

CARRIER PAPERS



These are the collected papers of J A E (Archie) Heard, Chairman of the IHVE Archaeology Working Party (forerunner of the CIBSE Heritage Group). There are 3-Ring Folders (VOLUMES) and 4-Box Files (BOXES), including one of photographs. The collection consists mainly of catalogues and documents relating to Willis Carrier, American Carrier Corp, British Carrier Eng, and Drysys (the Carrier car-body paint apparatus company).

There are copies of many of Willis Carrier's technical papers relating to air conditioning and the development of the centrifugal chiller. There are also the published papers and the unpublished papers and book drafts of JAEH, with information on the early days of air conditioning in India, South Africa, for trains and for passenger liners; also details of the Haden take-over of Carrier UK. Included in the collection are historical papers in German and French, photos of installations (particularly the BBC, Langham Place) and early centrifugal and absorption chiller production and installations.

VOL-1

1. Centrifugal Compression as Applied to Refrigeration, W H Carrier, reprint from Refrigerating Eng, Feb 1926.
2. The Contact-Mixture Analogy applied to Heat Transfer with Mixtures of Air and Water Vapour, W H Carrier, Trans.ASME, presented 1936.
3. A Review of Existing Psychrometric Data in Relation to Practical Engineering Problems, W H Carrier & C O Mackay, Trans.ASME, presented 1936.
4. Air Conditioning in the Printing & Lithographing Industry, W H Carrier & R T Williams, Trans.ASME, presented 1929.
5. Temperatures of Evaporation of Water into Air, W H Carrier & D C Lindsay, presented 1924.
6. Engineering Education, copy of typescript for lecture by W H Carrier, 5 July 1944.
7. The Invention of the Centrifugal Refrigerating Machine. Proposed Script for A Tape Recording for the Smithsonian Institution, plus a Complete Historical Sketch, by Logan Lewis, 1 March 1962.
8. The Weather Vein, Organization Number, Vol.6, No.1, 1926, Carrier Eng (photocopy).
9. Comfort for Millions: A Far-Flung Romance (story of air conditioning and Willis Carrier), reprint from Reader's Digest, July 1950.
10. The Thermal Engineer, by W H Carrier, Carrier London booklet, based of paper of 1927.

11. American Engineering & Technological Advances during War-Time (includes American Developments in Air Conditioning and Refrigeration during the War Period, by W H Carrier) Dec 1945.
 12. The Control of Humidity & Temperature as applied to Manufacturing Processes and Human Comfort, paper 324, ASHVE 1929.
 13. Comparison of Thermodynamic Characteristics of Various Refrigerating Fluids, W H Carrier & R W Waterfill, reprint Refrigerating Engineering, June 1924.
 14. Willis Haviland Carrier, Father of the Air Conditioning Industry, by L M Fanning (Fathers of Industries Series) New York 1957.
 15. The Two Faces of Janus, (The Story of Carrier Corp), 1977.
 16. Rational Psychrometric Formulae, W H Carrier, reprint Trans.ASME, 1911.
 17. The Temperatures Of Evaporation of Water into Air, W H Carrier & D C Lindsay, Trans.ASME 1924 (as item 5).
 18. Dr Willis H Carrier, Father of Air Conditioning, by Cloud Wampler, booklet Newcomen Soc, USA, 1949.
 19. Engineering Education: Principles v Curriculum in Memorizing Facts and Theories, W H Carrier, ASME 1936.
 20. W H Carrier, A Teacher? typescript 12 Sept 1952.
 21. Willis Haviland Carrier (CV from Cornell, 19 July 1937).
 22. Notes on W H Carrier, Cornell c1936.
 23. Statistics on W H Carrier, Cornell c1911.
 24. Copy letter from J O Jackson (Pittsburgh-Des Moines Co) to Margaret Ingels (author WHC biog) re Carrier's work on Cleveland Wind Tunnel, 8 Feb 1950.
 25. Copy Carrier memo from Margaret Ingels, 13 Feb 1950 re (24).
 26. Copy letter from Willis Carrier (with signature) to Dr Kleir recalling their collaborative efforts in the 1920s and 30s, dated 17 April 1947.
 27. Collection of press cuttings re WHC from Cornell.
 28. Candidates for Alumni Trustees, Willis H Carrier, Cornell.
 29. American Developments in Air Conditioning and Refrigeration during the Last Decade, typescript by WHC, c1945.
 30. Profiles of Outstanding Alumni, WHC, Cornell, 6/1945.
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31. Fresh Uncontaminated Air in the Print Shop, J A E Heard, South African Printer, July 1974.
 32. Some Thoughts on Future Design Essentials for Air Conditioning Installations, J A E Heard, South African Builder, Feb 1974.
 33. Oxford Corner House, description of the 1926/7 installation by Ernest H Arthur, Aug 1977.
 34. The Air Conditioning of Khasbagh Palace, JAE Heard recollections from 1931.
 35. Stories of Willis Haviland Carrier, collected anecdotes of his eccentricity by JAEH with 1947 poem by Dr Klein.
 36. Willis Haviland Carrier (1876-1950), Fortune, 23 Mar 1981.
 37. Letter re WHC in Japan (1929) from Matsujiro Nakagawa to JAEH, 1 Dec 1975.
 38. List of Carrier Centrifugals installed in UK from 1926 to c early 1930s.
 39. Copy of letter from WHC to Dr Klein, 17 Apr 1947 (as 26).
 40. Letter from Dr Klein to JAEH re WHC, 20 Apr 1976.
 41. Christmas Card from Matsujiro Nakagawara to JAEH c1975?
 42. Carrier 50, brochure for 50 years of Carrier UK (1921-71).
 43. Air Conditioning for the Confectionery Manufacturer, Carrier UK Brochure, undated probably c1928.
 44. Carrier Tobacco Ordering Machine, Carrier UK Brochure, undated probably c1930.
 45. Carrier Incinerators, Carrier UK Brochure, prob. c1935?.
 46. Noise Smoke Dust, Carrier UK brochure, undated c 1940?
 47. Manufactured Weather Guarantees Uniform Temperatures and humidity, Carrier UK brochure, undated, late 1920s?
 48. Introduction to the Carrier System of Air Conditioning for British Textile Mills, Carrier UK brochure, c1925?
 49. Opening New Refuse Disposal Works, Margate, 26 July 1939. (contractors -Carrier)
 50. Carrier Eng Co Ltd brochure (list of installations) c1938.

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51. Opening of Refuse Disposal & Salvage Works, Guildford. Souvenir Brochure, 20 Oct 1938 (contractor -Carrier).
 52. Industrial Paint Baking by Infr-Red Radiation, Carrier UK brochure, Jan 1943.
 53. Rotodip, Carrier UK brochure (car finishing) c1950.
 54. First Principles of Manufactured Weather, Carrier UK brochure (reprint from Weather Vein, 1922).
 55. The Carrier Psychrometric Chart, Carrier UK, c1925.
 56. Carrier Continuous Pressure Cooking Machine, UK c1930?
 57. Manufactured Weather to make Every day a good day, Carrier UK version of USA Publ. mid-1920s.
 58. Carrier Dehumidifying Equipment, UK brochure (orig USA 1920).
 59. Ventilation for the Modern Store, Carrier UK brochure, prob. 1920s.
 60. The Pneumafil System, Carrier cleaner & broken end collector for ring spinning frames (textiles)(Pneumafil =Luwa patent).

TRAINS

61. Train Air Conditioning, typescript by JAEH, 1980s?
 62. Air Conditioned Carriages of the North Western Railway (India), May 1940.
 63. Stones of Deptford (History).
 64. The Development of Railway Air Conditioning, A H Chilton, 1951.
 65. The Royal Trains, C Hamilton Ellis (extract), 1975.
 66. Co-operation in Sales (India Railways), W J Ruston, c1950?
 67. India's New Fully Air Conditioned Trains, c1950?
 68. Air Conditioned Rail Travel in Australia, c1950?
 69. The Egyptian Royal Train, C E P Hall, c1952.
 70. Air Conditioning for the Emperor (haile Selassie of Ethiopia) -Royal Train, c1950.
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71. One for the Road, Stone-Carrier Air Conditioning, c1950 (Road Coaches)

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72. The Diary of a Takeover, typescript by JAEH relating events during takeover battle in which Haden secured control of Carrier, May-Aug 1970.
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MARINE VENTILATION & AIR CONDITIONING

73. Ships Lungs, typescript by JAEH on history of ships ventilation, c1979.
74. Ships Lungs, by JAEH in Haden magazine.
75. Ships Lungs by JAEH, CIBSE chronological listing of history of ship ventilation (with bibliography), July 1977.
76. Notes on Marine Ventilation & Air Conditioning, typescript by W Hood, covering 1927-mid 1960s.
77. Full Ahead for CAC Marine, J Baird, Haden-Carrier News, No.15, Oct 1977.
78. Letter on early ship ventilation by H Peck, 17 June 1975.
79. Illustration of Stephen Hales Ships Lung of 1740.
80. Illustrations of Ventilation of Merchant Steamers, J Webb.
81. Table of Centrifugal Refrigerating Machines on Shipboard (period 1935-1947) from HPAC.
82. Typed extract from American Twins of the North Atlantic (Washington 1932, Manhattan 1933), D B Beattie, Manner News, July 1975.
83. Typed extract from Marinair lecture to IHVE, JAEH & D Gilbert (given on board Orsova).
84. JAEH handwritten notes from A History of Marine Engineering, J Guthrie (Hutchinson).
85. Personal Notes by JAEH, on ship work and Carrier projects with 1938 Carrier letter to Winsor Eng.
86. Launch of a Queen, part i, typescript by JAEH on QE2 (1967)
87. The Air Conditioning of A Queen, part ii, typescript by JAEH on QE2 (from 1968).
88. Carrier's War Effort (construction of air-sea rescue craft 1940-47) Haden Insite magazine, c1980.
89. Marine Air Conditioning, JAEH document list, 21 June 1985.
90. Carrier Ross Eng, Marine Air Conditioning Div -Projects Completed, printed list 1960-1985.

MARINE VENTILATION & AIR CONDITIONING continued

91. Ships Lungs No.2. Document listing & notes JAEH, 21 July 1985.
 92. Collection of drawings from The Ventilation of Ships, booklet by Winsor Eng, with additional Carrier drawings of 1970.
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93. The Crown Iron Works, Being the History of L Sterne & Co, 1874-1949, typed notes.
 94. Historical Events Leading up to Modern Refrigeration, typed list, covers from 1685.
 95. Plank's list -events in history of refrigeration, 1660-1944 (compiled by N S Billington).
 96. Letter from P B H Brown of 25 July 1977, commenting on JAEH Refrigeration Events listing.
 97. Passive Defence & Collective Protection against Gas Attack, typescript on Carrier World War II filtration (listed documents not in archive).
 98. Carrier Absorption Refrigeration Machine, JAEH typescript. (refer to photographs in BOX-4).
 99. Air Conditioning for Summer & Winter Comfort, W H Carrier, reprint of 1930 paper in JASHRAE May 1980.
 100. Obituary, Dr Willis H Carrier, 1876-1950 from Trans.ASHVE (1950/51?).

1. Carrier-the Man and His Message, JAEH, BSEE Jan 1980.
2. Carrier World Wide, JAEH, BSEE Feb 1980.
3. Carrier -on Educating Engineers, JAEH, BSEE Mar 1980.
4. Carrier -the Early Years, BSEE DEC 1979.
5. J Irvine Lyle (initially Gen Mgr, Carrier NY), documentation from University of Kentucky.
6. The Controlled Environment, W L McGrath, Phil. Trans. Royal Soc, 1972.
7. Building for a Bigger Boom, W Wingstedt (review of Carrier Corp), Appliance Manufacturer, Jan 1971.
8. Logan Lewis (one of Carrier Corp founders), accession list, Cornell.
9. Carrier at the New York World's Fair, Carrier International News, Jan 1939.

Photocopies of Willis Carrier photographs held at Cornell.

10. Half-profile right side.
 11. Profile left side.
 12. Full face.
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13. Photo of seven founders of Carrier Corp.
 14. Photo, Willis Carrier with visiting engineers at Syracuse HQ, from Carrier Int News, prob.c1939.
 15. Photo, Willis Carrier with original centrifugal at Smithsonian in 1946, BSE Mar 1977.
 16. Benefiting Mankind (re Alistair Cooke's BBC Letter from America on Air Conditioning), Haden Insite, c1981.
 17. Carrier Products for Europe, RAC Sept 1979 (refers to Hot-Shot heat pump for HWS).
 18. Photo, Carrier Training Class 1929 (includes JAEH), Carrier Courier, July 1957.
 19. Chronological Table of Events which led to Modern Air Conditioning, JAEH typescript.
 20. Points re Carrier arising from discussion with Herman Seid on 31 May 1978, JAEH typescript.

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21. Mechanical Services in London Offices, typescript by
W P Jones, Haden-Young, 4 Aug 1978.

SOUTH AFRICA

22. Reminiscences of an Old Hand, R J S Caldwell, HACR (SA),
Nov 1969.
23. *ibid*, Jan 1970.
24. More Reminiscences of an Old Hand, R J S Caldwell,
HACR (SA), May 1971.
25. *ibid*, July 1971.
26. Letter from Robert Caldwell to JAEH, 6-1-72.
27. Brief Outline of CEC Commercial Progress, 1921-75,
typescript by JAEH.
28. Then and Now -The Birth of Air Conditioning, typescript
by JAEH.
29. First Centrifugal Air-Conditioning Compressor to Enter
Museum, press extract c1961.
30. Television Studios Create Development in Air Conditioning
Distribution, JAEH typescript, c1970 (with diagrams).
31. Anecdote on Willis Carrier by C L Sainty (Chief Eng, Carrier,
London).
32. History of Carrier Eng & Progress of Air Conditioning
in the UK, JAEH typescript.

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ARCHIE HEARD COLLECTION BOX-1 B/W [76]

May 96

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1. The Carrier-York Heat-Diffusing Unit, Catalogue Carrier-Ross, undated (probably 1930s -Carrier Ross was founded 1929).
 2. An Air Conditioning Achievement by Carrier -Manufactured Weather for Broadcasting House, brochure c1932. (see photographs in BOX-4).
 3. Today Tomorrow -Carrier Corp Annual Report 1975.
 4. The Romance of Air Conditioning, Logan Lewis, Carrier booklet (originally written c1950).
 5. Carrier Corp -Energy Ideas at Work, Annual Report 1976. (contains illustrated history 1902-1977).
 6. Moving Ahead with Carrier Corp, brochure 1977.
 7. Indoor Air by Carrier, UK brochure, mid-1930s.
 8. Carrier B-K Cold Diffusing System, UK catalogue, probably mid-1930s.
 9. Carrier Equipment for Bonderizing, UK catalogue, 1930s?
 10. Carrier: Engineering from Barrel to Body for the New Morris Finishing Plant, reprint Metal Finishing Journal, Nov 1958.
 11. Carrier is the Answer to Your Finishing Problems, brochure 1930s
 12. Metro Cinema -Inaugural Programme (Carrier installation), Bombay, 8 June 1938.
 13. Carrier-Volkart, Times of India advertising, 1941.
 14. Reminiscences of W Hood, typescript on Marine Ventilation, covers from 1927 to 1970s.
 15. Paintpots to Robots in the Automotive Industry, Carrier Eng to Haden-MaClellan, typescript by JAEH, 1913-1988.
 16. Looking Back Over 43 Years, typescript JAEH 1929-1972.

CIBSE HERITAGE GROUP

ARCHIE HEARD COLLECTION BOX-2 B/W [77]

May 96

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17. A Personalised History of Carrier Eng Co Ltd, 1921-1985, typescript and handwritten notes by JAEH in ring binder. (A book draft of 10 chapters).
 18. Dr Willis H Carrier: The Man & His Message (Air Conditioning, A Century of Development), typescript by JAEH. (A book draft of 12 chapters spanning 1876-1981).
 19. Air-Conditioning Apparatus: Principles Governing Its Application and Operation, W H Carrier & F L Busey, ASME Paper 1341, 1911.
 20. Drysys: Automatic Spray Finishing Robot, brochure, Haden 1981.
 21. Carrier Painting and Drying Equipment, label; and Carrier Air Conditioning and Drying Equipment Patented, label.
 22. Carrier Corp HQ, Syracuse (3 postcards).
 23. Carrier Centrifugal Compressor: handwritten capacity and selection calculations from 1946.
 24. The Kaiser-I-Hind (newspaper), India Trade & Industry Supplement, No.3097, Bombay 18 May 1941 with front page advert for Carrier -Volkart Bros.

CIBSE HERITAGE GROUP

ARCHIE HEARD COLLECTION BOX-3 B/W [78]

May 96

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25. Dr Willis Carrier: The Man and his Message, JAEH book draft in 12 chapters (similar item 18), in ring folder.
 26. Air Conditioning in India, collection of JAEH notes and drawings in folder; experiences of 1930s.
 27. Air Conditioning of the BBC Television Centre, JAEH, JIHVE, Feb 1963.
 28. Recent Developments in the Application of Refrigeration to Air Conditioning, JAEH & N F Bradshaw, JIHVE, Feb 1961.
 29. Selection of a Single-Duct Induction System on the Basis of Comparative Operating Costs, JAEH, N F Bradshaw & A J Keble White, JIHVE, Oct 1960.

PHOTOGRAPHS

1. Centrifugal Machine, Aberfoyle Manf Co, Pa, c1926.
2. Centrifugal Machines, Wm F Schrafft & Sons, Boston, 1923.
(Ingels, p61).
3. ibid.
4. Centrifugal Machine, Palace Theatre, Dallas, Tx, 1924.
(Ingels, p65).
5. As 1.
6. As 1.
7. Carrier Installation, USA. 3-Temperature Recorders, Resistance System by Leeds & Northrup, Philadelphia. LH label refers to "Farmers Floor".

CARRIER CENTRIFUGAL PRODUCTION LINE, USA prob. c1925.

8. Assembly Bay.
9. Heat Exchanger Assembly.
10. Assembly of Heat Exchangers (condenser plus evaporator).
11. Heat Exchanger (expanding tubes?).
12. Impeller Casing, Bottom Half (5-stage machine).
13. ibid.
14. Assembled Machine.

CENTRIFUGAL TEST BED, UK FACTORY, prob. c1930.
Note English Electric motor and Drive-Coupling Base marked Carrier Engineering Company Ltd.

15. Test Bed.
 16. ibid.
 17. Drive Coupling Casing, cover removed.
 18. ibid.
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19. Centrifugal, Carlton Theatre, London c1930.
 20. Centrifugal, Lyons Corner House, Oxford St, London.
 21. ibid.
 22. ibid, Air Handling Plant,

PHOTOGRAPHS

BOUND FOLDER SHOWING INSTALLATION AT BBC LANGHAM PLACE, c1930.

23. Air Handling Plant with washer.
24. ibid with switchboard.
25. ibid, washer.
26. ibid, fan.
27. ibid, inside fan chamber.
28. ibid, fan belt drive (no guard).
29. Ducting/piping.
30. Carrier Control Panel. Gauge dials read lbs per sq inch compressed air controls:
Main Heater, Main Dampers, Air Dewpoint, Steam Preheater,
Minimum Heat, Minimum Dampers, Steam Minimum Heater
and Steam Main Heater; Centre is Negretti & Zambra multipoint
temperature indicator.
31. General view inside plantroom.
32. Exhaust fans?
33. Fan drives.
34. Builderswork Chamber.
35. Starter Control Panel.
36. Roof Exhaust Fans.
37. Roof Fans.
38. Centrifugal chiller.
39. ibid, with control board.
40. Water Tank.
41. Two Steam Boilers with Clyde oil-burners.
42. Pumps and Calorifier.
43. Piping Headers and Valve Stations.
44. Air Compressors and Receiver?
45. External Roof Plant.

PHOTOGRAPHS

BOUND FOLDER SHOWING DEVELOPMENT OF ABSORPTION CHILLERS
BY CARRIER UK with descriptions/notes by JAEH.

46. Lyons, Greenford, 150 TR, c1950.
47. Completed machine in factory, 150 TR.
48. Mars Slough, 150 TR.
49. Lyons, Greenford, 150 TR.
50. Production line, Wembley; Type 16JA Chillers.
51. James Pascall, Mitcham; 2-16 B5 machines, 1951.
52. Wembley factory, reaming end plates.
53. Carrier House plantroom. 16E 113 machine.
54. *ibid.*
55. Production line, 2 x 150 TR machines.
56. *ibid*, 1 x 150 TR machine.

Folder also contains documents:

57. Absorption Development, UK by JAEH.
 58. Historical Outline, JAEH.
 59. A New Development in Absorption Refrigeration,
A A Berestneff, Refig Eng, June 1949.
 60. Combination Centrifugal/Absorption May Save Dollars,
V Chun, HPAC, Mar 1961.
 61. Preliminary Information on the Absorption Machine,
Carrier technical notes, 6-12-1946.
 62. Listing of Absorption Machines manufactured in Britain.
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PHOTOGRAPHS

WARNER THEATRE, Leicester Sq, London.

63,64,65,66. Air Plant Rooms, Fans.

67,68. External view Theatre, c1938/9 (based on Film).

WRIGLEY FACTORY, London, c1926.

69. External view.

70,71, 72. Internal views.

73. Cambridge Theatre, London; Air Plant & Controls.

74. SS Victoria, Air Plant on Deck, 1930.

75. SS Victoria, Dining Saloon, c1930.

76. QE2 on sea trials, 1968.

CARRIER CORP, USA.

77. Training School, Group Photo, Class of 1929 (named),
with JAEH.

78. Group photo, employees. Willis Carrier in front row.
prob.1930s

79. ibid (different group), again with WHC.

80. County Hall, London, under construction 1929.

81. ibid.

82. BBC White City Television Centre, Studio-3, 1960.

83. Acton R&D, airflow tests (smoke trials) in spraybooth.

84. Bengal Council Chamber, Calcutta; Rerigeration Plant Room
prob. c1940.

85. ibid, showing fan.

86. Centrifual chiller installation, date/place unknown,
prob.1930s believed London marked MOA?).

Heritage items, originally from JAEH, amalgamated into this Collection.

PHOTOGRAPHS OF CARRIER INSTALLATIONS IN UK

- A. County Hall, Council Chamber, London, 1929.
- B. Cambridge Theatre, London, air plant, 1929.
- C. Broadcasting House, Langham Place, London, centrifugal c1930.
- D. Princes House Estate, London, centrifugal, mid-1930s.
- E. Courtaulds of Leigh, Bedford Mill, weaving shed, dampers c1940.
- F. J A Pattreieux Ltd, Tobacco Factory, dehumidifying plant, c1945.
- G. *ibid*, ductwork in factory.
- H. Sir Joseph Causton, Eastleigh, printing works, inside factory, 1942/5.
- I. *ibid*.
- J. ICI, Trafford Park, Manchester, penicillin plant incubator, 1942/5.
- K. Glaxo Laboratories, air conditioned cabinet for tableting pencillin, c1942/5.
- L. *ibid*.
- M. Burroughs Wellcome, Dartford, penicillin plant, 1942/5.
- N. *ibid*.
- O. English Sewing Cotton Co, Stanhill Ring Mill, c1950.
- P. Sladon Wood No.2 Mill, Rock Nook, c1950.
- Q. Gartside & Co, Waterside Mill, c1950.
- R. *ibid*.
- S. *ibid*, Rhodes No.1 Mill, Middleton, Lancs, c1950.

Later Additions

9. "The Weather Vein" (brochure Carrier USA), "Drying Number", (32pp, Oct 1921).
10. *ibid.* "The Chemical Number", (June 1921).
11. *ibid.* "Motion Picture Number", (Aug 1921).
12. *ibid.* "The Marcaroni Number", (Oct 1921).
13. *ibid.* "Piping Number", (Nov 1921).
14. *ibid.* (Feb 1922).
15. *ibid.* (Mar/Apr 1922).
16. *ibid.* (June 1922).
17. "First Principles of Manufactured Weather", (Carrier UK, c1925).
18. "The Carrier Humidifying System", Treatise 99, (Carrier UK, 26pp, 1920).
19. "Carrier Humidifying Apparatus and Control", Treatise 100, (Carrier UK, 36pp, 1920).
20. "The Carrier Ejector System for Drying Finishes", Treatise 112, (Carrier UK, 16pp, c1920).
21. "The Carrier Humidifying System", Treatise 99, (Carrier UK, 26pp, 1920).
22. "Introduction to the Carrier System of Air Conditioning System for British Textile Mills", Treatise 102, (Carrier UK, 14pp, 1920).
23. "Carrier Dehumidifying Equipment", Treatise 300, (Carrier UK, 64pp, 1920).
24. "Carrier Temperature and Humidity Control in the Textile Mill", Bulletin 103, (Carrier USA, 54pp, 1916: reissued UK).