

3.3 AIR CONDITIONING IN INDIA

This outline of CEC activities in India has been compiled from Archie Heard's notes and the various papers and drawings listed in Section 8 of the references. Many of the events are seen through his eyes as he worked in India from 1930 until 1946.

The first reference to CEC working in India is as early as 1922 [5/553]. A significant order was received from the Indian Government for a humidity control system for a black gunpowder fuse-loading factory at Kirkee, near Poona. [see US example, Manufactured Weather]. As a result, C G Hooper, the Chief Engineer for CEC, went out to India to supervise the installation.

He was an energetic man and sought out other applications of the Carrier humidity control system in India, and was not long in obtaining orders from the cotton industry. He was joined by a young graduate engineer sent out from London, A W Putnam. An office was set up in Bombay. Later, agents were appointed in Calcutta.

At first, working drawings were made in London, but more local work, including some manufacture was undertaken as the business expanded. Early work was providing humidification and air conditioning plants for cotton mills in the Ahmedabad region. This small CEC team went on to tackle sizeable contracts for the air conditioning of public buildings, firstly the New Delhi Legislative Building, then the Bombay Legislative Chamber, followed by the Legislative Chamber of Bengal in Calcutta.

Archie Heard, following his training at Carrier Corporation in the States in 1929, was posted to India, going first to Bombay and Calcutta, before being sent to New Delhi early in 1930 to help complete the design and installation of the Secretariat and Legislative Assembly buildings. This work led directly to a series of contracts for cinemas in New Delhi and Lahore, and Palaces in Rampur, Jodhpur and Jaipur.

Design calculations were largely based on rule-of-thumb, with some American data, all suitably modified as appropriate by local experience. Work fell into three types: evaporative cooling, cooling and humidity control with refrigeration, and cinemas. Cooling loads for the latter were based on 15 or 16 ft³/min per person and 0.067 TR per seat.

Simple heat gain calculations used average heat transfer coefficients for walls or roof, or took them from the Buffalo Forge Handbook "Fan Engineering" [originally compiled by Willis Carrier]. The procedures took account of solar radiation, though not of thermal storage effects, and allowed for both fan and pump gains. Refrigeration duty was generally established on the basis of "10% unavoidable fresh air coming into the mixing chamber." [8/486, 4]



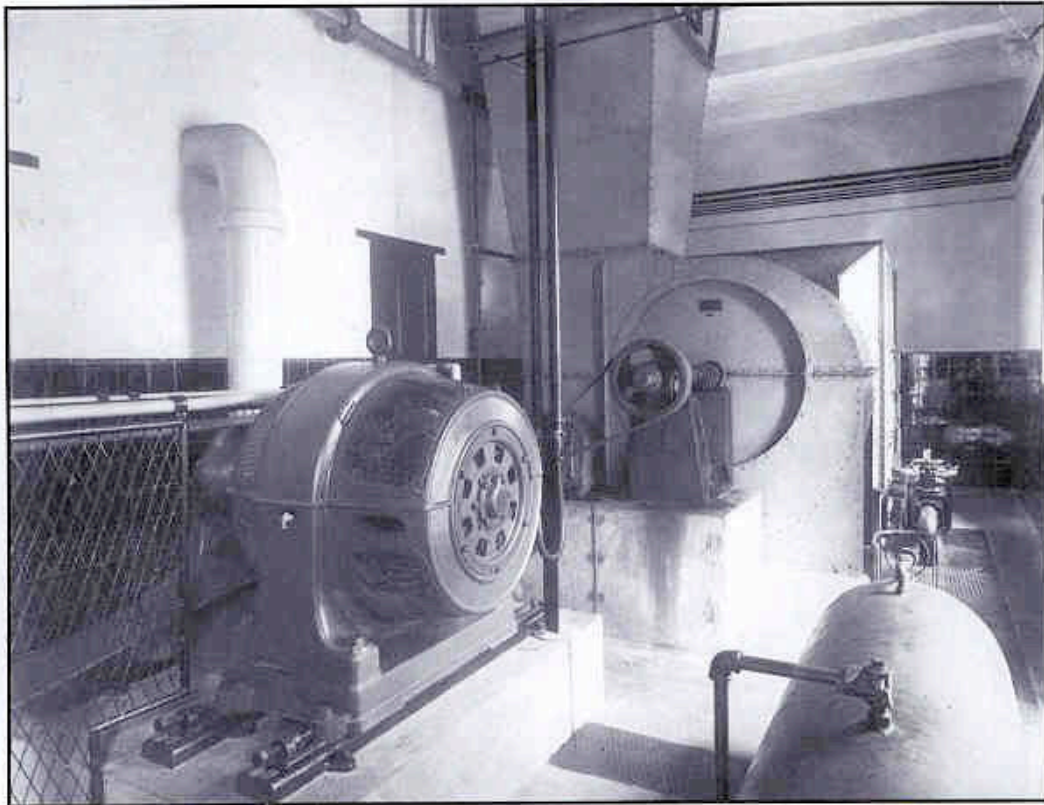
METRO CINEMA

JUNE 8th

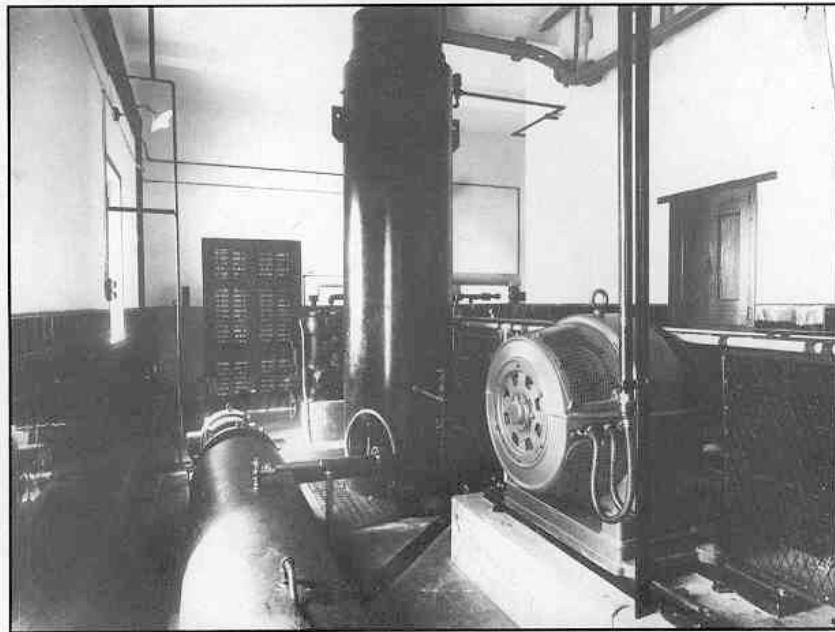
Inaugural Programme

1938

The Carrier air conditioned Metro Cinema, Bombay, 8 June 1938 [8/572].



Air conditioning plantroom, Bengal Council Chamber, Calcutta, c.1930 [P-668].



Refrigerating plant, Bengal Council Chamber, Calcutta, c.1930 [P-667].

Most equipment and materials were imported, including sheet metal ductwork [8/486,3]. Initially, ductwork, dampers and spray-washers were imported from Gardners of Dartford, but by the early 1930s were being made in India. To minimise on ductwork, most projects were designed to make extensive use of masonry shafts and chambers.

Originally, gilled air heaters were imported from the firm of Grouville et Arquebourg in France by arrangement with Rene Modiano of the CEC Paris office. From about 1925, CEC had arranged to have these copied and manufactured by Gardners of Dartford.

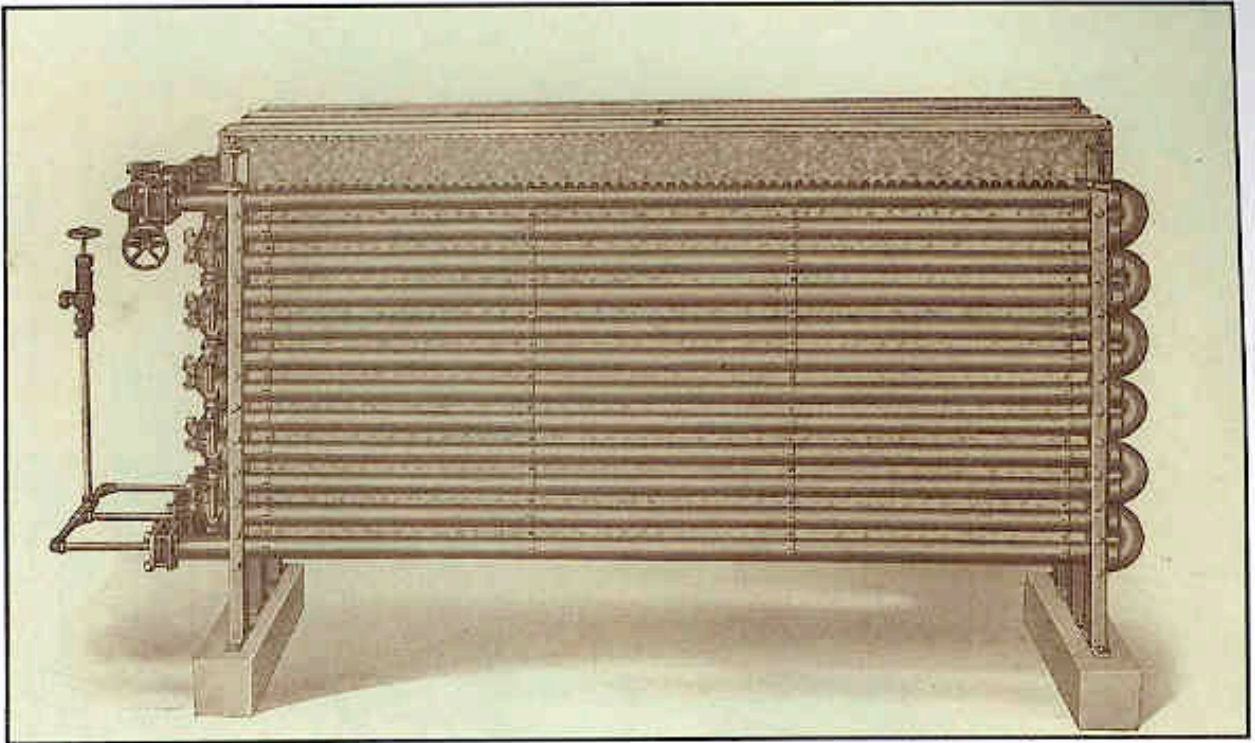
Centrifugal fans were purchased, with special design arrangements, from Keith Blackman. Centrifugal pumps initially came from Pulsometer, but later Holden & Brooke were favoured since they were willing to make modifications to suit specific design requirements. In the early 1920s, most electrical supplies were still direct current; dc motors were purchased from either Verity or Crompton, and used with Brookhirst starting gear. Later, ac motors came from BTH, Metropolitan-Vickers, or English Electric.

Refrigeration systems typically used Baudelot Coil evaporators for generating chilled water [the water running on the outside of the heat transfer surface in an open circuit]. Manufacturers included Le Bas Tube Company and J & E Hall. Condensers were tube-in-tube type, assembled in banks, usually 16 ft long and 12 pipes high [shell and tube condensers were not yet in common use]. Ammonia compressors were bought from York-Shipley in London and generally formed part of a package, including condensers and piping, with delivery and erection included. [At this time Carrier in the USA was using ammonia compressors purchased from York Corporation, USA]. In the early 1930s, when England came off the gold standard, CEC India started importing compressors, made by Vilter Manufacturing, direct from the States.

Erection was carried out by locally hired unskilled labour directed by short-term UK supervisors. These worked for a resident engineer who controlled a small staff of Indian draughtsmen.

The first palace to have full air conditioning, with ammonia refrigeration plant, was the Khasbagh Palace at Rampur. Archie Heard's experiences [8/486, 1] make for informative and amusing reading -the voyage through Suez to Bombay, the Blue Train to Calcutta, the mail train to Delhi, his first impressions of India and Rampur. Then there's the horse-drawn transport, the dust, the heat, the meeting with the Nawab (The Prince of Rampur) and the political intrigue [not your average air conditioning contract!].

The palace was built from scratch. The air conditioning had the inevitable huge masonry ducts. The elaborate interior decoration of the state rooms, with ornate plaster cornices, created special problems in the design of the air distribution outlets. The system used a chilled water spray washer, ammonia refrigeration (compressors by Vilter), steam heating coils, with pneumatic controls to achieve the well-tried Carrier dew-point method of operation.



Baudelot coil from a Carrier dehumidifier, 1920s [6/510, page 52].

FORTY YEARS OF AIR CONDITIONING PROGRESS INDIA FINDS NEW BENEFITS

TREMENDOUS AID TO INDUSTRIAL PRODUCTION

IN 1915 the Carrier Corporation was established, with Willis H. Carrier as its head. He had looked into the future and had seen air conditioning as a major

industry..... a vital function in the scheme of things
..... influencing life, business, and industry.....

(Continued on page 7)

CARRIER AIR-CONDITIONING

THE KEY TO BIGGER
PRODUCTION AND BETTER

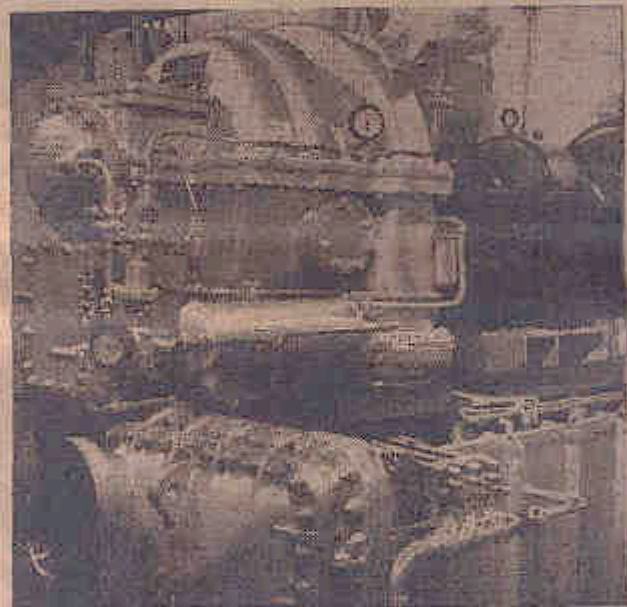
LIVING IN INDIA

Typical CARRIER Installations

A. I. E., Bombay, Calcutta, Delhi, Madras.
GRAMOPHONE CO., Dum Dum.
TOBACCO MANUFACTURERS, Bombay, Chuala.
H. E. & FUSE FACTORIES, Kirkee.
GANESH FLOUR MILLS, Cawnpore, Delhi, Lyallpur.
H. J. FOSTER & CO., Bombay.
TATA SONS, Bombay, Calcutta, Jambhedpur.
COUNCIL CHAMBERS, Bombay, Calcutta, Delhi.
AIR FORCES INDIA, Lahore, Ambala, Peshawar.
L. W. HOSPITALS, Lahore, Jaipur.
KODAK LTD., Bombay, Lahore, Madras.
FILM STUDIOS, Bombay, Poona, Madras.

and

MORE THAN 100 COTTON MILLS



Carrier Centrifugal Compressor as installed in Metro Cinema, Bombay.

CARRIER AIR-CONDITIONING
HAS BEEN INSTALLED IN OVER 500 OFFICES
AND HOMES IN BOMBAY AND CALCUTTA
ALONE

BY

Volkart Brothers

Bombay, Calcutta, Madras, Karachi, Lahore



Carrier advertisement with list of projects, The Kaiser-I-Hind newspaper, Bombay, India Trade & Industry Supplement No.3097, Vol.LX, 18 May 1941 [8/560, front page].

Mr. WEATHERMAKER

THE PIONEER



WAY BACK IN '02...

Sure was warm going in them days, especially in the dust. Then our outfit rented up them Carrier gadgets—'02 it was. And the folk at Bangalore for CARRIER'S cool air—got the heat, the dust, the dang fire.

UNIT room conditioner is blessing many an office and home in India now—Your's too? Just dial for service.

Weathermaker's back again, getting his right CARRIER Room Air Conditioner and their convenient, accurate, 1700 air-conditioning still tops. First owners in 1902, technical refinements kept them ahead. That's why they put the Carrier cooling plant in R.M.S. "Queen Mary", and Jeta, BEST and Maru in Bombay. And their

Carrier
Air Conditioner

Improved Standard Model True Air Conditioning at Low Cost.

VOLKART BROTHERS
THE SOLE IMPORTERS FOR INDIA
Bombay, Calcutta, Lahore, Karachi, Cochin, Madras, Secunderabad.

The Pioneer, 17 February.

Mr. WEATHERMAKER

THE SCOT



Lest Pennies Gang Aglee

They all say I must come from Aberdeen, but I just hate using things, that's all especially sleep, comfort, health. That's why I keep a Carrier at home. And what's wrong with watching pennies? It's the best bar-r-r-gain I ever str-r-uck.

Scot or no, Weathermaker makes good sense again. Carrier Room Air Conditioning definitely cuts down other bills. No more colds in working hours, no sick leaves, and pennies saved in sleep and

quiet hot up to pounds of daily health and fitness. Carrier home and office units tall at a third of that new car, and run on a few annas a day for ten years. Over 200 Bombay Scots are sticking to their cool Carrier bargains now.

Carrier
Air Conditioner

VOLKART BROTHERS
THE SOLE IMPORTERS FOR INDIA
Bombay, Calcutta, Lahore, Karachi, Cochin, Madras, Secunderabad.

The Scot, 11 March

Mr. WEATHERMAKER

BURRA SAHIB



I Want Results!..

There's no room for slackers in this office. I want still bigger returns from a still smaller staff. Unreasonable? Not a bit of it! Because I've put in Carriers to keep you in Condition. From now on you'll work flat out, in top gear, without knowing it—in hill station air...

Just like a B.S. that. Still, we think Weathermaker's pretty right. With Carrier plant in the office you don't feel what work is, because you're always

in cool, clean air, shut off dust, germs, smoke and noise—fresh as ever, every day, till the shutters come down. The new Carrier Room Units, with extra modern features, are ten-year investments in real comfort.

Carrier
Air Conditioner

VOLKART BROTHERS
THE SOLE IMPORTERS FOR INDIA
Bombay, Calcutta, Lahore, Karachi, Cochin, Madras, Secunderabad.

Burra Sahib, 25 March

Mr. WEATHERMAKER

THE DOCTOR



Presents A Clean Bill Of Health

Nothing wrong with you, old boy, your system's like a bell. All it needs is real rest and sound sleep... I know you can't take leave, just now, just leave it to me. I prescribe one unit of Carrier A.C. Sleep on that dose every night, then see how fiddle-fit you'll feel.

Weathermaker's no M.D., but right he is again. Carrier Unit Room Air Conditioning cuts out pollen, dust, germs—takes the nosebugs off hay fever—switches on cool, clean, silent air. And the new models bring cooling control, smoke extraction, adjusted fresh air, inexpensive too—ten years' family service at Rs. 15/- a month—just a sound investment in good health.

Carrier
Air Conditioner

VOLKART BROTHERS
THE SOLE IMPORTERS FOR INDIA
Bombay, Calcutta, Lahore, Karachi, Cochin, Madras, Secunderabad.

The Doctor, 5 November

Mr Weathermaker advertisements by Volkart Brothers, "Times of India," 1941 [8/573].

As the magnificence of the work increased, so did the difficulties in being paid. When Archie Heard pressed His Highness for a 68,000 rupee interim payment, he was pleasantly surprised to be told to present himself at the Treasury at 9.00 am the following morning. There was a catch. He was told that payment could only be made in the smallest coinage and that he would have to weigh it out himself! Archie duly complied and finished up with 68 sacks each holding (more or less) 1000 silver rupees, weighing 15 cwt, or three-quarters of a ton. Now came a bigger problem -how to bank this money? To cut a long story short, with the help of his local supervisor and four coolies, Archie purchased an old bus, loaded the money and drove 40 miles to Morababad to find the English Bank closed. He located the bank manager playing tennis, persuaded him to deposit the money in the safes, uncounted, before settling for a bath and a whisky and soda. It took two days to count the money.

On another occasion, Archie went to Delhi for a long weekend, missing the Royal summons to make up a four at bridge. For this, he was relegated to the back of the procession which regularly made a site inspection, and dropped from the Nawab's lunch party. Eventually all was forgiven. For the official opening His Highness unlocked the doors with a gold key and was hit by a rush of cold air. The air conditioning had been working overtime in a closed building with, in error, no plenum (pressure) relief, in anticipation of this great event. It is recorded the Prince turned to his guests with a pleased smile and said "There, you see! Air Conditioned."

In the mid-1930s, CEC in London decided to concentrate on the UK market, and made arrangements to transfer their operations in India to US Carrier. Archie Heard became responsible for setting up Volkart Brothers as the Carrier Corporation agent for India, for completing outstanding CEC work, and then supervising the air conditioning contracts being taken on by Volkart.

Archie Heard found himself in India at the outbreak of war. Initially commissioned into the Royal Engineers at Lahore he was later transferred to GHQ where he served General Auchinleck as a GSO1 responsible for counter-propaganda; he was promoted to Lt-Colonel, before finally returning to CEC London in 1946.