

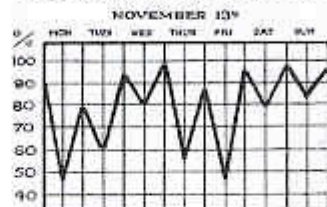
"SHUT YOUR WINDOWS -Eliminate Noise & Dust"
Cartoon from Carrier Weathermakers Unit Air Conditioning Booklet
c.1938 [6/498, 2-3]

PART-2

CARRIER ENGINEERING COMPANY LTD
London, 1921-70

Manufactured Weather

VARIATION IN
ATMOSPHERIC RELATIVE
HUMIDITY IN LONDON
DURING WEEK ENDING



(Taken Daily at Kew)

IT COSTS MONEY
TO INSTAL
MANUFACTURED WEATHER
BUT
IT COSTS LOTS MORE
NOT
TO INSTAL IT.

Every day a good day

We will be pleased to send you, upon request, any of the following

Carrier Treatises

- No. 99.
General Applications of Carrier Equipment.
- No. 100.
Description of Carrier Humidifying Apparatus.
Automatic Temperature and Humidity Control.
- No. 102.
Introduction to the Carrier System for British
Textiles.
- No. 111.
Rubber Drying and Vulcanising.
- No. 112.
Drying Points and Varnishes on Wood or Metal.
- No. 210.
High Temperature Drying-Japans, Varnishes and
Enamels.
- No. 300.
Dehumidifying, Cooling, Drying at Low
Temperatures and Low Humidities.

Carrier Engineering Company Ltd

24, BUCKINGHAM GATE,
LONDON.

2. CARRIER ENGINEERING COMPANY LTD, LONDON

This part of the CEC story is based mainly on the information listed in Reference Sections 5 & 6; in particular the unpublished manuscripts and notes of Archie Heard [5/553, 5/577 & 5/746].

It was in 1913 that the Buffalo Forge Company set up a subsidiary company of the same name in Britain. The first managing director was an Englishman, Stanley Laurence Groom. Another Englishman, Arthur Sanderson, was appointed Director and Secretary of the Company. In the same year, Stanley Groom visited the United States where he met Willis Carrier who was running the Buffalo Forge subsidiary, which bore his name, the Carrier Air Conditioning Company of America (CAC). Groom made what was to be a life-long friendship with Willis Carrier. Moreover, he returned full of enthusiasm for Carrier's work as he foresaw the potential for air conditioning in Britain, but the British Buffalo Forge had been established to carry on business in hot-blast heating, ventilation and drying plant, similar to the American parent.

The 1914 War resulted in the decision to close CAC and, as a result, Willis Carrier and six of his colleagues set up Carrier Engineering Corporation (later Carrier Corporation) in New York State in 1915 [see Part-1]. Meanwhile, British Buffalo Forge was busy on war work which included a heating and ventilating system for the government's first great aircraft factory. Stanley Groom had not forgotten his ideas on air conditioning, but the time to apply them was yet to come.

In fact, Groom had to wait until 1921 when Willis Carrier made a visit to Europe. Events moved swiftly. On 8 March 1921, the new Carrier Engineering Company (CEC) of London was registered, and a small brass name plate was added below that of Buffalo Forge outside the offices at 24 Buckingham Gate.

The first Board Meeting was held on 17 March 1921. There were four directors. The American Company had a 50% shareholding and was represented by Willis Carrier and Irvine Lyle. The 50% UK holding was represented by Stanley Groom and Arthur Sanderson. The firm of Hackett, Radley & Johnson was appointed as Auditors, Mr Hackett being a close personal friend of Stanley Groom. [Sanderson became Secretary, a position he held until his retirement in October 1928, when he was succeeded by Mrs L M Brook.]

Stanley Groom was elected Chairman & Managing Director, a post he occupied until his death in 1957. He was born on 4 November 1887 and educated at Alleyn's College in Dulwich, South London. His father had died when he was quite young and his mother had a struggle to enable him to complete his education. His first experience of the heating and ventilating business was gained with the Sturtevant Company in London's Queen Victoria Street, where he worked as a draughtsman. [The Company was a UK subsidiary of B F Sturtevant Company of Boston, Massachusetts, a renowned fan manufacturer and installer of heating & ventilation, founded around 1855. The UK Company was taken over by Drake & Gorham Scull in 1965.] Arthur Sanderson also had worked at Sturtevant, but in 1913 he and Groom left to set up Buffalo Forge, London. Groom was then 26.

Archie Heard recalls that Stanley Groom had an instinctive knowledge of engineering, in which he set a high standard, no doubt one of the reasons he got on so well with Willis Carrier. Groom was also described as a fine salesman and a natural leader, a man who aroused unusual loyalty amongst those who worked for him.

Further recollections of Groom [6/553, 7] come from J H Pascoe, who joined CEC in 1922:

"In common with the people who knew him in the early days at Carrier my memory is perhaps of the small things which he did quietly and unobtrusively for his people. He was called, but not to his face, 'the old man' and I suppose today he would be referred to as a father figure. A man might be in some trouble, his wife sick, and SLG would almost take over, providing the money for specialists, or care, from his own pocket. On the other hand, one almost needed a special permit to get a drawing pin because he had once said that a draughtsman should have four drawingpins which should last a lifetime."

Heard considered Groom to be an excellent businessman:

"He had a flair for being able to anticipate events -or so it seemed to us. He could be ruthless with anyone who tried to take him for a ride or get of trouble, but if you made a mess of a job and admitted it: after the initial blowup, his concern was how to get over the difficulty. One's errors were never referred to again except perhaps years later as a joke..... He was the old-fashioned type of boss, expecting immediate and unquestioned obedience. It was an experience to see a senior director drop everything and run in shirtsleeves to present himself to SLG's office, which was also the Board Room. Although he was seen less in the office as his health declined, he was always generous to those in need; initiated profit sharing and pensions; and was successful in his balancing control of arch rivals. Finally, he showed his generous appreciation in his Will to those of his older engineers who had helped him build up his business. His leadership was always unchallenged.....he obtained the best from his colleagues and staff and retained the close friendship of his business associates."

It is said that Groom searched all his life for an air conditioned atmosphere that would have the 'freshness of spring' or the feeling after a storm. His search included ionisation, artificial sunlight, rock and earth radiation. He would have endowed a Chair in atmospheric radiation but could find no other enthusiast to take the post. This may, or may not, have been a remarkable coincidence, for Willis Carrier had similar interests. In fact, on 25 January 1932, Carrier wrote from the Hotel Statler in Cleveland to C V Haynes, Chairman of the ASHVE Research Committee. His letter [1/712] reads:

"Dear Sir:-

I enclose herewith a check for \$1000 received by me last December as the cash portion of the John Scott Award in recognition of Inventions in Air Conditioning and Refrigeration. I have endorsed this check to the American Society of Heating and Ventilating Engineers with the stipulation that this gift be applied by them to co-operative research with reference to the Physiological Effects of Atmospheric Ionization, and with the hope that such investigation may prove of great benefit to Mankind.

*Respectfully yours
Willis H Carrier"*

CEC, backed by the knowledge, experience and resources of its American counterpart, introduced scientific air conditioning to Europe. The ability to control humidity, rather than simple cooling, instantly attracted the attention of many industrial companies. Even more attractive was the practice of CEC to offer with each enquiry, with each installation, a guaranteed result. Success was immediate. In industries which had been entirely dependant on the weather, which made production unpredictable, the advent of air conditioning was tantamount to a miracle.

The making of chocolates was one of the first processes to be completely revolutionised. It meant production could be planned independently of daily or seasonal fluctuations in temperature or humidity, particularly humidity. With the benefit of Carrier patents and apparatus, and the previously unheard-of offer of a guarantee, CEC was able to concentrate on humidity control installations to the virtual exclusion, by 1922, of heating work of the old type. So much so that in 1922 all but two of the entire Buffalo Forge staff, some two dozen people, were transferred to the CEC payroll. Now a large brass plate, with "Carrier Engineering Company Ltd" on it was put above the Buffalo Forge one outside 24 Buckingham Gate. Nobody recorded when the Buffalo Forge one finally disappeared, though an agency was maintained for some time for a Buffalo product, the Spiro Turbine.

Our Acceptance of Responsibility

Guarantee

The Carrier System of Air Conditioning is guaranteed to **Automatically** maintain constant conditions of temperature and humidity in any given closed space, full or empty, night or day, winter and summer, without draughts.



Carrier
Engineering
Company Ltd
London. S.W.

"Our Acceptance of Responsibility," CEC Guarantee, c.1932 [6/657, p.43].

As Archie Heard again recalls:

"The Carrier air conditioning business simply grew with decisions whether or not the Guarantee could be applied; at first if a client was not concerned with a high standard it wasn't 'a Carrier job.'" It wasn't long before the high standard became the norm and all jobs were "Carrier." The young men who joined Stanley Groom believed in themselves and the work they were doing, made decisions -and some mistakes -without committees, without paperwork. But in those first few years, air conditioning was established as a vital tool in industry, for chocolate making, confectionery and tobacco, in printing and for rayon production."

The first CEC Accounts (6 May 1921 to 30 June 1922) show the spread of this early business. There were contracts for Courtaulds, Andre Citroen, Famous Players Lasky, Ford Motor Co (England), J S Fry, Gestetner, J Lyons, Mackintosh, Pilkington Brothers, Rowntree, and Topical Films. Royalties are shown as being paid to Drying Systems of Chicago, Buffalo Forge and Carrier Engineering Corporation, USA.

Starting with Abdulla in 1923, other CEC contracts for the cigarette and tobacco industry soon followed, including Godfrey Phillips, Carreras, British American Tobacco, Gallaher and Laurens (Geneva).

Air conditioning for industrial purposes was provided for Carborundrum Ltd and Universal Grinding Wheels (both for grinding wheel production); Catalin Ltd and British Xylonite (plastics); Boots Pure Drug Co (capsules); C W Martin (sheepskins); W C Wilkinson (Pontefract cakes); Technicolour Ltd (films), and for Joseph Lucas (tropical test room). Air conditioning for pharmaceutical and chemical work included installations for Glaxo Laboratories, May & Baker, and Burroughs Welcome.

The introduction of Willis Carrier's new centrifugal refrigerating machine made the design and installation of larger cooling systems much easier. In particular, the great advances in artificial silk production in the 1920s led to many large installations with centrifugal refrigeration: Courtaulds, Kirkless, British Celanese, North British Rayon, and British Acetate. CEC also seized the opportunities for air conditioning in Northern India [Part-3.3] which included humidity control for textile plants for the Ahmedabad and Sholapore Cotton Mills.

Then came another great business opportunity for CEC. The introduction of the "talkies" and the need to attract audiences all the year round, regardless of the weather, led to an unprecedented growth in the USA of air conditioning for movie theatres. Carrier Corporation had gone into this in a big way. They had the new centrifugal refrigeration, they had the experience and know-how, and they held a number of important patents, particularly one relating to the air bypass system devised by Logan Lewis [Part-1].

One of CEC's earliest comfort installations was a spray washer system in 1921 for the Newington Sessions Courthouse in London. Their first installation for a cinema was in 1927 at the Broadway in Stratford, East London, a large 2768 seater, designed by George Coles for H & G Kinemas. Neither of these systems had refrigeration.

The first fully air conditioned theatre in the UK was the Carlton in London's Haymarket, with an installation by CEC in 1927, which incorporated the 4th centrifugal to be installed in the UK. The Carlton opened with a stage production, but began showing silent films in March 1928. In 1929 it was wired for sound and became a cinema permanently.

In 1928, CEC installed air conditioning with centrifugal refrigeration in the Empire in Leicester Square. Then no doubt influenced by the success of the air conditioning installed by Carrier Corporation in their New York cinemas, Paramount placed contracts with CEC to install full air conditioning in the Paramounts in Paris (1929), Manchester (1930), Leeds (1932) and Liverpool (1932). CEC also installed systems for London's Cambridge and Westminster Theatres, and for a number of Astoria cinemas, notably those in Finsbury Park and at Brixton. Not all had refrigeration.

Meanwhile, in 1923 an office had been opened by CEC in Paris to form a focus for sales opportunities in Europe. Originally staffed by René Modiano and an assistant, with all drawing work carried out in London, the business grew to such an extent that in 1929 Carrier Continentale SARL was formed. Modiano was appointed gerant (manager) and henceforth business in France was conducted by the French company. From 1928, Modiano was assisted by a young engineer recruited from General Motors, Antwerp, named John (Mike) Michiels, who would later help build-up the paint finishing side of the business through his contacts in the car industry [Part 4].

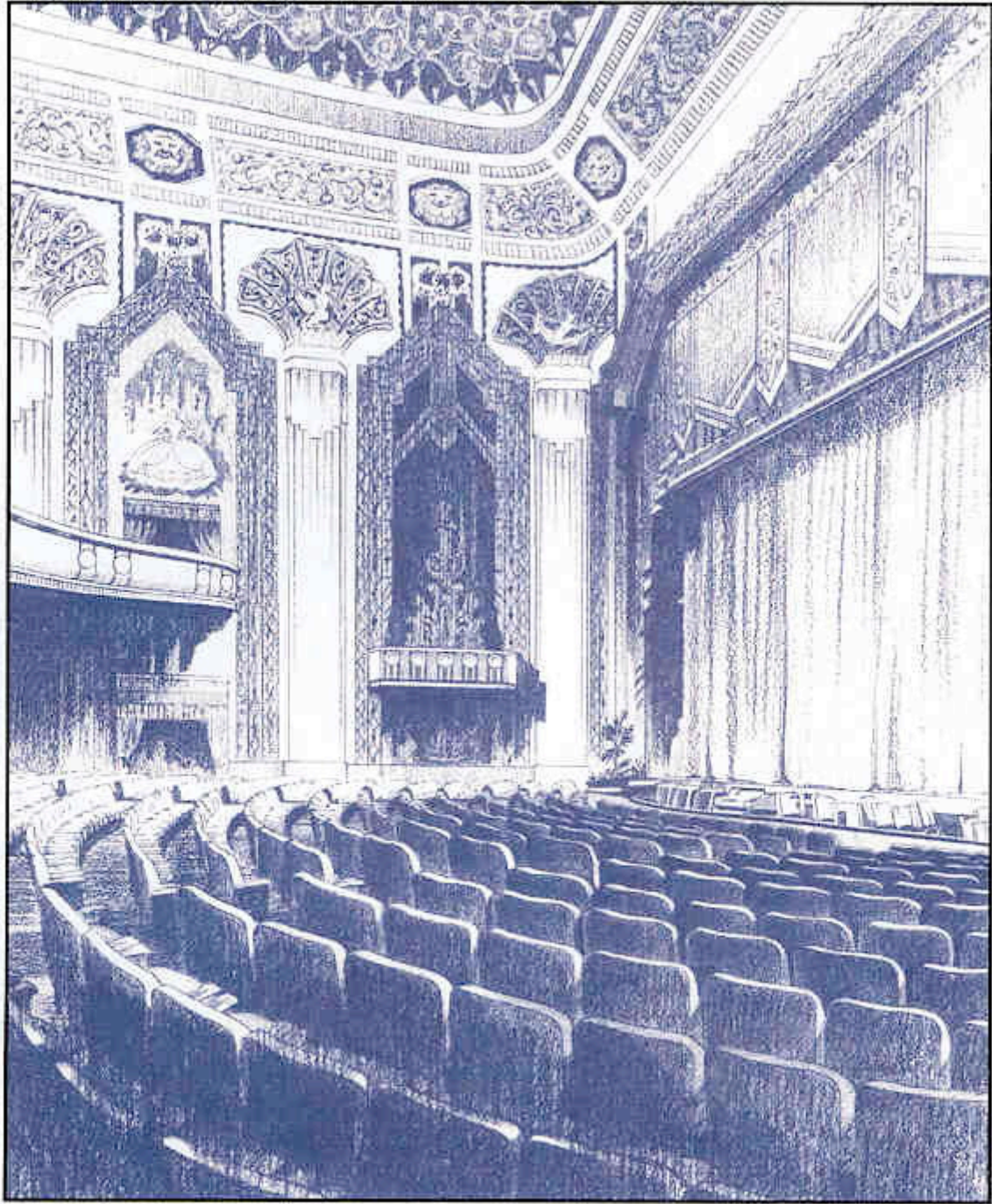
By the close of the 1920s, CEC had achieved a technical and geographic spread into nearly all of its subsequent areas of operation. Its success was due the policy of seeking out and developing the latest, most advanced techniques in thermal engineering in general, air conditioning in particular and in providing paint finishing systems for the car industry.

A book on Drying & Processing, published in 1929 by Carrier Engineering Corporation of New Jersey lists the Carrier Companies around the world [18/DPM, page 209]. CEC and Carrier in Germany, are listed as follows:

Carrier Engineering Company Ltd		
London	24 Buckingham Gate	S L Groom, Managing Director
Paris	Elysee Building	Rene Modiano
Bombay	Exchange Building	C T G Hooper
Johannesburg	Cullinan Building	J H Veasey

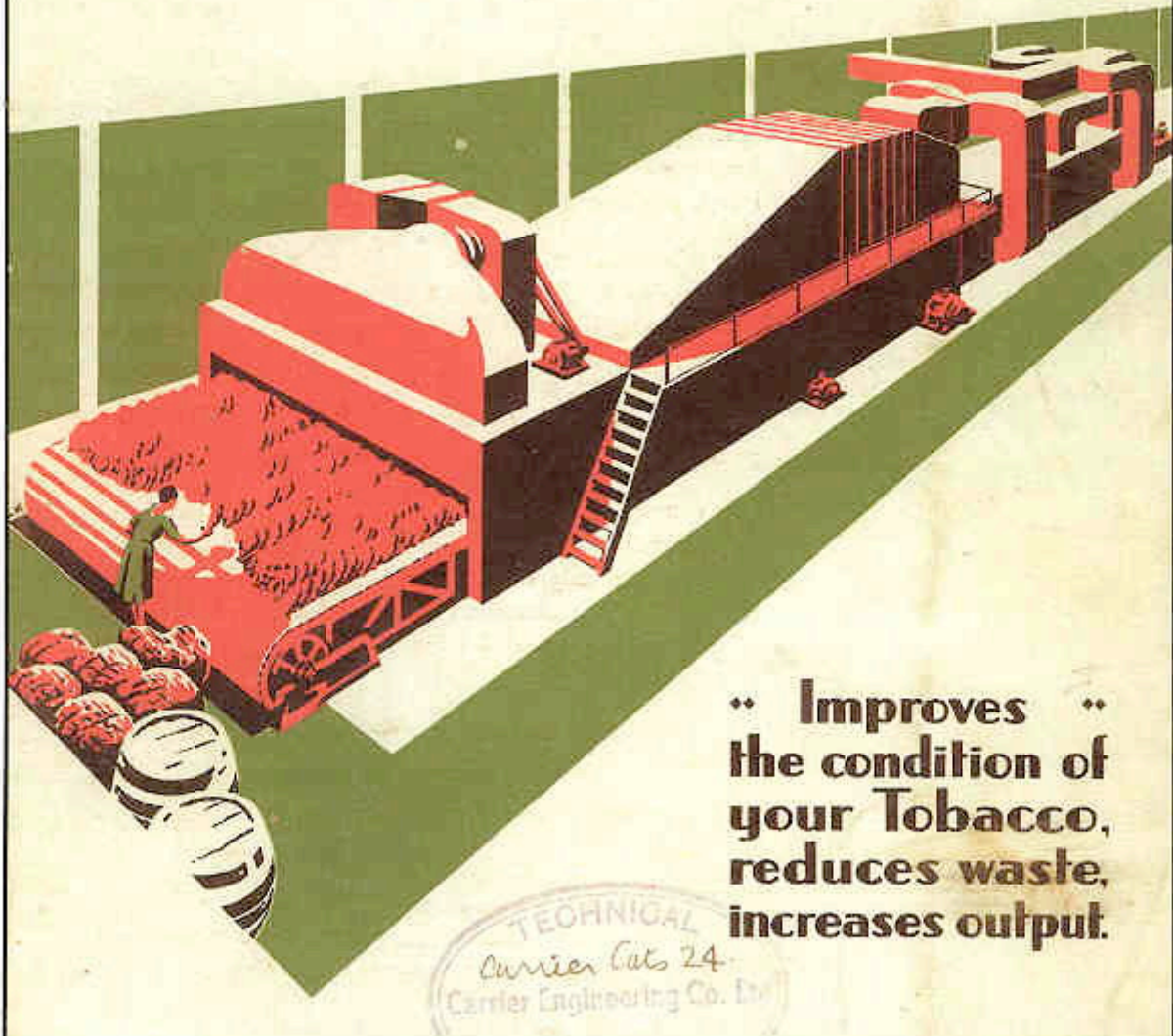
Carrier Lufttechnische Gesellschaft		
Stuttgart	61 Lange Strasse	Dr Ing Albert A Klein

[There is no mention of CEC in South Africa in the Heard papers, except for metal finishing projects. However, he refers to a meeting with Willis Carrier in Calcutta, when Carrier mentions that he had visited the Robinson Deep Mine in South Africa, the first deep mine to be air conditioned using Carrier centrifugal refrigerating machines, 5/577, 4.]



Paramount Theatre, Leeds, air conditioned by CEC, 1932 [6/567, page 29].

Carrier Tobacco Ordering Machine



.. Improves ..
the condition of
your Tobacco,
reduces waste,
increases output.

TECHNICAL
Carrier Cats 24
Carrier Engineering Co. Ltd.

CEC leaflet on Tobacco Conditioning, probably late 1920s [5/496, front cover].

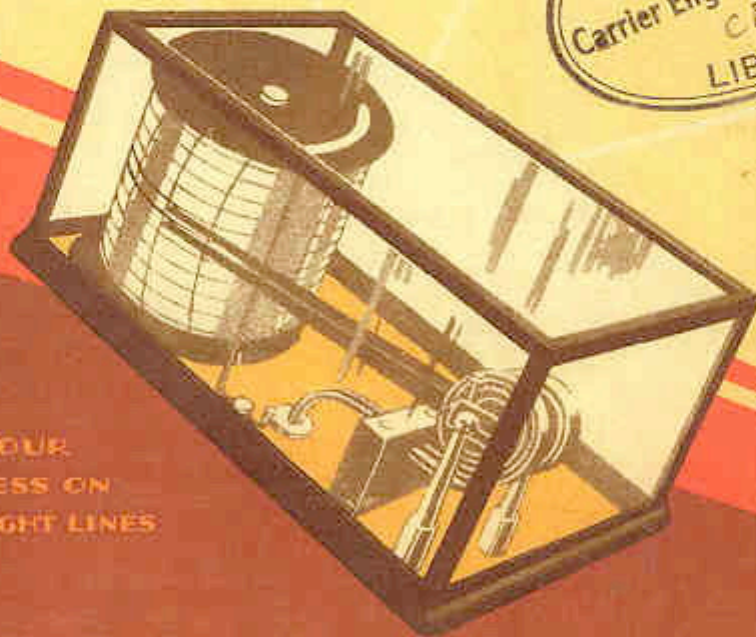
MANUFACTURED WEATHER

GUARANTEES UNIFORM

TEMPERATURE AND

HUMIDITY

TECHNICAL
Carrier Cat. 10
Carrier Engineering Co. Ltd
CE/10
LIBRARY



PUT YOUR
BUSINESS ON
THE RIGHT LINES

CEC leaflet on Control of Temperature & Humidity, probably late 1920s [5/499, cover].

In 1929, the Carrier Ross Company was formed in England, an association between CEC and the Ross Corporation of USA, to provide high temperature drying and ventilation techniques in the paper-making and finishing industry. Agreements were also made with the Wagner Company to build the special mechanised ovens used to bake tinplate sheets following lithographic printing.

According to Archie Heard, this success in the twenties was due to Stanley Groom, Willis Carrier, Arthur Sanderson, Alex Fowler, Jumbo Jameson, C L Sainty, Stan Ward, C T Hooper, John Cooling, A W Putnam and John Russell. In 1929, Archie Heard joined CEC and went on a training course with Carrier in the USA. On his return he went to India to help with the growing business on the sub-continent [3.3]

Into the start of the 1930s, further triumphs came with the provision of air conditioning for the studios at London's Broadcasting House [3.1] and the air conditioning onboard the passenger liner MV "Victoria" [3.5]. Although CEC decided to proceed with marine air conditioning it was decided that the application of air conditioning for trains would by agreement be carried out by Stone of Deptford [3.4]. This association was to continue for many years.

Also at this time, CEC recognised the advantages of using high pressure hot water (HPHW, typically 388 °F and 200 lb per sq.in gauge) for large scale heat distribution in preference to steam. HPHW provided advantages in piping layout, flexibility, better temperature control and economy of operation.

The HPHW system developed by CEC was given the trade name "Aquatherm," one of the first installations being carried out for Vauxhall Motors at Luton in 1932. Aquatherm installations followed at many factories of motor car and associated equipment manufacturers. Many sites were quite extensive and a boiler plant capacity in excess of 150 million Btu/h (around 44 MW), as at Fisher & Ludlow Ltd, Castle Bromwich, or Standard-Triumph Group at Canley, was not exceptional. The first Aquatherm system for the Lucas organisation was installed at their Formans Road Works in 1935. Later, systems were provided at Shaftmoor Lane, Great Hampton Street (both in Birmingham), Cannock, Burnley, at CAV Ltd in Acton, Rotax Ltd in Willesden and at Leverstock Green.

However, on the other side of the Atlantic, during 1930-32 the Carrier Corporation undertook an extensive reorganisation following unprofitable returns on contracts. They decided to concentrate on manufacturing but were short of capital. So in June 1932, the Americans sold their shares to Stanley Groom. Willis Carrier and Irvine Lyle ceased to be members of the Board. Additional Directors were appointed: A P Fowler, H L Groom, W Jameson, and C L Sainty. Alex Fowler had succeeded in establishing a profitable business in paint finishing. Harold Groom was Stanley Groom's nephew and was overall in charge of erection. W (Jumbo) Jameson supervised all production/purchasing, while C L Sainty was in charge of air conditioning. It was still a class-ridden society. As Heard recalls:

"It was part of the set-up that the air conditioning 'boys' were to be the front-line troops from Public Schools and Universities while the H 'boys' covering paint finishing were the 'second class, from board schools! It was a 'snobbery' that grew into a practice and seemed to fit the circumstances of the commercial involvements."



*Carrier Engineering Corporation, New Jersey, Training Class, September 1929 [P-659].
J A E (Archie) Heard is in the front row, third from left.*

The purchase of the American shares more or less coincided with a reluctance on Stanley Groom's part to continue with air conditioning contracts abroad. An early decision was made to hand India over to the Americans, though Archie Heard carried on to complete CEC contracts there, then becoming responsible to Carrier Corporation for providing technical and other advice to their new agent, Volkart Brothers. [Volkart eventually went on to form a company with Tata Brothers, called Voltas, which manufactured and distributed Carrier Corporation equipment in India.]

There was also pressure from within CEC to devote more resources to the paint finishing side of the business and less to air conditioning. In spite of this, CEC enlarged the comfort side of the business with contracts for the London Stock Exchange; the Cumberland, Dorchester, Strand and Regent Palace Hotels; and the Trocadero Restaurant.

The technical links with Carrier Corporation remained strong and were cemented by a new Agreement of 27 December 1935. The fact of the Company being wholly British owned and controlled was in Stanley Groom's opinion essential, for he intended to go public but still retaining the technical advantages of his association with Willis Carrier. CEC was converted to a Public Limited Company in 1936, the Directors being those appointed in 1932.

Another consideration at this time was the unrest in Europe, particularly in Germany, due to the activities of Adolf Hitler and the Nazi movement. The Carrier international trade mark was in the possession of Lufttechnische Gesellschaft, Frankfurt and to avoid possible later international problems the trade mark was transferred to Societe Carrier of France. This meant that control passed to CEC in London, which would lead to confrontation with American Carrier after the 1939-45 War.

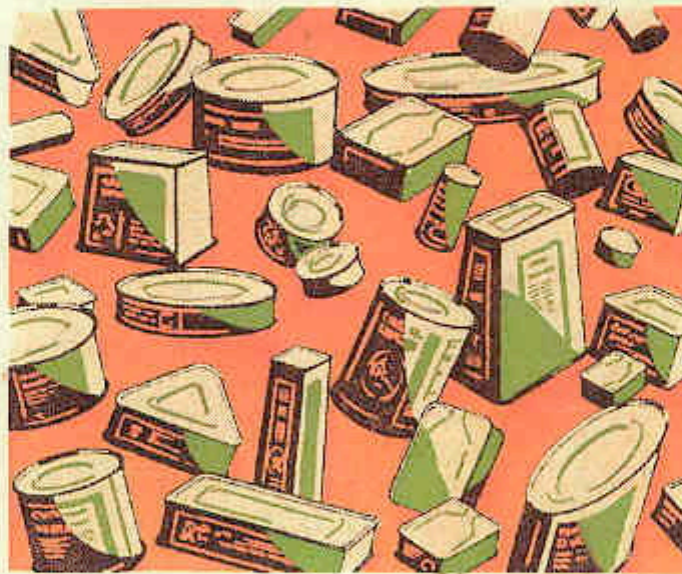
On 5 October 1937, an Agreement was signed between Carrier Corporation of Delaware, USA (successor to the original Carrier Engineering Corporation of the State of New York) and CEC and Stanley Groom. This Agreement stated (Clause 1) that Carrier USA agreed not to use its trade mark "Carrier," or indeed any of its other trade marks, in the Territory of CEC, except with the written permission of the latter. CEC Territories were defined as:

- Great Britain and Ireland
- The Irish Free State
- Republic of France and Europe
- Principality of Monaco
- Republic of Andorra
- French North Africa, including Algeria, Tunisia and Morocco
- Kingdom of Belgium in Europe, including Grand Duchy of Luxembourg
- Kingdom of Holland and Europe
- Kingdom of Italy in Europe, including Republic of San Marino
- French and Italian-speaking Cantons of Switzerland

Carrier Engineering Co. Ltd
See also 254/2
Carrier

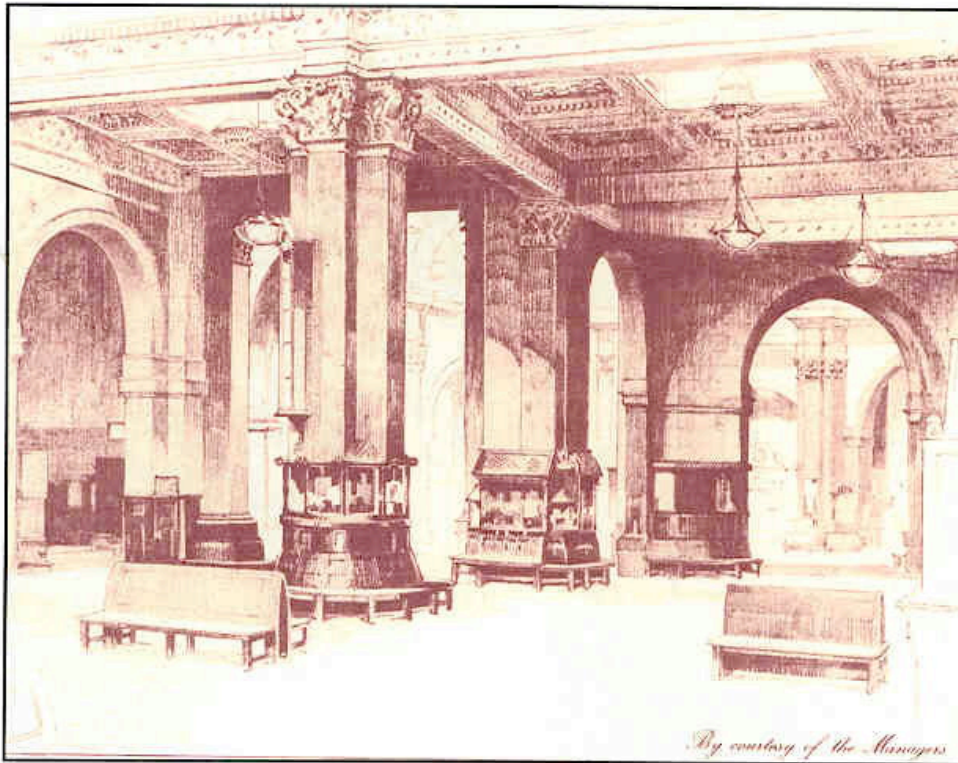
Continuous Pressure Cooking Machine

FOR CANS OF ANY SHAPE



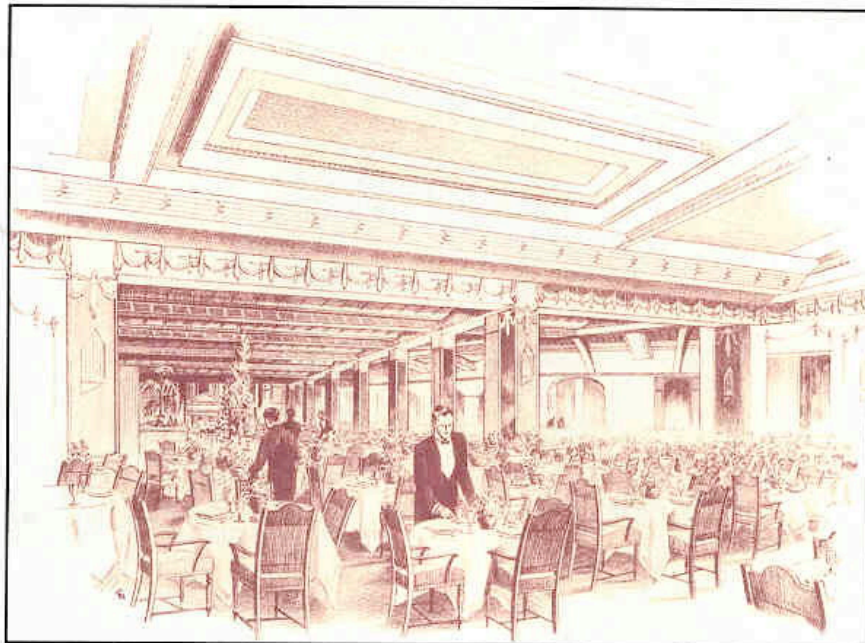
Carrier Engineering Company Ltd
24 Buckingham Gate, London.

*CEC Continuous Pressure Cooking Machine (another diversification),
1930s [6/508 front cover].*



By courtesy of the Managers

London Stock Exchange, air conditioned by CEC, c.1928 [5/567, page 23].



The Trocadero Restaurant, London, air conditioned by CEC, c.1930 [5/567, page 33].

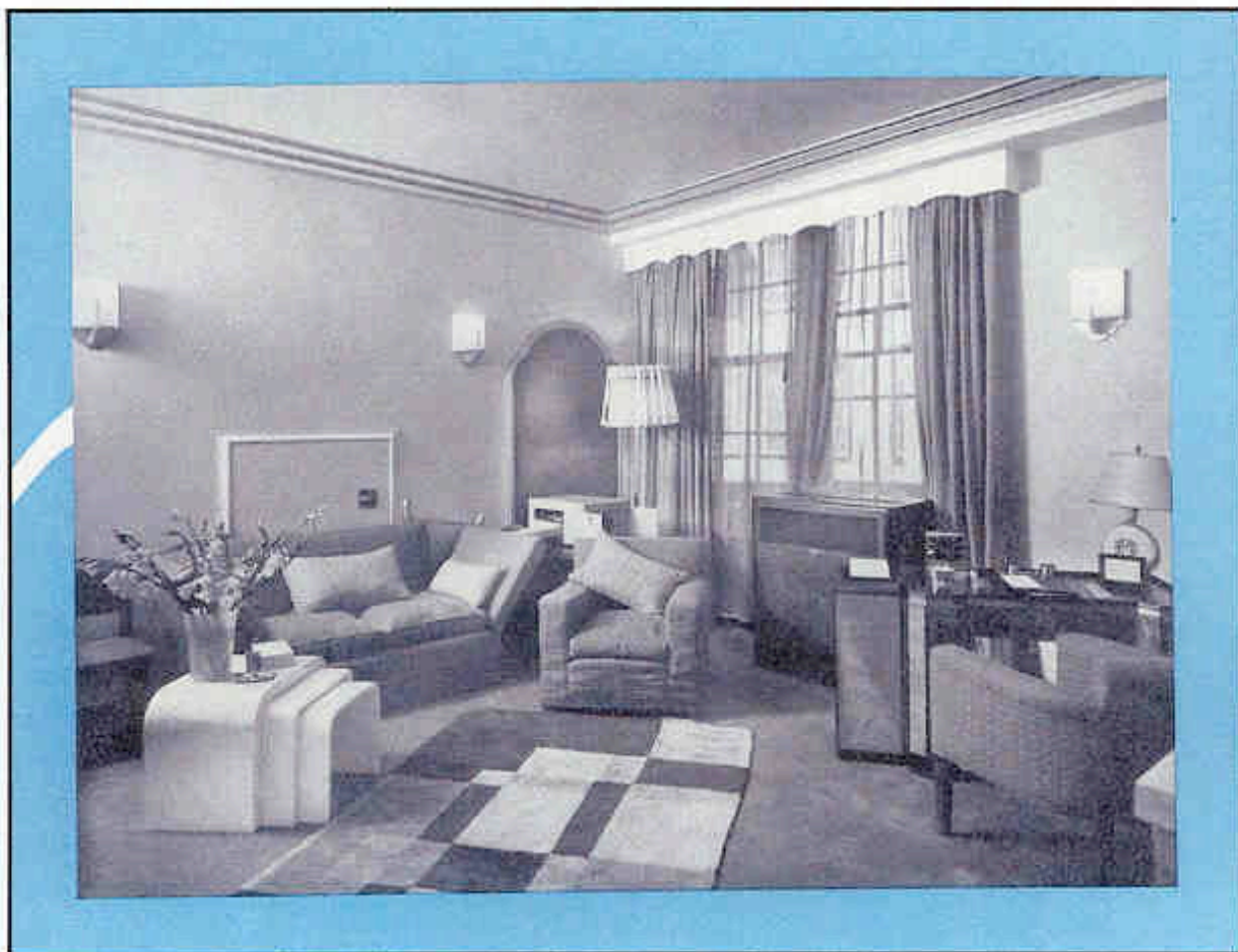
In 1937 Carrier Corporation developed unitary equipment and CEC set up a London subsidiary, with offices and showrooms at 27 Conduit Street in the West End, called Carrier Weathermakers to introduce self-contained room air conditioning units into Europe. CEC produced an oversize brochure [CHG] which included testimonials from a Mr Bundy of Shaftesbury Avenue, D Gestetner Ltd in Tottenham, Sir Julien Cahn, Bt for his rooms in Claridge's Hotel, Simpson's Restaurant in Piccadilly, Supermarine Aviation Works (jig boring room) at Southampton, and Berry's Electric in Newman Street. Air conditioning units were also installed in offices at George Brodie (stockbrokers), Tate & Lyle, for an automatic telephone exchange and in an operating theatre. This business came to an end with the outbreak of War in 1939.

Another area of business tackled by CEC in the 1930s was refuse disposal. They produced incinerators, described as "for Tropical and General Refuse," for hospitals, workshops, and a whole variety of commercial, industrial, military and institutional applications [6/497]. CEC also carried out the complete engineering installation for Municipal Refuse Disposal Works. Examples include those for the Borough of Guildford, opened 20 October 1938 [5/501] and for the Borough of Margate, opened 26 July 1939 [5/501]. The CEC contract at Margate covered Reception Hopper, Conveyor Belt, Magnetic Separator, Rotary Screen, Picking Belt, 2nd Conveyor, Furnace Hoppers, Reconstructed Furnaces, a 45 hp Steam Engine and the Machinery Buildings. The cost of the Margate scheme was £10,375; that of the Guildford plant was £18,449 16s 9d.

As the threat of war had increased, CEC undertook research into defences against poison gas, resulting in portable air filter units and shelter units which became standard government equipment. The basis of the gas defence unit was a special paper filter canister which CEC later used in another vital role -for the first sterile cabinets for the tableting of penicillin. The paper for these filters, impregnated with asbestos, was specially manufactured in Kent from the specifications of a French inventor. This development, and the flow of orders from the government, required manufacturing space which resulted in the purchase of a factory at Wembley and the establishment of Carrier Construction Company. This operation was managed by Harold Groom and during the War produced a large number of air and sea rescue craft. Mobile air conditioning units were developed for radar cabins and desert hospitals. Also in the desert campaign, British tanks and lorries rolled on through clouds of dust and sand, their carburettor intakes protected by a special centrifugal sand filter developed by CEC engineers.

On 28 September 1940, Carrier Continentale SARL became Societe Carrier SARL, Societe Francaise d'Exploitation des Procédés Carrier. Stanley Groom had helped Rene Modiano escape the German invasion to the relative safety of the South of France, so that Jean Michiels had to work under German supervision until Paris was retaken by the allies.

During this period there was little or no contact with Carrier Corporation and post-war there was considerable friction between them and CEC. In London, the offices at 24 Buckingham Gate were evacuated and re-established at Bolney in Sussex. Some CEC engineers were engaged for the duration by A V Roe and the BBC; others saw military service in Europe, Egypt and India.

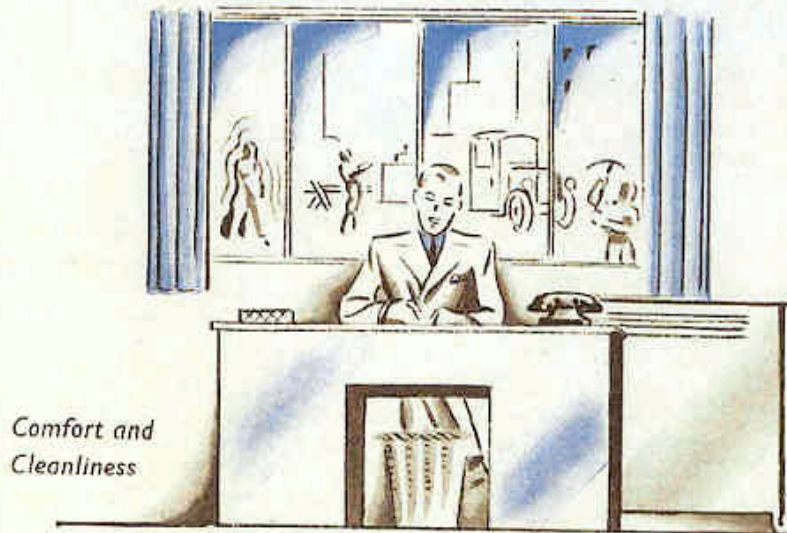


Weathermaker air conditioning unit in a private sitting room at Claridge's Hotel, London, c.1938 [6/-, 6].

Only a floor between—
BUT WHAT A DIFFERENCE!



Noise and
Discomfort

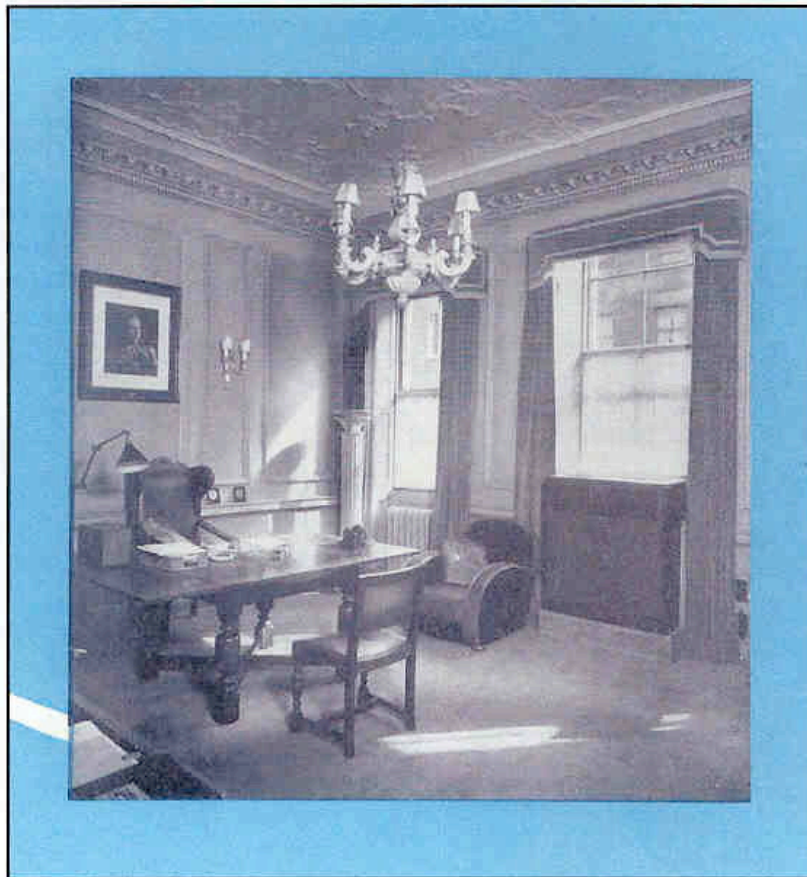


Comfort and
Cleanliness

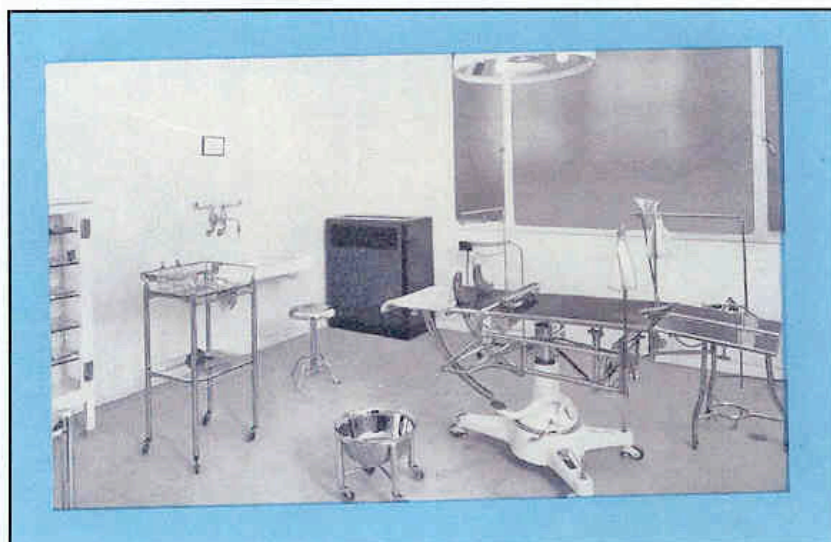
The difference is simply a
**CARRIER SELF-CONTAINED
WEATHERMAKER UNIT.**

Illustration from "Smoke, Noise and Dust," depicting the advantages of the self-contained air conditioning unit.

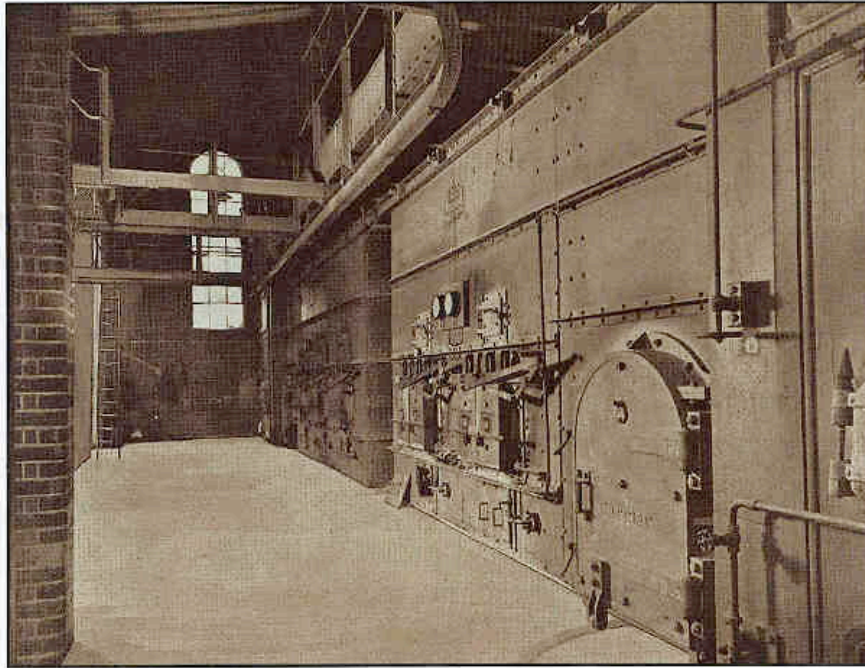
Carrier Weathermaster booklet, c.1938 [6/498. page 11].



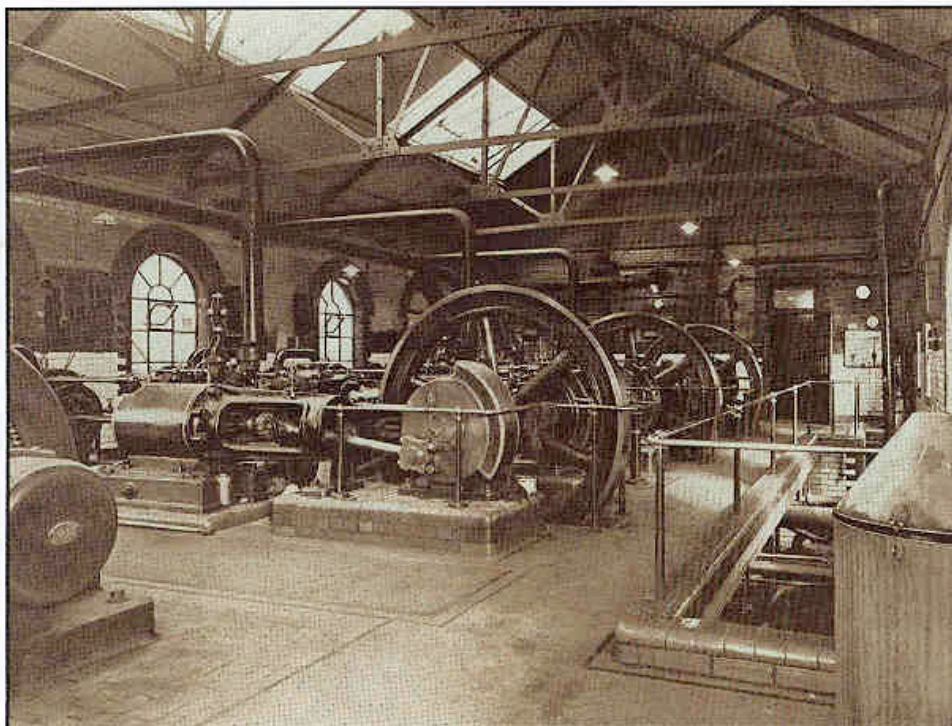
*Weathermaster air conditioning unit in private office
Berry Electric Ltd, London, c.1938 [6/–, 7].*



Weathermaster air conditioning unit in a hospital operating theatre, c.1938 [6/–, 10].



*Furnace House, Refuse Disposal & Salvage Works, Guildford, 1938 [5/503, page 12].
With 5 top-fed cells, 2 Babcock boilers & overhead clinker runway.*



*Compressor House, Refuse Disposal & Salvage Works, Guildford, 1938 [5/503, page 14].
3 horizontal steam-driven air compressors.*

Then in April 1945, Carrier Corporation dropped its first bombshell. In a letter of 18 April, it gave written notice of termination of the inter-company Agreement of 1935. This signalled the Corporation's intent to be free to deal anywhere in the world. Stanley Groom fought back to preserve his special relationship with them, at least in the UK and France. The interpretation of the small print of the 1935 clauses led to a number of confrontations and a marked deterioration in the relationship between London and New York.

Groom had been a longstanding friend of Willis Carrier and Irving Lyle, but now the President was Cloud Wampler, a Chicago banker, appointed in 1942 when profits were low, the same year which saw the death of Lyle. Willis Carrier had effectively retired at the time of Lyle's death, but was still engaged in what many consider his greatest project, his contribution to the war effort. [This was the air conditioning of a high-altitude wind tunnel for the National Advisory Committee on Aeronautics at Cleveland, Ohio. Designed to cool an air flow of 10 million ft³/min to -67° F, the refrigeration plant had a capacity of 20,000 TR, requiring fourteen 15,000 hp machines, FAC, 97-100]. Wampler and Groom definitely did not see eye-to-eye.

In December 1945, Archie Heard came back from India to discover there was intense internal rivalry within CEC between the Paint Finishing side under Alex Fowler and the Air Conditioning side under C L Sainty. Early in 1946, CEC began the move back to Buckingham Gate. After what Archie Heard describes as an acrimonious exchange of letters with John Rachal in New York, he was released from further commitment to Carrier Corporation and, by agreement with Stanley Groom, started work London under Alex Fowler in March 1946. He recalls:

"One of my first tasks was to engage six men to become a training class. Alex asked me for a description of the men. I said 'age about twenty-five, preferably university educated or otherwise ex-officers.' Alex thumped his chest and said 'look at me, only a board school boy.' I retorted that he might be one in a million but that I couldn't take such odds for new men. Years later he became most insistent on academic background but that was only when his own son was at college."

Before long Sainty resigned. Paint finishing contracts became predominant and for the next ten years or so provided the major part of CEC's profits. Air conditioning managed, with surreptitious support from Archie Heard and others, to survive. Sainty's resignation may also have led to Stanley Groom's decision to get out of the marine air conditioning business, more or less handing this to Windsor Engineering of Glasgow. But external factors intervened and marine work continued [3.5].

During the war Aquatherm heating, in conjunction with cooling, was used with purpose-made presses in the manufacture of laminated wood propellers for aircraft. From 1946 onwards, these systems were developed to serve presses, calenders and mixing rolls for a variety of clients and applications, including De La Rue (laminated plastics), Silvertown Rubber Company (foam plastic), and Rustyfa (Russian tyre factory).

In the ten year period, 1947-57, Heard engaged in numerous battles within CEC to introduce technical advances in air conditioning. The first was over the provision of direct-expansion cooling in the confectionery industry. Heard may have won the battle, but he lost the war, for by 1960 all the major confectionery manufacturers had transferred their allegiance to the London Air Conditioning Department of a rival firm, Brightside Heating & Engineering Company.

Then everyone was saddened by the death of Willis Carrier in 1950.

There was also increasing competition from Stanley Groom's old company, now Sturtevant Air Treatment, in the textile air conditioning market. However, CEC acquired the UK rights to the 'Pneumafil' broken-thread collector system, patented by Luwa of Zurich, and set up both UK and export agreements with a number of textile machinery manufacturers. CEC also secured important contracts from British Nylon Spinners and ICI (Imperial Chemical Industries).

Another in-company confrontation was over Groom's decision to switch from the importation of the Carrier centrifugal refrigerating machine to UK manufacture of lithium-bromide absorption machines [3.6]. This was largely unavoidable due to the currency restrictions on trading with the USA. Production lasted from 1950 until around 1976 [Appendix-E].

As the 1950s closed, a new wave of office building took place across the UK, the first series of high-rise air conditioned offices dating from 1962 [3.1]. This enabled CEC to utilise Willis Carrier's high velocity induction air conditioning -the 'Weathermaster System.' in a sales drive spearheaded by Archie Heard and Geoff Carroll [Appendix-C].

Following the sudden and unexpected death of W (Jumbo) Jameson in 1955, three senior executives were invited to join the Board: F (Fred) P Ashley (Head of Estimating), A W Putnam known as AWP (Chief Engineer), and L (Leo) E Geering (Head of Installation). Later in the year further Board changes occurred. R S Andrews (Andy) (previously CEC Auditor) was appointed, while Alex Fowler and Harold Groom became Joint Managing Directors with no indication as to which might take over from Stanley Groom.

In 1956 was a good year for CEC. Turnover was a record. The issued capital was increased to £700,000. Three major paint finishing orders were in hand: Vauxhall at Luton, Morris, and BMC in Sydney, Australia.

In 1957 Stanley Groom decided to reduce his shareholdings in CEC. In view of past associations, and preferring a private sale, he sent Alex Fowler and Harold Groom to the USA to sound out Cloud Wampler, now Chairman and the undisputed boss of Carrier Corporation. Their approach was rebuffed, so Stanley Groom disposed of these shares to major institutions. On 19 September 1957, Stanley Groom, a long sufferer from asthma, died.

His death brought the rivalry between Alex Fowler and Harold Groom to the surface, while Andrews took over as Chairman. A number of incidents followed, including the complete gutting of the Board Room, which had previously been Stanley Groom's office. This made Archie Heard realise that while his own respect for Stanley Groom had always been tinged with affection this was not the case with others. For them, all of the years of deference to Stanley Groom had been built on fear, even possibly tinged with hate. Heard knew he had lost an ally.

The year 1958 was a year of internal Board struggle. The lack of unity showed itself as the relationship with Carrier Corporation neared breaking point. As ever, CEC was concerned to keep the US company out of the UK and France. Holding the rights in these areas to use of the Carrier name and many patent rights put CEC in a strong position. In 1957 the know-how Agreement with Carrier Corporation expired and was not renewed. This also meant that CEC could not use the trade name of Carrier outside their own territories. For example, the large paint plant built by CEC for BMS in Sydney carried no nameplates at all.

There were negotiations between John Rachal of Carrier Corporation and Alex Fowler. Rachal made repeated visits to London for talks from which Archie Heard, possibly because he was an old friend of Rachal, was excluded. During this period, the Corporation considered linking up with a UK manufacturing organisation, while CEC discussed merger possibilities with another UK air conditioning company. CEC also considered appointing another director. Fowler favoured Geoff Carroll, but Ashley and Putnam wanted Heard. The Board remained confused but business was booming.

Towards the end of 1958 it was revealed that Carrier Corporation had forged a UK link with Stone-Platt to enable the manufacture of Carrier equipment under the title "Carlyle" (from Carrier and Lyle), being still unable to use the Carrier trademark. This signalled a complete breakdown of the old relationship between London and New York.

At the beginning of 1959, Heard was in the States inspecting hotels with Henry Scott, Chief Engineer of J Lyons, with sights set on the air conditioning for the proposed Ariel Hotel at London Heathrow Airport. Although due to sail home on the "Queen Elizabeth", Heard was instructed to return by air as a matter of extreme urgency, where he was met at the airport by a worried Fowler, wined and dined, promised a directorship, and asked to mend fences with Carrier Corporation. Heard also had good friends at Stone-Platt and valuable contacts with Société Carrier, and these would now be called into play.

The Joint Managing Directors called a temporary truce in their Board Room battles, agreeing that Fowler would run London Office and Harold Groom control the factory and all site work. Fowler, anyway, was due to retire in 1959, but the behind-the-scenes plotting for succession continued. When decision time was reached so was the inevitable compromise, for in the event Harold Groom expressed reluctance to become Managing Director. So Andrews became Chairman, with Alex Fowler becoming Vice-Chairman. Fred Ashley was appointed sole MD, while Groom became Chairman & MD of the newly constituted Carrier Construction Company. Geering and Putnam remained on the Board. It soon became apparent that Ashley was a caretaker MD and that Heard was being groomed for the job, initially being promoted from Sales Director to Assistant MD..

Next, René Modiano arranged to sell his shares to CEC giving them an 80% holding in the French company, the remaining 20% being in the hands of Jean Michiels and Roger Bois.. Then Harold Groom negotiated a leaving package and resigned his directorships.

Since 1957 there had been no agreement with Carrier Corporation, but through careful discussions in 1959, one was reached, enabling either party to trade in any part of the world, subject to the patent and trade-mark rights of the other. CEC was still prevented from using the name Carrier for export work and decided to make use of the name of their subsidiary Drysys Equipment Ltd, which had been registered in 1948. In particular, this would be of considerable benefit to the paint finishing business.

This period also saw a decline in many of the traditional UK businesses, including textile production and shipbuilding, two areas of CEC interest. However, 1960 was looked on as the year in which a new expansion of CEC began. Production facilities were increased and improved. R&D was transferred to new premises at Acton. The freehold of the buildings occupied by Societe Carrier was purchased: Michiels was appointed MD, Bois was made Assistant MD. Michiels also joined the Board of Drysys Equipment with the declared company aim of dominating the world paint finishing market. J W (Silas) Smith, Chief Draughtsman of CEC was promoted to Production Director.

Heard recalls that a visit to Norway with Alex Fowler convinced him that the time had come for Fowler to quit completely as he appeared to have burnt himself out. His interference, undermining Ashley's authority as MD, was also causing problems. Heard considered Fowler an excellent salesman and paid tribute to his success in the rough and tough motor industry, but his other traits were not so endearing:

"AF's dynamic energy, his sudden temper, his foul language made him a formidable opponent. During twenty years we had an uneasy relationship, admiring the other's strengths while resenting the different attitudes. His method of getting his own way was to use abusive language or throw a tantrum. The tantrum could be against physical things, such as throwing the telephone out of the window. The abusive language was to subdue people."

Alex Fowler was to die in 1967 at the age of 73, remembered as a colourful figure by many.

Another expansion, in 1961, was a further agreement with Luwa which extended CEC's manufacturing rights for Pneumafil to cover both Pneumastop and Pneumaclear. Also, an agency agreement was reached with Mechanical Handling Ltd of Australia for CEC automatic painting machines and know-how in motor car finishing in Australia and New Zealand. A number of important paint finishing contracts were obtained in Europe [Part-5] as well as the air conditioning for the new synthetic fibre factory of ICI at Kilroot.

However, 1962 was to prove the year of the greatest transformation of CEC's business, both in the UK and France. This was coupled with a new determination to build-up the export markets.

The 1959 Agreement with Carrier Corporation never did provide much of a real working arrangement between the two companies. This changed in 1962 when a new 10-year Agreement was signed. This secured for CEC the exclusive manufacturing rights, in their territories, for Carrier absorption machines [Appendix-E], Weathermaster induction units [Appendix-C], and "Rotospray" central station plants. A separate and simultaneous Agreement defined Societe Carrier's relations with Carrier Corporation in France, Belgium, Monaco and Luxembourg, including their confirmation as a distributor of Carrier products in these territories.

In August of the same year, CEC moved into larger, modern premises in Warwick Row. In September, Archie Heard was appointed Managing Director. Fred Ashley became Vice-Chairman and Assistant MD. Peter Faulkner joined the Board in the new position of Commercial Director with a brief to find new business opportunities, rather than become involved in sales for air conditioning or paint finishing.

In 1963, CEC emerged as the controlling company of an international group. There were a number of acquisitions in the paint spray business and the setting up of various overseas subsidiaries and partnerships [Part-4]. Leo Geering was forced to retire through ill-health.

In 1964, Harry Pitcher and Jean Michiels were appointed to the Board, with Frank Smith of Warburgs providing a new approach to financial matters. Then Peter Faulkner discovered he was suffering from multiple sclerosis. His flamboyant nature and unusual working methods had already created a number of problems and internal tensions, and the choice of various overseas business partners often proved unfortunate and unprofitable. Meanwhile, in the UK, rising costs were affecting profits and friction between labour and management was widespread, with unofficial strikes common. CEC was caught up in this, particularly over the installation of a large paint plant for Vauxhall at Ellesmere Port. This was a new experience for CEC as hitherto labour relations had been free of trouble.

At the end of 1965, Faulkner was forced by his illness to retire and Tom Hardcastle was appointed to the Board, a man whose experience in the paint finishing industry was unrivalled, and who had extensive contacts on the American scene.

During this period, the relationship with Carrier Corporation slowly and steadily improved. This was no doubt partly because Carlyle (started in the UK by Carrier and Stone-Platt in 1959) had lost money from the start and their manufacturing efforts were described by Heard as disastrous. A new respect for CEC's capability in the UK and French markets was recognised. Carlyle's commitments were phased out and Carrier Corporation acquired the complete shareholding, including the 5% which had been held by CEC. Carlyle continued to process orders for induction units made by CEC and this led to a closer liaison. From the low point of 1958, co-operation with Carrier Corporation had progressed from a purely commercial relationship to something more personal. With the departure of Cloud Wampler the new bosses were friends made by Heard from his 1929 training class in Newark. Following a defence of Carrier "Weathermaster" patents in France, Carrier and CEC combined in a joint enterprise, mainly for the production of induction units, by constructing a new factory at Gravigny in France.

Economic difficulties and pressure on margins would have had been damaging to CEC except for the policy of overseas expansion to offset UK results. CEC returned to greater profitability during 1967. [A summary of CEC profit 1951-70 is given in Appendix-G]. It had been Stanley Groom's policy to keep all possible mention of paint finishing activities out of the Annual Report. He had the view that any such revelation would attract competition whereas he felt air conditioning competition was containable. The diversity of business interests and their geographic spread made producing consistent profits in fluctuating markets extremely difficult. This led to a CEC policy of carrying a large liquid reserve, a fact which would inevitably attract predators.

In 1968, both Ashley and Putnam retired. After a year of some disagreements between Heard as MD and Ashley as Chairman, mainly over the presentation of accounts, Ashley too retired. After some discussion, an outsider with a distinguished career, Sir Steuart Mitchell KBE CB, took on the role of Chairman. J R (Joe) Edwards CBE, boss of BMC, agreed to join the Board as a non-executive director.

Heard recalls that for the first time there was meaningful discussion round the board table. In Stanley Groom's day there was little discussion because he had always made his mind beforehand and issued diktats. The double act of Alex Fowler and Harold Groom mutually agreed matters beforehand so as to keep their rivalry out of the board meetings itself. When Fred Ashley was MD, the structure of departmental directors led to decisions based on partisan considerations.

Throughout 1968 and into 1969 business boomed and profits rose. Now, CEC controlled an international group with six UK subsidiaries, seven overseas members, employing some 2300 engineers and technicians. 1968 saw the financial press announcing "Carrier Comes Bouncing Back." At the 1969 AGM, Sir Steuart Mitchell said:

"Our business is getting technically more complex.....we are now doing business in less than thirty-two different countries, and so internationally and financially it is getting much more complicated to manage...."

Turnover had increased over the previous year by 27%; pre-tax profits were up by 15%. But the storm clouds were gathering. As Heard recounts:

"However, 1968-9 provided a number of take-over scares, some of which required considerable diplomacy to fend off. The policy of the Group was to remain independent; we had the scope, we had the investment capital and we had the inner enthusiasm to grow under our own steam. Our business was largely dependent on our judgement of technical innovation as profit-making. We knew there was no other organisation that could amplify this judgement. Confidential discussions on this basis were sufficient to convince even the most determined of those few predators who started negotiations to withdraw. The experience so gained and from a general knowledge of the market, we considered our position was reasonably secure.

In other words, we were riding high and because of this were not easily approachable by City interests, much to the disappointment of our brokers. Somehow we had failed to grasp that we were no longer able to function without much more regard to our shareholders than Stanley Groom had done. We put the management and running of the Group as our main priority. Keeping the City informed was low on the list of priorities, except when the Annual Report was due. Details regarding our major shareholders had always been left to the Chairman, R S Andrews, and we had not realised he was cast in the wrong mould for the new relationship between companies and the City. Anyway we were making good profits, paying good dividends so thought our shareholders would automatically support us.

This optimism was to prove unfounded in such a short time.

The first few months of 1970 were among the happiest of my Carrier life. Steuart [Sir Steuart Mitchell] had become a friend as well as a support -his Chairmanship was so impartial, his enjoyment of and praise for the corporate spirit of the Group. His contacts in the engineering world were useful: his background provided an entry to many quarters; and his title put the some icing on the gingerbread of Carrier Drysys. He was able to form a close relationship with Joe Edwards and Frank Smith and therefore to profit by their long associations with the Group affairs. My trips to various subsidiaries were enhanced whenever Steuart or Joe accompanied me and they both assisted me when the overseas management were sometimes hesitant in accepting my policies. The Senior Management were unanimous in their appreciation of the stature of the non-executive directors so that the latter's support for my policies provided all the necessary back-up that I needed. After so many years of in-fighting at the top of the Company, after living through so many years of hatred between departmental chiefs, it was tremendousto know that there were no nagging doubts or concern about possible negative attitude.....

During these early months, the plans and forecasts of our expansion were now settled and the 1969 results were being substantiated by the forward order book showing that 1970 and 1971 onwards to 1972 would provide turnover and profit growth sufficient to cover the small loss-makers in our more recent acquisitions. A very healthy cash position meant that we could also plan further expansion by growth or merger. It was in this exalted confident mood that I went off in May on leave to strengthen me for the year ahead."

On returning from his holiday in France, Archie Heard found among his letters one from the Chairman, Sir Steuart Mitchell, saying that during Heard's absence he had been contacted by Alan Pullinger, the Chairman of G N Haden & Sons Ltd, requesting discussions. The words take-over or merger came to mind.

It would prove to be a take-over bid [The story of which is told in Part-5].