controlling the heating medium so that more heat would be made to circulate, while the valve controlling the cooling medium in the system automatically would close. When the temperature became properly adjusted the "thinking valves" would operate in such a way as to keep inside atmospheric conditions at that temperature.

One expert said this kind of control conceivably foreshadowed major changes in postwar heating and cooling of hotels, office buildings, and other large structures.

SATURDAY, FEBRUARY 20, 1943

T

Carrier '01 Describes Experiences In Development of Air Conditioning

Senior engineers were given a recipe for success yesterday by Willis H. Carrier of Syracuse, chairman of the board of the Carrier Corporation and a University trustee, which was to "Take advantage of opportunities when you find them."

"Any success I may have had," he said, "has been based on opportunity plus good fortune."

Mr. Carrier discussed briefly his experiences in the development of the air conditioning industry, tracing it back to the time he started the research department of the Buffalo Forge Company.

Does Drafting Research

Fresh from college in 1901, and assigned to a job in the drafting room which he did not especially like, the Cornell trustee said he went to the boss and told him some of their mathematical computations and tests

changes, and some control was wanted. He learned that calcium chloride was not successful as a humidifier, "at the cost of a \$12 pair of shoes."

The idea came to him that something had to be done in providing "manufactured weather" to meet industrial conditions — and a new field of air conditioning was opened. Then came the need to develop the equipment, studies on air saturation and moisture, temperature control, all of which he tackled successfully.

Before starting this, he pointed out, "I had never heard of any such thing as air humidity."

Society Talks Building

Press Cuttings 4

[Department of Manuscripts and University Archives, Cornell University]

SATURDAY EVENING, JUNE 15,

W. H. Carrier, Pfann Win Trustee Posts

6/15/40 *actual journal*
Willis H. Carrier of Syracuse, Class of 1901 and chairman of the Carrier Engineering Corporation, and George J. Pfann, Class of 1924, New York attorney, were announced as the newly-elected alumni trustees at the annual meeting of the Cornell Alumni Association in Bailey Hall this morning.

Both men will serve five year terms. Mr. Pfann was re-elected while Mr. Carrier was chosen to succeed the late Andrew Wilner of Newark, N. J.

A total of 11,303 ballots were cast of which 7,729 were for Mr. Carrier and 6,313 for Mr. Pfann.

Wilson Heads Council
Another important annual meeting was that of the Cornell Alumni Fund Council where officers were elected. Christopher W. Wilson, Brooklyn, Class of 1900, was elected president; Vice-presidents, Willis H. Carrier, Syracuse, re-elected; Jansen Noyes, New York City, Class of 1910; Julian Pollak, Cincinnati, Ohio, Class of 1907; and Harold T. Edwards, New York City, Class of 1910.

Three executive committee members selected for three years were Caesar A. Guannelli, Wilmington, Del., Class of 1922; Walter W. Buckley, Philadelphia, Pa., Class of 1926; Henry W. Roden, New York City, Class of 1918. Robert P. Butler, Hartford, Conn., Class of 1905, was elected for one year to fill out the unexpired term of N. W. Howe, Kansas City, Mo., Class of 1918, who resigned.

Change in the name of the fund-raising organization from the Cornellian Council to the Cornell Alumni Fund Council was officially adopted.

Again the Alumni Fund reported improvement in the number of givers as well as in the amounts collected.

Between July 1, 1939, and June 12, 1940, the number of donors was 6,483 compared with 5,611 last year during the same period. They gave \$68,488.28, an increase of \$5,863 over the corresponding period a year ago. In addition, the sum of \$145,402 was received in restricted gifts.

Progress Outlined

Before 1,200 or more alumni President Day outlined the progress of the University during the past year and of plans for the future at the meeting in Bailey Hall this morning. Creed Fulton of Washington, D. C., class of 1909, was chairman. Prof. Wright Gibson, president of the alumni association, reported on the alumni trustees election.

The total alumni registration had not been compiled as press time, but Friday evening 969 had listed themselves at the registration desk in Barton Hall. The 25-year class, 1915, led in attendance, with 164, with 1925 second, 150, 1910, and



WILLIS HAVILAND CARRIER was born in Angola, New York, November 26, 1876. Before entering Cornell in 1897, his early education was obtained in the district schools of Erie County, New York, and in Buffalo Central High School. He was graduated from Cornell in 1901 with the degree of M.E.

As a young man in high school, Mr. Carrier made up his mind to be a Cornell engineer. He entered Cornell with a State Scholarship; he then took the University scholarship competitive examination and was one of the nine successful winners. He was a working student, but still found time to go out for the freshman crew and to participate in intra-mural crew and cross-country. At the end of his junior year, he and a classmate bought out a laundry route on the campus, combined the services of two laundries and made them into a general agency; this was the beginning of the Student Laundry Agency at Cornell.

Upon graduation from Cornell in 1901, Mr. Carrier was employed as a research engineer by the Buffalo Forge Company, and in 1906 attained the position of Chief Engineer. In 1915, the Carrier Engineering Corporation was founded with Mr. Carrier as president, and he is now Chairman of the Board of the Carrier Corporation. Mr. Carrier has contributed widely to the advancement of the engineering profession and is best known as the "father of air conditioning." He freely disclosed his discoveries to scientific bodies and technical societies, and this information became available all over the world. He was president of the American Society of Heating and Ventilating Engineers in 1931, president of the American Society of Refrigerating Engineers in 1927, and represented both of these organizations at the World Engineering Congress in Japan in 1929-30. He was awarded the John Scott Medal for the invention of processes and apparatus for air conditioning and refrigeration, the F. Paul Anderson Gold Medal for distinguished scientific achievements in the same field, and the 1934 Medal of the American Society of Mechanical Engineers. In 1935 Lehigh University conferred on him the degree of Doctor of Engineering. Mr. Carrier has served on many committees and commissions as a member of the American Society of Mechanical Engineers, the American Society of Heating and Ventilating Engineers, and the American Society of Refrigerating Engineers. He is a Fellow of the American Society for the Advancement of Science and of the Royal Society for the Encouragement of Arts, Manufacture, and Science. He was elected to Sigma Xi in 1914, to Tau Beta Pi in 1928. American industry recently honored Mr. Carrier by selecting him as one of the nineteen Modern Pioneers "whose achievements have made our American industrial system the envy and example of the world."

Mr. Carrier has always been actively interested in the affairs of Cornell. He is now serving as president of the Cornell Society of Engineers and as a vice-president of the Cornell Alumni Fund. Mr. Carrier's advice and help have frequently been sought for and received by members of the instructing staff at Cornell.

Beulah, 1879, Cleveland Heights, Ohio; Albert W. Smith of Ithaca, dean emeritus, 1878; Clayton Ryder, Cornell, N. Y., 1879; James L. Knapp, Philadelphia, Pa., 1880; Lee J. Vance, Brooklyn, N. Y., 1880; George C. Watson, Clyde, N. Y., 1881; Gen. D. Weed, Los Angeles, Calif., 1884.

John A. Rea of Tacoma, Wash., solo survivor of the Class of 1869, was elected to register some time during the day.

Industries Honor W. H. Carrier '01 At NAM Banquet

Dr. Willis H. Carrier '01, chairman of the Board of Carrier Corporation, Syracuse, and founder of the air conditioning industry, was honored Tuesday by American Industry as one of the 19

Press Cuttings 5

[Department of Manuscripts and University Archives, Cornell University]

CARRIER WINS MEDAL

Willis H. Carrier, retiring president of the American Society of Heating and Ventilating Engineers, has received the first award of the F. Paul Anderson Gold Medal for scientific achievement in his field. R. A. Harding, of Buffalo, presented the medal at a luncheon of the Society held in Cleveland recently.

THE NEW YORK TIMES, W.



HONORED AS ENGINEER. Willis H. Carrier.

W. H. CARRIER WINS ENGINEERING MEDAL

Newark Man Honored by Society For Air-Conditioning Research—Other Awards Announced.

The medal of the American Society of Mechanical Engineers for 1934 has been awarded to Willis H. Carrier of Newark, N. J., for research in air conditioning, it was announced yesterday by the society.

Mr. Carrier is past president of the American Society of Refrigerating Engineers and of the American Society of Heating and Ventilating Engineers. He is chairman of the board of the Carrier Engineering Corporation, the Carrier Manufacturing Corporation and the Carrier Engineering Company, Ltd., of London.

The medal was established in 1920. It is presented for distinguished service in engineering and science.

The Worcester Reed Warner gold medal was awarded to Ralph E. Flanders of Springfield, Vt., for his "contributions to a better understanding of the relationship of the engineer to economic problems and social trends." It was announced. The Charles T. Main award went to Philip P. Self of Fort Collins, Col. John I. Yelbott Jr. of the University of Rochester received the junior award of the society. The winner of the undergraduate student award was H. Reynolds Hudson of Atlanta, Ga.

The awards will be presented during the annual meeting of the society, which will be held, beginning Dec. 2, in the Engineering Societies Building.

Fewer Windows Predicted for Future Offices

Willis H. Carrier Endorses Elimination of Openings on First Fifteen Floors

Greater Comfort Claimed

Saving in Operating Cost Also Assured, He Says

The elimination of windows on the first fifteen floors of future office buildings, for the purpose of increasing the comfort of the occupants, and effecting substantial economies in the operation of the structures, was predicted by Willis H. Carrier, president of the American Society of Heating and Ventilating Engineers. In an address before the members of the Management Division of the Real Estate Board of New York, Inc., in the Empire State Club last Thursday.

"The fact that no windows are needed on the lower floors will render offices there much more desirable than they are at present," he said, "because of the elimination of dust and the nerve irritating turmoil of the street. They also will be unobscured by the gloom of sunless days with their fog, smoke and depressing atmosphere. Such construction, at least for the lower floors, would reduce the cost of conditioning to almost one-half of what it would be with present construction, while it would greatly increase the rentable area, at the same time making them feet for feet more desirable than the upper floors if constructed in the usual manner without air conditioning.

"To be sure the cost of the average lighting load would be greatly increased, and there would be approximately a similar increase due to operation of air conditioning equipment. This would be to a considerable extent offset by a greatly reduced cost of heating in winter and a very decided saving through the elimination of window cleaning and the greatly reduced amount of dusting and other cleaning.

Less Cleaning Required

"This has already been demonstrated in air conditioned spaces. For example, in homes the cost of cleaning curtains and hangings has actually been reduced to about one-half. In the type of office building proposed, the reduction would be at least equally great, to say nothing of the satisfaction to the occupant from the absence of dirt.

"The increased power cost would be mainly during the summer, with but little additional charge for winter. In fact, the increase in cost due to lighting and ventilation in winter would be more than offset by the decrease in cost of heating. A relatively stable power load in which the summer demand would be increased considerably above

Termed Cure for Vacancies

"At present there is in this city a great excess office space, and only those builders who have sufficient foresight to make their offices attractive through air conditioning can hope to fill their rentable area at a profit. Thus air conditioning in office buildings can be viewed from two standpoints: First, as insurance against loss through unrented office space; and second, ability to obtain higher rental when the demand for office space becomes greater as in more prosperous times than at present."

During his address, Mr. Carrier mentioned that air conditioning apparatus used in government buildings at Washington kept the temperature of the White House and the House of Representatives at 80, while the Senate chamber was maintained at 82. He said that President Hoover likes to work with his coat on, so the temperature of his office was maintained at about 74 so that he could work in comfort.

Mr. Carrier also described one of the problems which had been met and solved in connection with large scale conditioning plants in metropolitan centers. If water were used as the sole medium for cooling the air in the buildings in summer, he said, about 4,000 gallons a minute would be required for the building now under way, and about twice that amount if the entire development is carried

JRSDAY, DECEMBER 6, 1934.

ENGINEERS HONOR WILLIS H. CARRIER

Newark Executive Gets 1934
Medal of Society for Air
Conditioning Research.

LABOR SCARCITY FOUND

Report Says Tool Makers Need
Recruits, Holds Government
Intervention 'Essential.'

The 1934 Gold Medal of the American Society of Mechanical Engineers, which is holding its annual meeting here this week, was presented last night to Willis H. Carrier, chairman of the board of the Carrier Corporation, Newark, N. J., in recognition of his research and development work in air conditioning. The presentation was made at the society's annual dinner to new members at the Hotel Astor. Mr. Carrier, who was born in 1876 and was graduated from Cornell in 1901, is a pioneer in air conditioning and the author of many scientific papers. The medal he received is awarded for distinguished service in engineering and science.

The Worcester Reed Warner Medal for 1934 was presented to Ralph E. Planders of Springfield, Vt., president-elect of the society, "for his contribution to a better understanding of the relationship of the engineer to economic problems and social trends."

The Charles T. Main award of the society was presented at the student luncheon luncheon yesterday afternoon at the Fraternity Club Building, Madison Avenue and Thirty-eighth Street, to Philip P. Self of Fort Collins, Col., for a paper on "air conditioning—its

practicability and relation to public welfare." The award carries an annual stipend of \$150.

The undergraduate student award was given to H. Reynolds Hudson of Atlanta, Ga., for a paper on "dynamic balance and functional utility applied to automotive design."

Paul E. Doty of Atlanta, Ga., retiring president of the society, presented special badges to nine fifty-year members at last night's dinner. H. V. Kaltenborn delivered an address on "The World in Revolution."

One of many reports presented before the society's section meetings during the day at the Engineering Societies Building, 29 West Thirty-ninth Street, was one on industrial management, prepared by the management division of the society. This said that a labor scarcity already had developed in the skilled trades of tool and machine building and maintenance, and that "a modest business pick-up would leave many capital-goods industries unable to find enough competent men."

"While the appearance of the government as a factor in industrial relations has, from a management point of view, complicated an already highly charged situation," the report adds, "it is clear that intervention was essential from a recovery angle. The code program has increased labor costs, but without increasing real earnings per employed worker and without substantially reducing unemployment."

One of the features of the afternoon program was the Chavin W. Rice lecture, given by Dr. John H. Finley, who spoke on Dr. Rice's contribution to international friendliness.

A report by the Oil and Gas Power Division said the United States was building only 0.9% per cent of the total motorship tonnage of the world. It asserted that the present ship-subsidy law, although designed to encourage shipbuilding, had actually prevented it in some cases.

Willis H. Carrier Gets 1934 Engineers' Medal Newark Man Honored for Work in Air Conditioning

The 1934 medal of the American Society of Mechanical Engineers was awarded yesterday to Willis H. Carrier, of Newark, N. J., "in recognition of his research and development work in air conditioning," officials of the society announced. Four other annual awards of the society also were made.

Mr. Carrier is chairman of the board of the Carrier Engineering Corporation, the Carrier Manufacturing Corporation and the Carrier Engineering Company, Ltd., London. He is a graduate of Cornell University and the author of numerous scientific works, dealing principally with theories of moisture evaporation. He is a former president of the American Society of Refrigerating Engineers and of the American Society of Heating and Ventilating Engineers.

Ralph E. Planders, of Springfield, Vt., received the Worcester Reed Warner gold medal for his "contributions to a better understanding of the relationship of the engineer to economic problems and social trends."

Carrier Corporation Elects Directors

Paul Stamm, former partner in Ladsburg, Thalmann & Co., and E. C. Wampler of Lawrence Stern & Co., were elected additional directors of Carrier Corporation at the annual meeting of stockholders. The authorized number of directors was increased to sixteen from fifteen. Stockholders also approved increase in the authorized number of shares to 1,000,000 from 500,000.

Willis H. Carrier, chairman of the board of directors, presided at the meeting and explained that the \$114,722 of nonrecurring income in Carrier's report for 1934 came from the sale of the company's royalty rights in the Auditorium Corporation in place of which the company took bonds.

PREPARING AIR FOR DEEP MINE REAL PROBLEM

Carrier Is Building \$500,000 System

It is more than greed that makes the Robinson Deep, a rich gold mine in the Witwatersrand (White Water ridge), South Africa, the worst place on earth in which to do a day's work.

About 57 percent of the gold at present produced comes from the Rand. There are no other gold deposits as rich in sight. Hence the cry of one school of economists that gold is an outmoded currency because not enough of it can be mined to meet the world's commercial requirements; hence the efforts to bring up more and more gold to the surface, and hence the terrible working conditions of the Robinson Deep's "turf shaft," which has now reached the record depth of 8500 feet. Five eight Empire State buildings on one another in the Robinson Deep, and only the pinnacle of the uppermost would be visible.

In the lower workings of that famous shaft the rocks have a temperature of 104 degrees. Men, stripped to the waist, sweat by the dim light of candles and electric lamps, in an atmosphere that is over 90 percent wet.

These conditions are now to be transformed. More gold must be won for a world that still uses it as a measure of value, even though it has abandoned it for actual currency.

Outdaring Radio City

A ventilating system the mine already has. It does no more than keep the air in circulation—merely the usual collection of fumes to be found at the mouth of every mine. It actually makes the workings hotter. An air-conditioning plant was wanted—something to reduce the temperature and maintain it at a bearable point, summer and winter. But the best! The biggest air-conditioning plant in the world is to be found in Radio City in New York. This had to be bigger. And the cost? About \$500,000.

The owners of the Robinson Deep turned to Willis H. Carrier, a distinguished American engineer of Newark, N. J., who has devoted his professional life to the designing and installing of air-conditioning machinery. South African mine owners had heard of a Brazilian mine in which Carrier had installed a cooling plant, at a depth of 6000 feet. So he was asked to study the Robinson Deep and make his recommendations. The result is a contract for the transformation of the turf shaft and its allied workings at a cost of \$500,000, with the prospect that a score of mines in the Rand will adopt air-conditioning and thus postpone the day when the last hole will have been drilled and the last blast fired in the richest ore region ever discovered on earth.

When Carrier has finished his work 300,000 cubic feet of air at a temperature of 23 degrees Fahrenheit (only three below freezing) will be blown at a velocity of 2000 feet a minute through a tunnel 100 feet below the surface and then distributed throughout the shaft and its galleries. The cooling effect will be that of 4,000,000 pounds of ice, although not an ounce of ice will be made.

CORNELL ALUMNI NEWS

Cornell
1934
From
P. H. ...

Press Cuttings 7

[Department of Manuscripts and University Archives, Cornell University]

C O P Y/

MEDAL AWARD FOR 3 CORNELL GRADUATES.

Cornell University was honored last week, when three of her sons were awarded the John Scott Medal by the Board of Directors of City Trusts of Philadelphia, at the meeting of the American Society of Mechanical Engineers.

These three men are: Albert H. Emery Jr. '98, of Stamford, Conn.; Willis H. Carrier '01, of Newark, N.J.; and Albert Kingsbury '89, of Greenwich, Conn.

The John Scott Medal awarded each year to "ingenious men and women who make useful inventions," was established by John Scott, a Scotch chemist of Edinburgh, by a bequest of \$4,000 to the city of Philadelphia.

Recently the Board of City Trusts, under whose care the fund is handled, received permission from the courts to increase the award from \$20 to \$1,000, since the fund had grown large enough to permit such generosity.

Among previous awards this year was one jointly to Philip Drinker and Louis A. Shaw of Harvard University, for an apparatus for the administration of artificial respiration, which has saved the lives of many persons suffering from paralysis.

Invented Testing Device.

Albert H. Emery Jr. '98 was awarded the John Scott Medal for the invention of the Southwark-Emery Testing Machine, a mechanical device for testing materials. This apparatus represents the highest development of the art of determining with precision the strength of materials used in construction.

Albert Kingsbury '89 was awarded the medal for the development of a thrust bearing, for use in ships and heavy machinery. This invention, known as the Kingsbury Thrust Bearing, has proved of great advantage in the matter of increased efficiency, reduced cost, space, and weight, in the construction of thrust blocks for ships, which take the driving force of the propeller. It has also been applied and is most essential in the handling of very great weights brought about by the enormous increase in the size and capacity of the modern water wheel generator sets.

Willis H. Carrier '01 received the award for the invention of processes and apparatus for air conditioning and refrigeration. He has been engaged since 1902 in developing systems of air conditioning,

Press Cuttings 8

[Department of Manuscripts and University Archives, Cornell University]

CVS 2/19/43

W. H. Carrier '01 Trustee Tycoon, To Speak Friday

Willis H. Carrier '01, a trustee of the University and Chairman of the Board of the Carrier Corporation, Syracuse, will deliver a lecture on "The Development of Air Conditioning" in West Sibley 2, at 12 o'clock on Friday, as part of the introduction to business and industry series. The public is invited.

Upon graduation with an M.E. degree Carrier was employed as a research engineer by the Buffalo Forge Company, becoming chief engineer of this concern in 1906. Brilliantly successful, he founded the Carrier Engineering Corporation in 1915.

Carrier was president of the American Society of Heating and Ventilating Engineers in 1931, and of the American Society of Refrigerating Engineers in 1927, representing both societies at the World Engineering Congress in Japan in 1929-30.

He was awarded the John Scott medal for the invention of processes and apparatus for air conditioning and refrigeration, the F. Paul Anderson Gold Medal for distinguished scientific achievements in the same field, and the 1934 Medal of the American Society of Mechanical Engineers. In 1935, Lehigh University conferred on him the degree of Doctor of Engineering.

Carrier is a Fellow of the American Society for the Advancement of Science and of the Royal Society for the Encouragement of Arts, Manufacture, and Science. He is also a member of Sigma Xi and Tau Beta Pi honorary engineering societies.

In 1940, Mr. Carrier was elected Alumni Trustee of Cornell University. *BF*

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Cornell Trustee To Give Lecture

Willis H. Carrier, Cornell 1901, a trustee of the University and chairman of the board of the Carrier Corporation, Syracuse, will speak on "The Development of Air Conditioning" at 12 noon Friday in Room 2, West Sibley. The public is invited.

Carrier was graduated from Cornell with the M.E. degree, and on graduation was employed as a research engineer by the Buffalo Forge Company, becoming chief engineer in 1906. Nine years after the Carrier Engineering Corporation was founded with the Cornellian as president.

Carrier was president of the American Society of Heating and Ventilating Engineers in 1931, and of the American Society of Refrigerating Engineers in 1927, representing both societies at the World Engineering Congress in Japan in 1929-30. He was awarded the John Scott Medal for the invention of processes and apparatus for air conditioning and refrigeration, the F. Paul Anderson Gold Medal for distinguished scientific achievements in the same field, and the 1934 Medal of the American Society of Mechanical Engineers. In 1935 Lehigh University conferred on him the degree of Doctor of Engineering. *FF*

Cornell Graduate Awarded Medal

Dr. Willis H. Carrier of Syracuse, a graduate of Cornell with the Class of 1901, was awarded the Frank P. Brown medal for scientific progress Wednesday by the Franklin Institute of Philadelphia.

The award was specifically for advancement "in the field of heating, ventilation and air conditioning," and Dr. Carrier was the first to receive it from the Institute.

In the year 1939, there were only three lynchings in the United States.

Willis H. Carrier, M.E. '01, chairman of the Carrier Corporation of Syracuse, is the author of an article entitled "The Employer Looks at Needed Improvement in Our System of Technical Education", which appeared in the October issue of "Mechanical Engineering."

Mr. Carrier is generally recognized as the founder of modern air conditioning and was designated last year as one of the outstanding pioneers of American industry. He

has been awarded the Anderson gold medal of the American Society of Mechanical Engineers, and is a fellow of the Royal Society of Arts and past president of the American Association of Heating and Ventilation Engineers. He is also a member of the Board of Trustees of Cornell University; last year he was president of the Cornell Society of Engineers.

After graduating from Cornell, he spent 13 years with the Buffalo Forge Company, and then in 1915 founded his own company to manufacture air-conditioning equipment. His research, much of which has been done in cooperation with the engineering staff at Cornell, has made him the foremost engineer in this field.

11/40 C Engineer

Cornellian Named To Defense Group

Dr. Willis H. Carrier of Syracuse has been named by Secretary of War Stimson to a committee of outstanding engineers to advise the War Department in matters concerning the protection of the civil

population from air and other attack in time of war.

A graduate in mechanical engineering at Cornell in 1901 and a trustee of the University, Dr. Car-

rier is chairman of the board of Carrier Corporation. He will represent the American Society of Heating and Ventilating Engineers on the seven man national technological civil protection committee.

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11/3/41 Journal