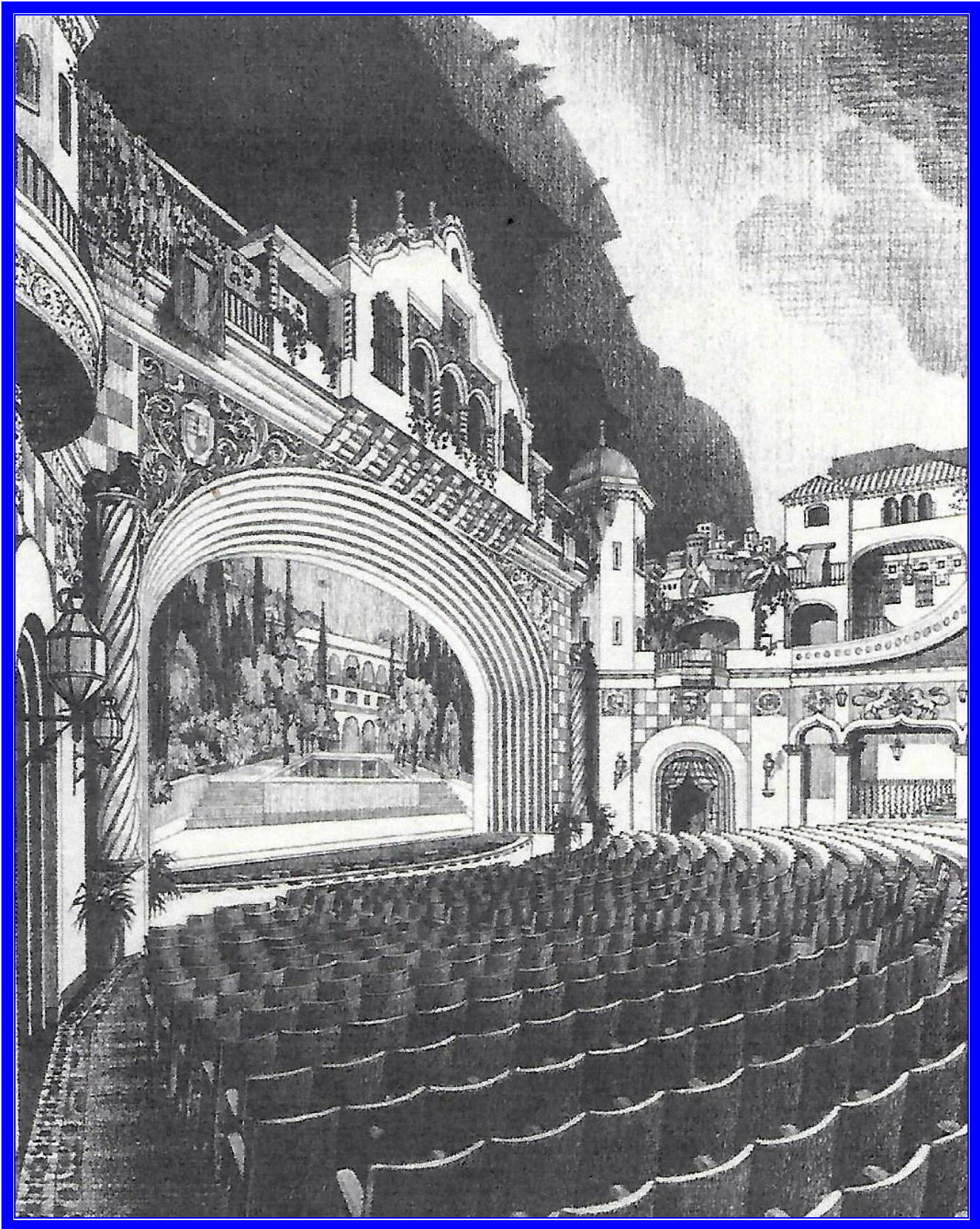


T H E A T R E S

**Heating Ventilation
Air Conditioning
Refrigeration**

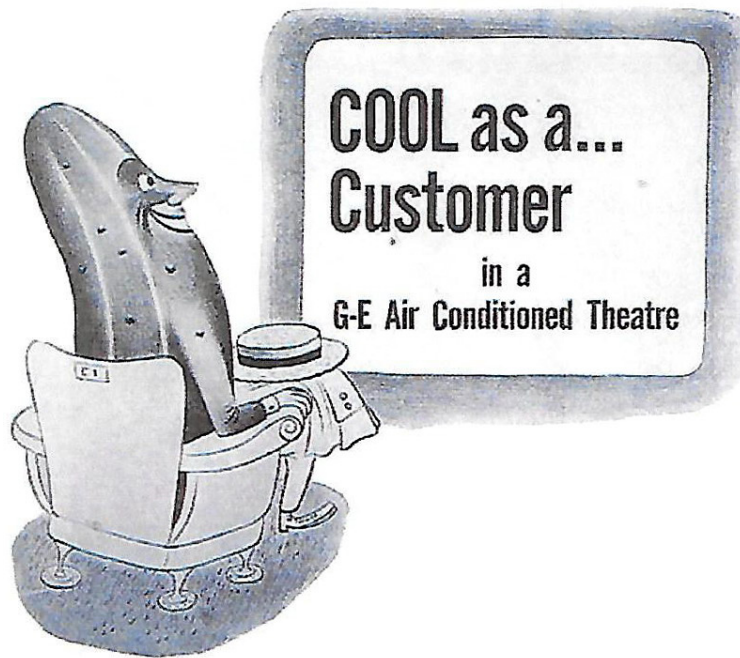
Pictures from the Past

CIBSE HERITAGE GROUP



*Astoria Finsbury Park, London, Ventilation with washer, Carrier UK 1930
(Indoor Air by Carrier, CIBSE Heritage Group Archive)*

*Front cover : Airdome Theatre, White City, Savin Rock 1919
(Ticket to Paradise)*



T H E A T R E S

**Heating Ventilation
Air Conditioning
Refrigeration**

Pictures from the Past

**Eur Ing BRIAN ROBERTS CEng Hon.FCIBSE
Life Member ASHRAE**



Keep Cool

AT THE

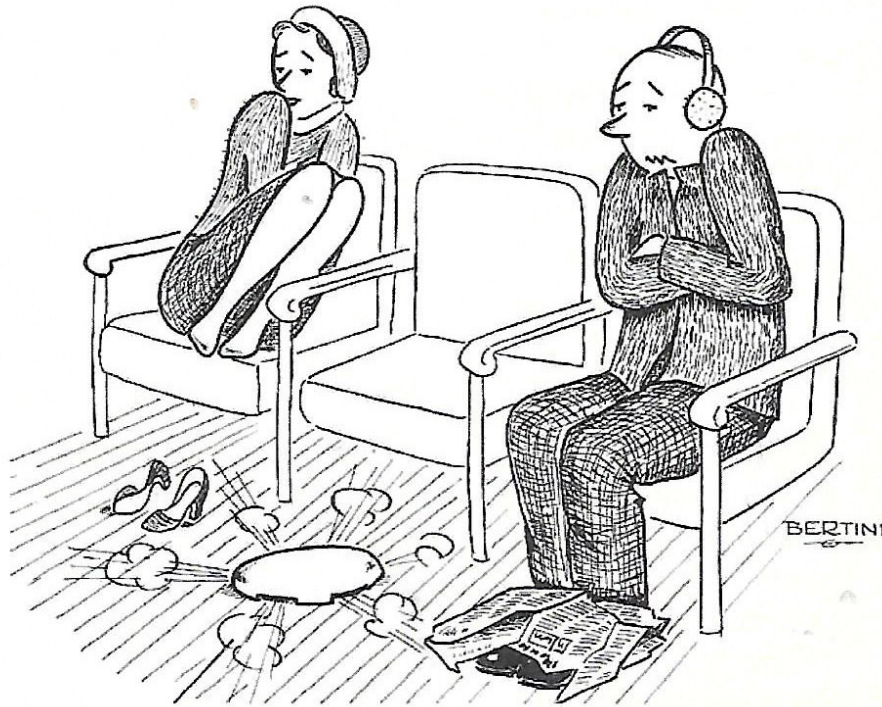
Rivoli

We have invested over \$100,000 in a refrigerating cooling plant to keep you cool and comfortable when the world is sweltering.

Unseen, unheard, resistless are the huge motors with a combined pulling power of 221 horses—representing but a small part of the marvellous equipment which absolutely assures a temperature that is just right.

Delightfully refreshing days and evenings all summer at

The **RIVOLI THEATRE**
BROADWAY at 49th STREET.
THE HOME OF *Paramount Pictures*



T H E A T R E S

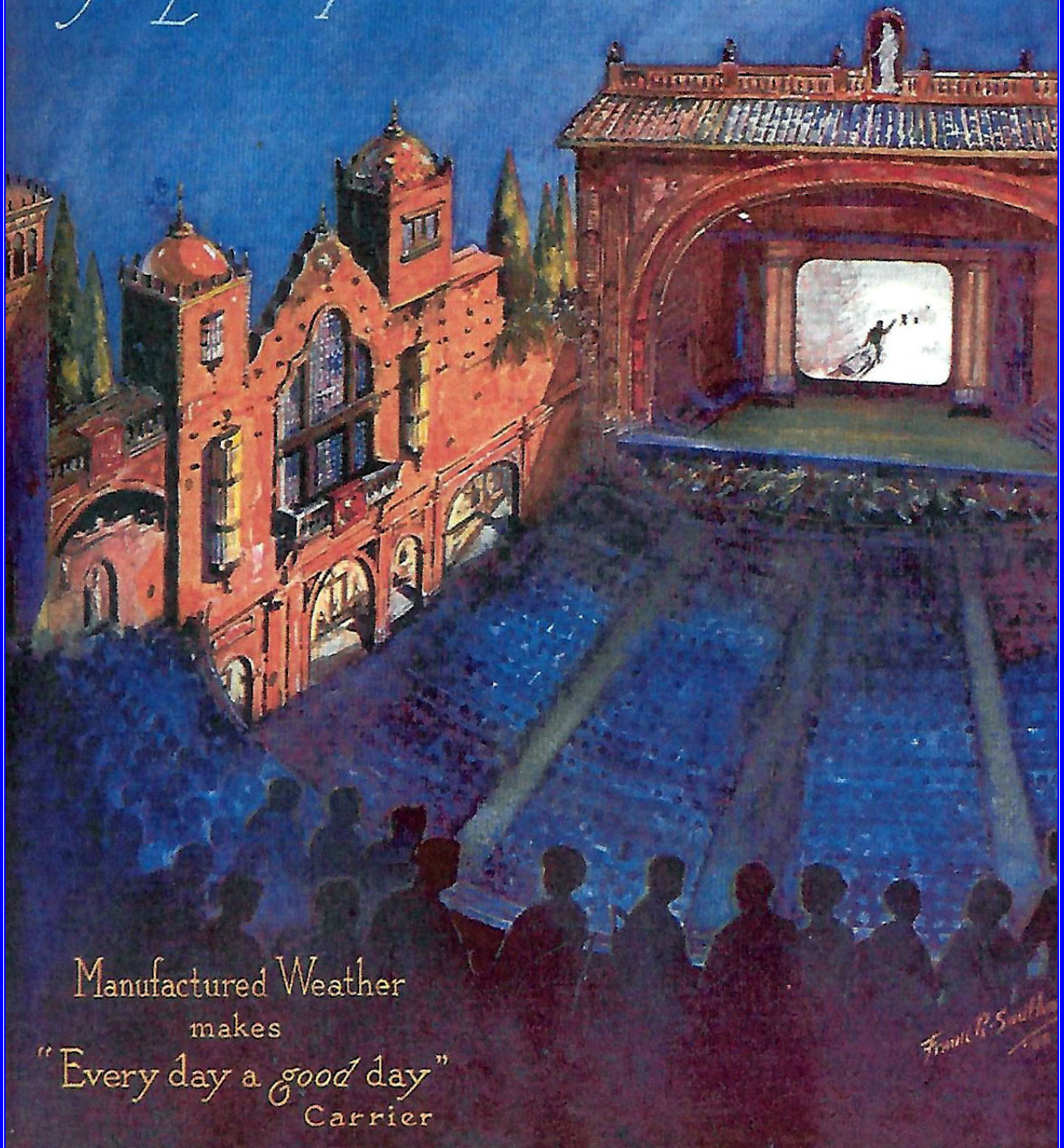
**Heating Ventilation
Air Conditioning
Refrigeration**

Pictures from the Past

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Carrier Cooled

The Last Magic Touch
Creating the Outdoor Atmosphere
in John F. Herson Theaters



Manufactured Weather
makes
"Every day a good day"
Carrier

Francis P. Sullivan

T H E A T R E S

HEATING VENTILATION AIR CONDITIONING REFRIGERATION

LIST OF THEATRES

1890 Empire Theatre, Leicester Square, London

1891 New York Music Hall: later Carnegie Hall

1916 Butterfly Theatre, Milwaukee

1919 Airdome Theatre, Savin Rock

1926 Rivoli, New York

1925 Davis Theatre, Pittsburgh

1927 Roxy Theatre, New York

1927 Carlton Theatre, Haymarket, London

1928 Empire Leicester Square, London

1929 Loews Kings Theatre, Brooklyn, New York

1930 Astoria, Finsbury Park, London

1932 Paramount Theatre, Leeds

1936 Gaumont Palace, Chelsea, London

VENTILATION

- Empire Theatre - Ventilation

Instructions for management.

- 1st - attention to be paid to the Gas Engine, and Fans, and gearing for driving same, that they are kept in proper working order, all working parts being kept clean and well lubricated, and any defects that may be found to be reported at once to the Manager.
- 2nd - The casings of the Fans, and Fan blades to be scraped and painted once a year if found necessary.
- 3rd - In the Summer months the Fans to be worked from 3.0['] clock in the afternoon till the house closes. This will apply from June 1st to September 30th For the remaining months, judgment is necessary, as the time of starting will much depend upon the external temperature but as a rule, the Fans should be in full operation 1/2 an hour or an hour before the admission of the Public.

VENTILATION

4—The gas mains to be cleaned and overhauled twice a year, once after the summer working, and before commencing same, i.e. in May and November—

5—The principal point to attend to in the management of the Ventilation arrangements, is that the atmosphere of the House is fresh before the admission of the Public, and for this purpose the attendant should as early as possible visit the building, and have all available openings for admitting fresh air in operation, so as to produce a complete ~~no~~ natural circulation of fresh air over the House—

6—It would also be advisable in order that this circulation of the air be kept ^{up} as long as possible that the drap curtain be not lowered before 7.0'clock—

7—The attendant should also see daily that all the Roller shutters and openings over the doors

VENTILATION

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VENTILATION

14, JOHN STREET, ADELPHI, W.C.

11 - If the weather is very cold the gas should be freely used for lighting the theatre for the first hour or so. after which say at 9.15 the electric lighting should be in full working order and the gas light put out.

12 - The Sunburners in the foyer must be kept slightly on at all times for carrying away the smoke. The low windows should also be kept at all times partially opened, and when found possible to be opened to their full extent.

13. The Louvers openings in Roof must be examined regularly, and seen that they are properly opened.

Wilson W Phipson

Surveyor

14 John Street

Adelphi W.C.

HEATING VENTILATION COOLING

With this amphitheater may be compared the New York Music Hall founded by Andrew Carnegie, a full description of which, with plans, is given in *The Engineering Record* of July 4, 1891, and February 6, 1892. The main concert hall has a seating capacity of 3,000, the recital hall beneath this seats 1,200. The fresh warmed air enters the music hall through numerous perforations in or near the ceiling,

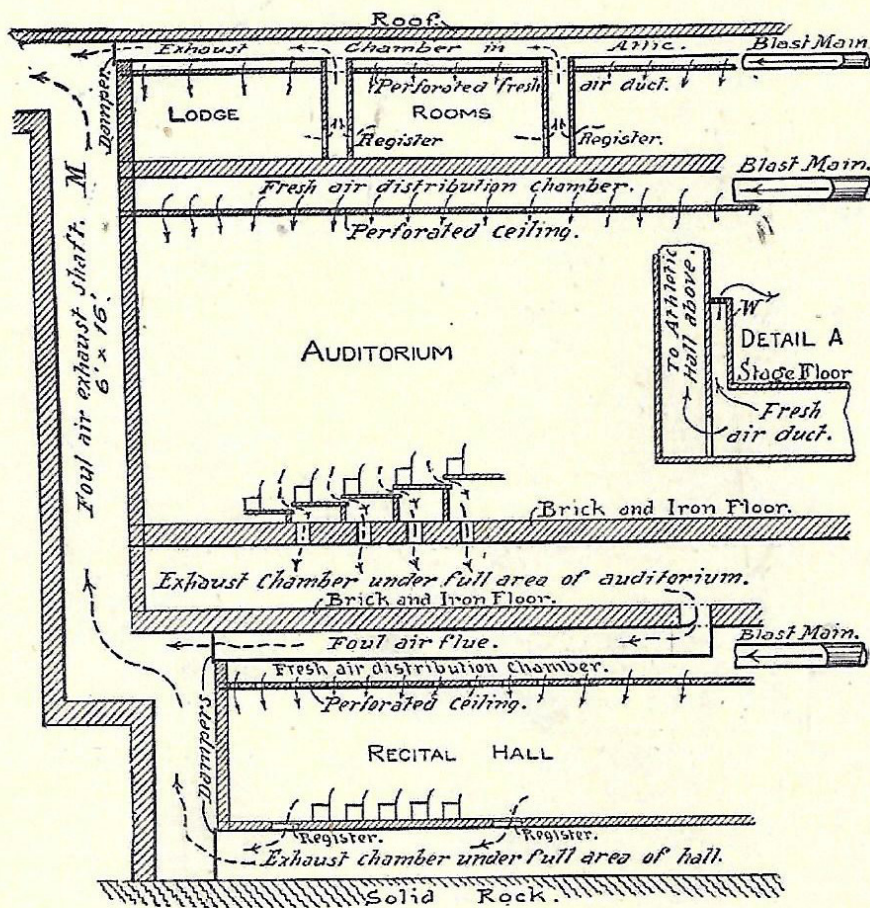


FIG. 129.

being forced in by two 7-foot Sturtevant blowers which draw it through heaters of $1\frac{1}{4}$ -inch pipe containing 6,600 square feet of heating surface.

Figure 129 is a general vertical section of the main building, not to scale or accurate position, but intended as a diagram to show the distribution of fresh air and the withdrawal of foul air in the principal

HEATING VENTILATION COOLING

NEW YORK MUSIC HALL.

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rooms. Detail A shows the method of supplying extra heat and air to the stage through perforations in the horizontal top of the 6-foot wainscoting *W*, around the walls.

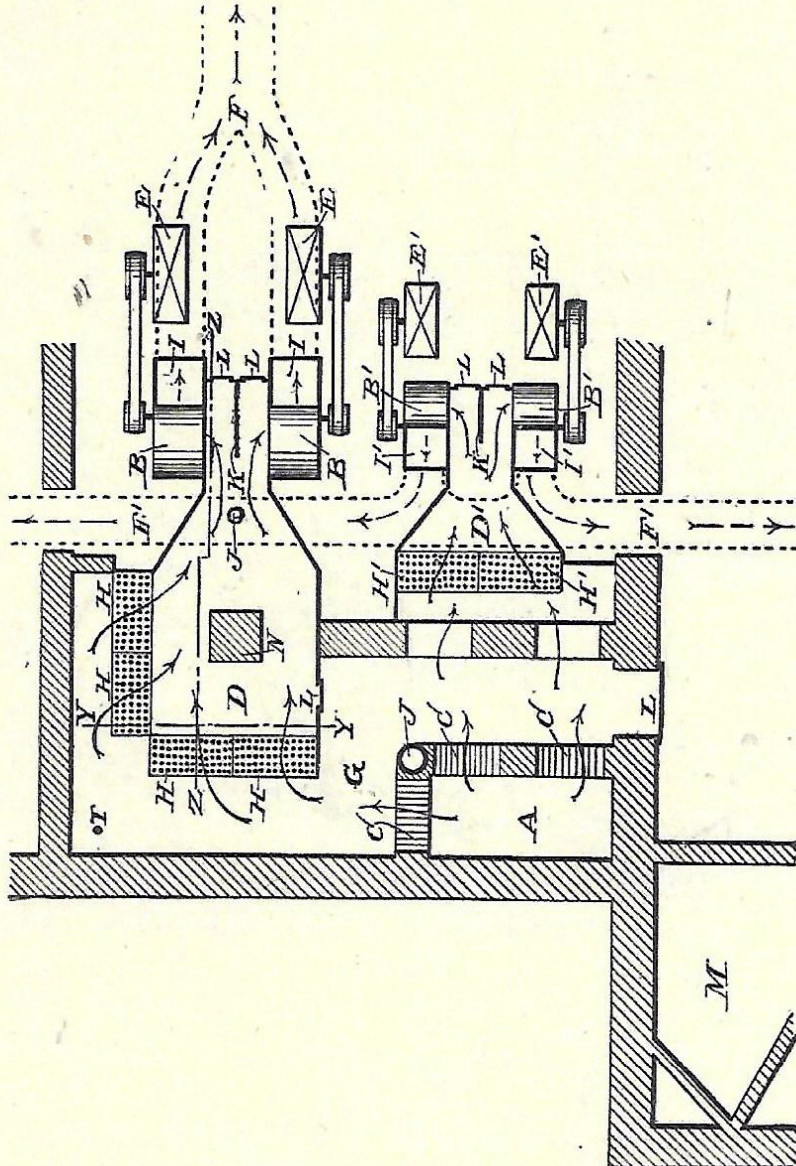


FIG. 130.

Figure 130 shows the heating, cooling and blowing plant. *A* is the fresh-air shaft from the roof, 6x12 feet, supplying the distributing

HEATING VENTILATION COOLING

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NEW YORK MUSIC HALL.

chamber *G*. In warm weather ice may be placed in the racks *C C* to cool the air. The blowers *B B* draw the air into the chambers *D D* through the steam radiators *H H*. *E E* are the engines driving the blowers, and *F* is the main air duct having a cross-section of 30 square feet.

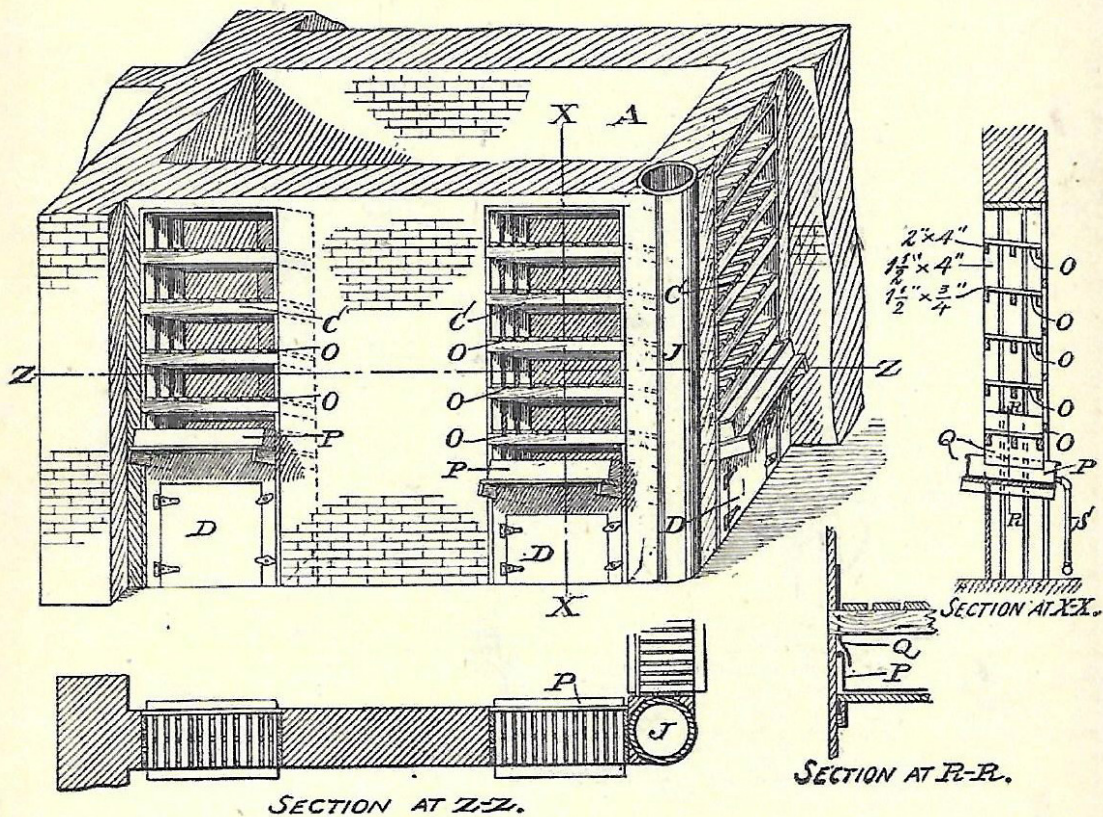


FIG. 131.

Figure 131 shows the bottom of the fresh-air shaft *A*, with its outlets. *O O* are the ice-racks; *P P*, iron drip-pans. *S S* are waste-pipes; *D D*, doors.

Figure 132 is a perspective view from *T*, Fig. 130, of the chamber *D*, two sides of which are composed of radiators *H H*. *U* is the steam supply and *V* the drip pipe.

Figure 133 is a section at *z z* Fig. 130 showing the inlet to the blower and the check valve *F*, which opens with the blast but closes against

HEATING VENTILATION COOLING

NEW YORK MUSIC HALL.

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back pressure. The air is drawn out from the hall by a separate fan system, being taken from or near the floor levels, and carried in a shaft to the roof where the exhaust fans are located. It will be seen that this

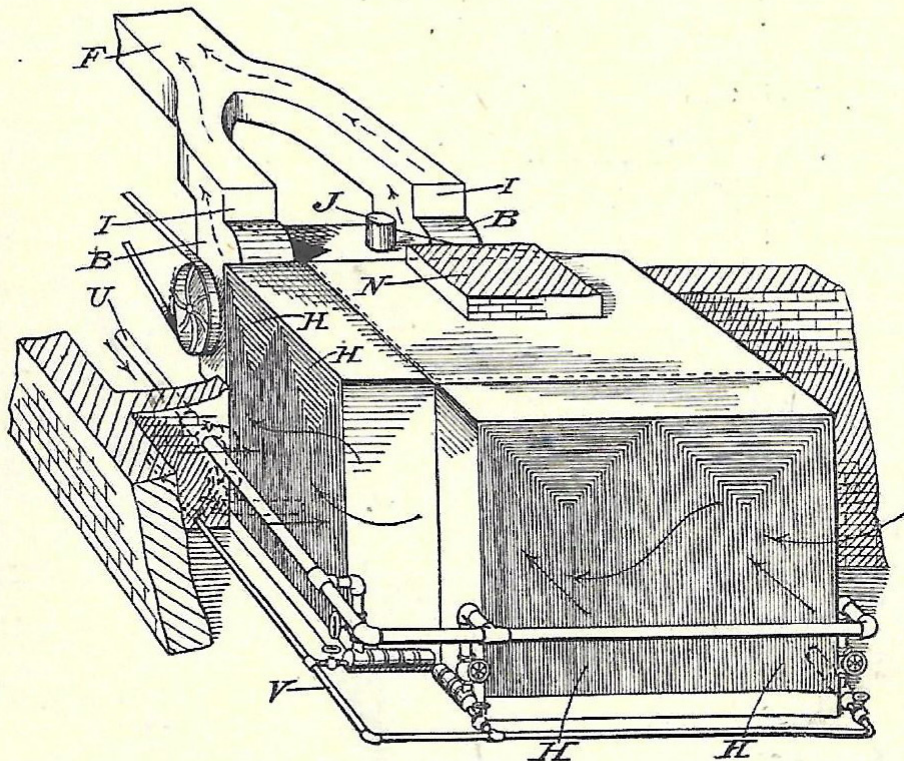


FIG. 132.

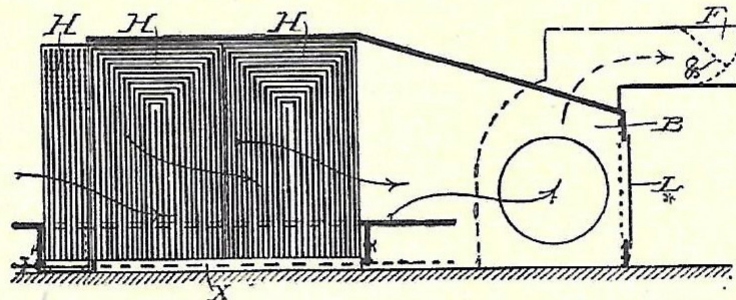
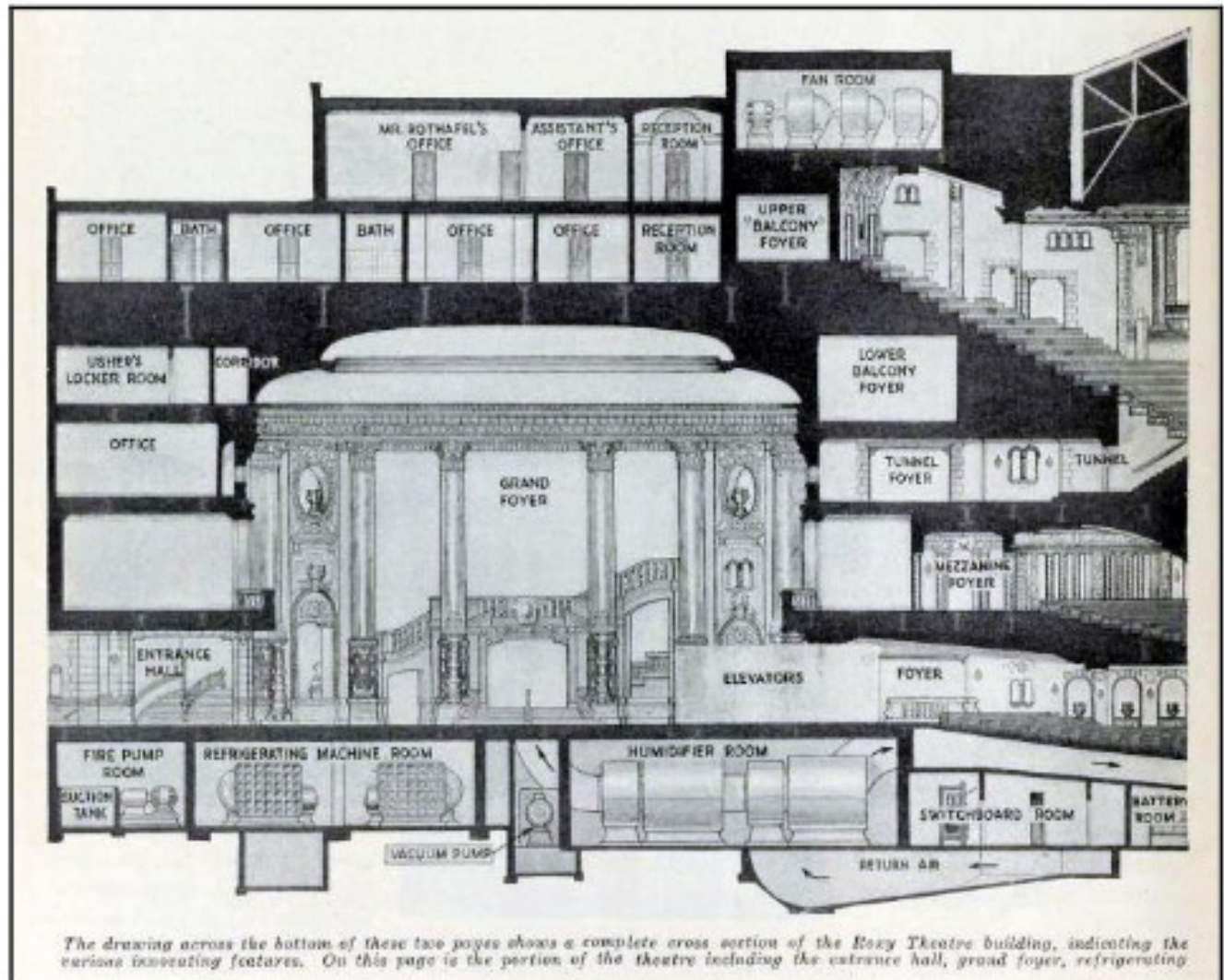


FIG. 133.

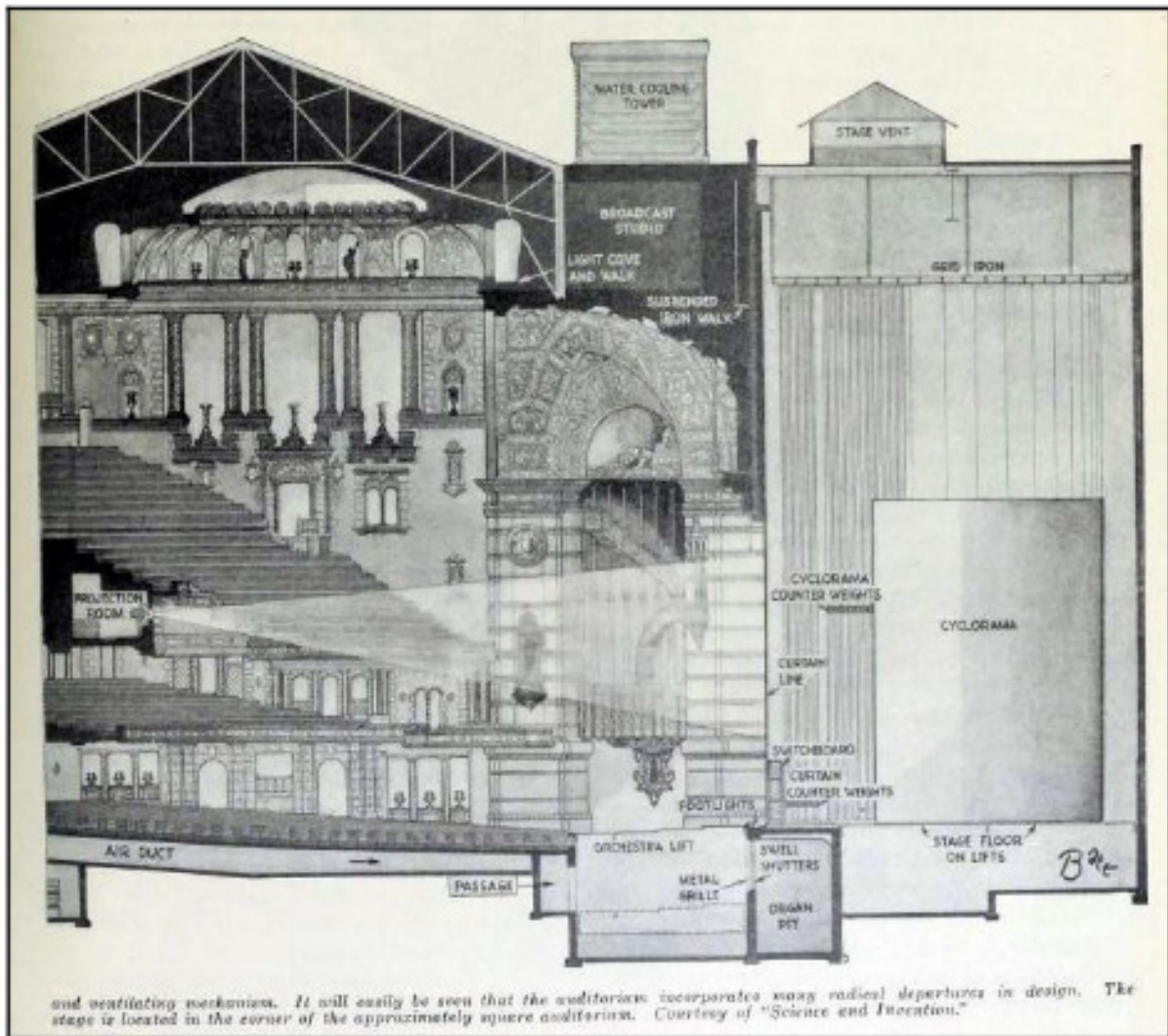
is a system of downward ventilation, the efficiency of which can only be maintained by a considerable expenditure for power.

AIR CONDITIONING



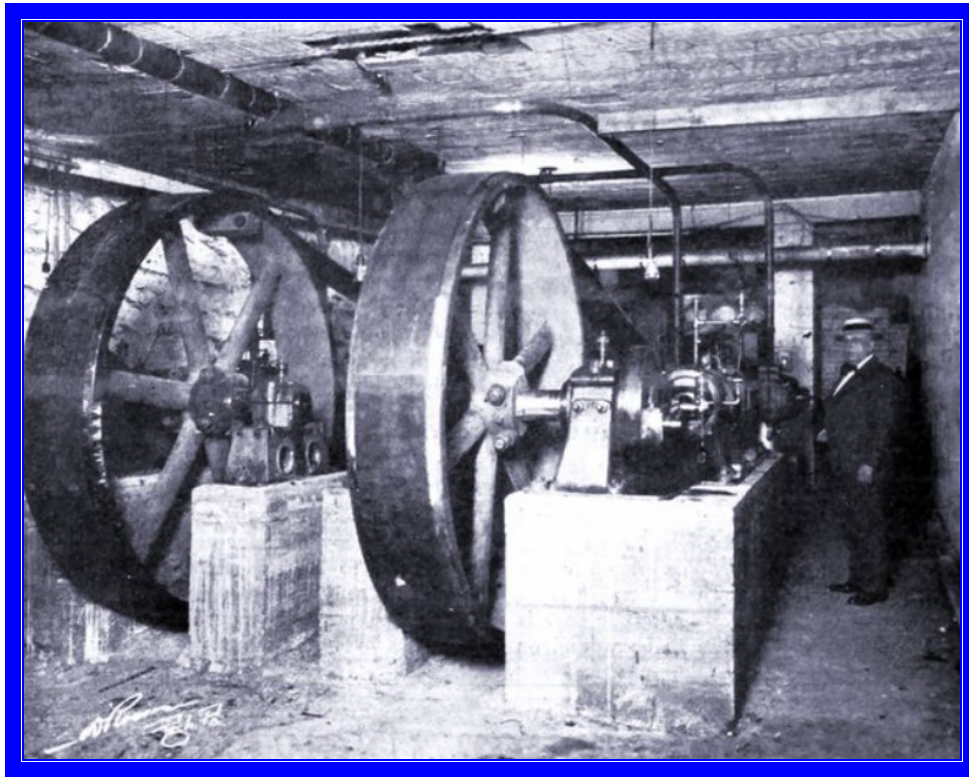
Carrier air conditioning system, 1927 showing centrifugal refrigeration and air handling plant
The Best Remaining Seats: The Golden Age of the Movie Palace, Ben M Hall, Da Capo, 1987

AIR CONDITIONING

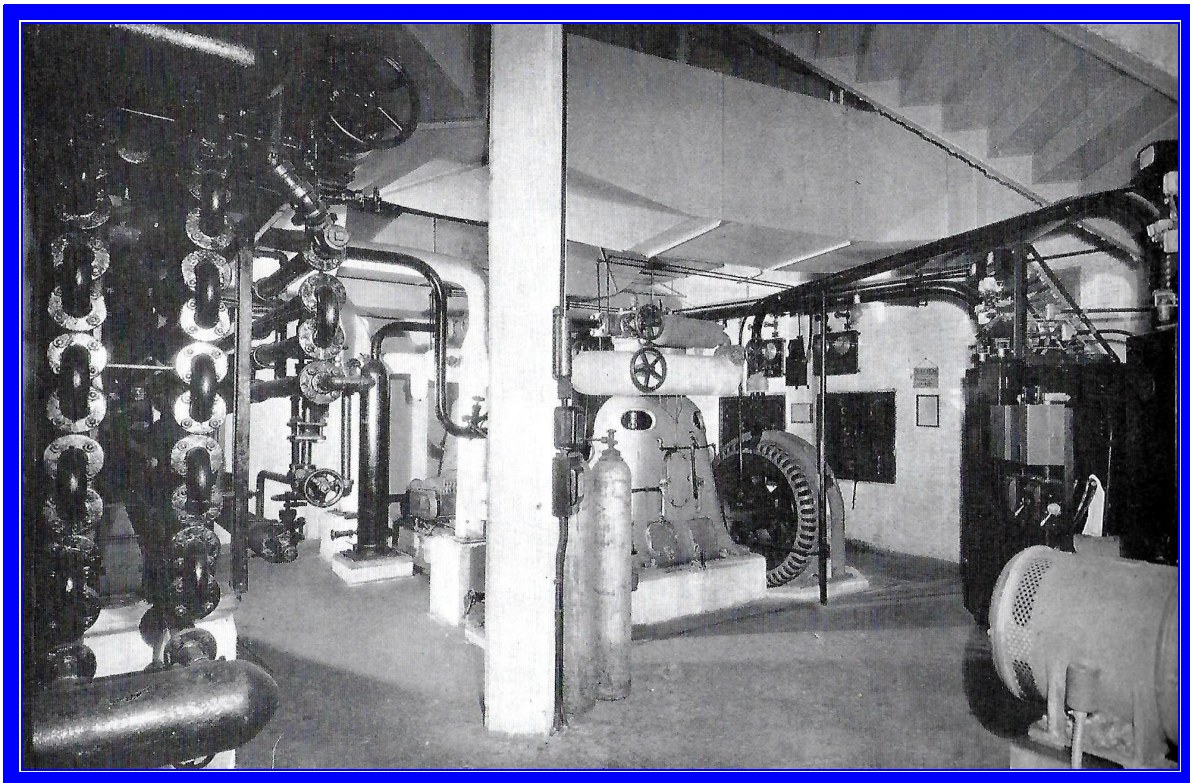


Carrier air conditioning system, 1927 showing air duct and roof-mounted cooling tower
The Best Remaining Seats: The Golden Age of the Movie Palace, Ben M Hall, Da Capo, 1987

REFRIGERATION *for* AIR CONDITIONING

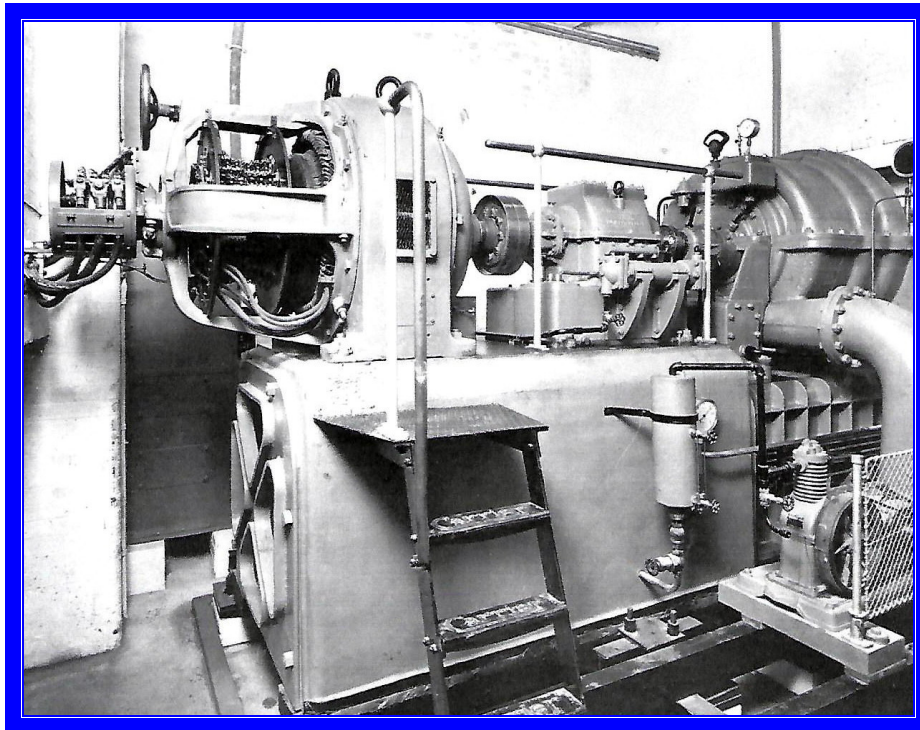


*CO₂ Refrigerating machine, Davis Theatre, Pittsburgh 1925
Wittenmeier Machine Company, Chicago*

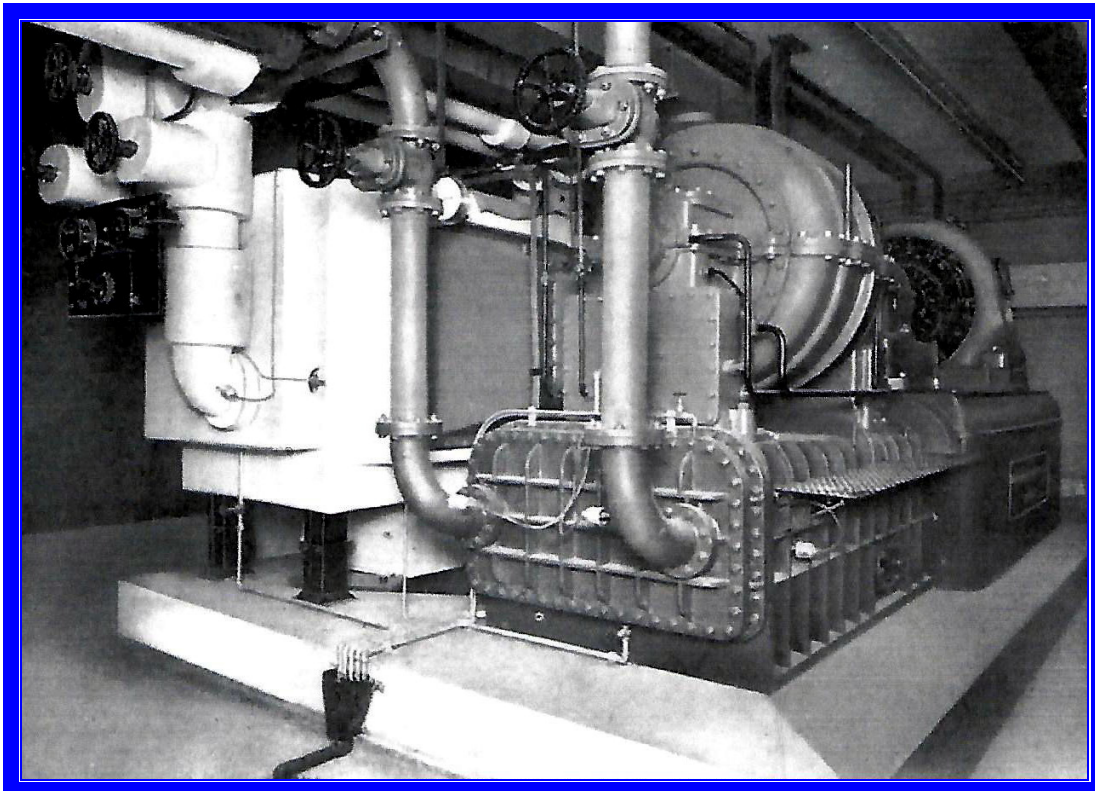


*Refrigeration plant, Kings Theatre, Brooklyn, New York 1929
(American Theatres of Today)*

REFRIGERATION *for* AIR CONDITIONING

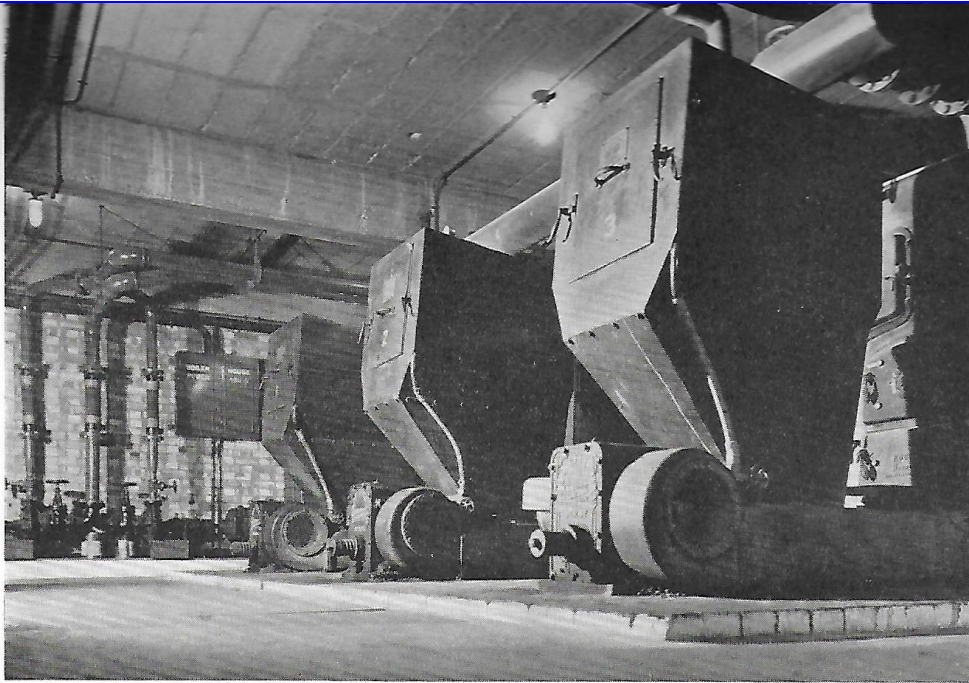


*Carrier centrifugal chiller at Carlton Theatre Haymarket, London 1927
The first fully air conditioned theatre in Britain (CIBSE Heritage Group Archives)*

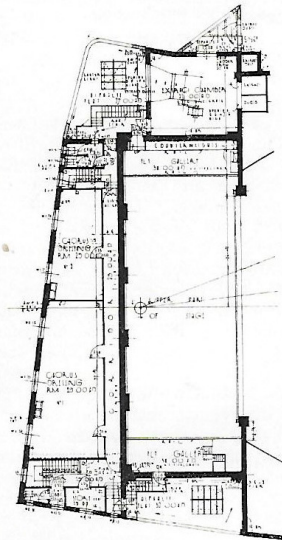
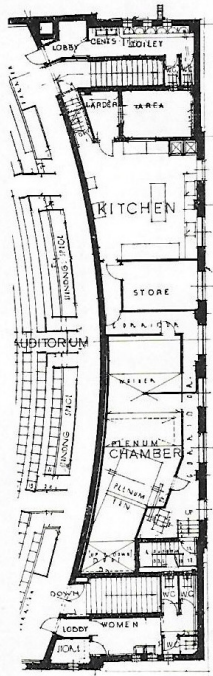
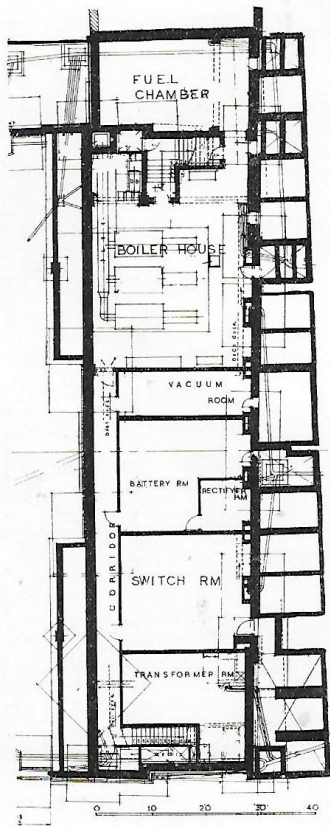


*Carrier centrifugal chiller 220 TR Empire Leicester Square, London
From 1930s Carrier catalogue (CIBSE Heritage Group Archives)*

WARMING AND VENTILATING

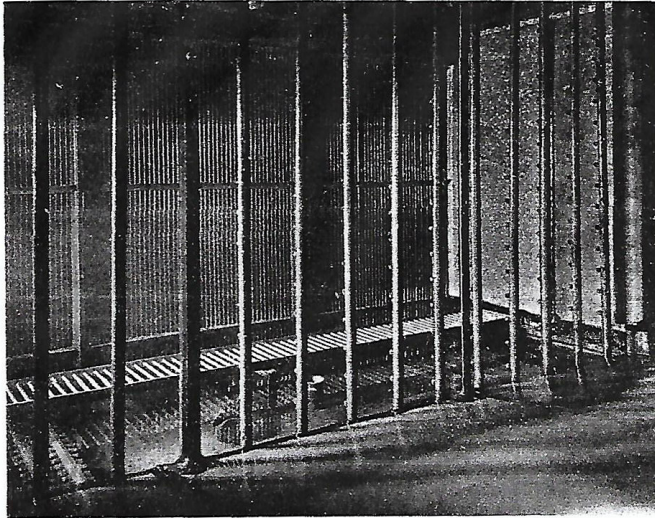


The boiler house usually accommodates three hot water circulating boilers, domestic hot water supply boiler, incinerator, circulating pumps, and electrical starting gear.

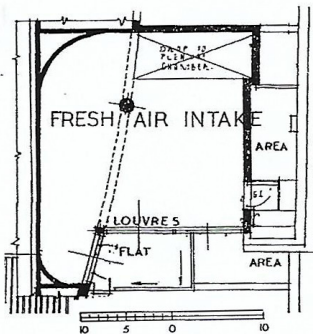


Plans of the accommodation for warming and ventilation. In this case the boiler house is in the basement, the plenum chamber on the third floor, both units being planned in the south—the main front of the cinema. The extract chamber above the property room at the stage end—the opposite end of the building—contains the centrifugal fan, which extracts approximately 75 per cent. of the air to ensure a balanced plenum system.

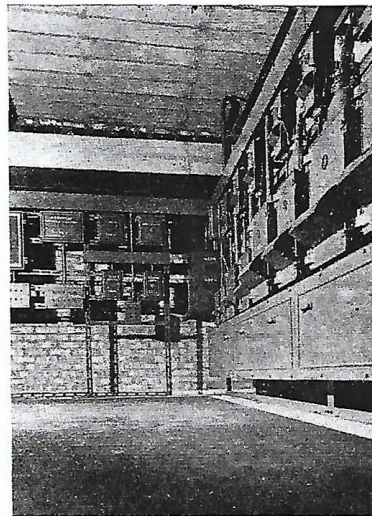
WARMING AND VENTILATING



In the air washer the air is drawn from the back, through a series of banks of fine water sprays into the chamber shown and over the ceiling. It is then forced through the gilled type heaters and into the theatre at convenient points.



The fresh air intake, planned in the roof at the front of the building. As its name implies, it is from here that fresh air is drawn into the cinema at the rate of 1,000 cubic ft. per person per hour.



Part of the main switchboard in the large intake switch room.

statically controlled from points in the auditorium when any desired set temperature is reached.

The plenum chamber is planned in the most convenient position to take the supply of fresh air, and houses the large centrifugal intake fan and motor, washer plant, circulating pumps, pre-heaters, etc. The fresh air is drawn through a series of banks of fine water sprays to extract the impurities, then through the gilled type heaters, and passed into the theatre at convenient points through sheet metal or builders' ducts at the rate of 1,000 cu. ft. per person per hour in the auditorium, and at the rate of four changes per hour to the vestibules, foyers and café. Staircases, toilets, stage, dressing rooms, staff rooms, etc., are heated by radiators.

The extract chamber is usually placed at the stage end. It houses the centrifugal fan the duty of which it is to extract the equivalent of approximately 75 per cent. of the volume of air forced into the building by the inlet fan to ensure a balanced plenum system. In a cinema equipped with a stage and fireproof curtain two-thirds of the vitiated air is extracted from a position immediately in front of the proscenium, together with a separate extract from the stage itself. Broadly speaking this means in practice that the fresh-air inlet grilles are placed at the back and sides of the auditorium, and the extract grilles in front of the proscenium. This very necessary provision for the changing of the air often proves a thorn in the architect's side when designing the interior decoration. How many of the general public realize that this adjunct to their comfort and health incurs an expenditure of from six to eight thousand pounds?

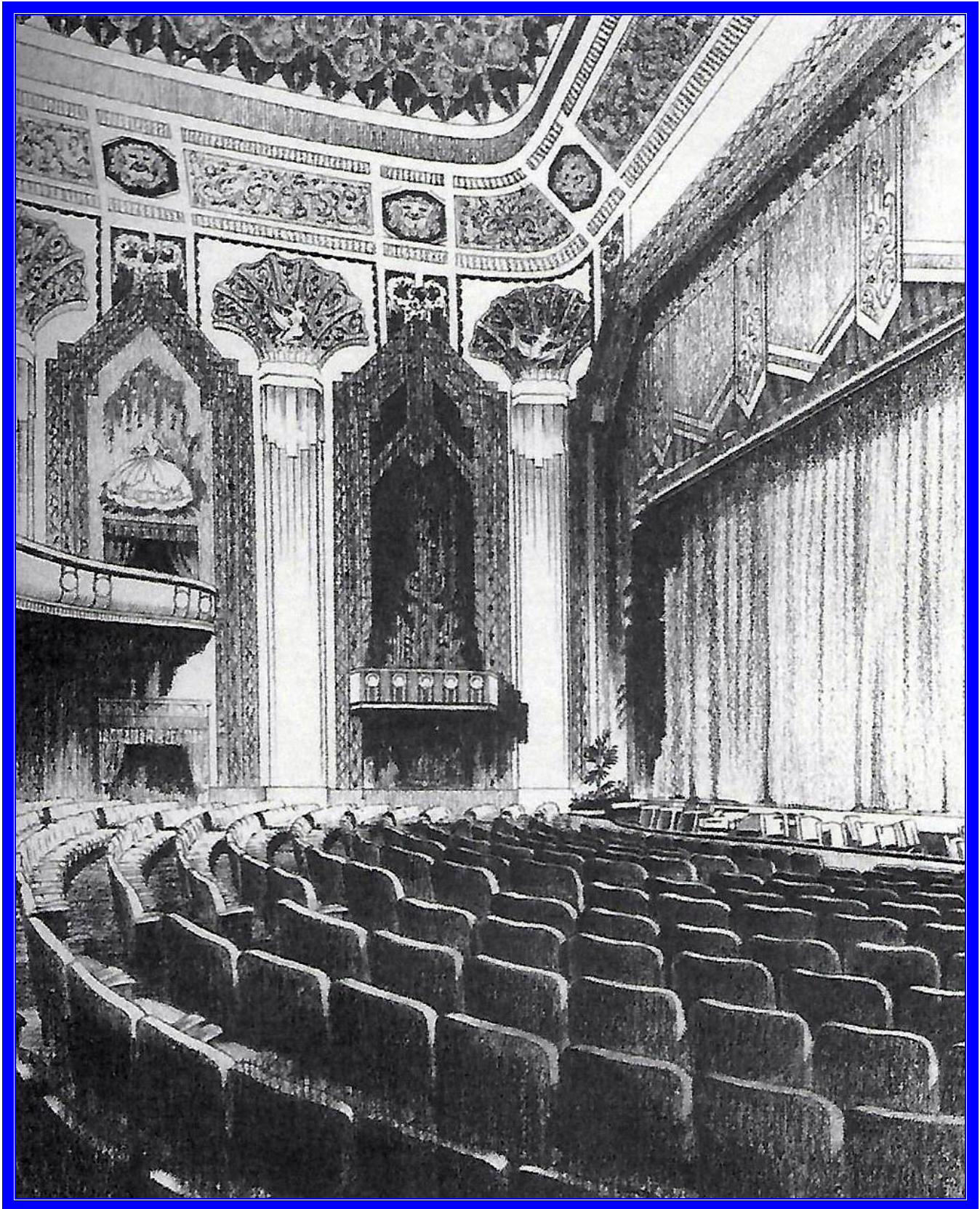
chamber and extract fan chamber. The boiler house is usually planned in the basement of sufficient size to accommodate three hot-water circulating boilers, domestic h.w. supply boiler, incinerator, circulating pumps, and the necessary electrical starting gear, with, say, a ten-ton capacity solid fuel store adjoining. It is very economical and satisfactory to equip the boilers with underfeed mechanical stokers as this permits of the use of small, cheap coal. Except for the occasional filling of the hoppers the stokers are entirely automatic in action, and can be thermo-

WARMING AND VENTILATING.

Warming and ventilating necessitates the provision of a boiler house, plenum

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*Paramount Theatre Leeds, Air Conditioned by Carrier UK 150 TR, 1932
(Indoor Air by Carrier, CIBSE Heritage Group Archive)*

*Back cover: Ventilation Butterfly Theatre, Milwaukee 1919
(Ticket to Paradise)*



BUTTERFLY THEATRE, Milwaukee, Wis.
Most Luxurious, Exclusive, Refined
Photo-Play House in America.
Absolutely Fireproof—Perfect Ventilation.
Change of Program Daily.
Complete Change of Air Every 3 Minutes.