



1898: Auditorium Building, Chicago. Part Auditorium, part Hotel, 10 floors, 270 ft tower.  
In 1907, Hotel became the Congress Hotel, 1000 rooms, air conditioned by Kroeschell,  
140 TR, CO<sub>2</sub> refrigeration, early dual-duct system (diagram on page 44).

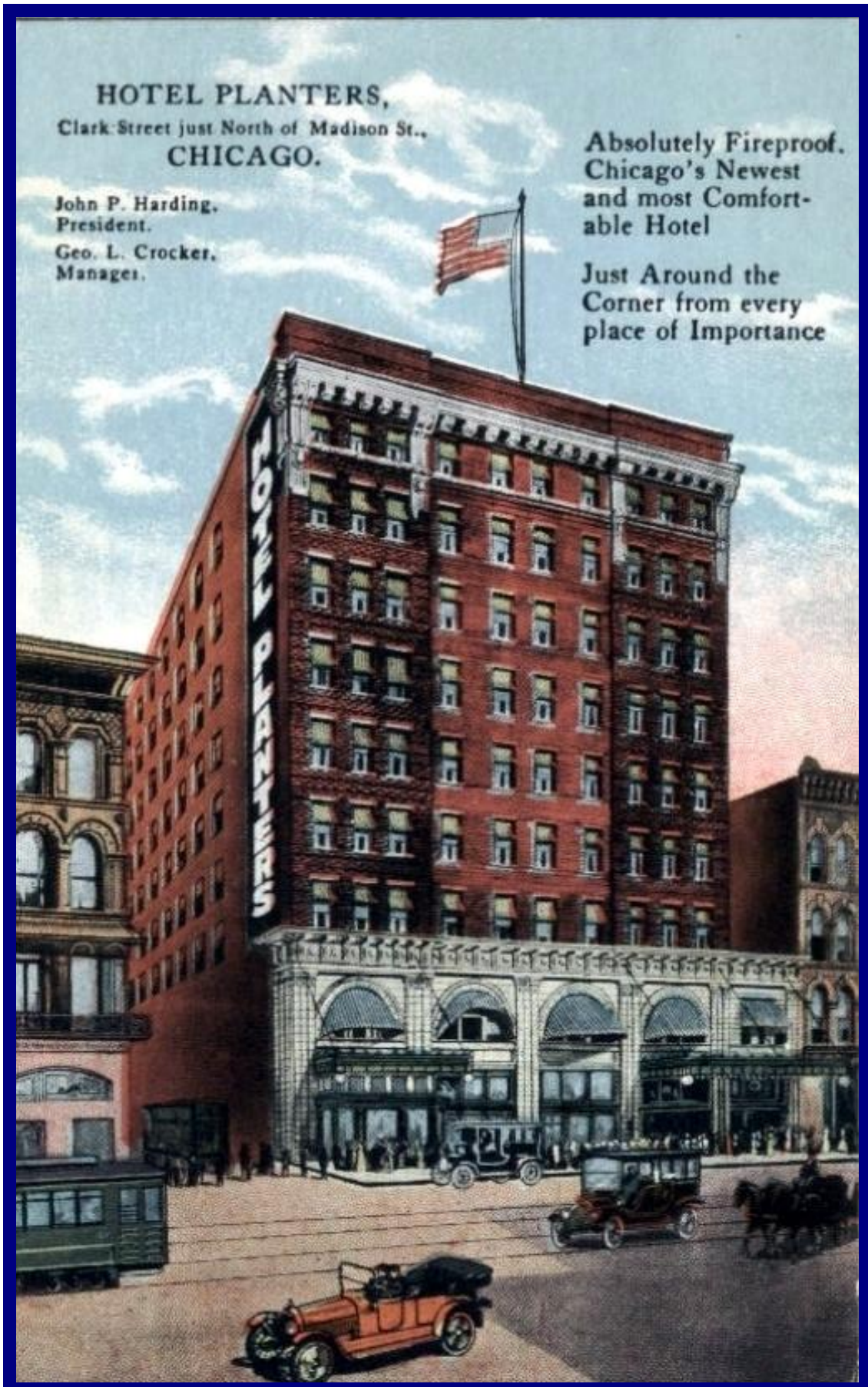
# **HISTORIC GRAND HOTELS**

## **A MACHINE FOR LIVING IN**

### **PART THREE NORTH AMERICA & ENGLAND**

**BRIAN ROBERTS**

## HOTEL PLANTERS, CHICAGO



Air conditioned by Wittenmeier (Ingels p.137).



# CONTENTS



The Congress Hotel, Chicago (for details of the air conditioning see p.10-11).

The word **hotel** is derived from the French **hôtel** (coming from the same origin as hospital), which referred to a French version of a building seeing frequent visitors, and providing care, rather than a place offering accommodation. Before hotels, mid-18th century, England was crisscrossed with coach routes, and hundreds of **coaching inns** were spread out at seven to ten mile stages across the land. The coach stopped at the end of each stage to change horses. The inn served the needs of travellers, for food, drink, rest or accommodation.

## EXAMPLES OF ENGLISH COACHING INNS

The George, Southwark, London: 4, The Mermaid, Rye: 4,  
The Talbot Inn, Ripley: 5, The Old Crown Coaching Inn, Farringdon: 5:

## HOTELS IN NORTH AMERICA BY LOCATION

Banff: 29, Boston: 16, Chicago: 1-3,10,14,17,44, Detroit: 32, Kansas City: 12,  
Minneapolis: 8,26, Milwaukee: 26, New Bedford: 9, New York: 22, Philadelphia: 20,  
Quebec: 30, San Diego Bay: 24, Washington: 34, Wenatchee: 28

## HOTELS IN ENGLAND BY LOCATION

Liverpool: 40, London: 36,39,41, Manchester: 38

## REFRIGERATION ADVERTISEMENTS

Kroeschell Bros. Ice Machine: 6, Wittenmeier Machine: 7

<4>

## **THE GEORGE INN, SOUTHWARK, 17C**



## **MERMAID INN, RYE, SUSSEX, Rebuilt 1420**





<5>

## TALBOT INN, RIPLEY, SURREY, 1453



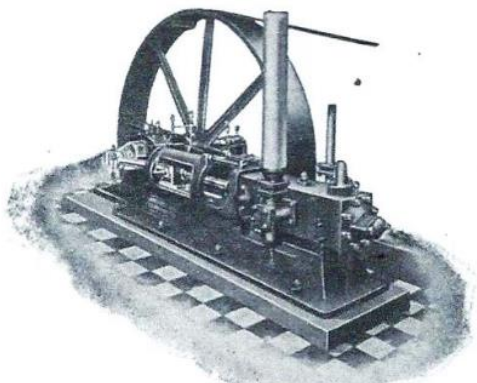
## OLD CROWN, FARRINGTON, OXON, 14C





# KROESCHELL BROS. ICE MACHINE CO.

**KROESCHELL**  
CARBONIC ANHYDRIDE SYSTEM



Catalog And Information On Request

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SAFE  
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—  
EFFICIENT

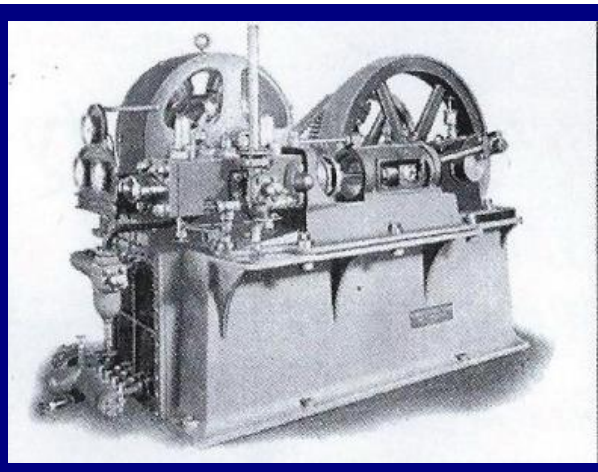
FOR  
ICE MAKING  
AND  
REFRIGERATION

## THE KROESCHELL BROS ICE MACHINE COMPANY

In 1896, Frederick Wittenmeier joined Kroeschell Bros who, at the time, were in the boiler manufacturing and steam-fitting business. .

It was in Chicago that carbon dioxide refrigeration was developed by Wittenmeier and the Kroeschell Bros using patents purchased from the Hungarian Julius Sedlacek. Wittenmeier experimented with CO<sub>2</sub> ice machines and this developed into a successful business leading to the formation of the Kroeschell Bros Ice Machinery Company in 1897 with Wittenmeier as Chief Engineer, leading in turn to the application of air conditioning for movie theatres.

“At that time (1900) the carbonic machine was commercially unknown in this country (USA) and much of the credit for its successful development to the present time must be given to him (Wittenmeier).”



## The Carbonic Anhydride System of Refrigeration

GIVES THE BEST ECONOMY AND EFFICIENCY WITH SAFETY IN OPERATION

**No Odor      No Explosions**

OUR MARINE AND LAND TYPE MACHINES OPERATING IN HUNDREDS OF PLANTS GIVE BEST RESULTS EVER OBTAINED. ~ ~ ~

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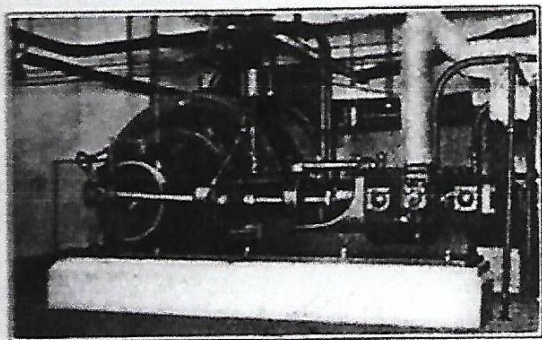
Write for Catalog



# THE WITTENMEIER MACHINE COMPANY

## Ventilation

Complete Air Conditioning Installations  
Cooling—Refrigerating—Washing



*Wittenmeier Horizontal Compressor CO<sub>2</sub>*

### *A Few Representative Installations*

CAPITOL THEATRE, New York, N. Y.  
WARNER BROS. THEATRE, New York, N. Y.  
KEITH'S FORDHAM, New York, N. Y.  
LDEW'S NEW ROCHELLE, New Rochelle, N. Y.  
FOX ACADEMY OF MUSIC, New York, N. Y.  
UNITED ARTISTS THEATRE, Los Angeles, Calif.  
METROPOLITAN THEATRE, Boston, Mass.  
PYTHIAN TEMPLE, New York, N. Y.  
ELKS CLUB, Union Hill, N. J.  
MASONIC TEMPLE, Kansas City, Mo.  
ILLINOIS ATHLETIC CLUB, Chicago, Ill.  
UNION LEAGUE CLUB, Chicago, Ill.  
N. Y. COUNTY COURT HOUSE, New York, N. Y.  
FEDERAL RESERVE BANK, Chicago, Ill.  
U. S. NAVAL HOSPITALS, San Diego, Calif.  
CONCOURSE PLAZA APTS., New York, N. Y.  
RALEIGH APTS., New York, N. Y.  
WEYLIN HOTEL, New York, N. Y.  
MONTAUK POINT HOTEL, Montauk Point, N. Y.  
RITZ-CARLTON HOTEL, Boston, Mass.  
NEW BEDFORD HOTEL, New Bedford, Mass.  
AMBASSADOR HOTEL, Chicago, Ill.  
WINDERMERE HOTEL, Chicago, Ill.  
AUGUSTINIAN FATHERS, Staten Island, N. Y.  
BOARD OF EDUCATION, Chicago, Ill.  
N. Y. TELEPHONE COMPANY, New York, N. Y.  
NATIONAL CITY BANK, New York, N. Y.  
WRIGLEY BUILDING, Chicago, Ill.  
TRIBUNE BUILDING, Chicago, Ill.  
KINGS COUNTY HOSPITAL, Brooklyn, N. Y.  
CITY OF NEW YORK NURSES' HOME, Welfare Island, N. Y.  
NORTH COMMUNITY HOSPITAL, Glen Cove, N. Y.  
MICHIGAN CHILDREN'S HOSPITAL, Detroit, Mich.  
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NORTHERN PACIFIC HOSPITAL, St. Paul, Minn.  
LUCKEY PLATT DEPT. STORE, Poughkeepsie, N. Y.  
HORNE DEPT. STORE, Pittsburgh, Pa.  
CURTISS CANDY CO., Chicago, Ill.  
ALBERT PICK & CO., Chicago, Ill.  
TRIANON BALLROOM, Chicago, Ill.

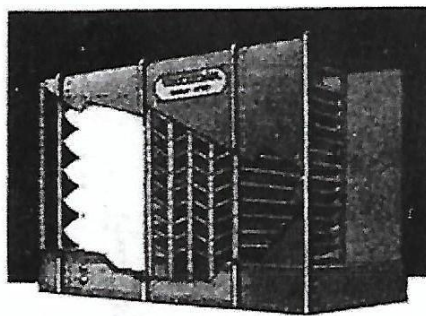
WHEREVER comfort and efficiency require cooled or refrigerated air, Wittenmeier-Vitolyzed-Air equipment delivers it.

In hundreds of theatres, hotels, clubs, restaurants, apartment houses, schools, hospitals, and industrial plants our installations give perfect service.

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*Air washer and eliminator as installed by Wittenmeier-Vitolyzed-Air*

*One Contract---One Responsibility*

# WITTENMEIER—VITOLYZED—AIR

1926 BROADWAY—NEW YORK CITY



## ROGERS HOTEL, MINNEAPOLIS



Built c.1886: 5 floors. Wittenmeier "Air Cooling Apparatus", after 1911 (Ingels p.137).



# NEW BEDFORD HOTEL, MASSACHUSETTS



Provided with Wittenmeier "Air Cooling Apparatus", after 1911.  
(1927 advertisement), (picture c.late 1930's).



<10>

## CONGRESS HOTEL, CHICAGO



Built 1893, expanded 1902 & 1907, 871 rooms.  
Kroeschell CO<sub>2</sub> cooling plant 140 TR, for Pompeian Room,



## CONGRESS HOTEL, CHICAGO

The cooling plant was designed not only to provide cooling but humidifying and dehumidifying as well. It was made of two large chambers with a large centrifugal blower (fan) between them sited in the basement beneath the Pompeian Room. The reason for the unusual configuration was, that Wittenmeier added his cooling system to the hot blast system that already had an air washer (see Figure 3.13). Air was drawn into the first chamber, which comprised, in order, preheating coils, a spray chamber, eliminators, and then tempering coils (reheaters) before the air was drawn into the fan suction. Air leaving the fan opened into two paths, one through heating coils and the other through a cooling chamber with a bank of direct expansion cooling coils. The total length of the cooling coils was 3850 ft of heavy duty 1¼ in. pipe; water was sprayed over the pipe coils to improve heat transfer and prevent ice forming.<sup>49</sup> Air discharged from the cooling coils passed through eliminators and entered into what was described as a *humidifier*, but was in fact a *dehumidifier*, a simple pan filled with calcium chloride and intended to dry the air, not add moisture.<sup>50</sup>

The heated and cooled air streams then passed through dampers into a single stream of air, temperature controlled by the action of the dampers, an example of an early dual-duct arrangement. Cooling was provided by a 140-ton CO<sub>2</sub> refrigeration machine built by the Kroeschell Ice Machine Co.<sup>51</sup> The plant was installed during the spring of 1907 and completed in time to demonstrate its effectiveness during the extreme hot days in July and August.<sup>52</sup>

Wittenmeier, commenting on the design of the air cooling systems some 15 years later, said he conceived the idea of using the CO<sub>2</sub> direct expansion system for cooling the air, in connection with the ventilating system, by placing the cooling coils in the air washer spray chamber. The diagram, shown in Figure 3.13, shows the cooling plant added to what was otherwise a conventional hot blast system. The success of the installation was demonstrated by an announcement by the hotel management to install a sim-

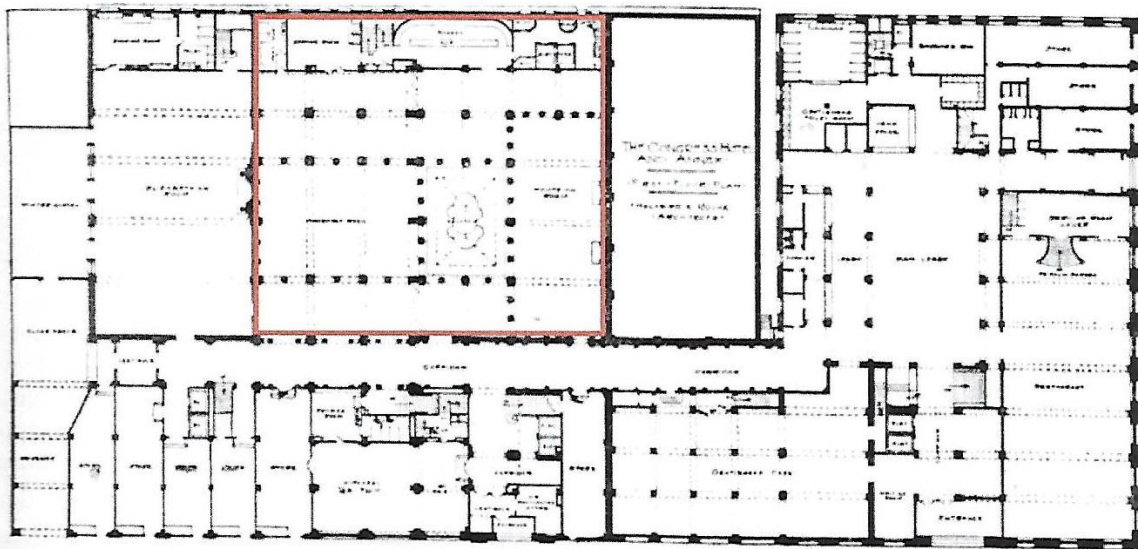


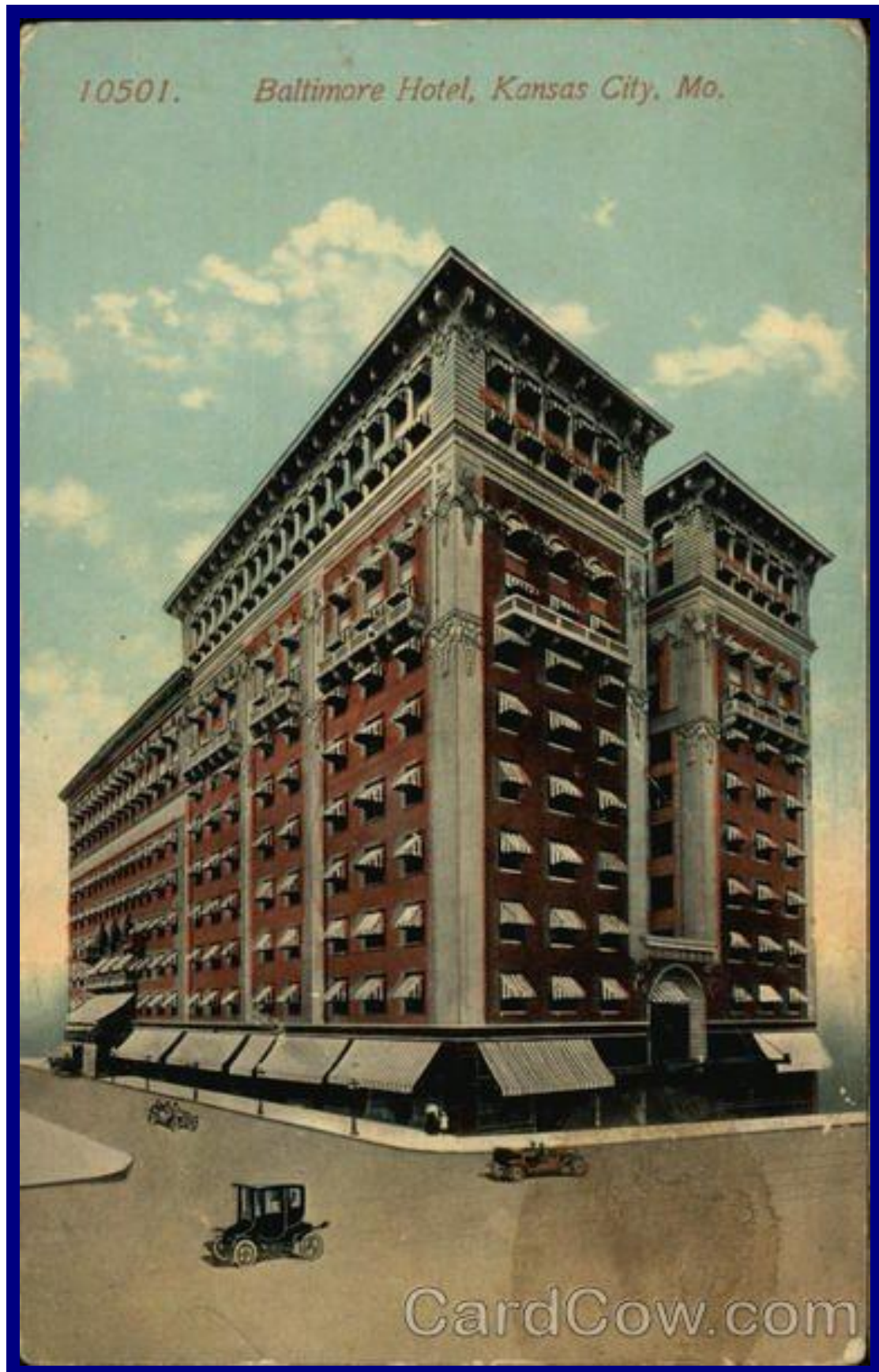
FIGURE 3.12 GROUND FLOOR PLAN, CONGRESS HOTEL<sup>47</sup>

The Kroeschell air conditioning system (from Arnold p.43).



<12>

## BALTIMORE HOTEL, KANSAS CITY



Air conditioned by Carrier with mechanical refrigeration (Ingels p.49).



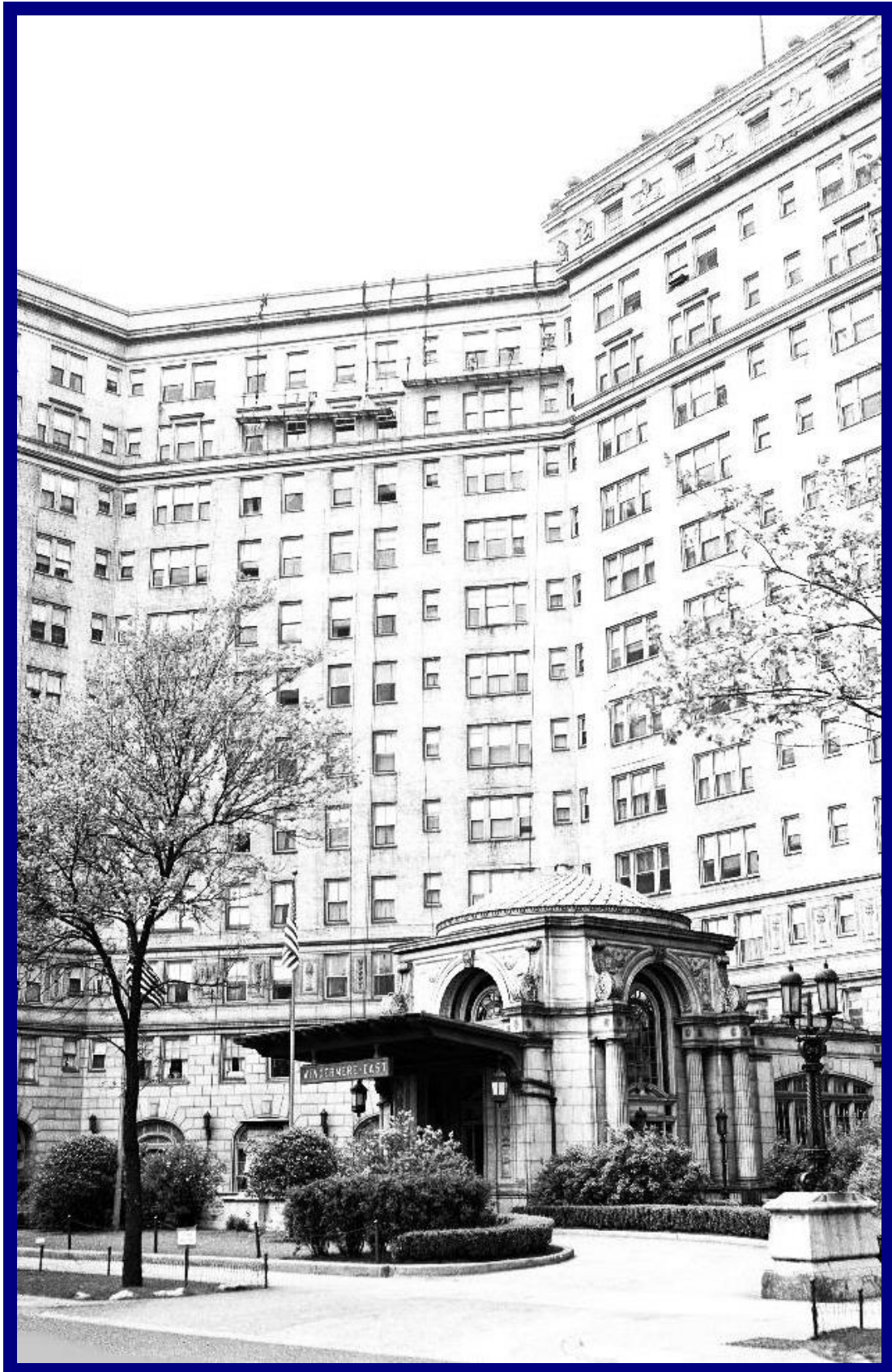
## MUEHLEBACH HOTEL, KANSAS CITY



1914: 144 ft, 12 floors,  
Air conditioned by Carrier with mechanical refrigeration (Ingels p.49).



## WINDERMERE HOTEL, CHICAGO



1892, rebuilt 1924, 12 floors, 482 rooms, 200 apartments.  
Air conditioned by Wittenmeier (1927 advertisement).



<15>

## AMBASSADOR HOTEL, CHICAGO



1926: 17 floors, 285 rooms.  
Air conditioned by Wittenmeier (1927 advertisement).



<16>

## RITZ-CARLTON HOTEL, BOSTON



1927: 201 ft, 18 floors, 200 rooms.  
Air conditioned by Wittenmeier (1927 advertisement).



<17>

## BLACKSTONE HOTEL, CHICAGO



1910: 290 ft, 21 floors, air conditioning by Wittenmeier (Ingels p.137).



# BLACKSTONE HOTEL, CHICAGO

## THE BLACKSTONE HOTEL, CHICAGO

Perhaps as a result of his success at the Congress Hotel, Wittenmeier was asked to design and supervise the cooling systems in addition to the entire refrigerating plant for the Blackstone Hotel,<sup>55</sup> the latest high-class hotel being constructed in Chicago in 1909. The refrigeration system served nearly 40 refrigerators, chilled from the central brine system, producing 8 tons of ice per day. Vacuum flasks were filled with chilled drinking water and delivered to every room daily. “Three air washers ... cleanse the atmosphere as it enters the building (an indictment against Chicago’s murky downtown atmosphere is secured in the muddy water which spatters down from the air washers).”<sup>56</sup> To top it all off, The Blackstone had plans for a rooftop airship station to be called “Drome No. 1.” The “aviation station on the roof” was claimed to be the “first droming station to be erected on any hotel or other building anywhere in the world” and would be big enough for four airships, housing stalls, and a repair shop. The manager said it was “not a whim nor advertisement” for the newly-opened hotel.<sup>57</sup>

Days before the hotel was due to be opened to the public on April 03, 1910, the new assistant manager, Paul Gores, who had been enticed from the Auditorium Hotel (before it was called The Congress) invited the press to preview the novel features. He somewhat ostentatiously arrived by airship, with a colleague that landed somewhat unceremoniously, not at a drome station, but on a bed of gravel on the roof of the hotel, from where his party was then shown the hotel and eventually the refrigeration plant in the basement.<sup>58</sup> The plant included two CO<sub>2</sub> compressors: one a 50-ton machine and the other a 75-ton machine driven by Corliss steam engines operating at 150 pounds of pressure. The machines chilled two brine storage tanks from which brine was circulated to the 50 or so refrigerators in the building by three steam-driven pumps—two lower-pressure pumps for the lower floors and one serving the higher floors.

The air cooling system designed by Wittenmeier was in three separate units. “One to cool the main restaurant or “American Beauty Room” on the lobby floor; one to cool the banquet hall on the floor above and one to cool the cafe, grill room and barber shop on first or club floor.” Perhaps by mistake, an article in the October 1910 *Ice and Refrigeration* illustrated journal described the system at this hotel as “similar to” that installed in the Congress Hotel and included the same photograph of the piping to the air cooler that was already used in a previous article.<sup>59</sup>

Wittenmeier had developed his own air cooler design and patented what he described as an “Air Cooling Apparatus” in April 1911.<sup>60</sup> It was probably type of unit he installed at the Blackstone Hotel and subsequently at Chicago’s Hotel Planters and Minneapolis’ Rogers Hotel.<sup>61</sup> The apparatus shown in the patent

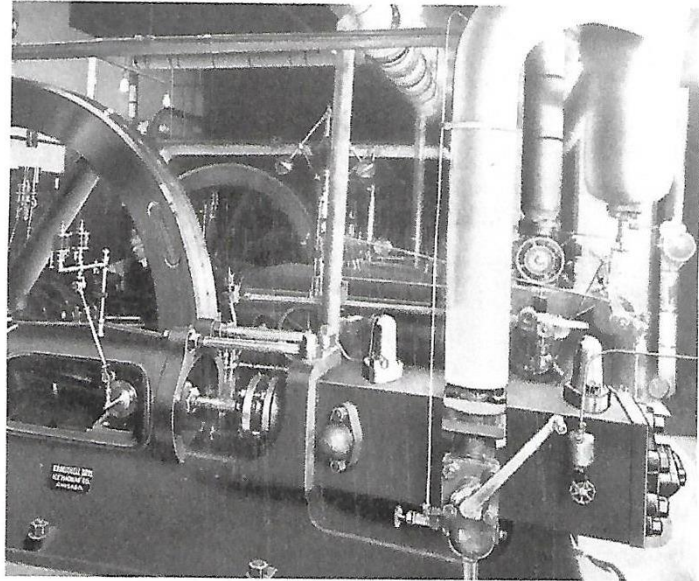
(From Arnold p.44).



# BLACKSTONE HOTEL, CHICAGO

application was simpler than those installed at the Congress Hotel, a rectangular box housing with refrigeration pipe coils beneath water spray pipes. It was divided into two compartments vertically with a water pan at the bottom. Air flowed into one compartment and water was sprayed over the coils preventing frost forming on the coils. Humid air then passed to the other compartment through which it is dried and cooled. A disadvantage was that it required manual intervention on a daily basis, when frost built up on the coils in the second compartment, after around 24 hours the direction of air had to be reversed to defrost the coils. The patent didn't include tempering coils or spray eliminators, just surface coolers in an air washer intended to be connected to a fan to provide "air-cooling and humidifying."

Wittenmeier wasn't alone in pursuing surface cooling combined with air washers. Abram Feldman, a consulting engineer in New York had also designed a mechanical cooling system with an air washer and surface cooling for a combined ventilating, heating and cooling plant in a bank office building.<sup>63</sup> He used surface cooling coils but circulated brine through them rather than liquid refrigerant as Wittenmeier had done at the Congress Hotel. One reason was there was not enough space to accommodate the size of ammonia refrigeration machine he considered necessary, so he installed a brine storage tank that could be charged with chilled brine overnight. This effectively halved the size of refrigeration machine by operating 24 hours a day, when necessary, to store half the cooling overnight for the next day.



**FIGURE 3.14** CO<sub>2</sub> COMPRESSORS, BLACKSTONE HOTEL<sup>62</sup>

(From Arnold p.45).



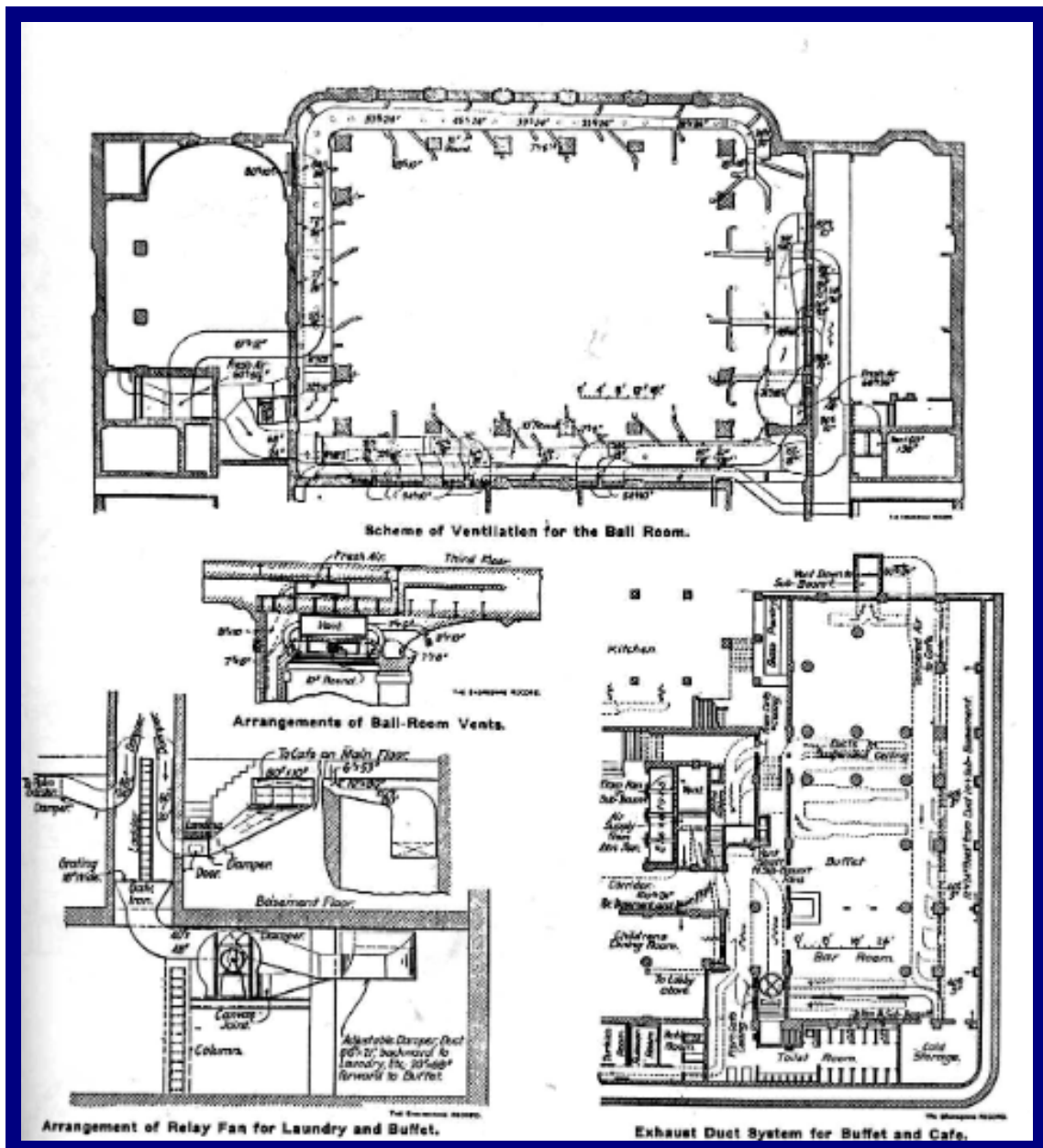
## BELLEVUE STRATFORD, PHILADELPHIA



Built 1904, extended to 19 floors with 1090 rooms in 1912.



# BELLEVUE STRATFORD, PHILADELPHIA



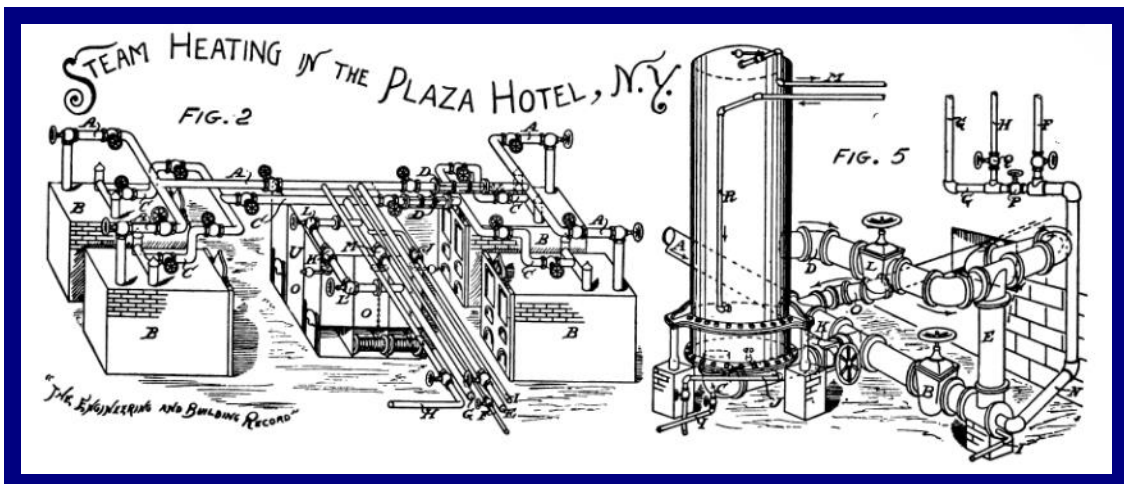
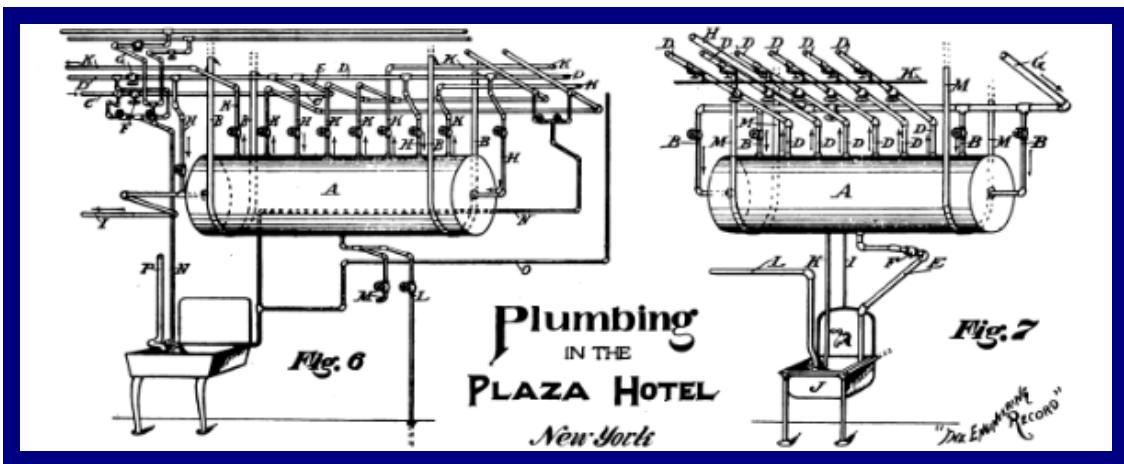
Mechanical Ventilation Systems (Engineering Record 1905).



# THE PLAZA HOTEL, NEW YORK



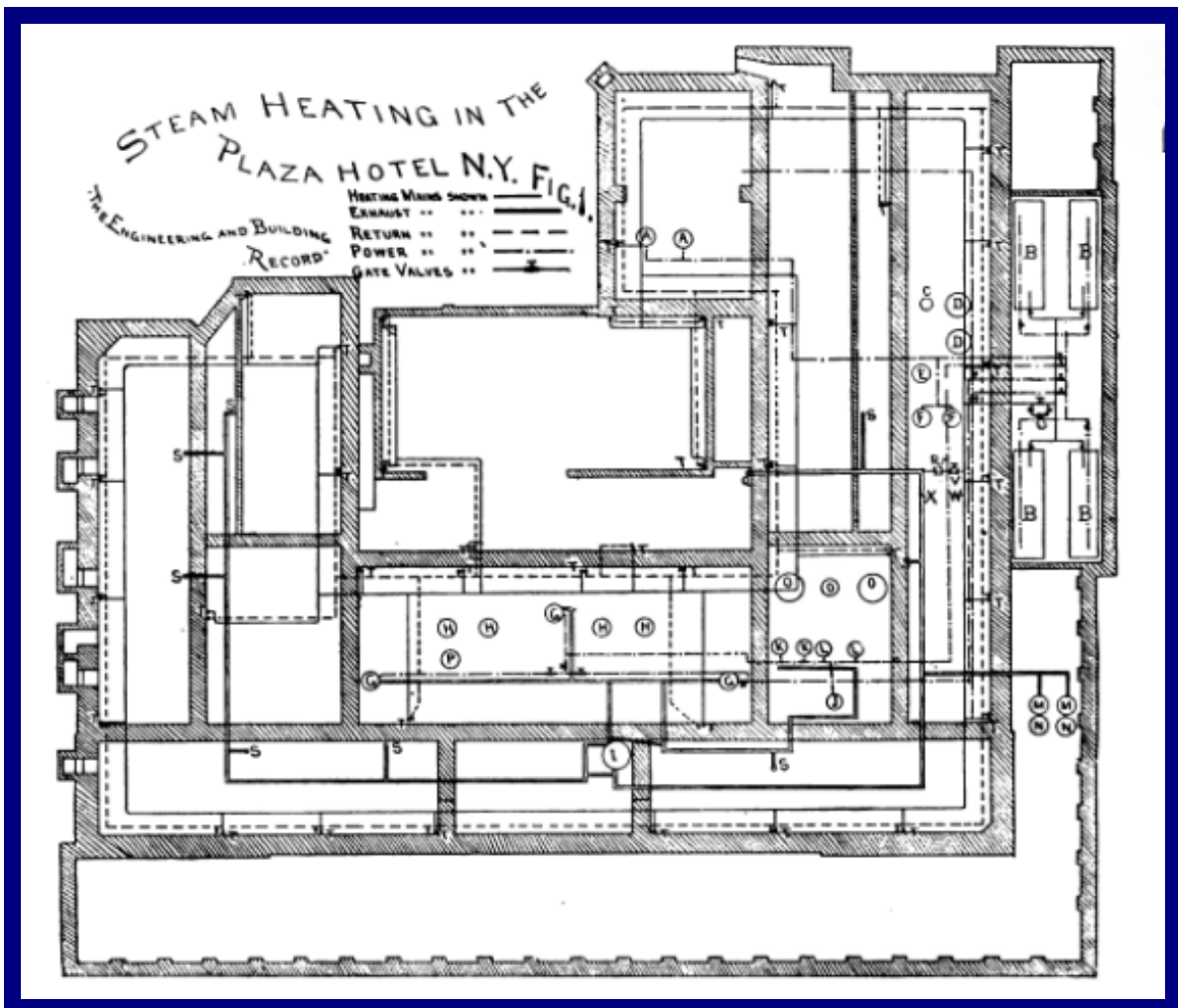
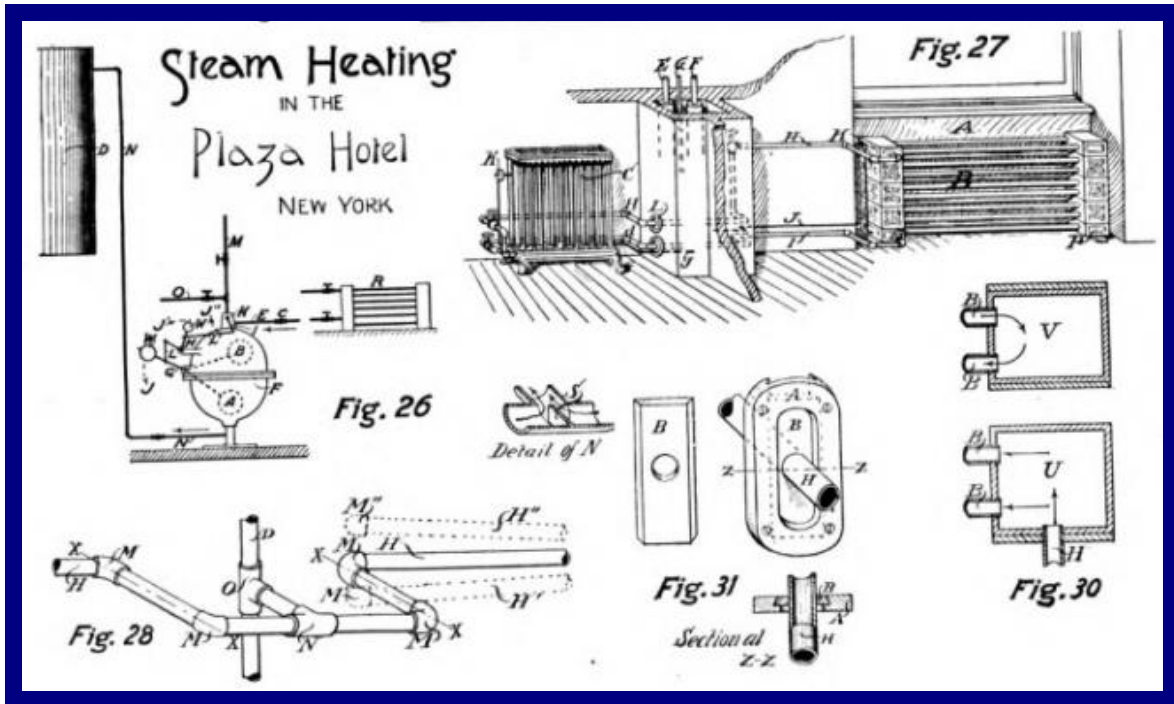
The first Plaza was built in 1890, 8 floors, 400 rooms.  
Demolished and replaced by second Plaza 1907, 13 floors, 800 rooms



Plumbing and Steam Heating Drawings (Engineering Record 1890-91).



# THE PLAZA HOTEL, NEW YORK





# HOTEL DEL CORONADO, SAN DIEGO BAY



Opened 1888: Architect James W. Reid, 7 floors, 757 rooms.

Famous for having featured in the Classic Hollywood Comedy:  
**Some Like It Hot**, American screwball comedy film, released in 1959, that is considered one of best in that genre. **Some Like It Hot** featured Marilyn Monroe as a “dumb blonde” and Tony Curtis and Jack Lemmon as women.

Reid's plans were being revised and added to constantly. To deal with fire hazards, a freshwater pipeline was run under San Diego Bay. Water tanks and gravity flow sprinklers were installed. He also built two giant cisterns with concrete walls a foot thick in the basement to store rainwater. Although these cisterns were never used for rainwater, they were reputedly very handy for storing alcoholic beverages during Prohibition. Reid also installed the world's first oil furnace in the new hotel, prompting a Los Angeles oil company to build tankers to carry the oil to Coronado.<sup>[1]</sup> Electric lighting in a hotel was also a world first. The electric wires were installed inside the gas lines, so if the electricity didn't work, they could use gas to illuminate the rooms.<sup>[2]</sup> Contrary to popular rumour, Thomas Edison not involved in the installation of The Del's electrical system. The electricity was installed by the Mather Electric Company out of Chicago (sometimes referred to as Mather-Perkins Company). An early Del brochure touted its "Mather incandescent electric lamps, of which there are 2,500." Electricity was still new to San Diego, having been introduced in 1886.



<25>

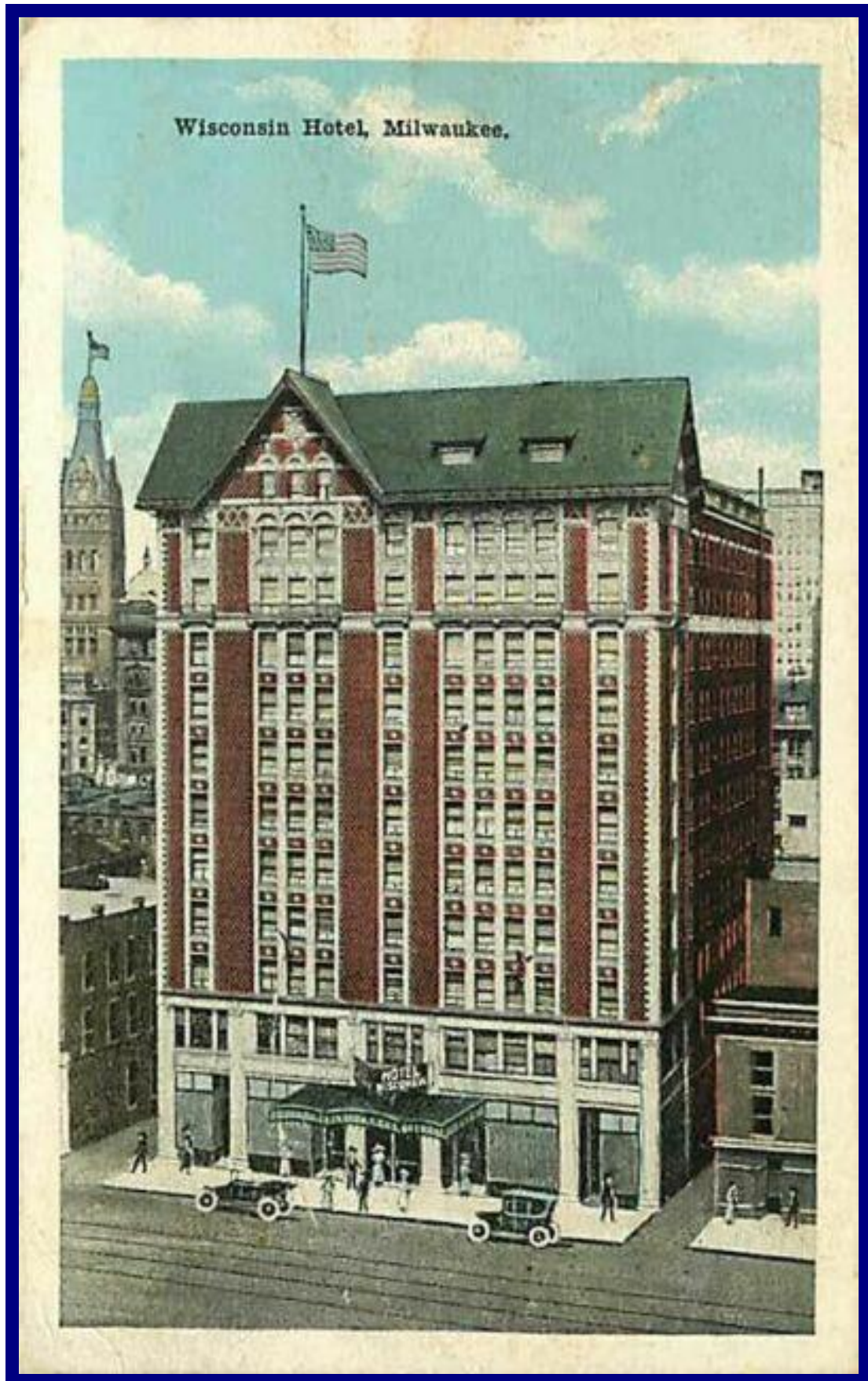
# HOTEL DEL CORONADO, SAN DIEGO BAY



The second largest wooden structure in the USA.



# WISCONSIN HOTEL, MILWAUKEE



Air conditioning thought to be by Carrier Air Conditioning Corporation of America.



## WISCONSIN HOTEL, MILWAUKEE



"Two, Sir?"

A Hotel Dining Room where even the Air is Appetizing. Manufactured Weather keeps this Dining Room Comfortable and Clean, Winter and Summer.



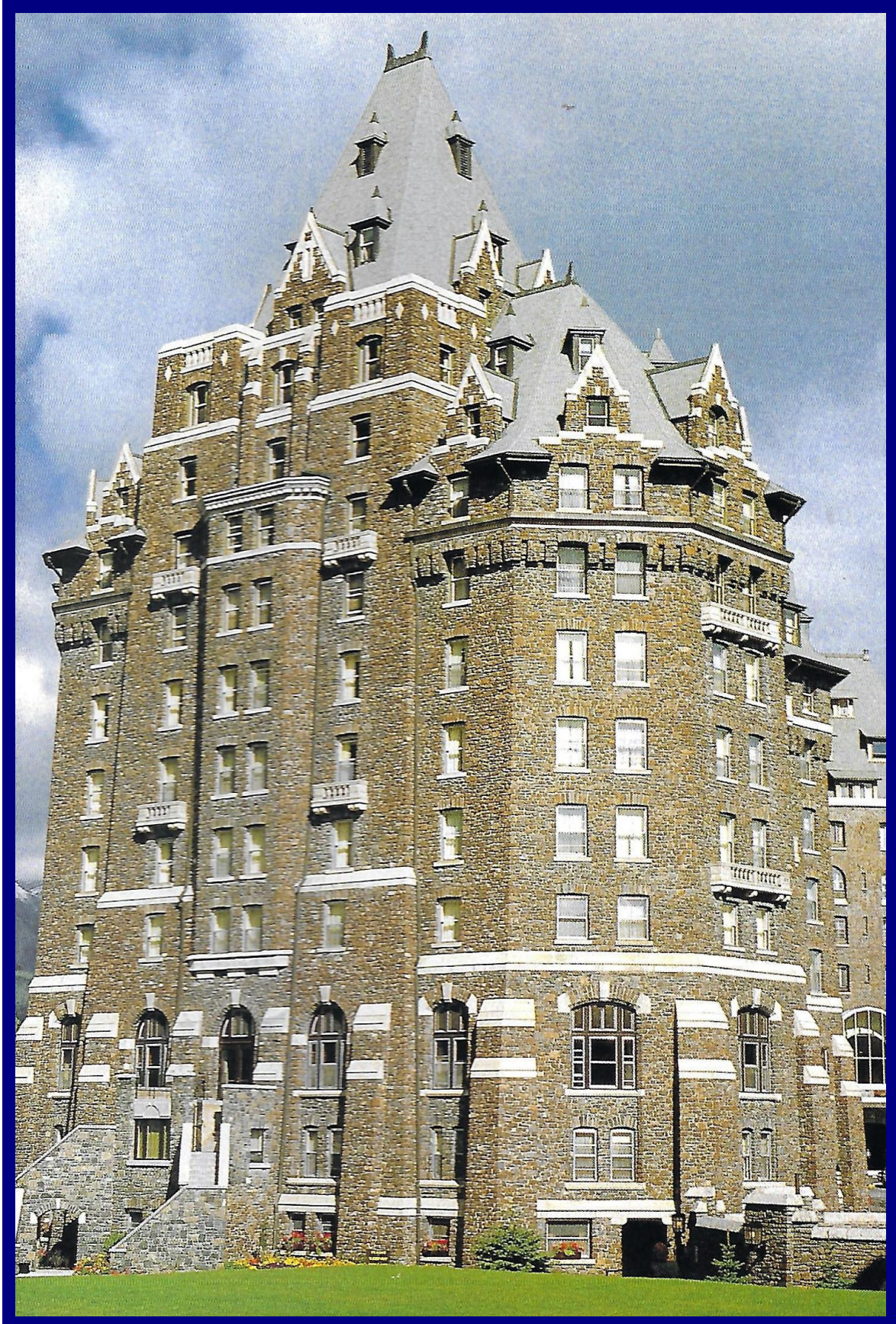
## CASCADIAN HOTEL, WENATCHEE



Built 1929 Washington State, 10 floors, steam heating radiator system, with "a state-of-the-art air conditioning system" (Knowles & Spargo).



## BANFF SPRINGS HOTEL



Built originally 1893, tower 1911, main block 1927, 15 floors (Denby).



<30>

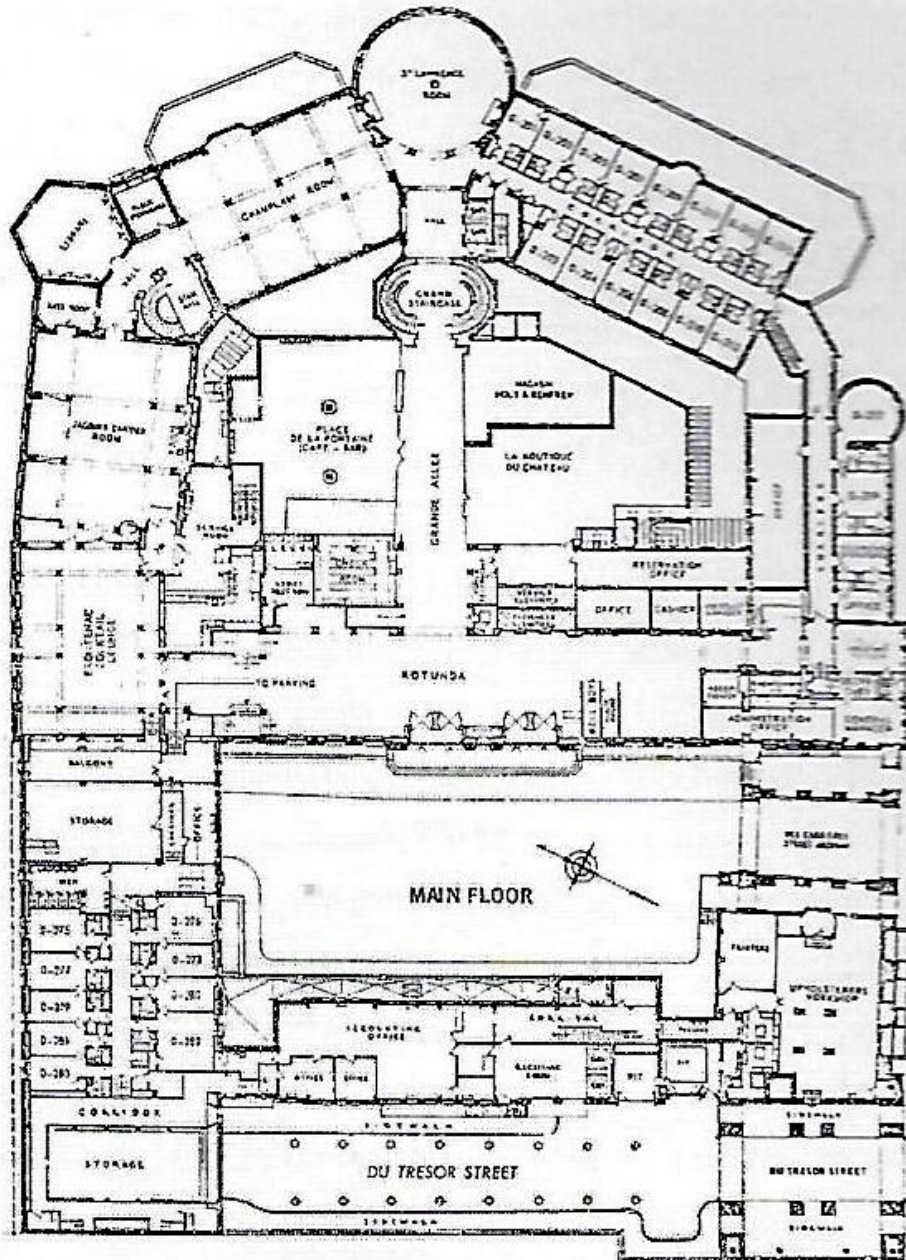
## CHATEAU FRONTENAC, QUEBEC



1893: later expanded, 262 ft, 18 floors.



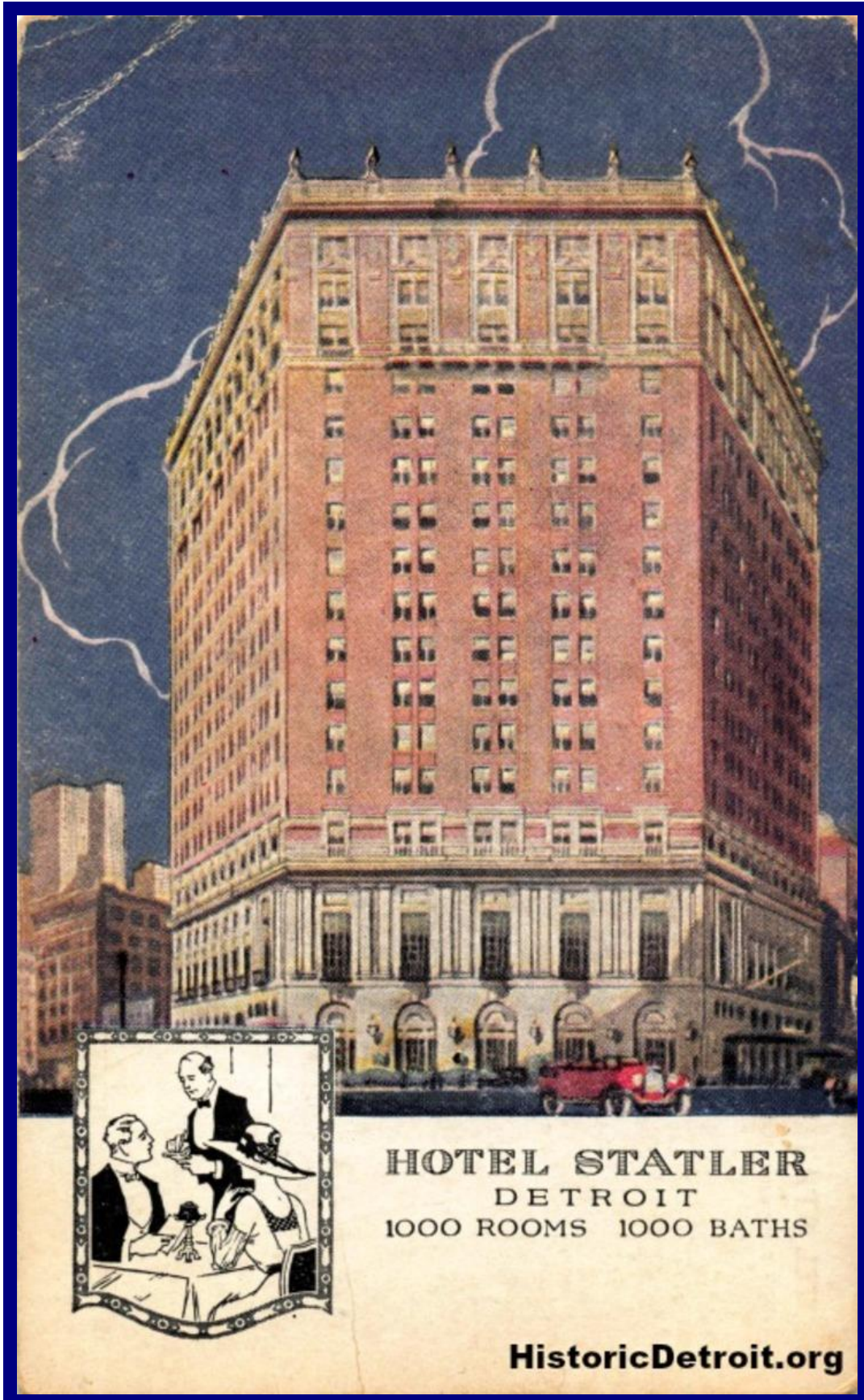
# CHATEAU FRONTENAC, QUEBEC



Like the Banff Springs Hotel, the Château Frontenac was subject to many major extensions to keep pace with demand. The Château Frontenac too suffered a fire in 1926 in the Riverview wing and the main floor plan shows proposals for rebuilding and enlarging that Edward and William S. Maxwell were to carry out.



# STATLER HOTEL, DETROIT



1915: 15 floors, 800 rooms, closed 1975, demolished 2005.



## STATLER HOTEL, DETROIT



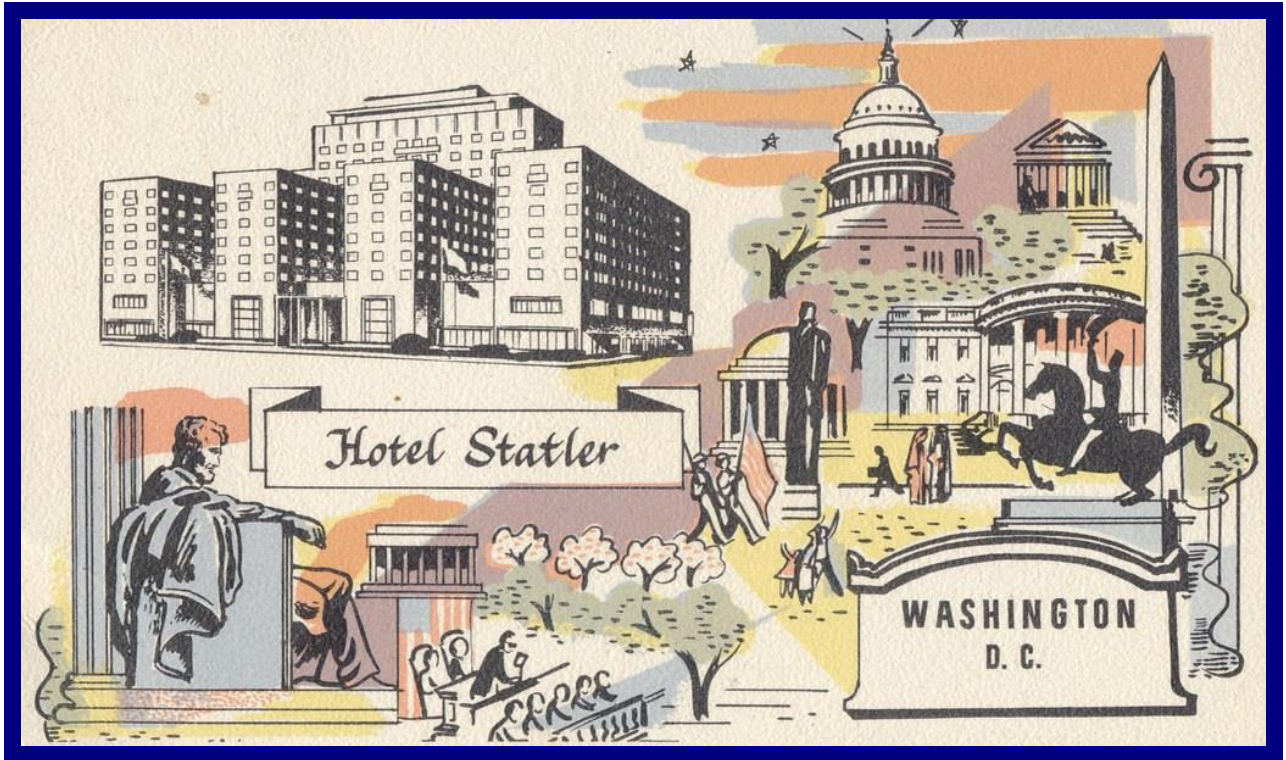
### THE FIRST "FULLY AIR-CONDITIONED HOTEL"

The Statler Hotel in Detroit, an 800 bedroom structure built in 1915 and designed by the same architect as the New York Stock Exchange, George B. Post, was probably the first to be fully air conditioned.<sup>42</sup> When it opened, it was claimed to be Detroit's most expensive and luxurious hotel and the largest in the Midwest. The addition of air conditioning was completed in the summer of 1934 and an inaugural banquet held to celebrate the novelty of "Cooled Individual Rooms".<sup>43</sup> The system had several features in common with the Tribune Tower, individual, temperature controlled, room cooling units that drew air in from outside, were fed with chilled water at 47°F from a 167-ton steam jet refrigeration machine. In addition, the ball rooms, conference rooms, and lobby, were all cooled. Perhaps by coincidence, the American Society of Refrigeration Engineers planned to hold their spring conference in the hotel the following spring. The refrigeration machine and room cooling units were also manufactured by Westinghouse.<sup>44</sup>

(Text from Arnold p.99).



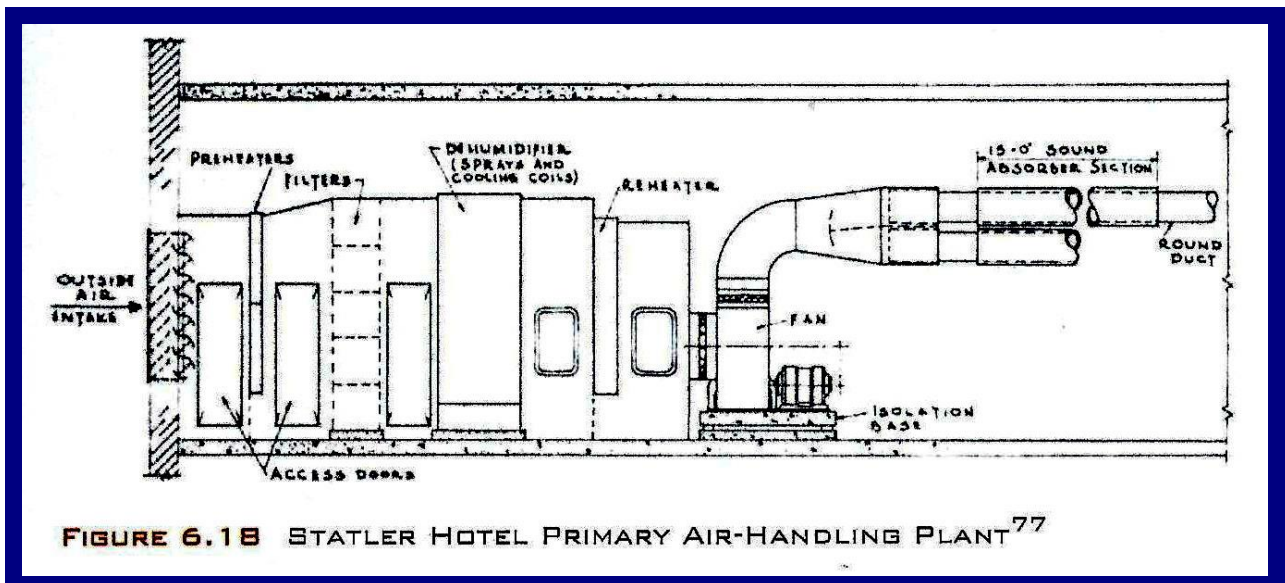
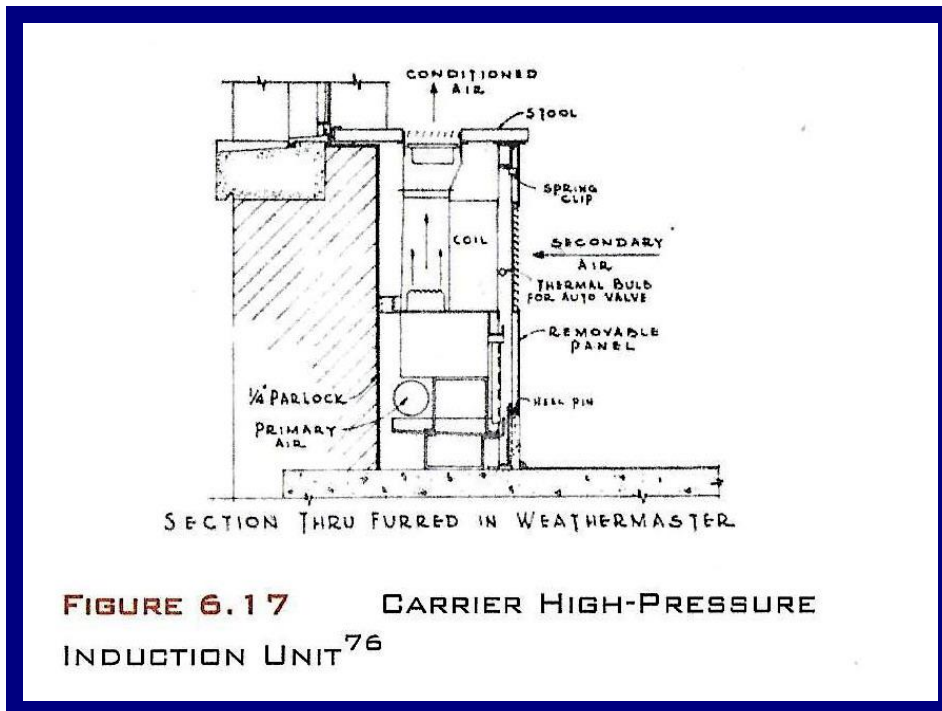
# STATLER HOTEL, WASHINGTON



Built 1943: 150 ft, 13 floors, renamed Capital Hilton.



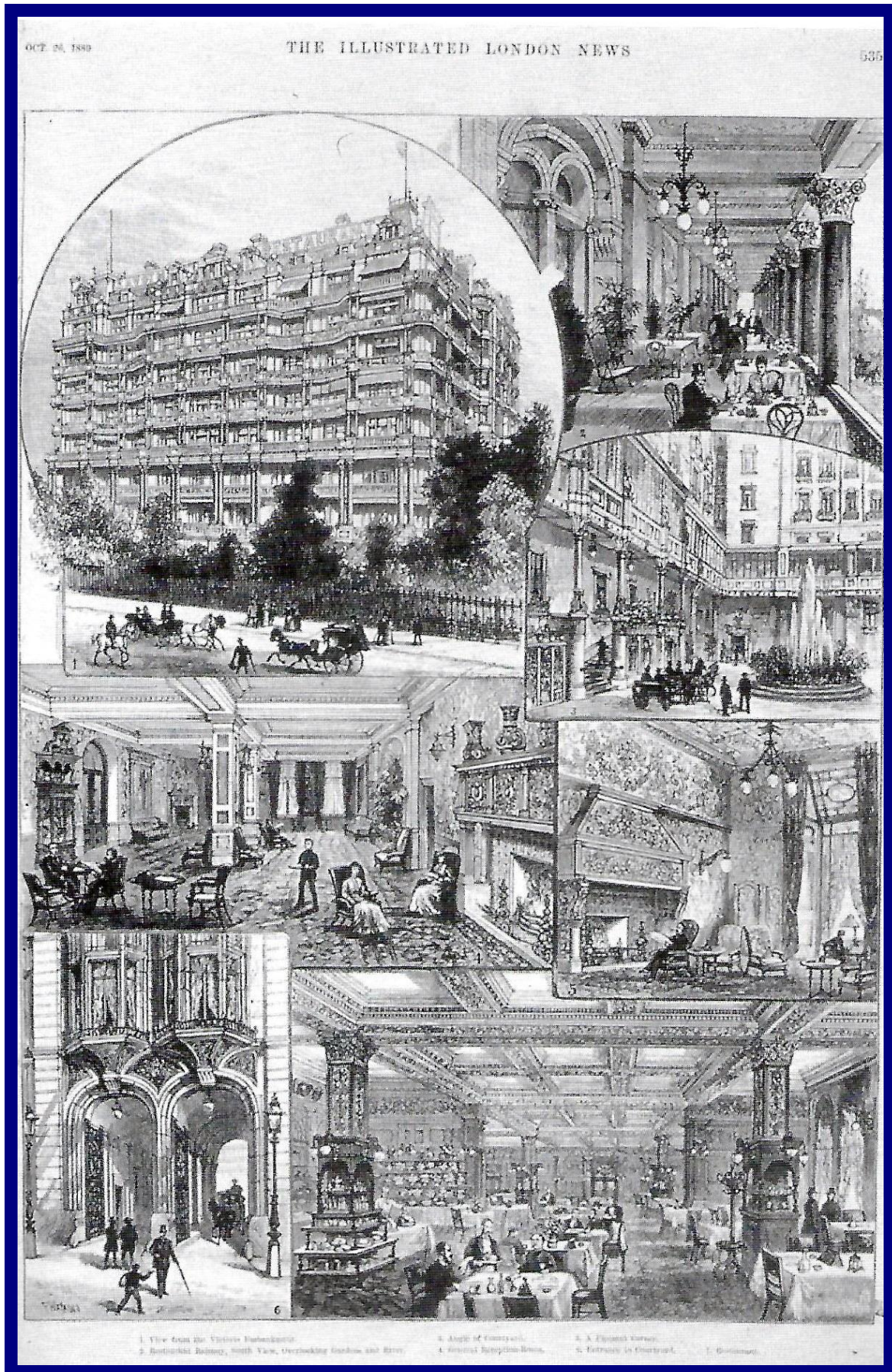
# STATLER HOTEL, WASHINGTON



The last major hotel constructed before Conservation Order L-41 was issued was the new 1000-room Statler Hotel in Washington, DC, part of the same chain and potentially influenced by the Statler Hotel in Detroit. Construction began in 1941, but a major fire in February 1942 caused significant setbacks and construction was further delayed by the War and a shortage of materials.<sup>72</sup> The hotel was finally opened in the summer of 1943 and claimed to be the “first hotel in the world to install the Carrier Conduit Weathermaster system of air conditioning” and featured year-round air conditioning throughout the hotel: in all guest rooms, public rooms, and corridors.<sup>73</sup> It was also claimed that by distributing the air to 931 Weathermaster units through relatively small pipes, the space savings was equivalent to two extra floors.



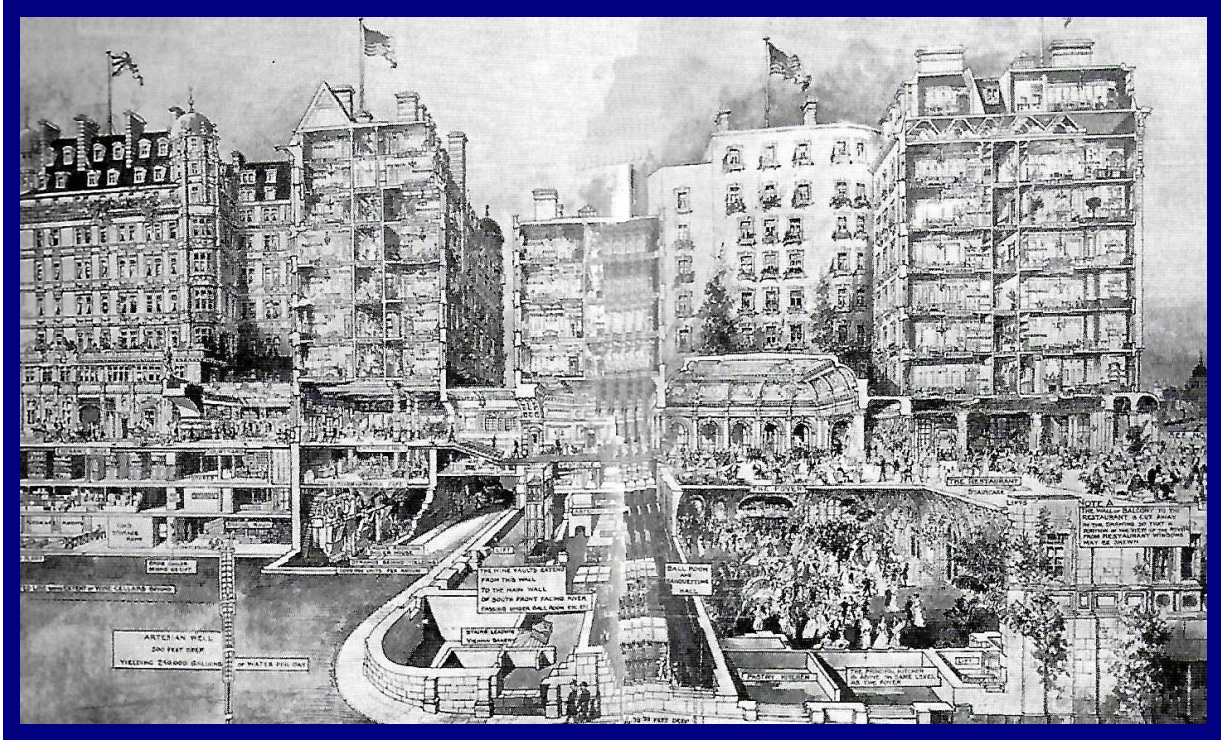
# SAVOY HOTEL, LONDON



1889: (*The Illustrated London News* and Denby p.147).



# SAVOY HOTEL, LONDON



Artists cross-section from 1911 showing all functions of the hotel (Denby, p.148).  
{an example of an Hotel being "A Machine For Living In"}.



The Thames Foyer.



## THE MIDLAND HOTEL, MANCHESTER



### 1903 Midland Hotel, Manchester

The warming and ventilation of the Midland Hotel [Charles Trubshaw, 1903] [2.9] in Manchester was probably the largest comfort installation carried out for a British hotel up to that time. A brochure issued by the contractor, Ashwell & Nesbit, describes the systems: <sup>26</sup>

*“..the corridors, entrances and a few of the principal bed and sitting rooms are warmed by direct radiators; but the main portions of the building, embracing the smoking room, billiard room, lounge, coffee room, reading room, ball room, etc., is supplied with fresh warmed air from the battery chambers situated in the sub-basement under the centre of the hotel. The fresh air is derived from two air shafts in the main wall which constitutes the centre of the building, extending from a height of about 70 feet (21 m) to the sub-basement and conveyed by a short horizontal duct to the eight groups of batteries supplying the above rooms with fresh warmed air, a by-pass being provided with a suitable damper, so that a variable volume of cool air may pass directly to the fans.”*

Two types of system, later used in air conditioning applications, can be identified: dual-duct and zone reheat. The brochure also refers to the air filtration or cleansing screen made from wooden frames covered with a fine cloth, followed by a coke screen *“which eliminates the particles of smut and dust from incoming air,”* and notes the two fans are driven by 20 brake horsepower (15 kW) motors. An interesting fact about the boiler plant is that it comprised three large steam Locomotive boilers supplied by the Midland Railway Company. A sticker attached to the brochure refers to a test made on 5th September, 1903 which showed:

*“..that our Ventilating Apparatus was delivering SIX MILLION CUBIC FEET OF AIR PER HOUR (100,000 ft<sup>3</sup> /min, or 47.2 m<sup>3</sup> /s) into the Hotel, which means that with air at 62° Fahr. (16° C)= 203 TONS WEIGHT.”*



## STRAND PALACE HOTEL, LONDON



Built 1909, redeveloped 1928, 9 floors, 900 bedrooms.  
With second-hand coal-fired steam boilers, air conditioned by Carrier.



## ADELPHI HOTEL, LIVERPOOL



The Hypostyle Hall in the third Liverpool Adelphi Hotel of 1914 (Denby p.44).



<41>

## CUMBERLAND HOTEL, LONDON



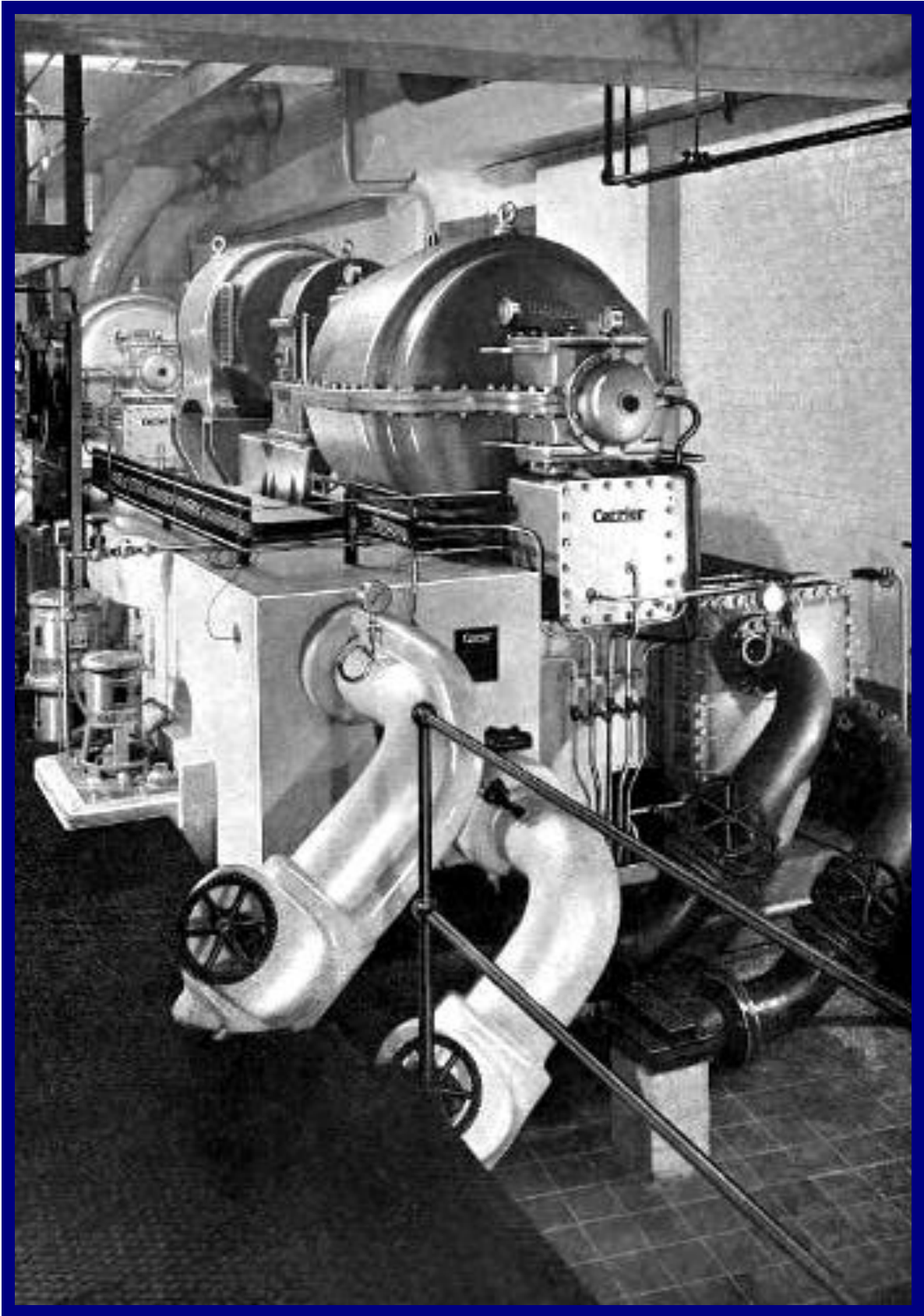
Opened 1933, air conditioned by Carrier.



1950s.



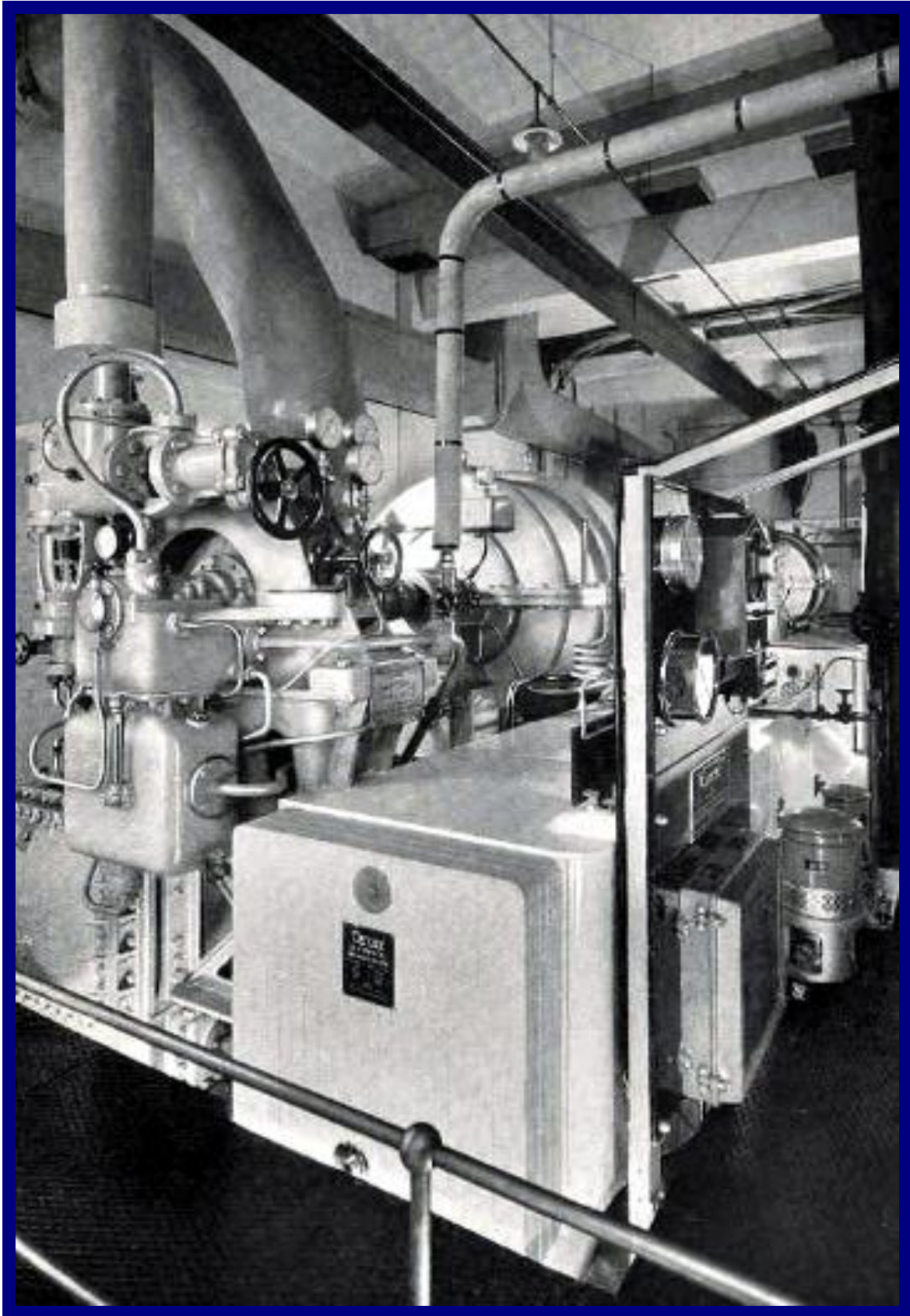
## CUMBERLAND HOTEL, LONDON



1933: Carrier refrigeration, centrifugal chiller, electric motor driven 250 TR.



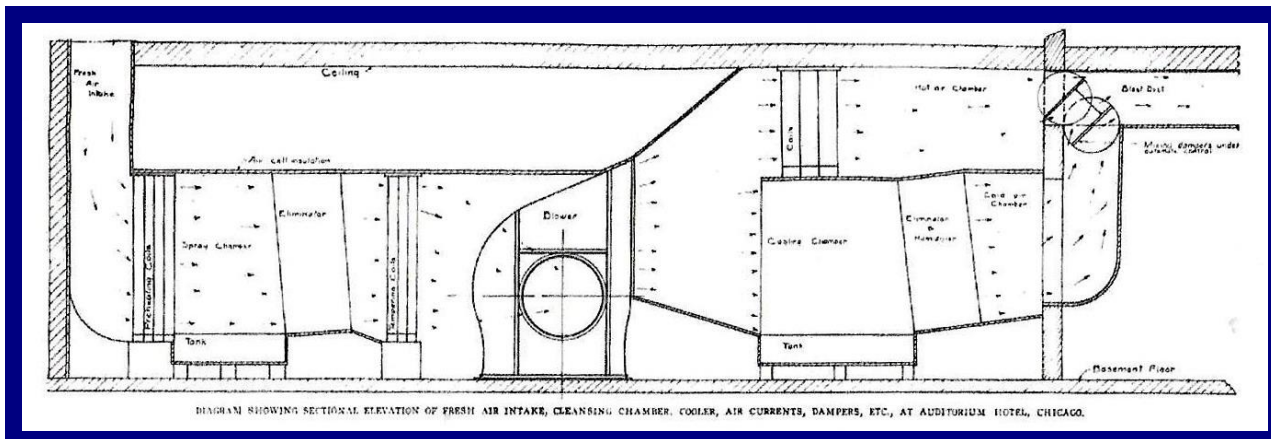
## CUMBERLAND HOTEL, LONDON



1933: Carrier refrigeration, centrifugal chiller, steam turbine driven 250 TR.



# REFERENCES AND FURTHER READING



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Other information from the Heritage Group Archive and website.

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