COOL as a... Customer in a G-E Air Conditioned Theatre

HVAC in Early Theatres & Cinemas
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Programme
Showing Today – Continuous Performances

Prologue
1. Nineteenth Century Theatres
2. Early Twentieth Century Theatres

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4. Early Twentieth Century British Cinemas

References & Curtain
Progress was the addition of sound to movies and the installation of air conditioning in movie theatres


Billings in his book of 1896 observed that as a rule, theatres have insufficient and unsatisfactory arrangements for ventilation and invariably become overheated when the audience is large. This situation was made worse by the wide scale introduction of gas lighting which added both noxious fumes and even more heat. Billings quotes tests taken during 1899-90 in a number of Manchester theatres: the Comedy, Theatre Royal and the Princes. In the Circles, temperatures in the range 90-95 F were typical when the outdoor temperature was in the 30s; in the Galleries it was even worse and as high as 116 F was noted. In addition, staggering levels of CO₂, organic matter and microorganisms were detected. Mechanical ventilation, often aided by exhaust systems utilising the rising hot air from gas chandeliers was introduced from mid-Victorian times, while near the close of the 19th century saw a few attempts to lower auditorium temperatures using ice-block cooling or evaporative water sprays.

The early silent cinemas experienced similar problems regarding lack of ventilation. By 1915, a number of Health Authorities had introduced regulations stipulating minimum fresh air quantities, typically 25 ft³/min per person. Another problem, in the warmer states of the USA, was that in summer the heat and smell of the crowd, to say nothing of the humidity, became unbearable. The only answer at the time was to close in summer months. One attempted solution, widely adopted, was the installation of powerful roof fans but (for cheapness) without a separate fresh air intake, relying on open doors for bringing in make-up air. These were an improvement, but not particularly effective. Gail Cooper records that one of the most active companies in this field was the Typhoon Fan Company of New York, equipping some 1500 cinemas by 1923. An alternative solution was the introduction of the “air-dome” cinema, built outdoors and without a roof, typically showing films in the late evening.
In 1911, Walter Fleisher, used a spray air washer system to lower temperature in the Folies Bergere Theatre in New York. Later, this idea caught on and between 1925 and 1930, the United States Air Conditioning Corporation of Minneapolis installed some 8000 central-station evaporative cooling systems, many in theatres.

However, to a number of people it was apparent that using mechanical refrigeration was the only real solution. Ammonia systems were in common use at this time but the toxicity of ammonia was judged an unacceptable risk around large audiences. The way forward was promoted by a Chicago engineer, Fred Wittenmeier, chief engineer for the Kroschell Brothers Ice Machinery Company from 1897 until 1917 at which time he founded the Wittenmeier Machinery Company. He refined CO₂ machines and designed an air conditioner where direct-expansion cooling coils were placed within the spray chamber of the washer itself. One story is that it was Barney Balaban (part owner of the cinema chain of Balaban & Katz) who conceived the idea of adapting refrigeration to air cooling for his new theatre, the Central Park Theatre in Chicago, opened in 1917. This proved so successful it became a standard feature in their chain: Rivoli (1919), Tivoli (1921) and Chicago (1921). However, the method of supplying cold air through mushroom ventilators beneath seats led to complaints of draughts.

Meanwhile, Carrier Corporation sought their own solution to air distribution in cinemas and for their 1921 installation in Grauman’s Metropolitan Theatre in Los Angeles they introduced supply at ceiling level (this became known as the “upside-down” system). Another innovation by Logan Lewis was the provision a return air bypass control arrangement which made a considerable reduction in the cooling load. Lewis patented the arrangement but after some 300 installations it was discovered that Carrier had infringed upon an earlier patent by Walter Fleisher. However, in 1927, Carrier and Fleisher pooled their patents to form the Auditorium Conditioning Corporation. York Ice Machinery Corporation challenged these patents in court but lost. It is said that by 1946 the Auditorium Conditioning Corp had licensed an estimated 90% of the comfort installations in the USA.

The years from around 1913 to the mid-1930s are generally regarded as the “Golden Age of the Movie Palace.” Cinema chains and architects strove to outdo one another in size and grandeur. Themes included Baroque, Spanish, Moorish, Egyptian and Chinese, while a special design was the “atmospheric” where the audience was surrounded by decorative building facades while above was a ceiling resembling the night sky, complete with twinkling stars. All this was spurred on the introduction of the “talkies” in 1927.
Meanwhile, in 1922, Willis Carrier had designed and built the refrigeration machine that would revolutionise the air conditioning industry—the centrifugal water chiller.

The first centrifugal installation in a cinema was made in 1924 at the Palace Theatre in Dallas, shortly followed at the Texan and Iris in Houston, where a single centrifugal served both. The breakthrough came with a number of New York installations of centrifugal chillers: the Rivoli, (1925), the Paramount (1926) and the giant 6000-seat Roxy (1927).

It is said that the comfort air conditioning business for cinemas was the factor that enabled Carrier Corp to weather the Depression. By 1938, an estimated 15,000 of the 16,251 cinemas in operation in the USA were equipped with air conditioning.

The first British cinema with cooling (a washer system by Carrier without refrigeration) appears to have been George Coles’ 2768-seat Broadway at Stratford in East London, opened in 1927. Carrier Engineering Company Ltd (50% British owned) was established in 1921. Having access to the American company’s centrifugal chiller gave them a unique advantage in the cinema air conditioning market. The first to be fully air conditioned was the Carlton Theatre in London’s Haymarket (1927). Others followed, including the Empire, Leicester Square (1928), and the Paramounts in Manchester (1930), Leeds (1932) and Liverpool (1932). However, the majority of British cinemas relied on ventilation systems, equipped with air washers, but without refrigeration. A leading contractor at this period, who installed a number of such systems using their “patented air distribution” system (details unknown), was J Jeffreys & Company Ltd of London. A large number of British cinemas had supplementary heating provided by low pressure hot water radiator systems.