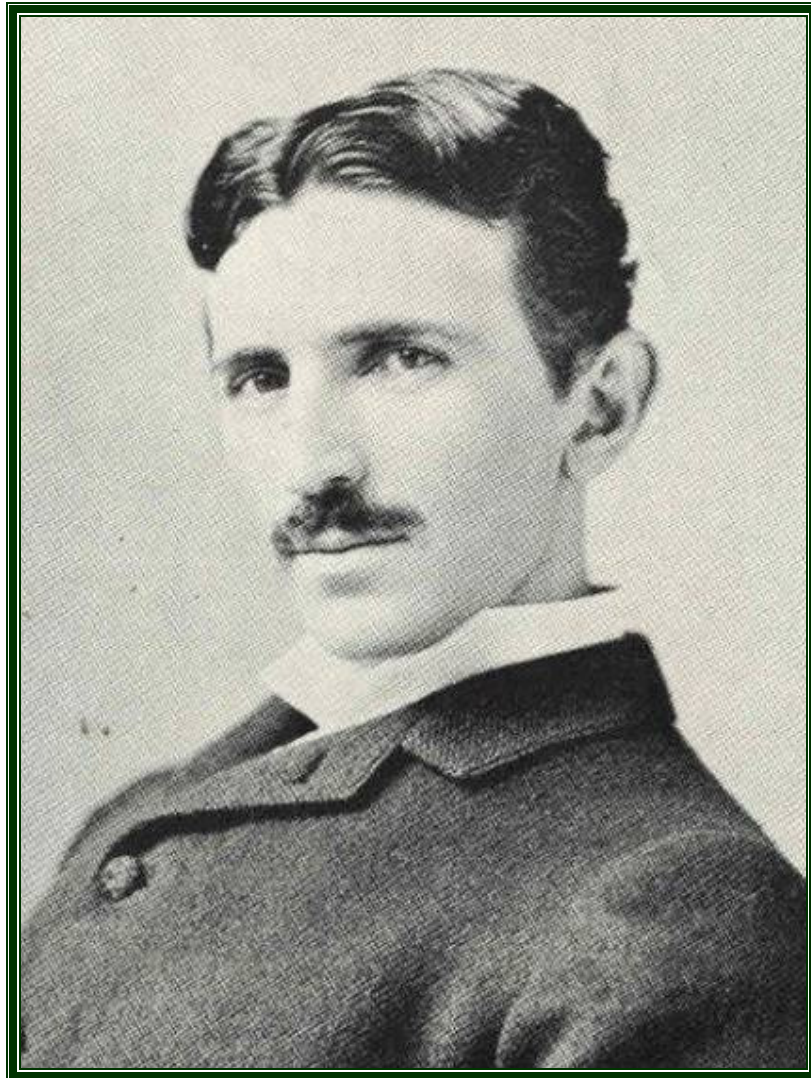




# NIKOLA TESLA

## 1856-1943



*Leading Pioneer of Alternating Current Systems*

**Nikola TESLA****1856-1943**

Croatian-American electrical engineer. He played an important part in the introduction of alternating current and developed transformers and ac motors. In a chequered career, he fell out with Edison [280] over payment of monies due to him, and collaborated with Westinghouse [278] to ensure the adoption of alternating current (defeating all of Edison's attempts to get dc universally adopted). Later (1912) he refused the joint award of the Nobel Prize in Physics to himself and Edison and neither was honoured. His achievements were considerable and the SI unit of magnetic flux density, the *tesla*, is named after him.

*(Mini-biography from CIBSE Heritage Group Records)*

In 1882, while working in Budapest, engineer Nikola Tesla, in a sudden flash of insight, conceived the operations of rotating magnetic fields, the concept of the ac induction motor, and the basic concepts of polyphase systems of ac generation and distribution. But failing to find support for the development of his concepts in Europe, he immigrated to the United States, where, in 1888, he took out patents on ac polyphase systems, complete with motors, generators, and transformers—inventions that have undergone no really basic change since. Westinghouse bought these patents and sponsored years of work on their development.

*(EPRI Journal, March 1979)*

**Nikola Tesla** (10 July 1856 – 7 January 1943) was an inventor and a mechanical and electrical engineer. He is frequently cited as one of the most important contributors to the birth of commercial electricity, a man who "shed light over the face of Earth," and is best known for his many revolutionary developments in the field of electricity and magnetism in the late 19th and early 20th centuries. Tesla's patents and theoretical work formed the basis of modern alternating current (AC) electric power systems, including the polyphase power distribution systems and the AC motor, with which he helped usher in the Second Industrial Revolution.

Born an ethnic Serb in the village of Smiljan, Vojna Krajina, in the territory of today's Croatia, he was a subject of the Austrian Empire by birth and later became an American citizen. After his demonstration of wireless communication (radio) in 1894 and after being the victor in the "War of Currents", he was widely respected as one of the greatest electrical engineers who worked in America. Much of his early work pioneered modern electrical engineering and many of his discoveries were of groundbreaking importance. During this period, in the United States, Tesla's fame rivaled that of any other inventor or scientist in history or popular culture, but due to his eccentric personality and his seemingly unbelievable and sometimes bizarre claims about possible scientific and technological developments, Tesla was ultimately ostracized and regarded as a mad scientist. Never having put much focus on his finances, Tesla died impoverished at the age of 86.

(“Wikipedia”)



(From Cheney & Uth)



# TESLA

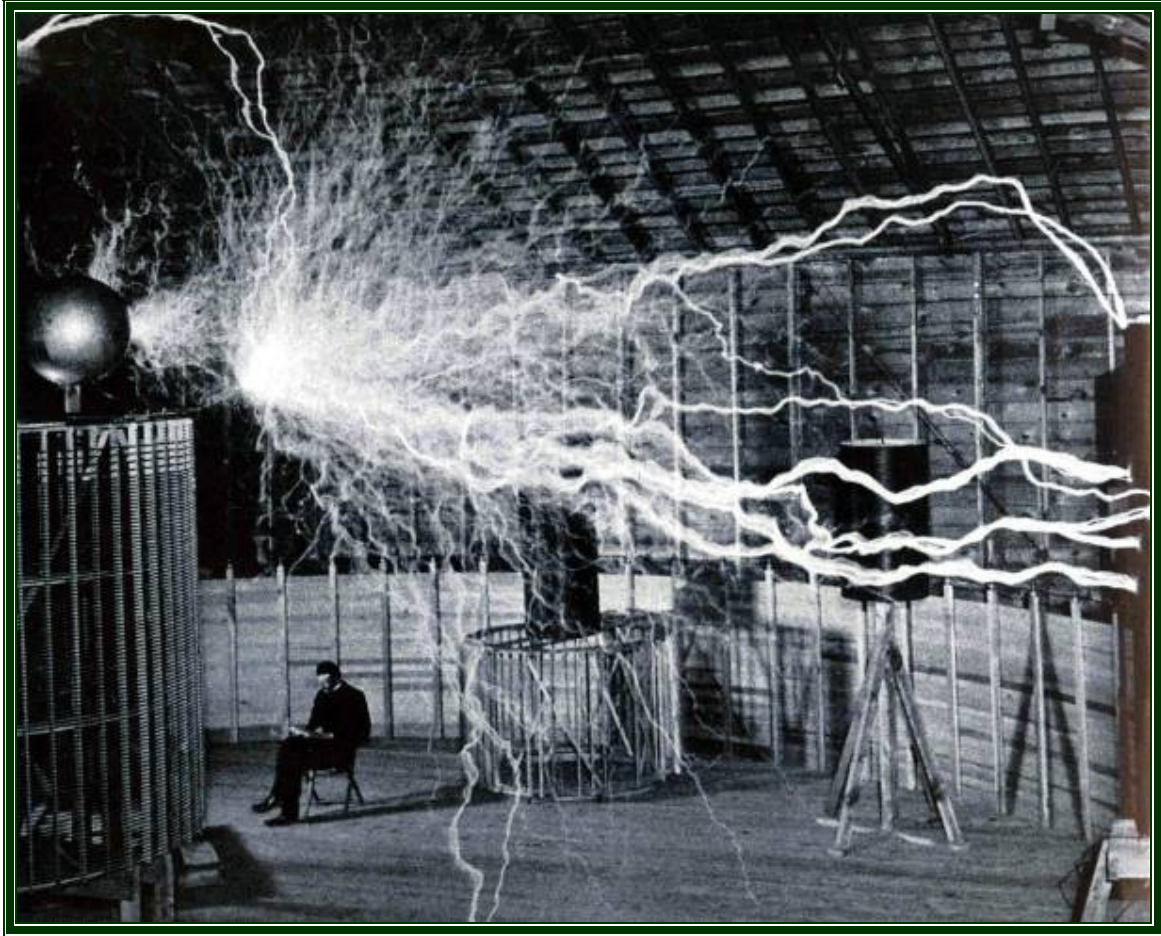
MASTER OF LIGHTNING



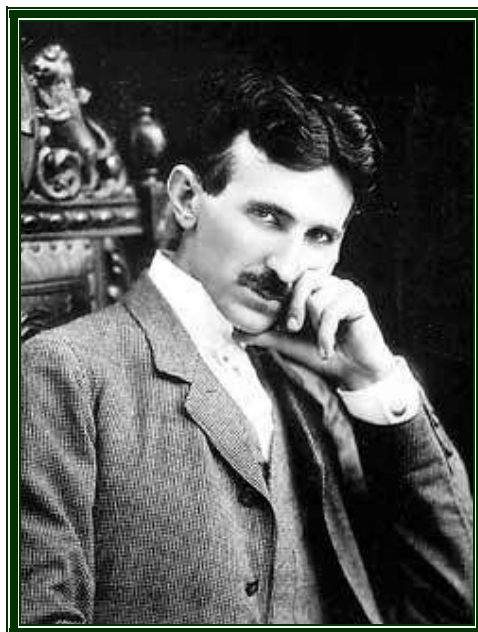
Cheney  
Uth  
P.S.

MARGARET CHENEY  
& ROBERT UTH

*2003 (CIBSE Heritage Group Collection)*

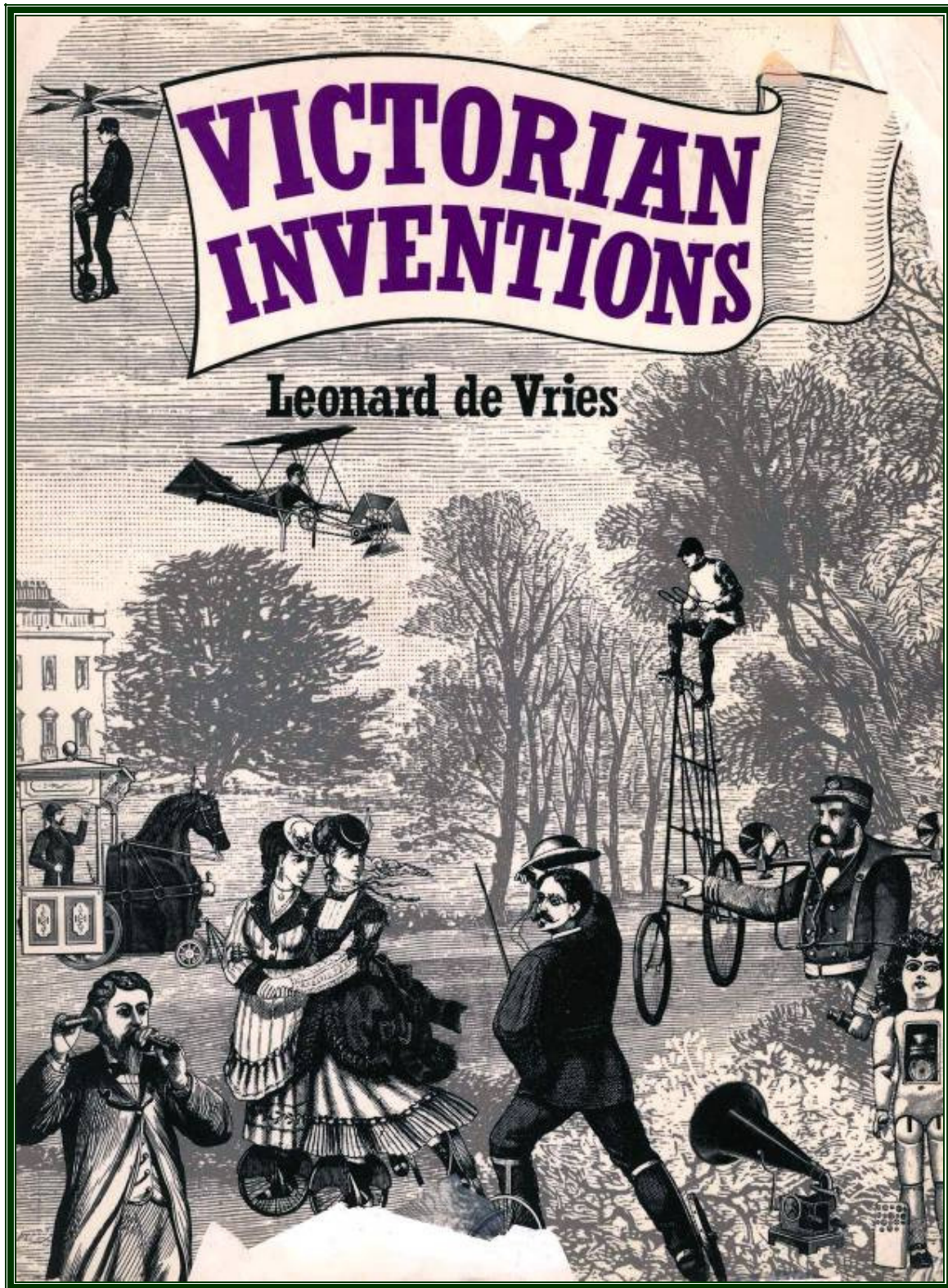


*Experiments with Man-Made Lightning*



*Tesla*





1973 (CIBSE Heritage Group Collection)



## TESLA'S EXPERIMENTS WITH ALTERNATING HIGH VOLTAGE CURRENTS

While in Europe alternating currents with frequencies not exceeding 100 per second were still being studied eagerly for practical applications, reports were received from America in 1891 that most surprising experiments were being carried out there with alternating currents of 15,000 cycles. The initiator of these studies was a Hungarian employed with the Westinghouse Company—Nicola Tesla. With remarkable talent he has conducted experiments and research in a hitherto almost unexplored field: that of alternating currents of extremely high voltage and frequency. He gave an account of his work before the American Institution of Electrical Engineers in New York in a lecture which has since become famous. It made an indelible impression upon the audience, both on account of the brilliant experiments and the completely new vistas it has opened. His work places Tesla among the greatest of our present-day scientists and inventors such as Edison, Graham Bell and Thomson.

When the news of Tesla's experiments reached Europe, he was approached by the most prominent scientific circles in Britain and France who invited him to repeat his

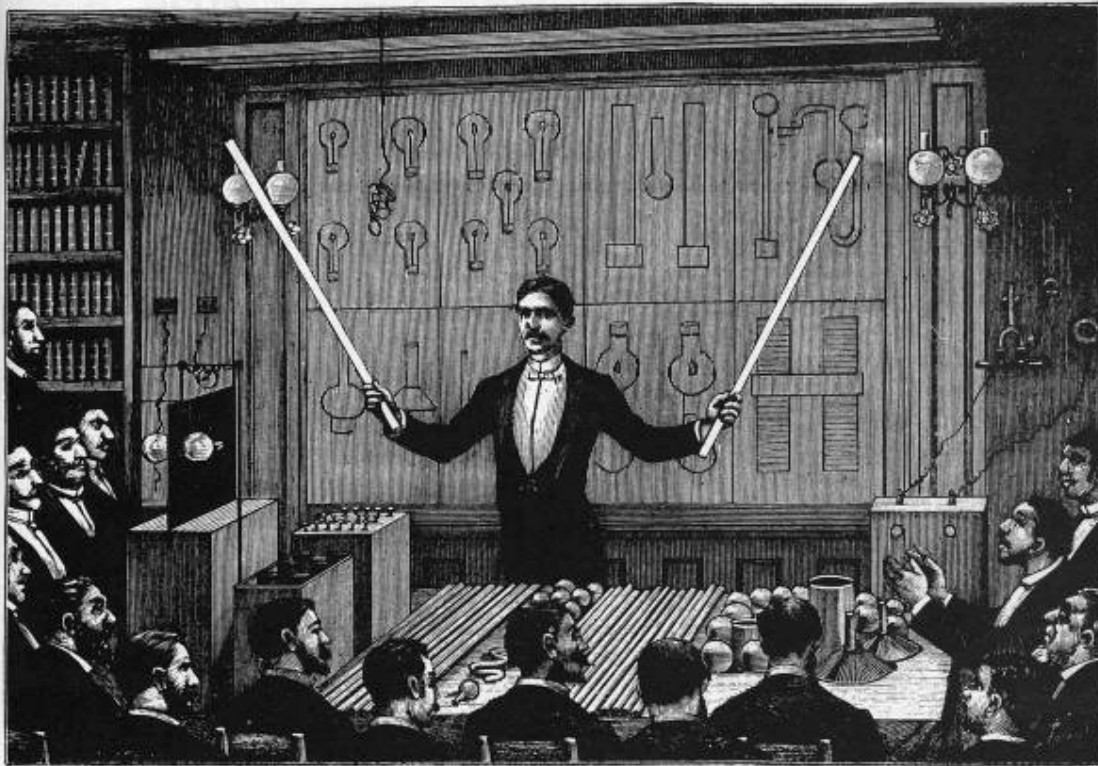
experiments in those countries. These lectures were attended by large and enthusiastic audiences which included men of great authority in the fields of the theoretical and applied sciences. After three hours of lecturing to an enthralled and fascinated audience, Tesla was compelled to admit that he had discussed only part of his research work.

Tesla uses two different types of equipment for generating his alternating high-frequency currents. One is a dynamo with 384 wire coils and an equal number of field magnets rotating at 50 revolutions per minute, thus producing an alternating current of  $50 \times 384 = 19,200$  cycles per second. Tesla also uses a special type of transformer. Its primary coil has only a few windings and is connected in series with a spark-gap, a condenser and the secondary winding of a Ruhmkorff-type induction-coil. With the second combination, tensions of half a million volts and scores of thousands of cycles per second can be generated, producing most impressive discharge phenomena in the open air and in glass tubes filled with rarefied air.

In the air, these currents engender electrical fireworks of unprecedented splendour

which assume the weirdest shapes, forming luminous fans and plumes of gossamer-like texture. Amazingly enough, these ultra-high voltages are in no way dangerous, thanks to their high frequency. In Berlin, Tesla placed himself between two of his assistants who were almost 15 feet apart, each of them touched one pole of the high-voltage transformer, and when Tesla reached out to them with his two arms, wavy bundles of violet-coloured electric fire shot forth from his fingertips, spreading out to one assistant's hand and to the other's forehead. This to the great dismay of some of the spectators, until they noticed that the experiment was harmless and painless!

One of Tesla's most striking experiments was his demonstration with the 3-foot-long Geissler tubes. For that purpose, two metal bars, 10 feet in length, attached to the floor and ceiling, were connected to the poles of his high-voltage transformer. When Tesla moved two Geissler tubes into the field between the two bars, they became luminous over their entire length without being connected either to the metal bars or to the transformer. In the words of one reporter: "Tesla stood there



*"Tesla stood there like the archangel, brandishing the flaming sword!" [1893]*

*(From de Vries)*



**JAMES ALEX TRANE**  
**1857-1936**



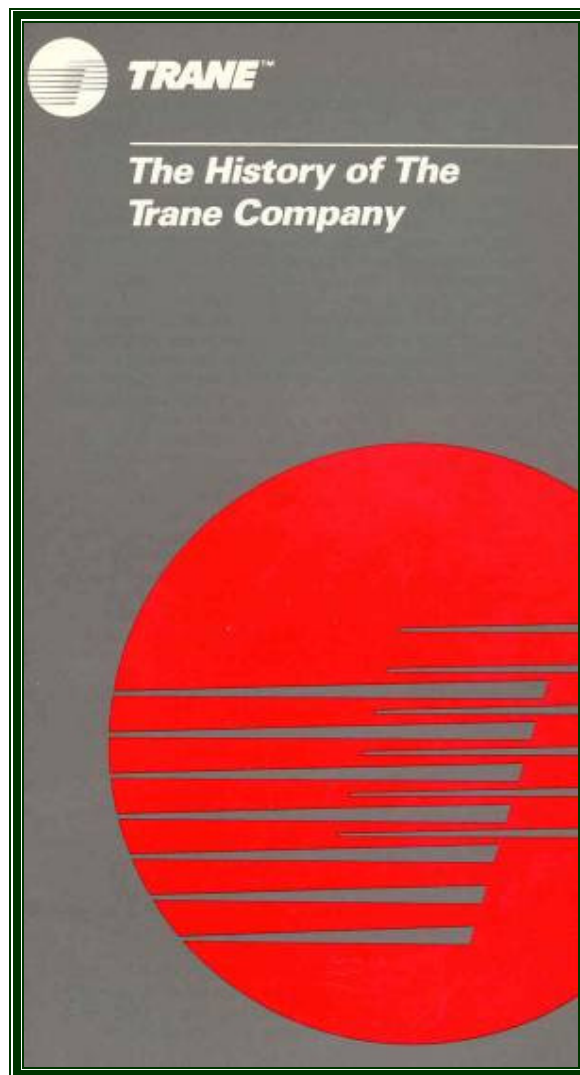
*Family plumbing business to International HVAC Corporation*



### **The Early Years**

The Trane Company, today one of the world's largest manufacturers of heating, ventilating, air conditioning and building management systems and equipment, began as a family business more than a century ago.

Norwegian immigrant James Trane settled in La Crosse, WI, in 1864, finding work as a steamfitter and plumber. In 1885, he opened his own store, and within a few years had gained a reputation as one of the area's best plumbers.



*(CIBSE Heritage Group Collection)*

*A history of the Trane Company is available on this web site under **Electronic Books***

## A SUCCESSFUL MAN.

A Brief Description of James A. Trane's New Store in La Crosse, Wis.

THE LARGEST PLUMBING BUILDING IN THE STATE.

J. A. TRANE, of La Crosse, has the honor of owning and occupying the largest building in the state of Wisconsin entirely devoted to the plumbing and heating business. As the structure was erected especially for this purpose, a short description of it may be of interest to the readers of *DOMESTIC ENGINEERING*.

The building occupies a prominent corner, extending 36 feet on Jay street, and 100 feet on Eighth street. It is three stories in height, above basement, with exterior of pressed brick. The basement, which extends under the entire building, is used for a workshop, and has all the appliances that ingenuity could suggest.

Electricity is used as the motive power for the pipe machines. Around the walls are the fitting racks; and one end is given up to wrought iron pipe.

Light comes from all sides, so that the numerous incandescent lamps need never be used except during a short



JAMES A. TRANE, LA CROSSE, WIS.

winter day. Vaults have been excavated under the sidewalks and are utilized for storage of soil pipe and fittings. The wrought iron pipe is unloaded on the side street through area ways, where rollers place it on the racks, thus reducing the handling of it to very little trouble.

A freight elevator runs from the basement to the third story. This en-



PLUMBING, GAS, STEAMFITTING AND BICYCLE STORE OF JAMES A. TRANE, LA CROSSE, WIS.



tire floor is used for storing supplies. It is filled with range boilers, earthenware tanks and seats, and *bicycles*.

On the second floor is a workshop where gas and electric fixtures are fitted up. Here is also a private office, where Mr. Trane locks himself in when tourists are many.

The entire ground floor is used for offices and as a show room. There is no finer show room in the west than this; 36 feet wide and 90 feet long, with a height of 15 feet, it gives an

The office has one corner to itself, and furnishes ample quarters for a cashier, stenographer, and a collector. And here is the haven to which the weary wayfarer hies, in the hope of rest and—business. He is always sure of a welcome. Seated in a comfortable chair, and comparing the surroundings with other establishments, conveniently located in cellars and back alleys, he can hardly realize that all this belongs to a plumber, like unto other men, subject to the same

*ing profession lies through a neat show room.*

There are paths, and they may reach to the same goal, but the highway is the best and safest route for travel.

All honor, then, to Mr. Trane; may he have many followers! His success is well deserved, and all of us join in congratulating him for his pluck. His career illustrates that the proper way of spelling luck is "pluck."

D. L. HANSON.



SHOW ROOM OF JAMES A. TRANE, LA CROSSE, WIS.

idea of immensity. The walls are wainscotted in black ash, the ceiling being of Georgia pine, all woods finished in natural colors. The display of plumbing fixtures is in good taste, closets under pressure, bath tubs of all grades and designs, and a nice line of lavatories. Overhead is a very complete line of gas and electric fixtures. Mr. Trane has for some time past sold bicycles, and wheels of all prices occupy no small part of the first floor. Toward the rear are show cases, in which are displayed brass goods.

conditions that they are, liable to dull times, exposed to competition, for La Crosse has other plumbing concerns, which rank with the best in the land. And then this pilgrim, if he is a thinker, (and are they not all?) realizes that the average plumbing business is subject to the same laws of compensation as are they who sell groceries or dry goods. A plumber can not hide himself under a bushel and expect his light to shine forth. *The high road to success in the plumb-*

#### Pittsburg Plumbers to Pass.

Every plumber in business in Pittsburg at the present time will have to stand an examination within the next two months to determine whether or not he shall remain in business. This examination is required by a new law passed last winter by the state legislature, making the superintendent of the bureau of health, superintendent of the bureau of plumbing and one reputable plumber an examining board. J. N. Addy, a well known plumber, is the third member of the committee, which will meet early in March to prepare the questions which are to be put to the plumbers, and to lay down a plan for work.

(From "Domestic Engineering," April 1896)



Figure 11-21 Showroom of James A. Trane, LaCrosse, WI (from Domestic Engineering, p. 37).

MERCURY SEAL

**JAS. A. TRANE**  
**Vacuum**  
**Heating**  
**System**

Superior to Hot Water Heating in  
**ECONOMY,**  
**EFFICIENCY,**  
**SIMPLICITY,**  
**COMFORT.**

Write for Full Information.

**JAS. A. TRANE,**  
**Vacuum Heating Co.**  
**LA CROSSE, WIS.**

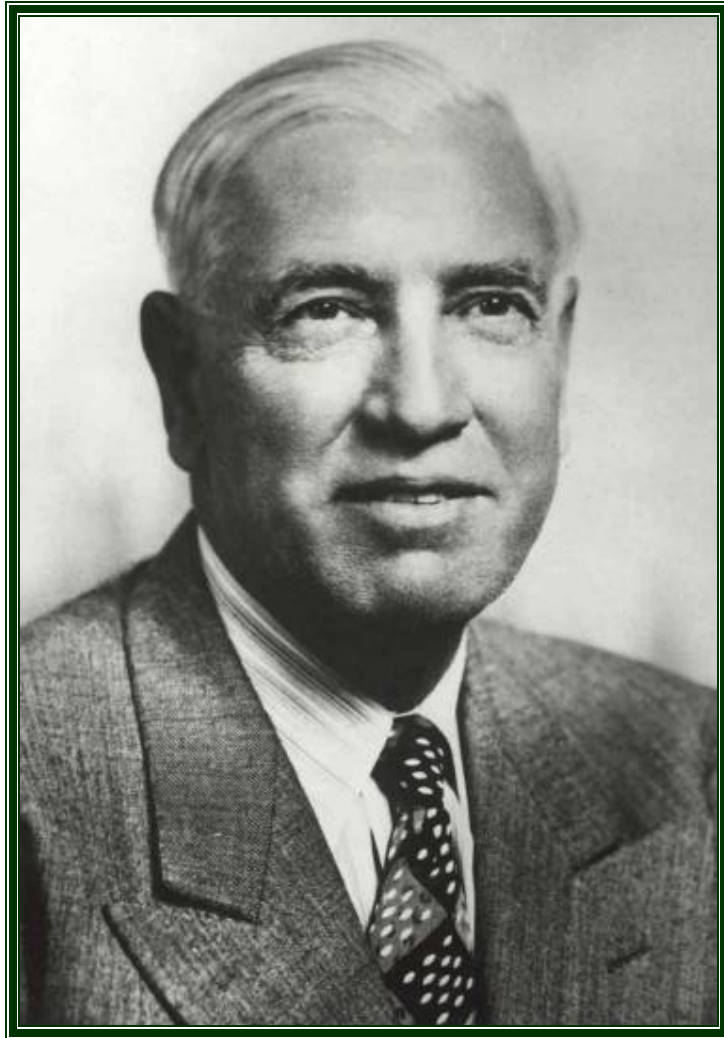
Vacuum Heating Co., 425 Hood Building, Philadelphia, Pa., Eastern Distributors.

Figure 11-22 Advertisement, James A. Trane vacuum heating system—from its original days of manufacturing steam heating equipment (from Engineering Review, October 1903).





**REUBEN N TRANE**  
**1886-1954**



*Member ASHRAE's Hall of Fame  
(Photo CIBSE Heritage Group Collection)*

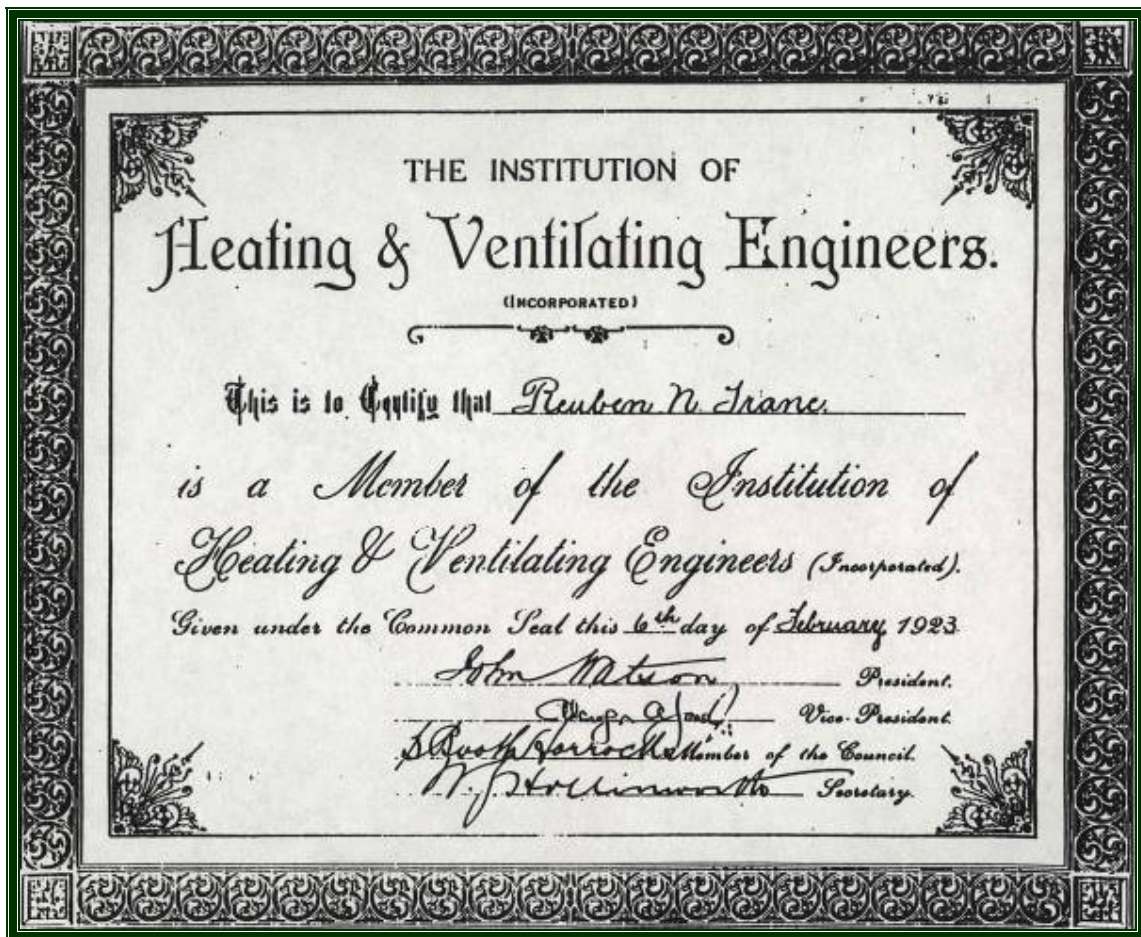


[108] Reuben TRANE

died 1954

American engineer, inventor, and business executive. Son of James Trane [44]. Founded the Trane Co. with his Father (1913). Developed a convector *cabinet heater* (1926), a U-shaped copper tube and fin design in a sheet metal enclosure, as an alternative to the cast-iron radiator. Secured 28 patents, including a fan-coil unit (1933) and the first hermetic centrifugal refrigerating machine (1938). Pioneered mechanical refrigeration for railway freight wagons. He inaugurated a company student training program (1925). Later, set up endowments of post-graduate engineering scholarships at Wisconsin and other universities. The Trane Co. established ASHRAE scholarships in his name (1991). Reuben Trane was inducted into the ASHRAE Hall of Fame (1997).

(Mini-biography from "The Comfort Makers," Brian Roberts, ASHRAE, 2000)



Reuben Trane joined the IHVE in 1923



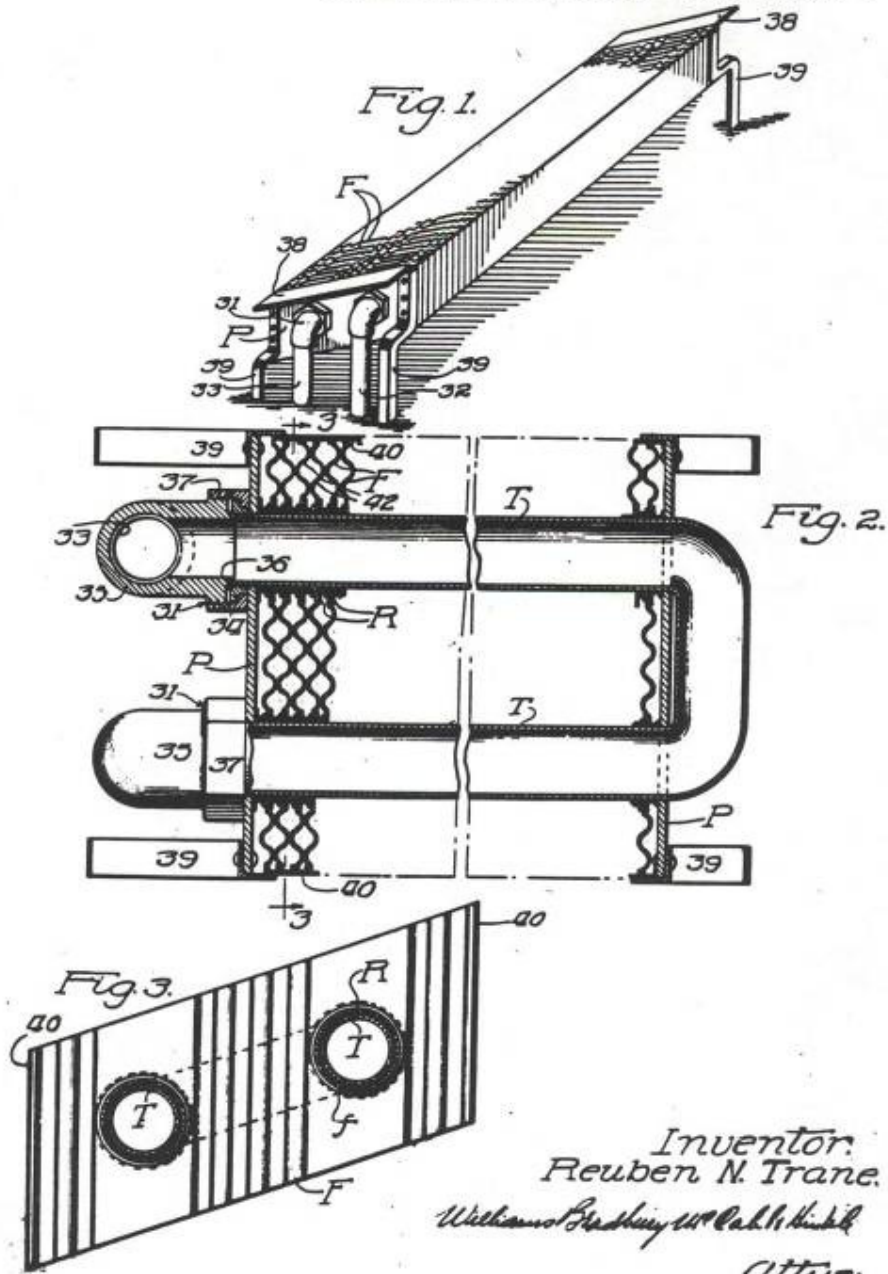
May 12, 1931.

R. N. TRANE

1,805,116

RADIATOR

Original Filed April 23, 1926 3 Sheets-Sheet 1



Inventor:  
Reuben N. Trane.

William S. Buckley, C. A. H. Kiehl

Attys.

Feb. 5, 1935.

R. N. TRANE

1,990,356

HEATER

Filed March 31, 1933



Fig. 3

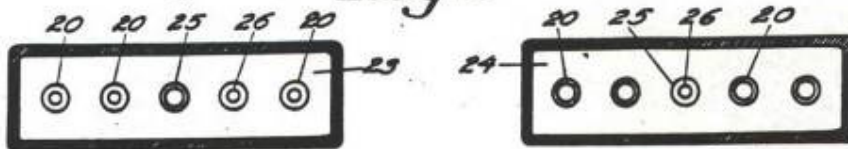


Fig. 4

Fig. 5

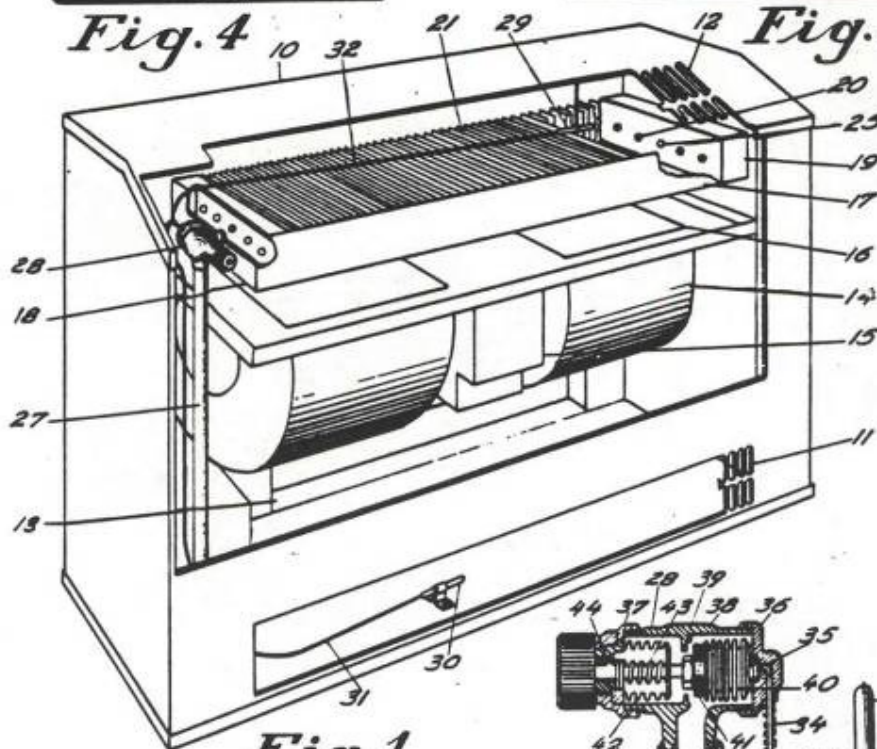


Fig. 1

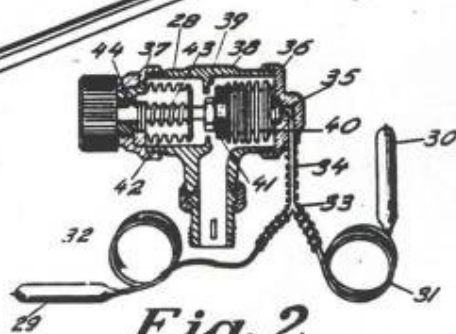
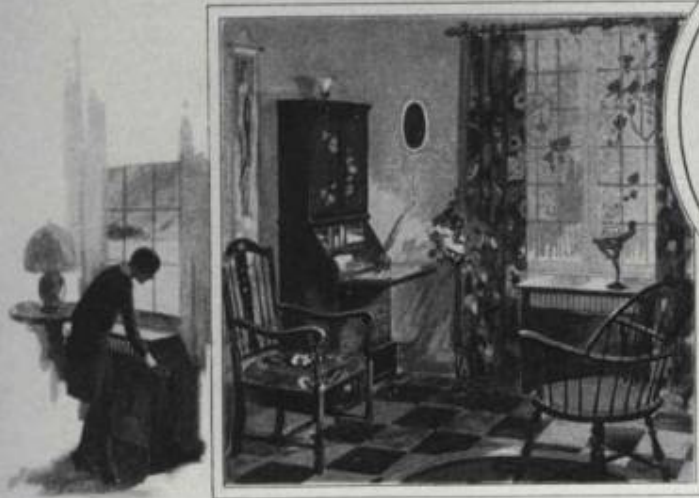


Fig. 2

Inventor.  
R. N. Trane  
per Arthur I. Holmes  
Attorney.



# Reuben N. Trane's Achievement Made Heating History!



REUBEN N. TRANE,  
President, The Trane Company

## Replaces the Unsightly Radiator with Efficient Heating Furniture

"A radical improvement, yet based on sound, accepted heating principles"—that was the news quickly circulated throughout the heating world, following the announcement of Trane Heat Cabinets.

The long-awaited "Successor to the Radiator" had arrived. Architects, engineers and the public quickly responded to this new achievement of Reuben N. Trane. They recognized that here, at last, was an opportunity to escape the limitations of existing methods—to attain new standards of heating efficiency—to make heating a constructive factor in the planning of beautiful interiors.

Trane Heat Cabinets of the visible type have all the decorative possibilities of the finest furniture. Not a modified radiator, but a new type of equipment, heating by convection. Write today for complete information.

THE TRANE COMPANY  
Established 1881. LA CROSSE, WIS.



A—End view of Trane Heat Cabinet showing position of the radiator.  
B—Plan view. Shows position of heating element and compare to the radiator.



A U-tube with closely spaced copper plates attached by the patented Trane Process.

# TRANE

## HEAT CABINETS

*Successors to the Radiator*

Figure 11-23 Advertisement, Trane heat cabinets (from The Heating and Ventilating Magazine, January 1927, p. 18).



The Trane Company can trace its history to the plumbing shop opened in La Crosse in 1886 by Reuben Trane's father, James A. Trane. Reuben and his father incorporated The Trane Company in 1913 to manufacture steam valves and traps that James had invented.



Reuben Trane's company developed a centrifugal compressor with a hermetically sealed motor in 1938. The technology fueled the development of machines to supply chilled water to air condition large buildings.

## A Special Tribute to Reuben Trane

### Industry Giant Joins ASHRAE Hall of Fame

**B**OSTON--Reuben Trane was more than a talented inventor. He was an astute businessman who knew the key to success was a constant flow of new products. He surrounded himself with a strong corps of young engineers whom he valued more than the physical assets of his company.

"If the choice were mine," he often said, "I'd rather lose my business -- but keep my engineers together."

His dedication to "human engineering" became a tradition of The Trane Company which he headed as president from 1916 to 1951, and as chairman of the board from 1951 to January, 1954.

The philosophy provided a successful foundation for his company. Sales of products have grown from \$50,000 in 1913, to more than \$45 million in 1953, to more than \$3.4 billion in 1996. Many of the products were invented by Trane, who held 28 patents, including the fin-and-tube convactor radiator in 1926 and the fan coil unit in 1933.

A different generation of engineers gathered here June 28 to honor their colleague who died in 1954 by inducting him

into the ASHRAE Hall of Fame. The honor has been awarded to only 11 people in an industry that has employed millions.

"I know Reuben Trane would be especially proud of his induction into the ASHRAE Hall of Fame," Trane Executive Vice President Jim Schultz told the gathering at the plenary session at ASHRAE's 1997 Annual Meeting. "It is an honor bestowed on him by his peers -- his fellow engineers and industry leaders."



Reuben Trane led The Trane Company from 1913 to 1954.

Another speaker, Nick Trane, Reuben Trane's grandson, presented a personal view of Trane. His grandfather, he said, was a very active man who loved golf and his industry, and was dedicated to the community of La Crosse, Wis. "He seemed to know everybody in the shop, and saw them as friends," he said.

The presentation also included a slide show that traced Trane's life, including his years as a student at the University of Wisconsin where he earned an engineering degree in 1910, became an accomplished rower, and co-founded a student union that became the prototype for student unions throughout the nation.

Trane's professional career blossomed in 1913 when he and his father, James A. Trane, incorporated The Trane Company to make steam valves and traps that James Trane had invented in connection with a vapor heating system. Three years later Reuben Trane was company president, dividing his time between devising new products, marketing and running the business.





The invention of the fan coil paved the way for air conditioning for ships, trains and planes. Reuben Trane (left) celebrates the advent of air conditioning on airplanes with engineers, contractors and airline officials.



Reuben Trane (left) receives Distinguished Service Citation from the University of Wisconsin. Trane endowed post-graduate engineering scholarships at Wisconsin and other universities.

An milestone for Trane and the HVAC&R industry came in 1925 when Trane conceived the basic idea for his convector, the modern successor to the cast-iron radiator.

He called his invention a "heat cabinet." It consisted of a cabinet housing a fin-and-tube coil -- thin aluminum or copper fins attached to thin copper tubing which carried the heating medium, steam or hot water. The fins speeded up the dissipation of the heat. It was the heart of a convector which was trimmer, neater, lighter, quieter and more efficient than the old radiator.

Manufacturing of the convector started in 1926 as Trane was developing a "unit" heater. This device used the fin-and-tube coil as its heart, but included an electric-powered fan to increase the amount of heated air the unit could deliver.

By this time, The Trane Company had emerged a national factor in the industry. More was to come. In the early 1930s Trane discovered that his fin-and-tube coil would work just as effectively in extracting heat from air as it did in transferring heat to air. As a result, the coil, which made the convector and unit heater possible, became the core of Trane air conditioners which were introduced in 1932 and 1933.

The technology evolved new systems of air conditioning that are still used to-

day in buildings, ships, airplanes and wherever conditioned air is needed for comfort or production.

Other inventions followed. The Turbovac, centrifugal compressor with a hermetically sealed motor, was devel-

including chemicals and petroleum.

Each of Trane's developments brought corresponding needs for physical plants and facilities. From the half dozen employees Reuben Trane had when the company started, the payroll has grown to 2,500 in La Crosse. In all, Trane has 16,000 employees plants in eight countries.

The centerpiece continues to be the engineer. In 1925 Reuben Trane inaugurated a program of student training that reflected his long-range planning. Under this program, which continues today, the company seeks out high-ranking graduates of leading engineering schools for training as company sales engineers.

One of the students in the first class in 1925 was Donald C. Minard, a young graduate of Iowa State College who succeeded Trane as president of The Trane Company. Another graduate is Jim Schultz, Trane's executive vice president who spoke at the Hall of Fame installation.

Schultz told ASHRAE members that Trane was a hands-on business leader. "If he were alive today," said Schultz, "he would marvel at the technological advances we have made, applaud our renewed emphasis on serving the customer and protecting the environment, and devoutly wish to head out to the laboratory to be a part of it all." ■



1996-97 ASHRAE President Jim Hill (L), R. Nicholas Trane II, and James R. Schultz, Trane executive vice president, are shown at the induction ceremony on June 28 in Boston.

oped in 1938. The technology fueled the development of the factory-assembled machines that supply chilled water to air condition large buildings.

During World War II, Trane developed a new type of heat exchanger that is more compact and lighter to cool air from aircraft superchargers before being fed in the carburetor. The manufacturing process, which involved brazing the thin sheets, created exchangers that require one-fourth of the space and one-third of the weight at half the cost. The technology is used today in a variety of industries,

**Name of Nominee:**

Reuben N. Trane

**Date and Place of Birth:**

Sept. 13, 1886 in La Crosse, Wisconsin

**Last Occupation or Profession:**

Retired Chairman of the Board, The Trane Company

**Significant Positions Held:**

Co-founder of The Trane Company with his father, James, which was incorporated in 1913, later holding the position of President and ultimately Chairman of the Board.

**List outstanding contributions of the nominee which have advanced the heating, refrigeration, air conditioning and ventilation industry. Include other pertinent information that clearly indicates the nominee's outstanding contributions in order of significance:**

- Co-founder, President and later Chairman of The Trane Company, during which time the company grew from a predominately local concern with sales of \$50,000 in 1913 to, at the time of his retirement in 1953, a worldwide HVAC manufacturer with sales in excess of \$45 million. Today, The Trane Company is a leader in the global HVAC industry with annual sales in excess of \$2.5 billion.
- Holder of 28 patents in the HVAC field
- Inventor of the fin-and-tube convactor radiator (1926)
- Inventor of the first fan coil unit (1933)
- Initiated the industry's first graduate training program
- Developed brazed aluminum process of manufacturing heat exchangers
- Developed the industry's first hermetic centrifugal refrigeration machine
- Endowment of post-graduate engineering scholarships at the University of Wisconsin
- Subsequent endowment, in his name by current Trane Company, of ASHRAE two-year scholarships for two outstanding student recipients per year.

**Honors and/or Recognitions:**

- Bachelor of Science in Mechanical Engineering from the University of Wisconsin in 1910.
- Distinguished Service Citation, University of Wisconsin. 1951
- Member, Pi Tau Sigma, honorary mechanical engineering fraternity

**Professional Memberships**

- Member, Institution of Heating & Ventilating Engineers
- Member, American Society of Heating and Ventilating Engineers, to which he was voted lifetime membership in 1951.
- Charter member and director, University of Wisconsin Foundation
- Member of the lightweight extended surface heating equipment and fin, coil and cooler Industry Advisory Committees of the War Production Board (World War II).

*(Extract by James M Ritter, Chapter Historian, ASHRAE Chapter, La Crosse)*



# Trane Named To Receive Citation From University

Reuben N. Trane, president of The Trane Co. of La Crosse, will be one of five engineers and industrialists to be presented distinguished service citations by the University of Wisconsin on May 4.

Announcement of Trane's selection was made Saturday by the university's board of regents. The presentation will be at the annual engineers' day dinner to be held in Madison.

Others selected for citations were: Oliver Storey, Chicago; Grover Neff, Madison; Edwin Seeger, Milwaukee; and Clarence H. Lorig, Columbus, O.

Trane, Storey and Lorig are graduates of the university's col-



REUBEN N. TRANE

lege of engineering. The regents said the accomplishments and leadership in their fields by the five men prompted the awards. Born in La Crosse

Trane was born in La Crosse September 13, 1886, the only son of James A. Trane and Mary Miller Trane. James A. Trane had emigrated from Norway, locating in La Crosse where he learned and followed his trade as steam fitter, later establishing his own shop.

It was in 1905 that Trane was graduated from high school after attending the public school in La Crosse. Upon graduation he went to work for his father as a plumber's helper in order to secure funds to continue his education.

After a year of such employment he entered the University of Wisconsin in 1906. Because of his limited funds he earned his room and board by waiting on table and tending furnace fire.

Despite the fact that he had to earn his way through school, Trane still found time for extra curricular activities. One of his early interests was the crew. In

## UW

(Continued from Page 1)

his first year he rowed in No. 7 position on the freshman crew, which won the freshman two-mile race at Poughkeepsie in 1907, and followed this with three years on the varsity, serving as captain in his last year. He is one of the few Wisconsin crewmen who participated in four Poughkeepsie races—one as a freshman and three as a varsity man.

With Jack Wilkes and Sam Kerr, he organized the Student union. Trane was the first treasurer at its beginning on the main floor of the YMCA. As treasurer he saw to it that the pool tables and candy department showed a profit. He also became a member of Pi Tau Sigma, honorary mechanical engineering fraternity.

He was graduated from the university in 1910 with a bachelor of science degree in mechanical engineering. Immediately following graduation he was employed by a machine tool manufacturer in Milwaukee.

In 1912 he was married to Helen Hood of Madison and returned to La Crosse. There, with his father he organized The Trane Co. Principal assets of the small company were the engineering training Trane had received at the university, plus the determination to make the little organization grow. During its early years the infant company specialized in manufacturing and distributing valves, traps and water circulators for steam heating systems. Sales for the first year were about \$13,000.

The company's spectacular growth followed Trane's development of the first non-ferrous convactor, which was announced in 1926. The convactor has largely supplanted old style cast-iron radiators in the heating of office buildings, hotels, apartment buildings and large homes.

### Revolutionary Developments

The development of non-ferrous extended surface heat transfer coils by Trane followed in

short order and contributed to revolutionary developments in the air conditioning industry. These coils for both heating and cooling have become standard components of most air conditioning systems and units.

Beginning from scratch, Trane in 38 years has built The Trane Co. to its present position. Not only is it one of the larger industries in western Wisconsin but it is an acknowledged leader in the manufacture of heating, cooling, ventilating and air conditioning equipment. Sales totaled approximately \$23,000,000 in 1950.

Many of the engineers in the Trane organization are graduates of the Trane student engineering class, a training course set up by Trane in 1925. Each year outstanding engineering graduates are selected to receive a year-long training in advanced heating and air conditioning practices as well as Trane methods. Trane continues to participate in these post-graduate classes.

Trane has made many important contributions to the industry. In addition to the development of the convactor, he holds in his own name 27 patents for improvements in heating, ventilating and air conditioning, together with numerous applications.

### Perfects Intercooler

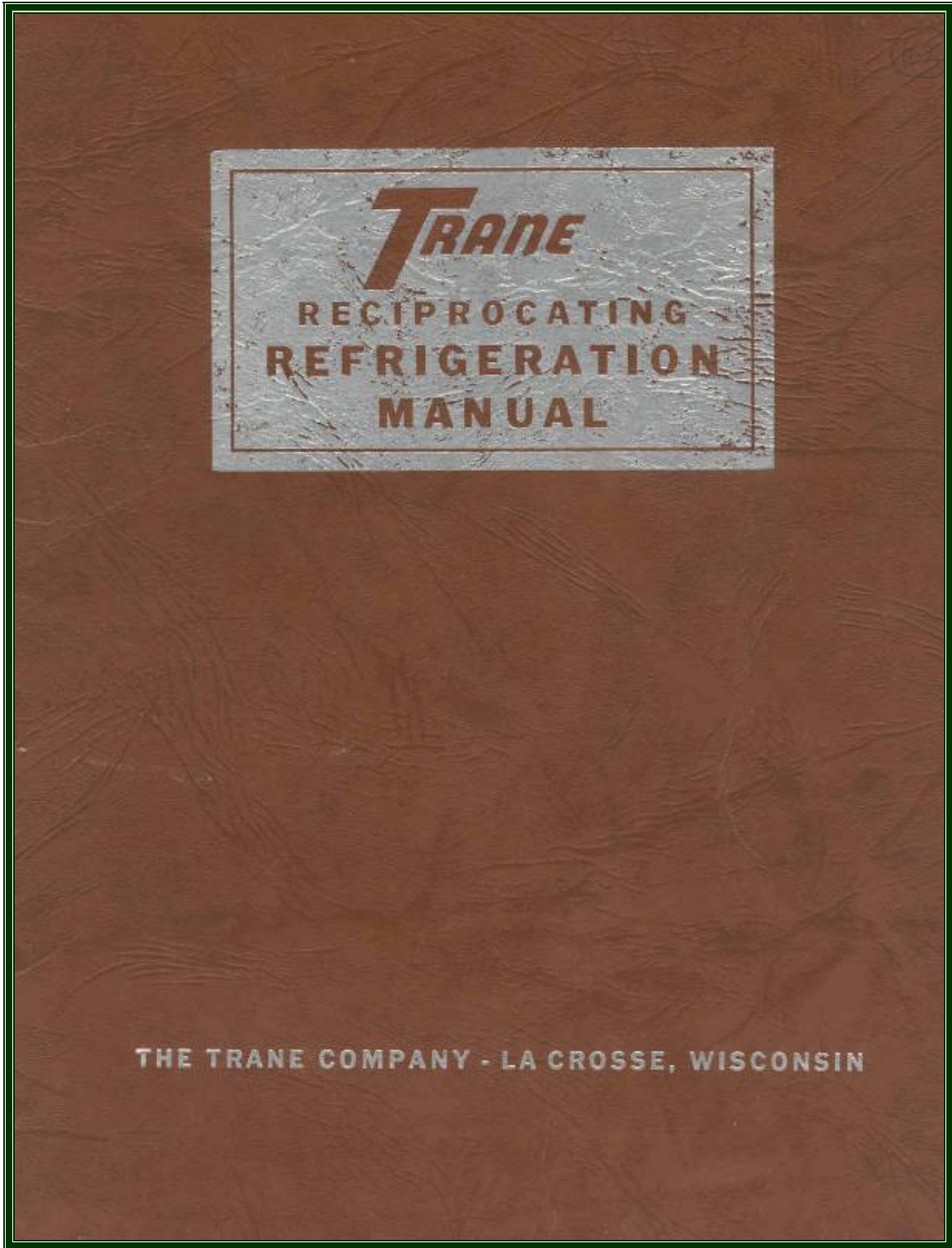
During the last war he devoted his energies to the development and manufacture of an intercooler for high altitude airplanes. One of the difficulties encountered was the welding of aluminum sheets which apparently no one in the country knew how to do commercially.

This problem was solved so successfully that not only was an efficient intercooler produced but this conception of light weight heat exchange surface permitted the development of a whole new segment in the Trane business.

He is a member of the American society of Heating and Ventilating Engineers.

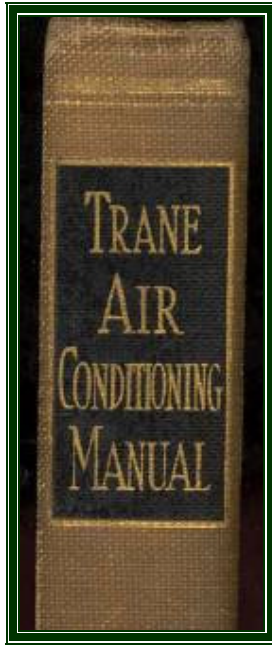
In addition to the development of The Trane Co., Trane always has been active in community activities. He has served as president of the La Crosse Chamber of Commerce and trustee of the La Crosse YMCA. He has taken part in many fund raising drives, most notable of which has been that for the La Crosse Home for Children.

He has always been interested in the University of Wisconsin and its work, especially in the college of engineering. He is a charter member and director of the University of Wisconsin foundation. Through his efforts, The Trane Co. authorizes two scholarships for graduate engineering students in heating, ventilating and air conditioning.



*1964 (CIBSE Heritage Group Collection)*





*1938 (CIBSE Heritage Group Collection)*

**REUBEN N TRANE**

**1886 – 1954**

Reuben N Trane graduated from the University of Wisconsin in 1910 with a Bachelor of Science in Mechanical Engineering. In 1913, he and his father founded The Trane Company in LaCrosse, Wisconsin. He later held the position of President and, ultimately, Chairman of the Board. Mr. Trane had 28 patents in the HVAC field, including the invention of the fin-and-tube convector radiator (1926) and the invention of the first fan coil unit (1933). He initiated the industry's first graduate training program. He developed a brazed aluminium process of manufacturing heat exchangers and other firsts within the industry, including the development of the first hermetic centrifugal refrigeration machine. Mr. Trane led The Trane Company's growth from a predominately local concern with sales of \$50,000 in 1913 to a worldwide HVAC manufacturer with sales in excess of \$45 million in 1953, at the time of his retirement. Reuben Trane was a member of the Institution of Heating and Ventilating Engineers (now CIBSE) and of the American Society of Heating and Ventilating Engineers, to which he was awarded a lifetime membership in 1951. Reuben N. Trane was inducted into the ASHRAE Hall of Fame in 1997.

*(Edited extract from ASHRAE "Hall of Fame" Citation)*