

ASHRAE Leadership Recall (formerly Leadership Recalled)  
Transcription

Interview of: William S. Bodinus

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Interviewed by: Bernard Nagengast

Note: Interview conducted at Mr. Bodinus' home in Chicago.

Bernard Nagengast

January 18, 1998 interview with Mr. William Bodinus. B-O-D-I-N-U-S.

William Bodinus

Things that I have, old man you know I'll be 89 in February so I've had a lot of, my entire career has been in refrigeration and air-conditioning since 1929.

B.N.

Well why don't you tell me you know about how you started in the business and what you first were doing.

W.B.

Well okay, I graduated from a technical high school in Chicago in 1926. The state of Illinois had at that time they called Smith Hughes courses. They were trade school courses. You could take up printing industry or the steel industry or baking industry we had a bakery there, or carpentry. You also could take architecture so I took four years of architecture. A little of it was on the mechanical end but not much. Our text was Walker and ventilation and a little duct sizing and things like that. And then I took a job with a firm of architects when I graduated as a draftsman. I was put in the mechanical department. The mechanical department consists of the chief engineer and me, just two. Thielbar and Fugard. They were well known architects. Fugard graduated from University of Illinois in architecture so they were quite a firm in Chicago at that time. So I was in the mechanical department for three years 1926 to November 1929 for which period, I tried to take the examination for architecture license but I didn't pass. And then I was working on a job, First National Bank building in Houston, as a mechanical draftsman. I met with the Carrier people as well as the Brunswick Kroeschell Company people and my boys did the engineering and I did the drafting and so the man from Brunswick Kroeschell Company offered me a job and things were getting pretty bad in 1929 so I took a job with Brunswick Kroeschell. They were manufacturers of ammonia machines and carbon dioxide machines. And my assignment was a sales engineer, CO2 sales engineer, carbon dioxide sales engineer. We manufactured in the Kroeschell plant in Chicago carbon dioxide machines. So I was up to my ears in CO2 equipment. In the fall of 1930 we merged with Carrier so then I was transferred over into the Carrier engineering department. And most of the Carrier men were air side people. Will Carrier at that time was basically a first class sheet metal contractor. And they manufactured air washers and centrifugal machines and so forth down in north New Jersey. But they didn't have much, none of them had much, they were all college graduates, none of them had much experience in small refrigeration ammonia machines and carbon dioxide

machines so I was the one laid out there in Chicago, their CO2 systems and so forth. And then Freon came into the picture in 1931 and CO2 started downhill during the 30s up to about 1935. CO2 met its demise completely, done. All during the 20s and before that, slightly before that, CO2 was the number one refrigeration cycle in the air conditioning industry. And Kroeschell was the number one company in the United States who made most of the CO2 machines. This part is in the historical article of course I'm putting together. In the meantime I've been going to night school and in 1935 I got be BS degree from what is now Illinois Institute of Technology, Lewis branch at that time. And I was a pretty good refrigeration engineer by that time having gone to school at night and working during the day it was a pretty good system. So how it happened to, and I progressed at Carrier from the engineering department to the sales department to the manager department right up the line until I finally retired in 1974 from Carrier which was 45 years after I started. I was the top man in the western zone. My territory was from Pittsburg to Hawaii and Canada to the gulf. In the meantime I obtained my professional engineering degree license and continued my night school activities by teaching at the school I graduated from, Lewis Institute and Armour Institute, which formed Illinois Tech, as well as Northwestern University. I started, I developed two courses for the graduate school at Armour Institute and taught them from 1938 to about 1941. And then after the war I taught to graduate courses at Northwestern University under Burgess Jennings. Do you remember Burgess Jennings?

B.N.

I didn't know him but I have certainly heard of him.

W.B.

Well he was head of mechanical department and he was my predecessor when I became chairman of the Chicago section with ASRE in 1945. We were very close. That was an interesting experience. So that's the, nine men pulled out of Carrier, nine Kroeschell employees pulled out of Carrier and went in business for themselves and called it the Kroeschell Engineering Company which is still in business today. All of the principles that I worked with are dead now except me and of course I stayed with Carrier at that time. In 1932 I wasn't very far along in Carrier either. Then I became the only source of information at Carrier at the Chicago office anyway, knowing anything about CO2. Last job that I engineered was the Commonwealth Edison Company that's the power company in Illinois and that was two horizontal, double acting duplex CO2 machines which were put in, in 1935, and lasted for about 15 years before needing replaced. Now you know the history.

B.N.

So what did you do then after the 1940s?

W.B.

Well in 1940 of course I was with Carrier, and of course the war came on then. And most air conditioning systems ceased except those in the government powder drying and so forth. And during the war I was assigned to the Bureau of Yards and Docks, not in the service. I was never in the service. Then I obtained some 15 million dollars worth of orders from Carrier for portable refrigeration systems that were installed in cold storage plants in Quonset huts and so forth. They were five ton units backed up into the Quonset huts to take care of frozen foods and so forth. As well as air conditioning units for drying parachutes and things like that. That went on for about four years. Also did some special jobs for industry, frequency meters, freezer insulations and some actual industrial installations for making at, Bell and Howell Company and places like that. Making war instruments and things like that.

B.N.

Then after that what did you do?

W.B.

Well at '46 we went right back into the air conditioning business and that is the era, that is really the era after the war when office buildings were air conditioned. Before the war very few office buildings had been air conditioned. There was a big push on building construction and, of course all buildings then became air conditioned, especially the lower floors, the first five floors particularly in the Chicago area. Those were the floors that were attractive from a rental standpoint. They put in air conditioning so that they could rent those floors. And then the department stores too cooled. Even the famous department stores like Marshall Field were partially air conditioned in the basement and the first floor. Again to attract customers and then entire buildings started to become air conditioned, Montgomery Ward did buildings, Sears Roebuck. Although Sears Roebuck and Montgomery Ward both started in 1934-35 with air conditioning in their retail stores. So that's what happened in my experience.

B.N.

And then when you ultimately left Carrier and went into business for yourself then?

W.B.

No, I retired from Carrier in 1974.

B.N.

Oh okay, so you stayed at Carrier your entire career pretty much.

W.B.

Yes and I receive a pension from Carrier. And then Carrier had six plants, sheet metal specialty plants. Dallas, which was under my supervision, they had one in Los Angeles, they had one in Cleveland, and we had one in Chicago, where I was headquartered. And they had one in New York and they had one in Philadelphia and Atlanta. And then Carrier was starting to get in disrepute with consulting engineers because they were in competition with consulting engineers. We were in the installed complete business and so an air conditioning job complete. Ask no questions. And the way we sold it at that time, which I did too a tremendous amount, we'd go to the head of a department store and say, hey now we will air condition your department store in the summer time to a temperature of 80 degrees at 50% and we'll heat it in the winter time to 75 degrees and it'll cost us \$350,000. That was the contract.

B.N.

So you just guaranteed the end result.

W.B.

That's right. And that's the way we sold, I still have copies of the standard contract. And of course you, as a professional engineer, consulting engineer, didn't like that worth a damn because we were taking business away from you. And then also the contractors didn't like it because we had a complete, cheap little contracting group that actually, and what the hell, we're manufacturing and air conditioning equipment and everything else by that time. So the managers decided to get the hell out of there, install complete business, in 1960. We went straight to manufacturers and started a dealer distributor program. They'd be sold through dealers and distributors, small size equipment. The bigger size and the centrifugal machines and the large air conditioning, air handing apparatus was sold direct. So we continued to maintain these shops, you'd call them. But we only made parts, dampers and so forth. And enclosures, wall to wall enclosures for fan coil units. I guess you know the Weathermaster system

that Carrier developed and we made the spiral tubing and so forth and so on. So we closed all those plants in a period of about five years before I retired except the one in Skokie and they maintained that as long as I was around. I was still watching over it carefully and it was turning a profit and when I retired they said, Bill get an appraisal and sell the plant. So I bought it along with another very close contractor friend of mine and that's how it became the E.H. Gustafson Company. We named it after our shop superintendant who was a good Swede, well known in the industry, been with us 20-30 years and he was about to retire. He was the same age as I was. So we named it after Gus. He died about 10 years ago now. So I took over position. That's where work today.

B.N.

So you've been doing that ever since.

W.B.

Yeah. A couple of my old customers at Carrier, one in particular, the Ferrara Pan Candy Company. They make these little packages of candy and all, Boston baked beans, and lemon heads and so forth. And I had been very close to, known old Ferrara for many years so I still do their engineering and make them use Carrier equipment. Matter of fact I buy the Carrier equipment and sell it to them at 2% margins. So I still maintain some engineering ability.

B.N.

Well I'd like to, you know, now that I've got the over view of what your career was, I'd like to go back into some of those earlier things you talked about and discuss them a little bit more. And one thing that would be interesting to know is if you know this is, why did Carrier decide to buy Brunswick Kroeschell?

W.B.

Because we were too much of a competitor of Carrier. What the hell, we did, Carrier did very little theater business and that's a big business for air conditioner in the 20s. That was the only business for air conditioning in the 20s you might say. Ninety-five percent of the air conditioning or the air cooling systems were theaters and the only reason for that was during that period of time and before, centuries before, theaters were closed in the summer time. Movie houses, they were too hot, you couldn't use them, something July 1st until September 1st, out of business. Did you know that?

B.N.

Well I guess I never thought about it.

W.B.

It's a fact. I know we couldn't go to a show in summer time.

B.N.

Well, you know, everything that you usually read about air conditioning history says that in the 1920s, of course it talks about the movie houses where they begin to air condition them, and the things you usual read gave Carrier a lot of credit for doing that. That they had taken over this business, pretty much did it all. But what you're saying it isn't quite that way.

W.B.

Carrier did a couple of jobs. They did the Riviera. That's been published a thousand times, in New York City and so forth. Carrier got all the credit for that but they weren't in the business, the theater business. They were in the industrial business. Because really that's what Carrier's business was, industrial air conditioning. There was damn little comfort cooling before 1920 anywhere.

B.N.

Well and then, you know, along the same lines a lot of credit for Carrier getting so much theater business supposedly in the 1920s is because of the centrifugal chiller, you know, that Carrier developed. And that supposedly took a lot of the business away from people like Brunswick Kroeschell didn't it?

W.B.

I don't think there was one centrifugal machine that was installed in a theater by Carrier before 1926 or 27 or 28. Most of the installations before that were carbon dioxide, everywhere. It was the only machine that was safe. If they put in any other machines, there may have been some ammonia installations that I don't know about, put in remote power houses, pipe the water pipe over but I wasn't involved in anything like that.

B.N.

But as far as direct expansion systems...

W.B.

Well it was chilled water in the building, you could put a 200 ton ammonia machine in the basement of a hotel and hopefully get by with it. I did that once myself. I put in a? for a furrier in Detroit with a 10 ton ammonia machine. And the engineer tightened up the stuffing box of the gauge glass on the receiver. Broke it, the whole damn building got up. They're all up on the roof, on the street. Telephone calls were going, what the hell is going on here. You couldn't put ammonia in buildings unless you put it on the roof.

B.N.

Well what kind of competition existed for Brunswick Kroeschell, you know, from the time that you were there, 1929, 1930. Who else was competing against you?

W.B.

Well there was one company called Carbondale Refrigeration Company somewhere in Pennsylvania that made a horizontal CO<sub>2</sub> machines and there was another company called American Carbonic Company. And I think that was way over in Michigan. And they made horizontal machines. In the earliest days, in the early 1900s a couple of the old line refrigeration companies like Wolf Linde made machines. I never ran in to any installations of theirs and York, Baker, Frick and Worthington all took a crack at something. See you couldn't use CO<sub>2</sub> in a enclosed crankcase machine because the pressure was too great for the crank case. So they all had to use the stuffing box arranged with a double acting piston. And then in 19, Fred Wittenmeier worked in the boiler plant for Kroeschell. And he was there in 1897 when they decided to go into the refrigeration business. I think Fred was far less an engineer at that time and he more or less convinced the Kroeschell brothers to get into the business so they formed a separate company. I guess you know this part of it. They called it the Kroeschell Bothers Ice Machine Company. And they made some small vertical piston type machines and got into the business around 1900, 1898, 1899. And then they got into the horizontal machine business. And started to install all for refrigeration making and ice plants. In hotels we put in an ice plant maybe a field the size of this room. The ice cans, ice cans put into brine solution and they'd cool the brine solution and circulate the brine to freeze the ice.

B.N.

When Kroeschell got into the horizontal CO<sub>2</sub> machines, the larger machines, do you know who designed the equipment? Was it Wittenmeier?

W.B.

Yes he may have been involved because in 1915 Wittenmeier pulled out of Kroeschell, Fred Wittenmeier whom I met, and formed his own company in Chicago. And duplicated these machines. Besides the bore and stroke, the speeds were all the same as the Kroeschell machines. So obviously there was no legal, to my knowledge no legal fight about that so I guess Wittenmeier must have been a key man at Kroeschell in designing the compressors and he took the whole thing with him. So now you have two machine companies in 1915 and 16 in Chicago making identical machines. A job would come up and they'd both compete against each other. And so it was when I entered there, I got to know Fred's son real well and he was in the contracting business also, did theaters. They may have done as many theaters around Chicago as Kroeschell did, small theaters. So they were a busy company in 1915- 16, right on up to the end.

B.N.

What happened to Wittenmeier's company when the CO2 business went out?

W.B.

Fred Wittenmeier's son by that time belonged to the contractor's association and so forth. And I was a member of the contractor's association representing Carrier. And they meet every month, still do. And out of the heating, piping and mechanical contractors association, and Fred was a member there. And I'll tell you an interesting experience. They had an annual party there which my wife and I always went to. I don't think they ought to repeat this but this party was at the club called the Chez Paris in Chicago, downtown Chicago. And we were up in the third or fourth floor in this upper, and the entertainment that evening was a dancing group of about 40 black girls. And they got up there and they danced various dances together. They get into these dances where they're going like this and then all of the sudden they're going like this. This went on for about an hour or something so by that time I was going like this. Well that ended the dinner party and two of the men died that night of heart attacks. They did. Fred Wittenmeier (Jr.) was one of them.

B.N.

Really?

W.B.

So his company and then his successors were employees and good men and so forth but even the contracting company disappeared two years after.

B.N.

Now the Fred Wittenmeier that died of a heart attack at the gather, that was the senior?

W.B.

No.

B.N.

That was the son. Okay, had the senior already passed away by then?

W.B.

Yes. The senior was, this must have been in the 50s so he would have been 100 years old or something.

B.N.

So it just kind of fell apart then after that.

W.B.

Yep. Both Kroeschell, when CO2, although Carrier had all of the residual equipment from manufacturing CO2 machines and they sent in each to our plant from the Carrier plant, and the superintendant and the

chief engineer of Kroeschell , Martenhauer, who made all the calculations and so forth and capacities and had retired. Then Wittenmeier and the Kroeschell group that pulled out did all the service work on the CO2 machines during the period after 1930. Carrier got the hell out and moved into Freon, Freon 12. They did the service work and so did Wittenmeier, they did a lot of service work. Wittenmeier worked on Kroeschell compressors, Kroeschell worked on Wittenmeier compressors.

B.N.

I guess it was fortunate it was both the same wasn't it? It made it easy to do it. So Carrier, after they took over Brunswick Kroeschell, pretty much wanted to get out of the CO2 business anyway.

W.B.

Well of course on any big machines, centrifugal was going to win with Carrier now involved.

B.N.

How did the centrifugal machines and the carbon dioxide machines compare on efficiency and so on?

W.B.

Well, see the critical temperature of CO2 is 86 degrees. From then on it has no more heat in the liquid. It's a gas then. And then if you compress and expand it you get some refrigeration effect, you don't get very many BTUs. So CO2 is good with 70 degree condensing water. So its horsepower per ton, it's probably nine tenths or nine five or something like that. So in the beginning, talking about 1930, CO2 brake horsepower under those conditions was as good as centrifugal, maybe even a little bit better. All of this information on this data and these tables and so forth I have already sent to (Harry) Will and told him.

B.N.

He has since transferred that to me. So I know what you're talking about.

W.B.

Good because all those tables that I had in my files, they're good, but hell they were sending it out to California and they're sending it to New Orleans. So what are you getting in condensing water? You were lucky if you could get 85 degree water for condensing. And then the horsepower would go to 4.7. Under those circumstances, no good.

B.N.

What about the installed cost of the equipment? How did that compare? If you did a job with a centrifugal system versus a CO2 system.

W.B.

Well a centrifugal had to be a chilled water system. So you were stuck with the chilled water piping installation and so forth. So the centrifugal installations was more costly than the carbon dioxide installations. I don't know how much more but maybe ten percent more or something like that. Carrier's centrifugal price wasn't, well they weren't giving it away either. As a matter of fact they still have some manufacturing cost. I ended up in charge of everything in Chicago so I had all those files.

B.N.

You had, I think it's, some of the material that I had read, it was mentioned that some of the CO2 systems, apparently the later ones, the earlier ones used pipe coils and that later ones used, it said thin copper.

W.B.

Fin coils. Aerofin. That's a Carrier invention. Carrier got the patents on that in 1924.

B.N.

Now were the tubes for the CO2 system, were they copper tubes or were they steel tubes?

W.B.

Yes, they were Aerofin fin coils, they were one inch copper, extra heavy copper pipe.

B.N.

Okay. I was going to say how did they contain the pressure. But that's what they did, they used extra heavy pipe.

W.B.

Those fins were about two and a half inches, oh three sixteenths apart. The engineering, the journal you sent me, some of which I put in my paper, was very amusing to me because prior to that in the material you got, that's before I have this Wittenmeier. You amount the figures I have in that are the same that Wittenmeier had in this article.

B.N.

Oh, no, I didn't notice that.

W.B.

Well you probably wouldn't. But I immediately caught that because I read the article from Wittenmeier. For example we used 13 to 15 lineal feet of Aerofin per ton of refrigeration. That's how it was engineered. It was about ten rows deep. That was it. Wanted a cheap job then maybe down to 12 lineal feet per ton and maybe 8 rows deep. It's some engineering isn't it? I think that was more or less actual. They ever did any tests on the thin coils or anything like that. So it's really trial and error. But it worked.

B.N.

Well we were talking about how a lot of the big business for the CO2 machines in the 20s and into the early 30s were the movie theaters and then you also mentioned you know to a small extent, I think you mentioned hotels. Was there very much hotel business at that time?

W.B.

No there wasn't. There were one or two rooms. Like there was a cocktail lounge in the Morrison Hotel in Chicago. And I was sent over there in 1936 thereabouts because that cocktail lounge on the first floor, and this was during a period of, it was installed during prohibition. It was cooled from air from the tunnel from the bottom of Chicago. Chicago has a industrial tunnel all under the streets. I don't know if you know that or not.

B.N.

Yeah I didn't know it until recently when I read it in the paper about the part of it got flooded.

W.B.

Well I wrote an article for ASHRAE on that a couple of years, a few years ago. They would take the air from that tunnel which was around 58 degrees and ventilate the cocktail lounge. And I was sent over there to see, it started to get smelly. Musty. So we replaced that with a regular air conditioning system from Carrier. But, so the cocktail lounge and there might be another space but that's all that was in the hotel. In 1937 the Palmer House contracted with the engineer Charlie Leopold. I don't know if you ever heard of him. From Philadelphia.

B.N.

Yes I've heard of him.

W.B.

And he laid out complete air conditioning system using Carrier equipment, specified Carrier machine and that was installed in '37 or '38 in the Palmer House. Now that was the first hotel in Chicago that was air conditioned. Where the rooms were air conditioned. I don't think it was completely air conditioned at the time. But the first 400 ton Carrier centrifugal was installed in the Palmer House. It was the largest centrifugal made up in that time. It was 1937-38. Then the other hotels started following.

B.N.

Well apparently there were isolated examples of earlier than that time that they would put in a system like you said for part of the hotel. They would do like a banquet room or things like that. Because we had talked over the telephone about the Congress Hotel which was apparently one of Wittenmeier's earliest jobs. And then I think, as I remember, I think the Blackstone Hotel in Chicago had a system and I think that was a Brunswick Kroeschell system, or a Kroeschell system.

W.B.

It was. As a matter of fact I presented the manager with a 50 years certificate when I was at Carrier. And that's in the material you got from Will. There's a picture of that when I present the, I don't remember off hand what the dates were when that was put in. But it was about 1905 or 1906.

B.N.

The Blackstone?

W.B.

Yeah.

B.N.

Yeah I think it was around 1911, 1910-1911. Yeah, the Congress Hotel system was around 1905 or so.

W.B.

Maybe it was the Congress Hotel.

B.N.

And you know when we were talking about people involved in CO2 work and you know, you talked about Wittenmeier and some of the other companies, did you ever read or hear of any of the material that had been done by a guy by the name of Justus Goosmann or Gardner Voorhees?

W.B.

Voorhees I did. Not Goosmann.

B.N.

Okay. Goosmann had written a series of articles for Ice and Refrigeration, you know the trade magazine on carbon dioxide systems. Of course Voorhees was, I guess he was first involved with ammonia and then later got heavy into CO2 work. And had designed that multiple effect compressor where he brought in the suction gas into the side of the compressor.

W.B.

Side of the cylinder.

B.N.

On the side of the cylinder, yeah. But he didn't, as far as I know, he wasn't involved in manufacturing or anything. I don't know whose equipment he used but maybe anybody he could get.

W.B.

Most of those, Carrier made it anyway so. If you wanted to get a Frick machine you'd probably talk to Frick. Or Worthington. Specialized.

B.N.

Well when you got up into the, you know, into the 30s, later 30s, I guess the theater business at that time was switching over to centrifugal stuff or were other people's systems-

W.B.

No they were all Freon. First Freon 12 machine I put into a theater for Carrier, it was in 1935-36 in Bloomington, Illinois. Put in two vertical, two cylinder ammonia machines using Freon 12. It was alright except for the damn stuffing box. Ammonia machines all had stuffing boxes. They didn't have mechanical seals or anything like that. It worked though. You lost a little Freon.

B.N.

Now who made those compressors?

W.B.

Worthington made those. Worthington made compressors with the Carrier name on them sometime for a couple years.

B.N.

Now at that time why was it, I think by that time, hadn't Carrier begun using refrigerant 11 in their centrifugals?

W.B.

The first refrigerant 11 machine was installed in Chicago at the Mandel Brother's department store in 1934. I was involved in that and again it was for basement, first floor, and second floor. And I think it was around a 300 ton machine and it was turbine driven.

B.N.

Now since, you know, Carrier had been so hepped up on the centrifugal work and so on and then you're talking about the theaters later on being air conditioned using R12 systems with reciprocating compressors. Why didn't then use the R11 centrifugal in those theater jobs?

W.B.

Well in the first place the small centrifugal machine, you see Carrier had made centrifugal machines using the General Electric gas compressor from 35 to about 50 tons back in 1929 and 30 for many machines. They used a 17,000 RPM gas compressor. In Chicago, several of them were installed and they ran for many years but they were very costly, quite costly. I don't know how much more they cost over the reciprocating cycle but they were more costly. Supposedly much better installation and so forth. And then when the Depression came on they quit making those. And so there was no centrifugal, no small centrifugal.

(recording break for tape change-out)

W.B.

You asked me about the Conduit Weathermaster. And as I told you I met with, the luncheon meeting with Carrier and the other principles in the Chicago office. And he had explained, this is in 1938, he explained the principles of the Weathermaster system, which was to supply a limited amount of outside air as required for ventilation in space and delivered through nozzles in the unit at a high velocity causing a secondary induction of about three times the primary air which secondary air passed over a

cooling coil which is a combination heating and cooling. And that was the principle, and still is, of the induction Weathermaster system. Let's see, what were we talking about earlier.

B.N.

So what kind of a person was Willis Carrier? You had met with him on that occasion and other occasions.

W.B.

Well my first contacts with Willis Carrier were as an employee in the engineering department when he would present certain engineering principles to a group. And he's a very congenial person. Then in the 30s, later 30s, about '36 or '37, a man by the name of Max McGraw of the McGraw Electric Company was on our board of directors, he owned 3,000 acres of property on the Fox River just west of Chicago which he converted into a game club called it the Fin and Feather Club. And Willis carrier was a member of that and I then became quite acquainted with Max McGraw and Carrier who from time to time would be at the club. Because I was assigned to do all the engineering for air conditioning the restaurant that McGraw built there and for providing air conditioning systems for the smoking of pheasants and fish and so forth. And I hunted out there with Mr. Carrier several times. Also when I would go to Syracuse I stayed at Mr. Carrier's home and he had a fish pond in the back of his home in Syracuse. We did a little fishing there and I thus became quite acquainted with Willis because he loved to hunt and fish and so did I. Also during, when prohibition ceased in 1933 the breweries started to rebuild and Mr. Carrier applied the centrifugal machine to breweries first in a brine circulating system, circulating brine to the stock cellars, fermentation cellars. And then later by direct condensation of ammonia vapor in the cooler of the centrifugal machine called the ammonia condensing system. The so cold ammonia liquid would then be pumped to the cellars using direct expansion coils and thus became the ideal method of refrigerating breweries with ammonia. And I was with Willis Carrier about a week before he died. But he wanted me, he knew he was going to pass on even though I doubted it, and he wanted to give me his Parker shotgun which I didn't, I refused to take because I didn't think he was going to die. That's the kind of guy he was.

B.N.

So you were pretty close to him really then. They say that, you read these stories about him being somewhat absent minded at times. Did you ever experience that?

W.B.

Absent minded isn't really the true term because he would be, have a two foot slide rule always in his possession. He would get involved in calculating certain engineering problems. He was the most capable man of handling calculus that I ever knew. And he would get into these deep problems and he just wouldn't know you were existing.

B.N.

So he just had a tremendous power of concentration.

W.B.

That's right. That's right. I observed that. I sat opposite him and watched what went on. You and I can use calculus, go about it and so forth. He actually used it like arithmetic.

B.N.

That's amazing. I guess you-

W.B.

You want to know what the temperature three inches in this wall and he'll tell you, well it's 90 degrees outside and the temperature over there happens to be 84 degrees or something like that.

B.N.

Well he really was in many respects a genius.

W.B.

Yes he was.

B.N.

Well when you used to get together with him, you know hunting and fishing and things, did he mainly talk about business and things?

W.B.

No. Not at all. He was just as ordinary as any other person. He smoked his pipe, he loved his pipe. Smoked and his conversation was far from air conditioning and anything else. I don't want you to think that I was with him regularly. It was only once in a while. Maybe three times a year. Or four times a year we got together and maybe two of those times would be on business and not sportsmanship.

B.N.

Did you get to know any of the other principles at Carrier?

W.B.

I knew all of them.

B.N.

Did you know all of them?

W.B.

Every one of them. J. I. Lyle was the top man and he formed the company but he used Carrier's name because Carrier was already well known at Buffalo Forge before as an engineer and they put him out right in front but he was a very kind businessman, J.I. Lyle. Born and raised in Kentucky, graduated from the University of Kentucky. Was a tremendous alumnus and many if not most of the early Carrier engineers came from University of Kentucky. And he was a close acquaintance of Paul Anderson and that's why Paul Anderson had become, and still is the great professor of air conditioning in this country. And his brother C.R. Lyle was with Carrier as a sales manager I think in the New York office. And then he left Carrier and I think he went with the Armstrong company. But he was still I think on the board of directors. And E.T. Murphy was the head of the, graduate of Lehigh University in Pennsylvania and was manager of the office. Ed Heckel was construction manager and he ended up as manager in the Chicago office. And Stacey, Ned Stacey was the research engineer. And a man by the name of Smith, let's see, Tobes, T-O-B-E-S. Tobes Smith was manager of construction. That meant sheet metal fabrication, erection and all piping systems installation. And Logan Lewis was an engineer and I think that constituted the original founders, which I believe were seven men. And then when the Kroeschell group pulled out of Chicago in 1932, Ned Murphy was transferred to Chicago in the Midwest region as the manager. Ed Heckel still remained here but for some reason became disenchanted in 1938 and he retired and became a professional engineer in Chicago for a number of years.

B.N.

Who were some of the other leading people, leading engineers you knew at Carrier or who had later left Carrier that you had gotten to know?

W.B.

Well Bob Waterfill was the right hand man of Willis Carrier in the centrifugal engineering. And had a lot to do with the design of the centrifugal compressors. Actually in this month's magazine, did you read that yet? The second page about Carrier and the centrifugal? Well Carrier used the German compressor and never made a compressor, centrifugal compressor, until about 1930 or 31 or possibly 32. The only reason they made their own compressor at that time, and I was there so I know this, was because the installation made in the, I think the Department of Justice building in Washington D.C., had installed a couple of Carrier centrifugal machines and the government inspector noticed that at the bottom of the casing on the centrifugal machine was a name plate, manufactured by the Jaeger Machine Company of Germany. The federal law at that time stated that you could not use any foreign manufacturing equipment in government buildings. This is my personal recollection. So Uncle Sam descended upon Carrier and pointed out that they no longer could or should use foreign compressors. And then Carrier tried to get a company in the United States to build this machine for them and finally decided to build it themselves. And that was the first US made centrifugal machines from this country.

B.N.

So Waterfill was the right hand centrifugal man. Who were some of the other people that-

W.B.

Well Waterfill was right had centrifugal man. And he joined up with the Buensod Stacey crew in 1937 to form Buensod Stacey Air Conditioning Company along with seven or eight other Carrier men and left Carrier. Waterfill then apparently designed the hermetic centrifugal machine. They've got the patents on it. And then negotiated with Trane Company to allow them to build the first hermetic centrifugal machines. This is in 1938.

B.N.

So the Trane design was designed by Waterfill.

W.B.

Yes. And I think the patents are probably in his name but I don't know that. So that was the beginning of Trane business in centrifugal machines.

B.N.

But it turns out that Trane actually hadn't built the first centrifugal because the ones that General Electric made for Carrier were the first ones probably.

W.B.

That Carrier made using the General Electric.

B.N.

Do you know who designed the General Electric machines?

W.B.

Well that was a Carrier machine. General Electric never did have a centrifugal machine.

B.N.

No but they manufactured one for Carrier didn't they?

W.B.

No, Carrier manufactured using the General Electric domestic gas compressor which they had already developed.

B.N.

Oh, okay.

W.B.

They had an electric gas compressor which pumped gas from various sources and so Willis used, Willis Carrier used that, probably Waterfill used that compressor and assembled it with a cooler and condenser to make a packaged centrifugal machine.

B.N.

Okay but that General Electric compressor, that was made by General Electric? And Carrier just bought them?

W.B.

Yes. That's right, a high speed compressor.

B.N.

And that was introduced when?

W.B.

About 1928 or 29. It only lasted about three or four years.

B.N.

Was that because of expense?

W.B.

Well Depression. Carrier almost went broke in 1932 and all of us had a ten percent cut in salary and all us contributed one month's work without pay. And they were so bad off they sold their operation in Britain I think for a half a million dollars which enabled them to keep going in the Depression. I forget the man's name who was in charge of the British company.

B.N.

Did you know or get to know any of the other famous air conditioning engineers at the time like Fleisher or Cramer?

W.B.

No. I was pretty well bottled up right there in Carrier.

B.N.

Of course they were all competitors of Carrier.

W.B.

Well I don't remember at that time, I wasn't old enough to be or advanced enough at Carrier to be in the, well I did join the ASRE in 1941 and I had been active a few years before that. I just wasn't far enough along.

B.N.

Is there any other things that you'd like to tell me about? You probably have lots of things you could say but does anything come to mind that might be interesting?

W.B.

Well from a historical standpoint - one thing I do know is that Carrier spent a lot of money in research. I think more so than anyone else. Almost all of these years kept on designing, I believe they were the first ones who designed the evaporative condenser for ammonia systems. And also for a number of years they developed a cooling tower using an absorption media. I think they were the first ones to do that. And actually in the Carrier Skokie plant we built several hundred of these cooling towers and then dropped out of that business, dropped out of the evaporative condenser business. Then others picked it up and made a good business out of it. Carrier is responsible for a lot of the basic equipment designs.

B.N.

Did they continue to play such emphasis on research or did that kind of decrease as time went on?

W.B.

No, I don't know how much they're spending right now but every year they spend thousands or hundreds of thousands of dollars on straight research. They always had a research department even at the time of the merger in 1930, both Carrier and Kroeschell, I know Kroeschell had a nominal research department for the most part it was on a trial and error basis but they kept records and so forth of what they did.

B.N.

Okay, well thank you very much for all the information you're given.

W.B.

Well it's been, as I say, my only career, and well you go back to 1926 as a mechanical draftsman, what is it, 70 some odd years?

B.N.

A long career.