

# FREDERICK WITTENMEIER and the CO<sub>2</sub> REFRIGERATING MACHINE

by Brian Roberts, CIBSE Heritage Group



*Frederick Wittenmeier, 1863-1928*

Frederick Wittenmeier was born in Zweibrucken in Germany on the 30th May, 1863. He obtained a thorough training in mechanical engineering in Germany where he worked in the steam-fitting business. He migrated to the USA in 1881, moving to Chicago in 1885.

Wittenmeier became an important pioneer in the development of the carbon dioxide refrigerating machine and in the early introduction of air conditioning in movie theatres.

## **THE EARLY HISTORY OF CARBON DIOXIDE REFRIGERATION**

The idea of carbon dioxide (also known as carbonic acid gas and carbonic anhydride) refrigeration systems can be traced back to the American civil engineer and professor Alexander Catlin Twining (who advanced the earlier work of Evans, Perkins and Hague) by building a vapour-compression ice-making plant in 1853, based on his US Patent 10,221 of 1853. The claim in his earlier British Patent, BP 13,167: 1850, that he invented the vapour-compression process itself proved to be insupportable. The American Civil War prevented Twining's efforts to make ice in the South.

During the 1850s, James Harrison, a Scotsman working in Australia, also obtained a number of British Patents for his machines, though he first used ether as a refrigerant.

Another early pioneer was Carl von Linde who experimented with carbon dioxide when in 1882 he designed a machine for Krupps in Essen, Germany. (Linde preferred and developed ammonia machines).

Raydt received BP 15475:1884 for a compression ice-making system using carbon dioxide.

The breakthrough came when Franz Windhausen of Germany designed a carbon dioxide compressor and obtained BP 2864: 1866 which was purchased and improved upon by J & E Hall and found widespread application for refrigerated cargo ships.

## **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).”

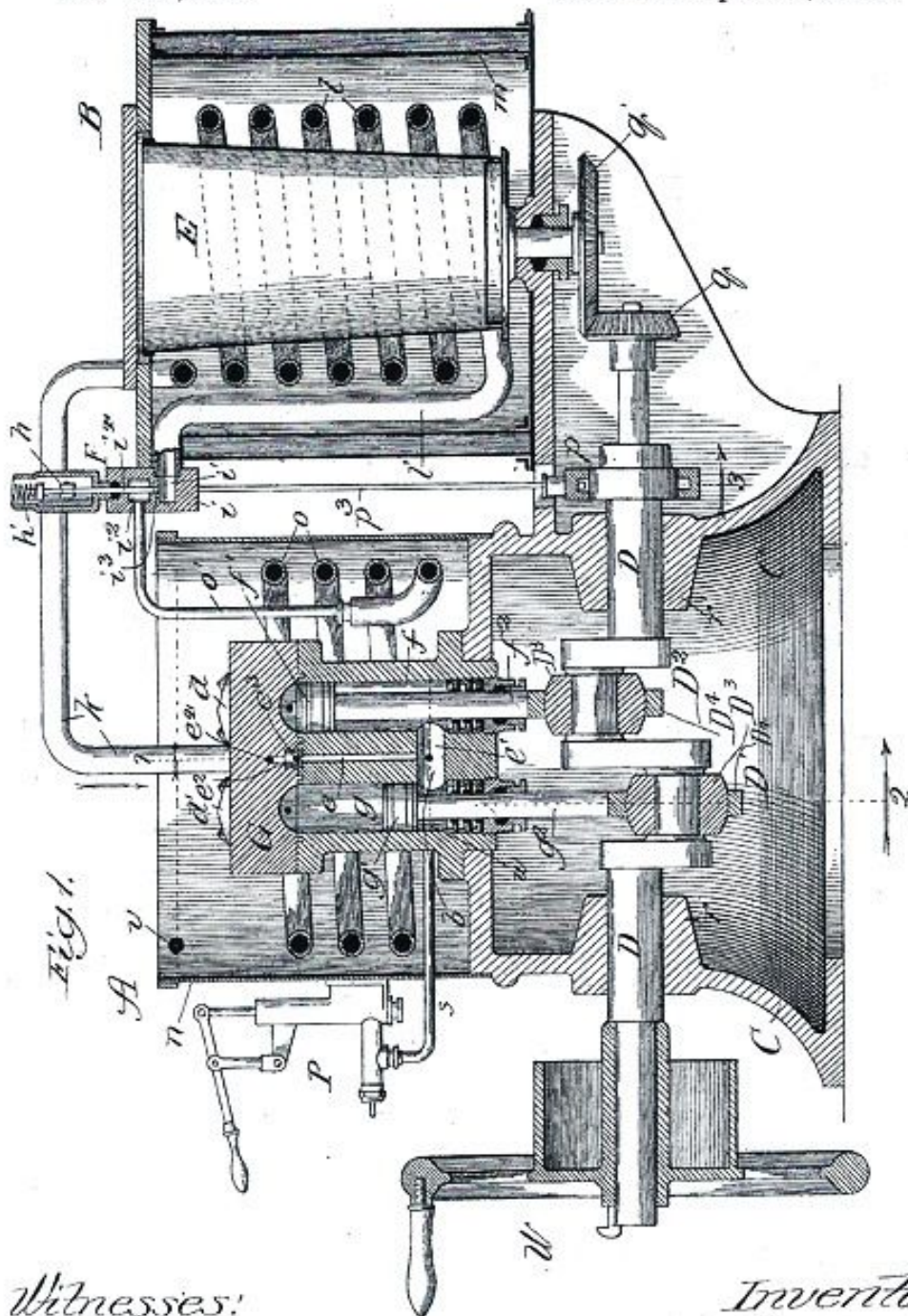
(No Model.)

3 Sheets—Sheet 1

J. SEDLACEK.  
REFRIGERATING MACHINE.

No. 602,199.

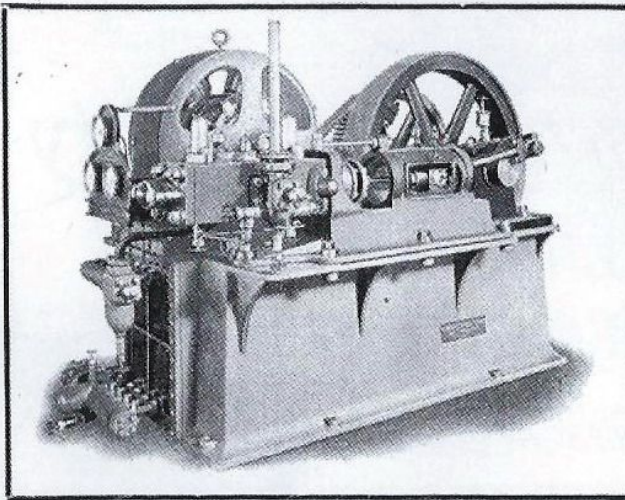
Patented Apr. 12, 1898.



Witnesses:  
Charles E. Gaylord,  
John J. Miller

Inventor  
Julius Sedlacek,  
By Dyrenforth & Dyrenforth,  
ATTORNEYS.





## 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. ❧ ❧ ❧

**KROESCHELL BROS. ICE MACHINE CO.**  
29-39 Erie Street                      CHICAGO, ILL.

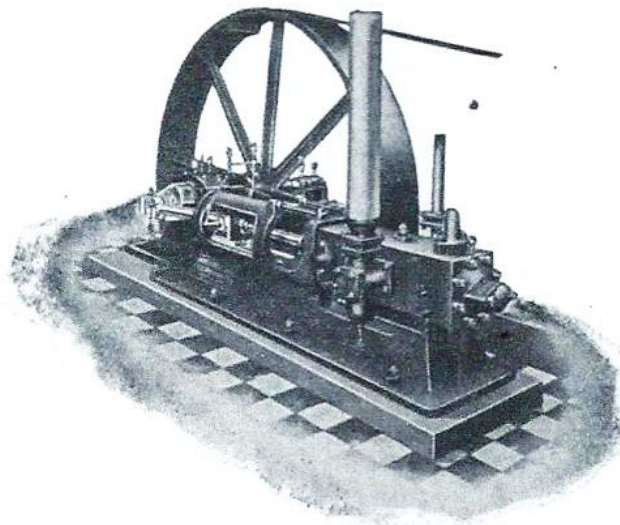
Write for Catalog

1904

# KROESCHELL

## CARBONIC ANHYDRIDE SYSTEM

SAFE  
—  
ECONOMICAL  
—  
EFFICIENT



FOR  
ICE MAKING  
AND  
REFRIGERATION

Catalog And Information On Request

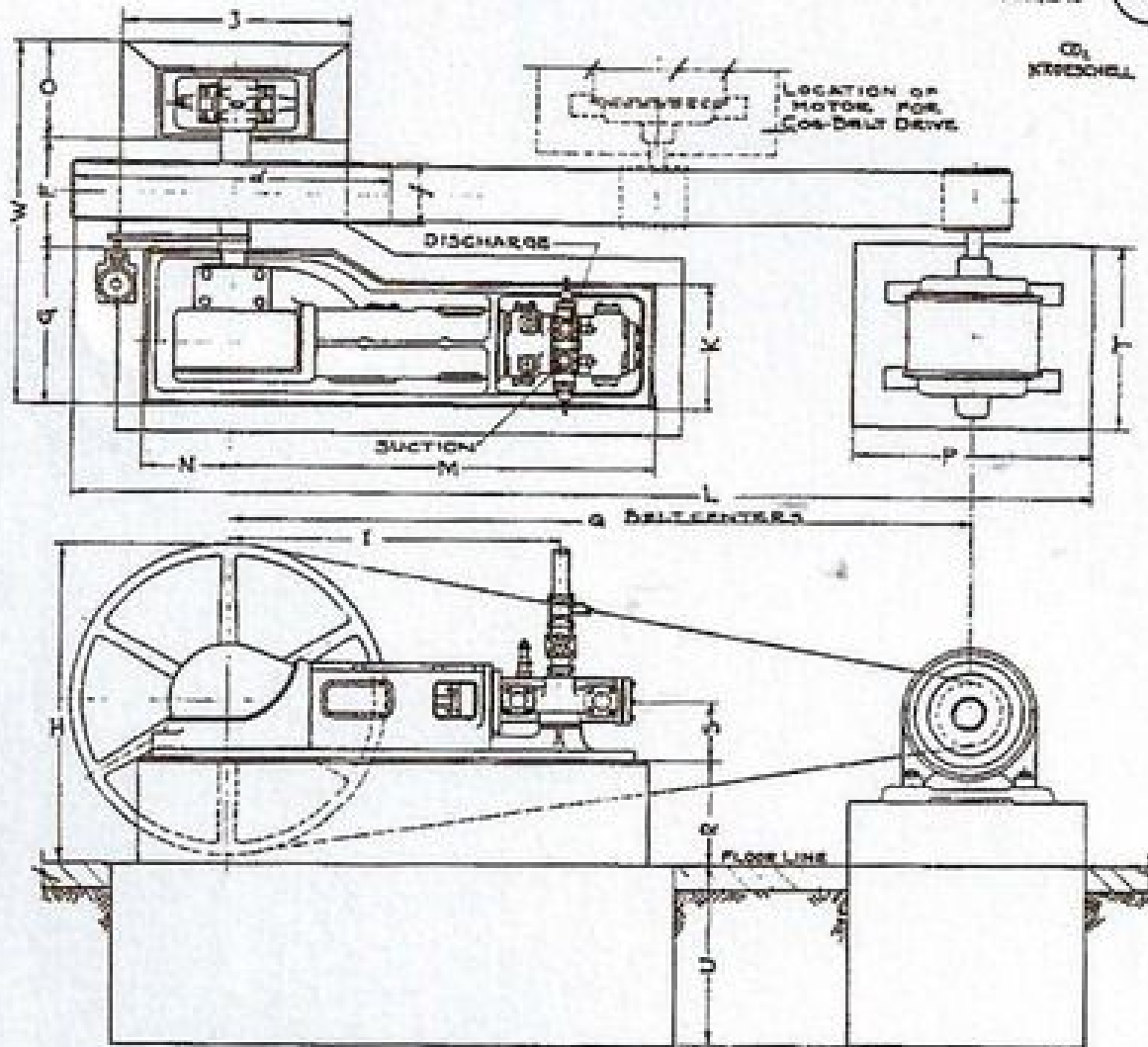
**KROESCHELL BROS. ICE MACHINE CO.**

MAIN OFFICE AND WORKS  
472 W. ERIE ST., CHICAGO, ILL

EASTERN OFFICE  
30 CHURCH ST., NEW YORK, N. Y.

1920

CO<sub>2</sub>  
KROESCHELL



DIMENSIONS									
	HD	H-12	H-13	H-14		HD	H-12	H-13	H-14
F	17	24	32	40	U	22	30	40	50
G	2-7	3-1	5-8	4-7	W	5-8	7-8	8-4	9-8
H	5-6	6-3	8-3	8-6	d	60	72	90	120
I	5-6	6-3	7-7	8-3	f	13	15	25	31
J	3-6	4-6	5-6	6-6	g	2	2	3	3
K	2-7	2-4	2-8	3-4	h	2	2	3	3
L	18-4	20-6	24-3	28-0	h	1	1	1	1
M	6-7	8-8	9-6	11-6					
N	17	20	20	2-4					
O	20	23	2-7	2-7	V	1	1	2	2
P	4-6	5-6	6-6	6-6	W	32	50	124	200
Q	14-6	16-6	18-6	20-6	X	22	30	37	47
R	2-9	2-4	2-7	2-7	Y	37	103	175	310
S	11	13	17	21	Z	58	102	144	260
T	4-6	4-6	4-6	5-6					

V - DIA. PISTON ROD - IN INCHES  
W - WT. PISTON & ROD - IN POUNDS  
X - LENGTH CONNECTING ROD - IN INCHES  
Y - WT. CONNECTING ROD - IN POUNDS  
Z - WT. CROSSHEAD - IN POUNDS

NOTE:  
COMPRESSION RINGS D-E SHOULD NOT BE USED  
FOR SUCTION TEMPERATURES BELOW +25° F.

DO NOT USE FOR CONSTRUCTION

MARCH 15, 1930









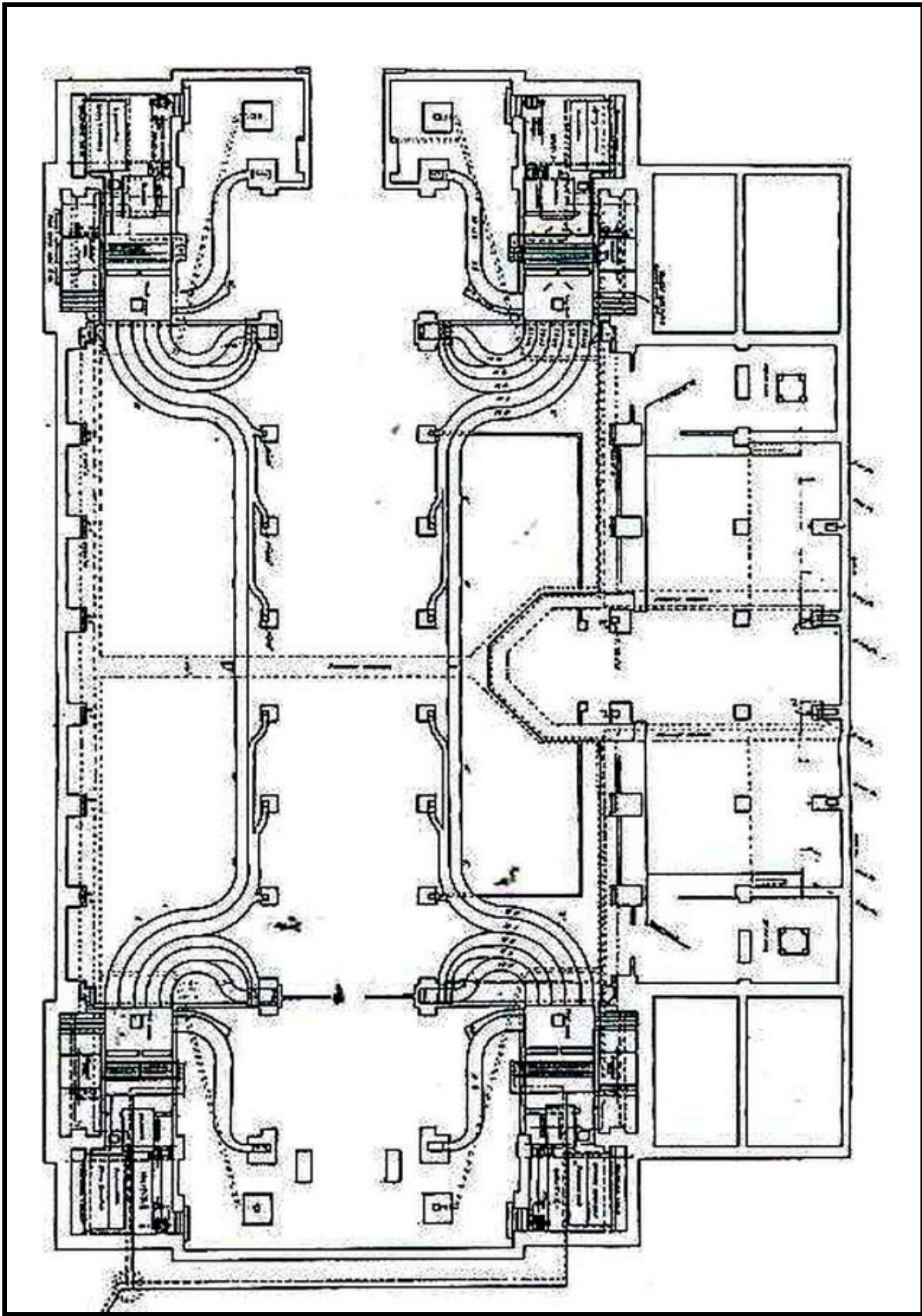
## WITTENMEIER and KROESCHELL BROS ICE MACHINE COMPANY

The Company, with Wittenmeier as Chief Engineer, manufactured CO<sub>2</sub> refrigerating compressors, condensers and brine coolers, high pressure CO<sub>2</sub> valves and fittings for cold storage systems.

As noted by Gail Cooper, “Under Wittenmeier’s leadership, Kroeschell Ice Machine Company installed several early carbon dioxide systems, most notably in the Pompeian Room and Banquet Hall of the Congress Hotel in Chicago in 1907, and in Frank Lloyd Wright’s Larkin Building (built 1904) in Buffalo in 1909. Then sometime before October 1910, Wittenmeier took advantage of the safety and versatility of carbon dioxide to design an air conditioner that placed direct-expansion coils within the spray chamber of the washer itself (See his Patents, USP 988,613 and USP 1,003,129, both of 1911, for *Air Cooling Apparatus*, illustrated in Appendix I). Wittenmeier’s incorporation of refrigeration coils into an air washer was explicitly aimed at the control of cleanliness, temperature and humidity- in other words at the development of an air conditioning system.”



The Pompeian Room of the Congress Hotel in Chicago was air conditioned in 1907 using a Kroeschell CO<sub>2</sub> refrigerating plant.



*This plan shows the 1904 layout of the ventilation system for the Larkin Building in Buffalo*

One report states that a Kroeschell CO<sub>2</sub> refrigerating plant was added for cooling in 1909.



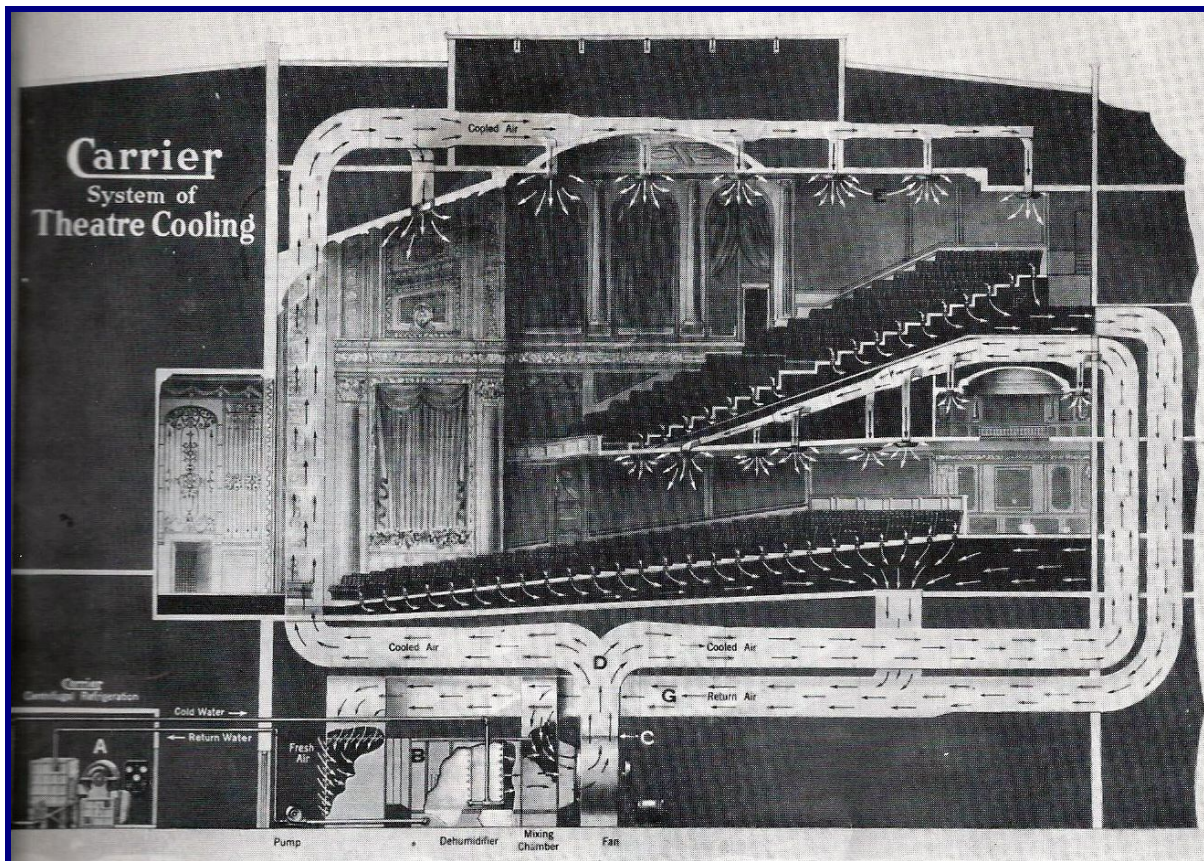


In 1919 Kroeschell, now the Brunswick-Kroeschell Company provided a 250 TR carbon dioxide refrigerating plant for the new 2260 seat State-Lake Theatre in Chicago, part of the Orpheum chain.





In 1922, Kroeschell provided a CO<sub>2</sub> machine for the Los Angeles Metropolitan Theatre though the air conditioning system was designed and installed by Carrier Engineering Corporation. A Carrier diagram of the installation (below) shows the new Carrier *Upside Down* (Overhead Supply) method of air distribution which was to supplant the underfloor “Upward Supply Air” method then in common use. The Carrier diagram has replaced the actual Kroeschell machine with a picture of their own centrifugal water chiller (bottom left of picture).

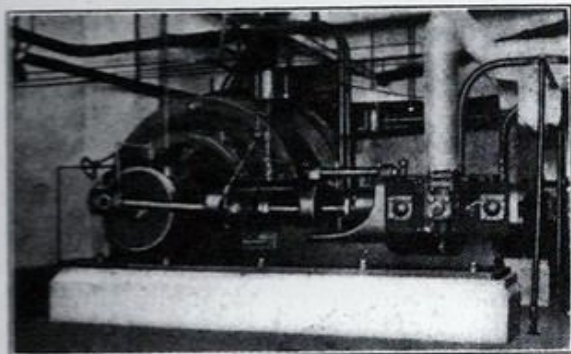




# Ventilation

## Complete Air Conditioning Installations

### Cooling—Refrigerating—Washing



*Wittenmeier Horizontal Compressor CO2*

#### *A Few Representative Installations*

CAPITOL THEATRE, New York, N. Y.  
 WARNER BROS. THEATRE, New York, N. Y.  
 KEITH'S FORDHAM, New York, N. Y.  
 LOEW'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.  
 ILLINOIS CENTRAL R. R. HOSPITAL, Paducah, Ky.  
 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.

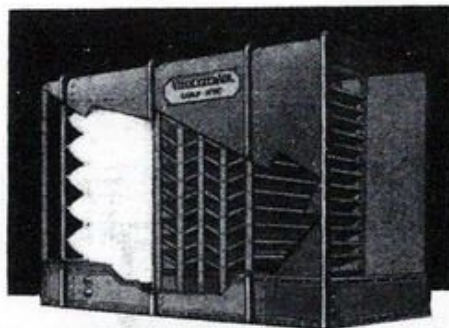
WHEREVER comfort and efficiency require cooled or refrigerated air, Wittenmeier-Vitolyzed-Air equipment delivers it.

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

Simple in design, construction and in operation, once installed they become almost automatic, requiring a minimum of time on the part of mechanic or engineer.

No matter what problem of cooling or refrigeration presents itself to you, we have sometime, somewhere faced and solved a problem similar in its main essentials—and installed the necessary apparatus.

Our experience is at your service. Full information supplied gladly upon request.



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

*One Contract---One Responsibility*

# WITTENMEIER-VITOLYZED-AIR

1926 BROADWAY—NEW YORK CITY

## *A Few Representative Installations*

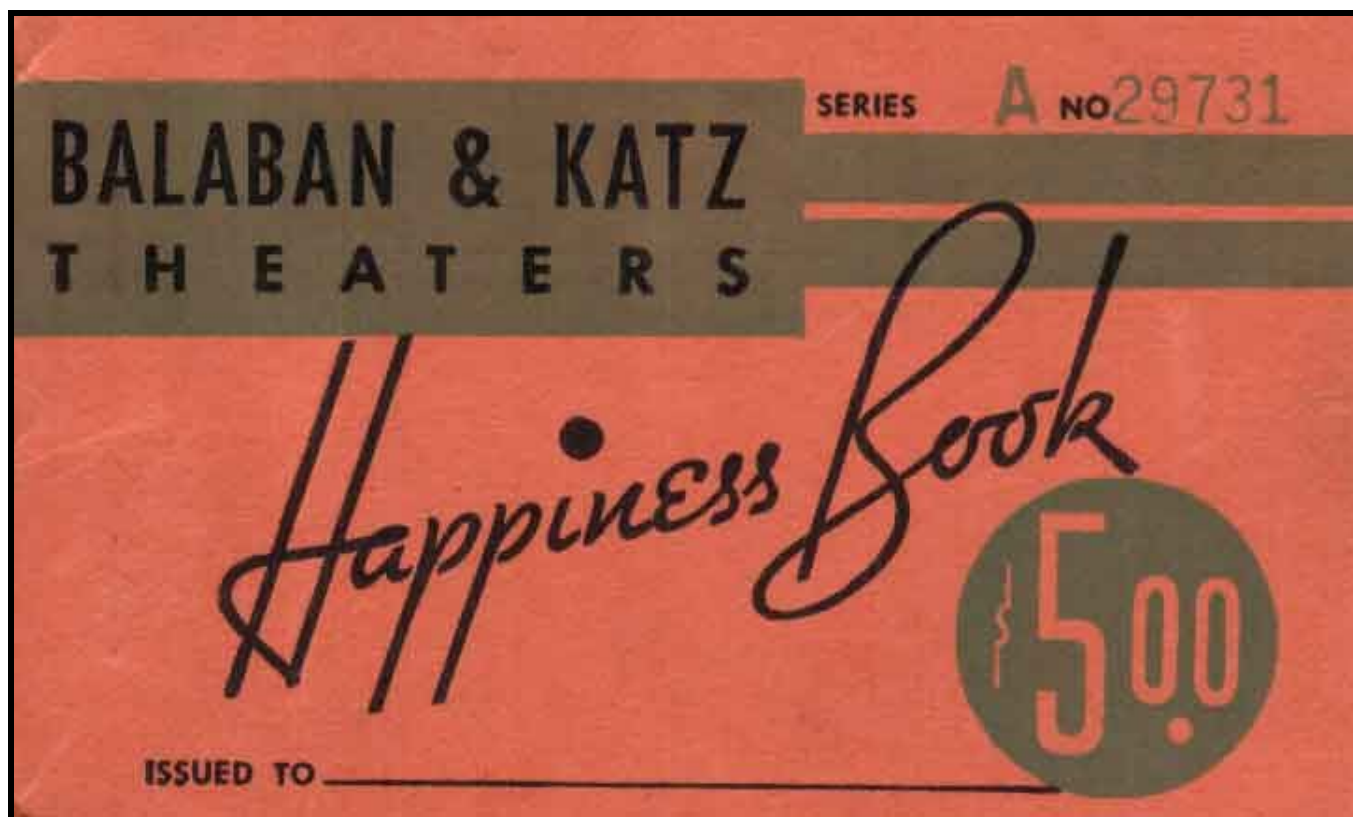
CAPITOL THEATRE, New York, N. Y.  
WARNER BROS. THEATRE, New York, N. Y.  
KEITH'S FORDHAM, New York, N. Y.  
LOEW'S NEW ROCHELLE, New Rochelle, N. Y.  
FOX ACADEMY OF MUSIC, New York, N. Y.  
UNITED ARTISTS THEATRE, Los Angeles, Calif.  
METROPOLITAN THEATRE, Boston, Mass.  
PYTHIAN TEMPLE, New York, 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.  
ILLINOIS CENTRAL R. R. HOSPITAL, Paducah, Ky.  
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.



## THE BALABAN & KATZ MOVIE THEATRE CHAIN



Two sets of brothers, Barney and Abe Balaban, and Sam and Maurice Katz, founded the Balaban & Katz Movie Theatre Chain in Chicago and opened their Central Park Theatre on the 27<sup>th</sup> October, 1917. The architecture and decoration by architects Rapp & Rapp was breathtaking but a major talking point was the introduction of air conditioning and this gave Balaban & Katz an edge over their competitors. As Barney Balaban recalled: "Up until then no one ever thought of going to the theatre in the summer time, but we proved that we could do business fifty-two weeks a year."



The air conditioning system at Central Park proved so successful that Balaban & Katz made it a standard feature in their chain of Chicago Theatres.

The Kroeschell Ice Machine Company provided CO<sub>2</sub> refrigeration for the air conditioning of the Central Park (1917) and possibly for the Riviera Theatre (1919). However in 1917, Kroeschell's Chief Engineer, Frederick Wittenmeier, set up his own business the Wittenmeier Machinery Company "devoted to the exclusive manufacture of carbonic refrigerating machines and apparatus." Balaban & Katz continued to build and open air conditioned theatres and at some point Wittenmeier secured the business and installed refrigerating machines of his manufacture and proudly advertised "Cooling and dehumidifying the air during the summer makes a theatre equipped with Wittenmeier System a profit producer."

The B&K Chicago theatres include the Tivoli Theatre (1921), Chicago Theatre (1921), Oriental Theatre (1924) and the Uptown Theatre (1925). Eventually they operated more than 50 Chicago-area theatres and a total chain of about 150 theatres. Other theatres air conditioned by the Wittenmeier Machine Company include the Capitol in New York (1920), the Orpheum in Minneapolis (1921, see Appendix II) and the Warner New York (1924).

In 1926 Famous Players-Lasky Corporation (forerunner of Paramount Pictures) bought a controlling interest in the Balaban & Katz Corporation.





**RIVIERA**

**BALABAN & KATZ**  
Announce the Only Air Refrigerating  
Systems in Theatrical Use  
—at the—  
**Riviera Theatre**  
Broadway and Lawrence  
**Central Park Theatre**  
W. 12th St. and Central Park

Refreshingly cool air, as invigorating as the balmy mountain breezes, undeniable beauty and exquisite entertainment are the valued possessions of these wonder theaters.

**OUR FREEZING PLANT**  
(JUST INSTALLED)

**Removes the Temper  
from Temperature**

It provides fresh and exhilarating air, chilled to any degree of coolness necessary to our patrons' comfort.

No Heat Is So Intense But That It  
Succumbs to Its Treatment—No  
Humidity So Great But That It  
Disappears Under Its Influence

If you want to escape the summer's heat and humidity and at the same time enjoy the season's best cinematic offerings artistically exploited, visit the RIVIERA and CENTRAL PARK Theaters.

**CENTRAL PARK**

Balaban & Katz advertisement for their Chicago movie theatres, the Riviera opened in 1919, the Central in 1917.





*Central Park Theatre, Chicago, opened in 1917 (1780 seats)*

Wittenemeier's rule of thumb figures for theatre cooling were 2.5 tons of refrigeration for every 1000 cubic feet per minute of supply air in the northern states, increased by 25% for southern areas and appear to be based on 50% outside air. His evaporator design was based on using 1.25-inch iron pipe coils calculated at 35 feet per ton of refrigeration (finned coils were not then in use). Recirculated washer spray water was installed before and after the face of the coils at the rate of 3.5 US gallons per square foot with the air face velocity at 500 feet per minute and a spray water temperature of 58 deg F (to prevent build up of ice). The evaporating temperature of the CO<sub>2</sub> was suggested as 22 degF. The condensing temperature using cooling tower water, often as high as 85 degF, resulted in a gauge pressure of 1240 pounds per square inch necessitating heavy-duty construction of compressor parts and heavy steel pipe and fittings. (Pressure gauges were often scaled in atmospheres to "avoid scaring the operators," for example a pressure of 1240 psig would read 83 atmospheres).

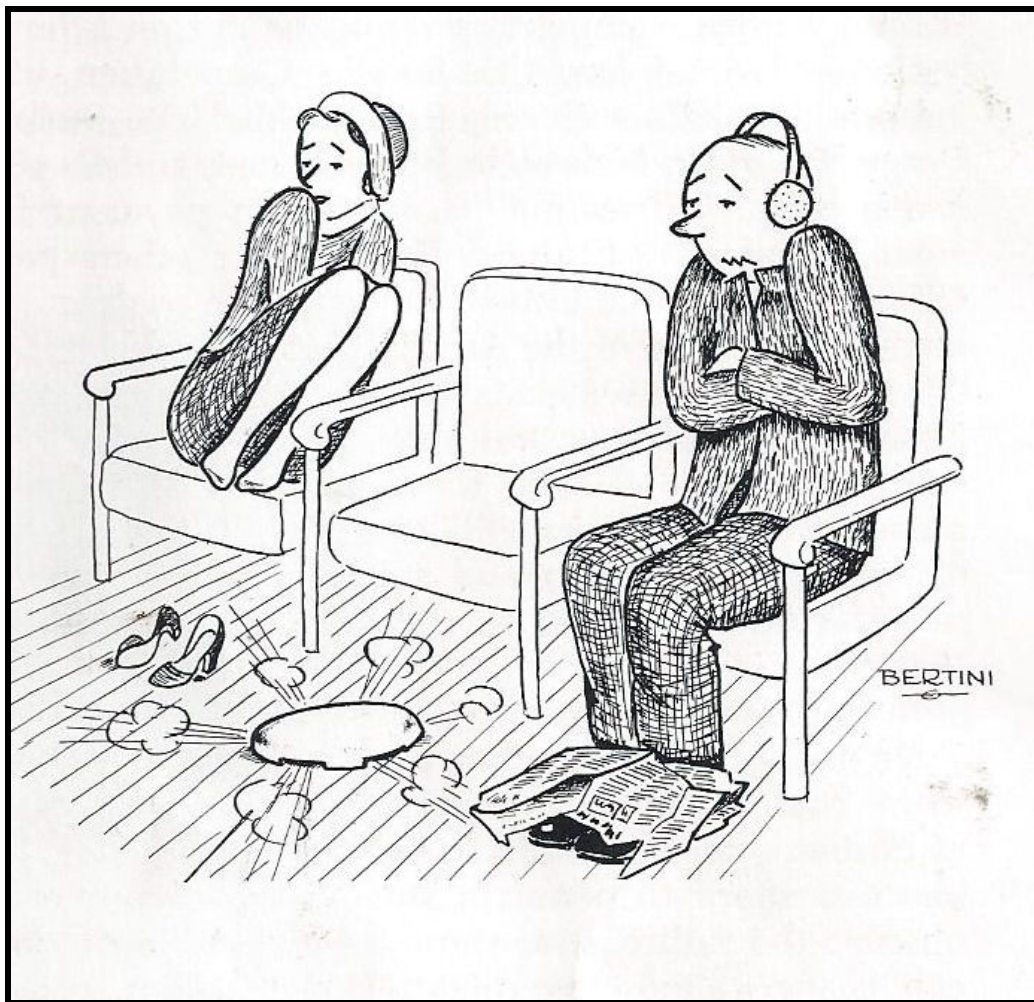




*Roosevelt Theatre, Chicago*

The air conditioned Riviera opened in 1919 with a CO<sub>2</sub> refrigerating plant by the Wittenmeier Machine Company. It has been recorded that the Wittenmeier system “provided for humidification but lacked an effective method for adjusting the humidity level. Air left the air conditioner nearly 100 percent saturated, and the body heat of the audience raised it by about 8 degrees. In the Riviera, that produced a relative humidity of approximately 70 percent. Wittenmeier routinely furnished a temperature of 76-78 (degF) and a relative humidity of 75 percent. I assure you that you will feel comfortable in such a house, he maintained.” Later, other air conditioning engineers and researchers would not agree with Wittenmeier’s statement and the audience complained about cold draughts due to the discharge of cold supply air through floor-mounted mushroom outlets by their feet. (In the past, these outlets had been satisfactory when supplying warm air for heating purposes).





Complaints that the Wittenmeier systems were “cold and clammy” prompted Balaban & Katz in 1919 to consider using Carrier Engineering Corporation (CEC) to design and provide the air conditioning for their next Chicago theatre.

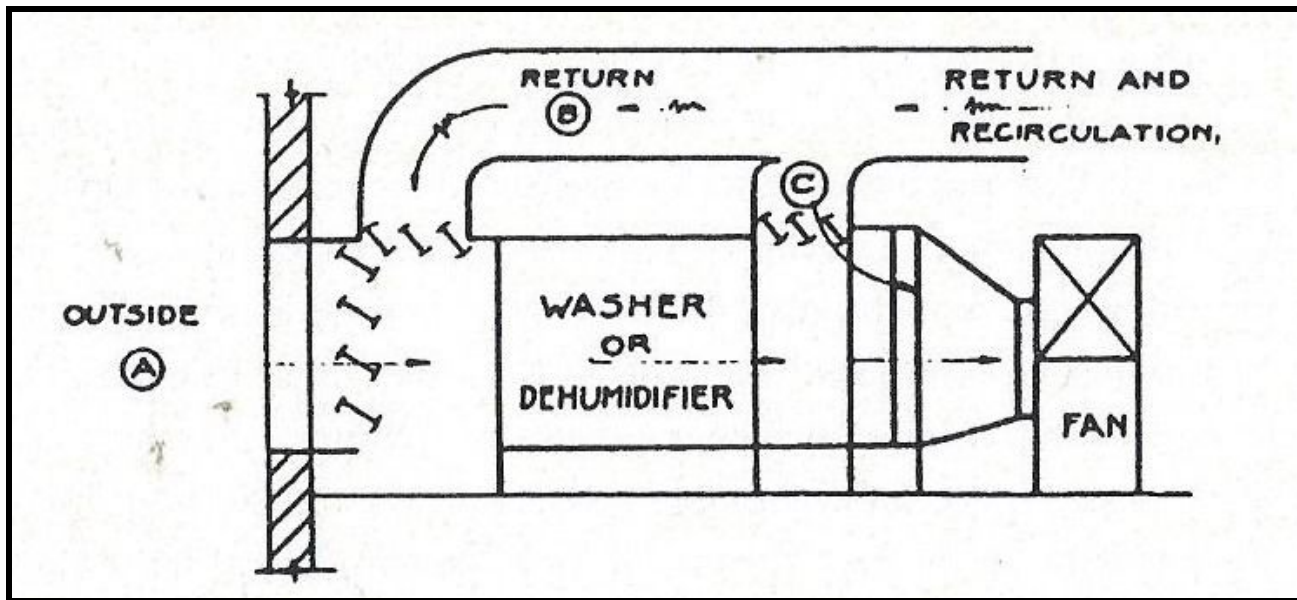
There were three possible solutions to the high relative humidity and cold supply air problem. Wittenmeier had made some improvement by limiting the design dry bulb temperature between inside and outside to 10 degF.

The first option was to reheat the chilled air leaving the direct-expansion coil. CEC had considerable experience of this method from their design of industrial systems with humidity control requirements. However, the additional capital and running costs made it expensive.

The second option was to reduce the air circulation to about 10 to 15 cfm (cubic feet per minute) per person allowing the audience body heat to raise the temperature and lower the humidity (a possibility with a full audience). However, it was a requirement of the Chicago Health Department that 25 cfm of outside fresh air had to be provided.

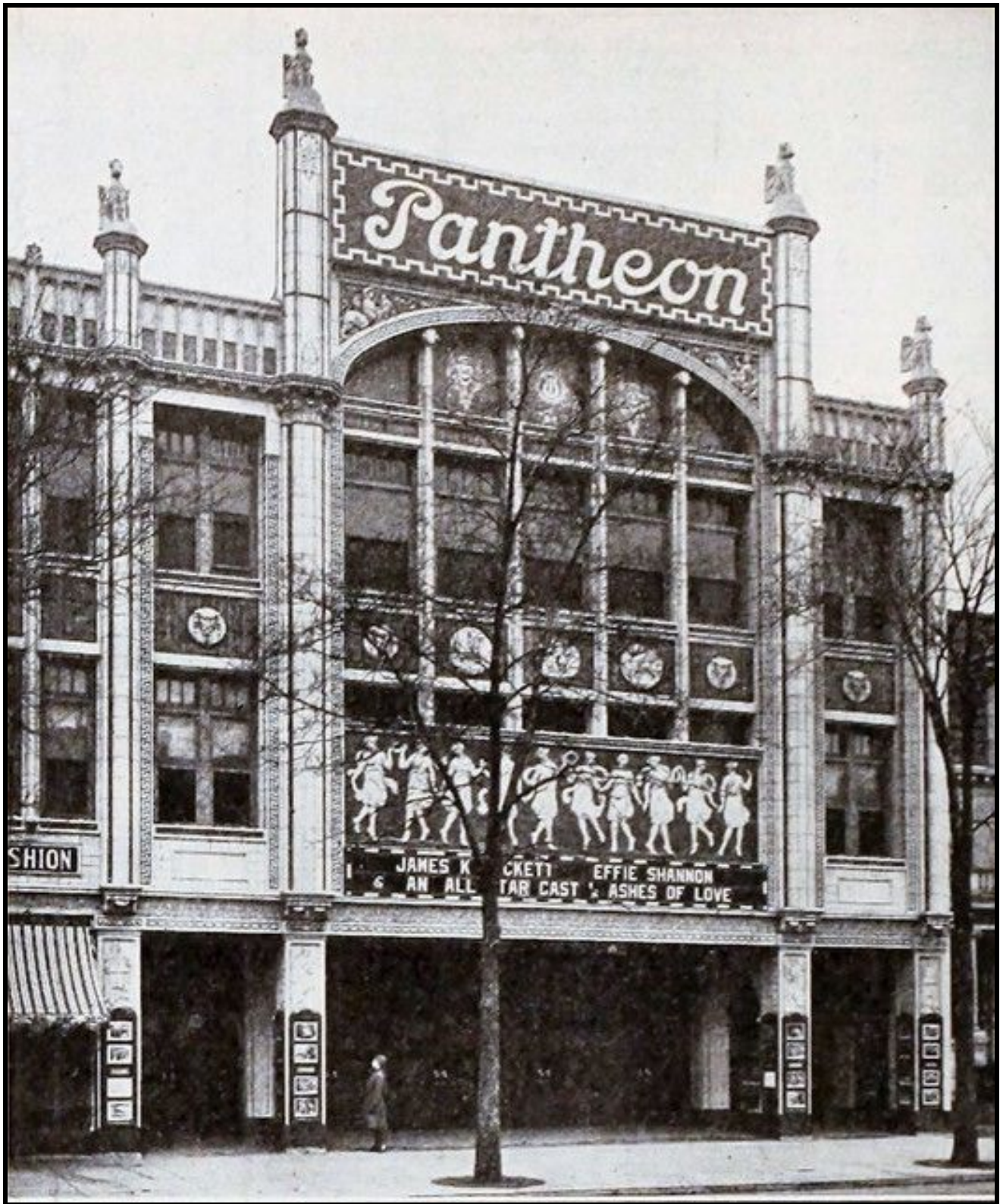


A third option was provide 25 cfm per person but mix 50% fresh air with 50% recirculated air which violated regulations but was, in fact, used by Wittenmeier at the Riviera Theatre (and possibly others). CEC rejected this solution as unacceptable as the desired humidity was not guaranteed. Their proposal was therefore to use a *return air bypass system*\* (see following diagram) but Wittenmeier continued to provide the air conditioning for Balaban & Katz theatres until his death in 1928.



*The Return Air Bypass System*

\*CEC's first bypass system was not installed until 1921 in the Los Angeles Metropolitan Theatre and is illustrated in the Carrier diagram on a previous page. In December 1924, Logan Lewis of CEC filed a patent application for the return air bypass system (and upside-down air distribution) but the pioneering air conditioning engineer Walter Fleisher held a patent for a similar design. So he and CEC joined forces and in 1927 formed the Auditorium Conditioning Corporation which by 1946 had licensed an estimated 90 percent of the comfort air conditioning installations in the USA.



*The Pantheon Theatre, Chicago*

The 3000-seat Pantheon opened in 1919. Around 1924, it installed a central station spray-type air conditioning using apparatus by Walter Fleisher with Sturtevant fans. The CO<sub>2</sub> refrigerating plant was provided by the Brunswick-Kroeschell Company.





*Capitol Theatre, New York*

The Capitol opened in 1919. Air conditioning by the Wittenmeier Machine Company was installed in 1920. The sign under the canopy reads "Largest Theatre Cooling Plant in the World-Now in Operation," while the sign over the entrance doors says "Cooling Plant."

THE  
**CAPITOL**  
THEATRE  
NEW YORK

WORLD'S LARGEST THEATRE



EDWARD BOWES, MANAGING DIRECTOR  
PRESENTATIONS BY S. L. ROTHAFEL

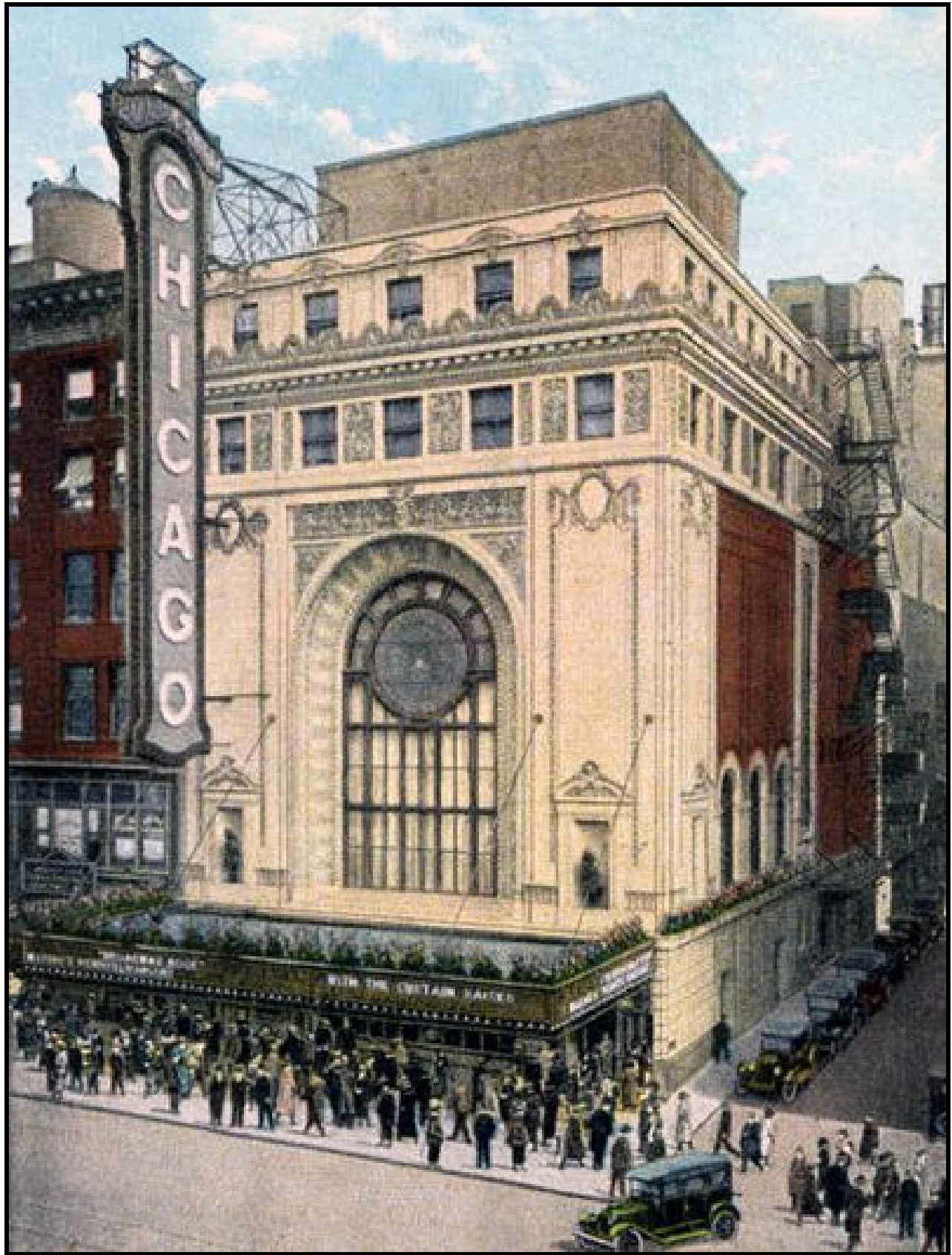
OUR TRUE INTENT IS ALL FOR YOUR DELIGHT





*Tivoli Theatre, Chicago*

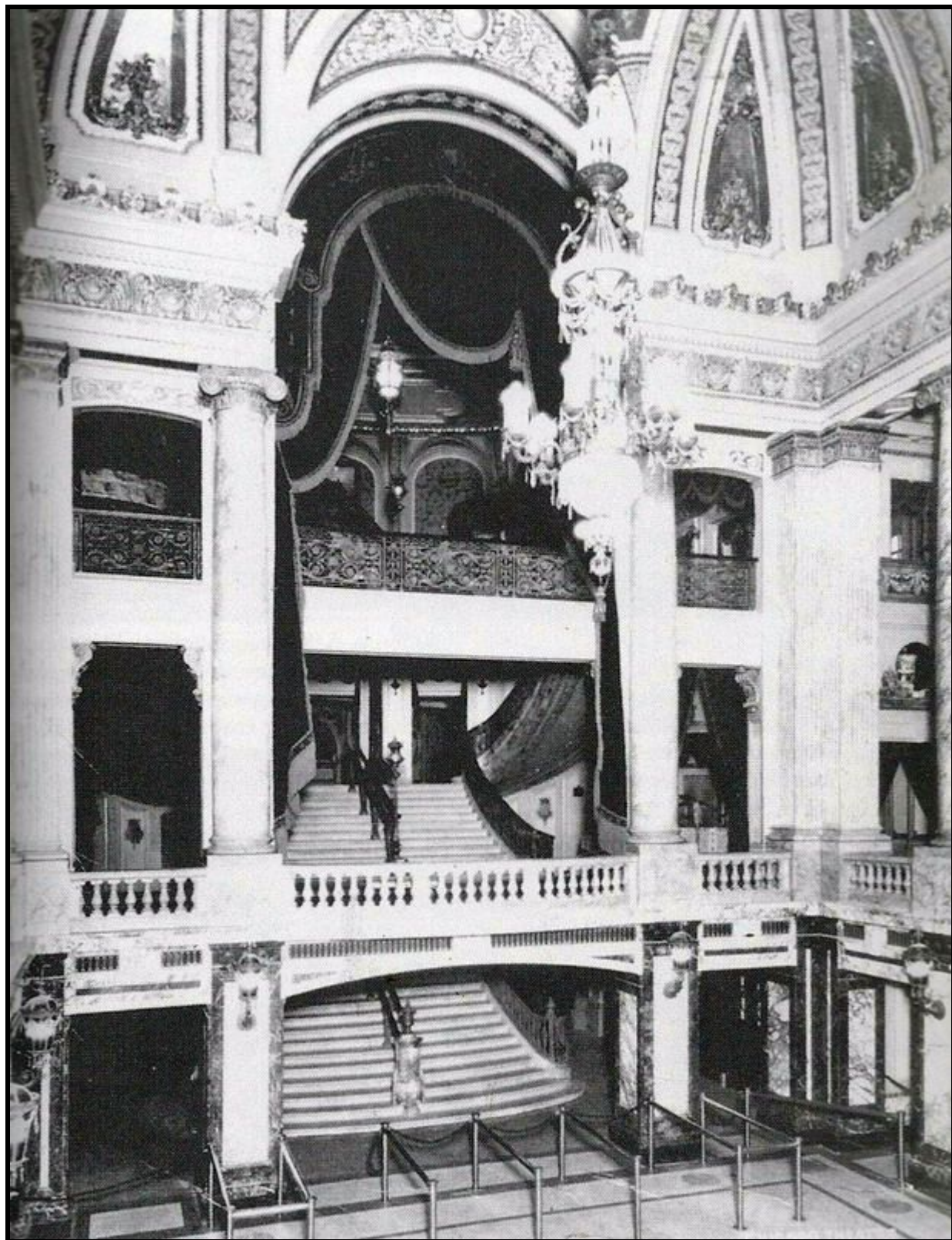
The Tivoli opened in 1921 with a CO<sub>2</sub> refrigerating plant by Wittenmeier Machine Co.



*Chicago Theatre, Chicago*

Opening in 1921, the Chicago was air conditioned by the Wittenmeier Machine Company and included a CO<sub>2</sub> refrigerating plant.





*Grand lobby of the Chicago Theatre*





*Roosevelt Theatre, Chicago*



*Roosevelt Theatre, Chicago (1926 photograph)*

Air conditioned by Wittenmeier, the Roosevelt opened in 1921.



MOTION PICTURES  
DOWNTOWN

MOTION PICTURES  
DOWNTOWN

MOTION PICTURES  
DOWNTOWN

## ATTEND the OPENING TODAY!

(9:30 a.m.—Performances continuous)

TODAY you can feel the thrill of beauty you never thought possible in a theatre! You can step from Randolph street—into the glory and glamor and romance of the Orient!

BALABAN & KATZ

# ORIENTAL

Randolph Near State Street

HERE is a theatre with a daring idea—with a dazzling beauty bringing to Chicago the jeweled splendor of the Far East against a background of soft silks, subtle lights, regal velvets. Here is romance agleam with modern theatre-magic.

In this glorious setting you will enjoy performances as unique as the theatre itself! On the screen, photoplays of note. On the "magic flying stage", newest marvel of stage-craft, you will enjoy as never before, the popular—

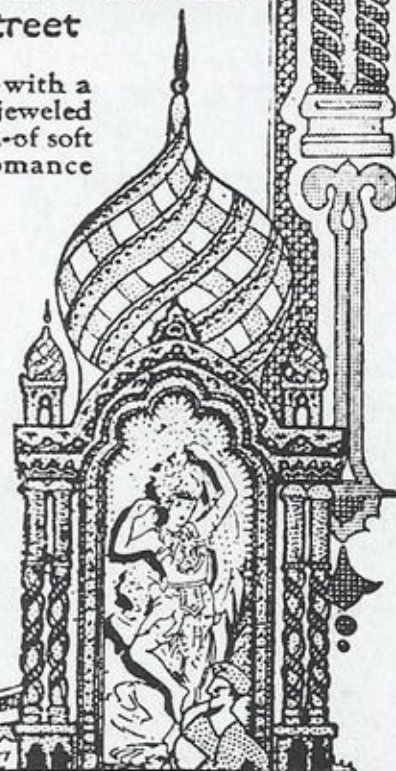
## PAULASH

*and his merry-mad musical gang*

"Insultin' the Sultan" is Paul's first great Oriental production. Milton Watson, Peggy Bernier and a dozen new stars are in this big three-scene syncopation show.

HARRY LANGDON in "Tramp, Tramp, Tramp."  
His first super-comedy feature.

HENRI A. KEATES  
at the organ.



*Oriental Theatre, Chicago*

The Oriental, air conditioned by Wittenmeier, opened in 1926





*Warner Theatre, New York*

In 1926, the Warner Theatre in New York saw the premiere of the film “Don Juan” with a pre-recorded musical soundtrack (The first talkie “The Jazz Singer” followed in 1927).

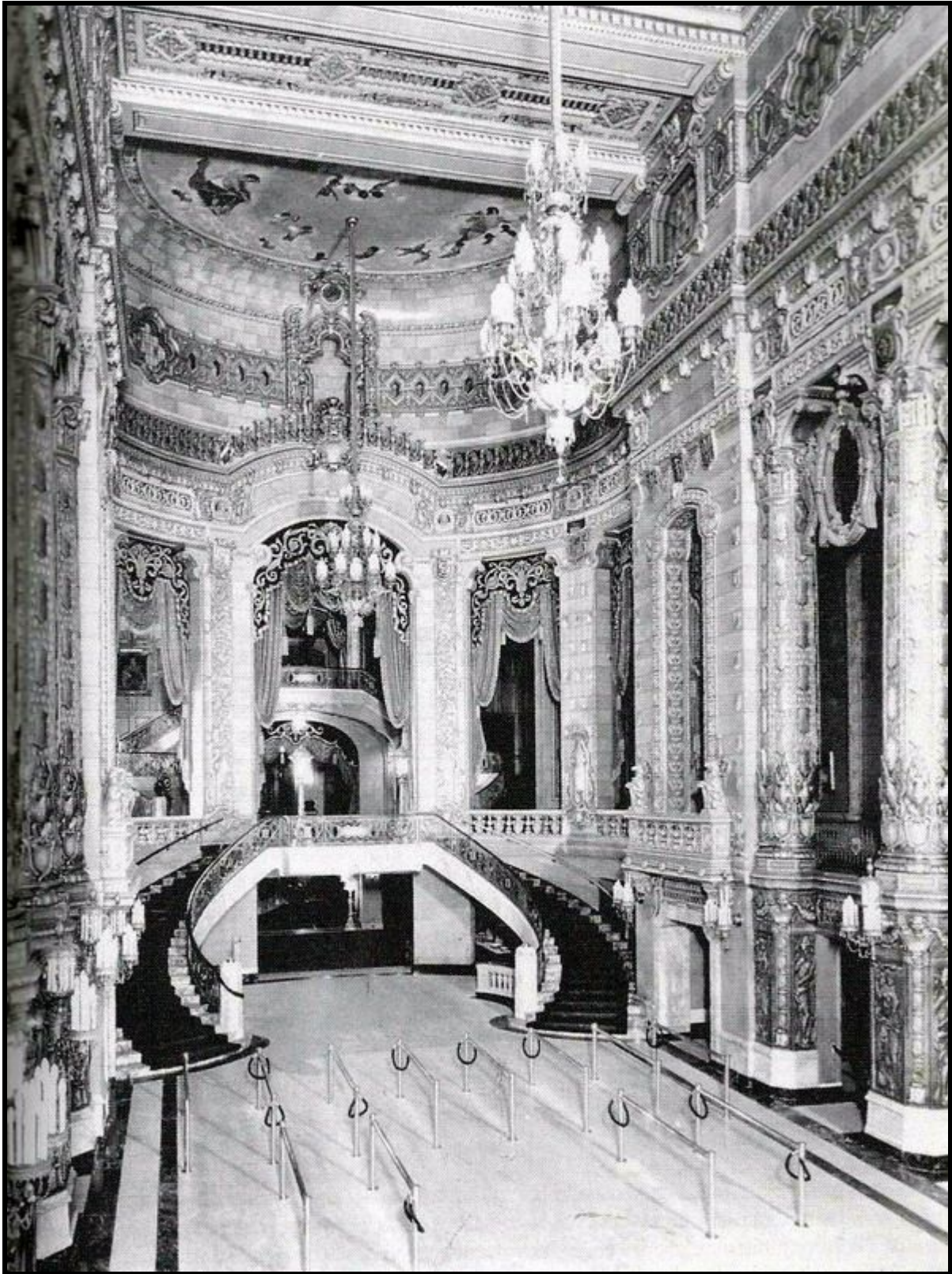
The air conditioning was provided by the Wittenmeier Machinery Company. They provided “vitolyzed air” with an air washer and carbon dioxide direct-expansion refrigeration. Hanging under the canopy is the slogan “Refrigerated Washed Air,” the sign being complete with icicles.





*Uptown Theatre, Chicago*

Opening in 1925, the Chicago was air conditioned using with a CO<sub>2</sub> refrigerating plant by the Wittenmeier Machinery Company



*Lobby of the Uptown Theatre*



**TODAY** At High Noon  
12 o'Clock Sharp  
THE UPTOWN THEATRE  
**OPENS ITS DOORS**


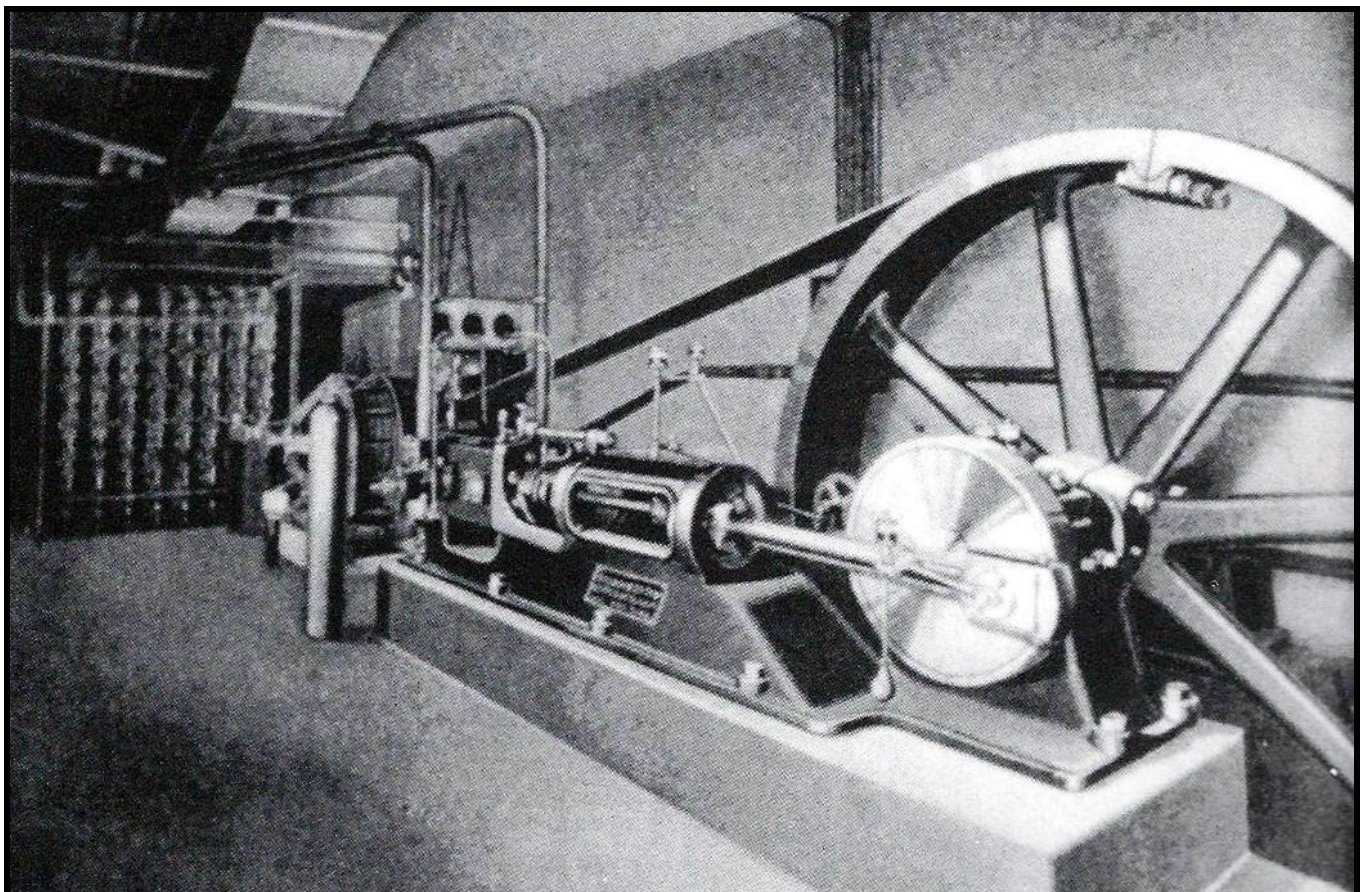
Drop everything and come! The Uptown Theatre's opening is too magnificent a moment to miss. Come for the most awe-inspiring sight of your life—

*There's An Acre of Seats*  
...  
BALABAN & KATZ  
**UPTOWN  
THEATRE**  
*Broadway & Lawrence Ave.*  
NEW YORK CITY

Come for the most enjoyment you ever had in a theatre! A main show of enough splendour to match the swirling grandeur of the dance-hall—floors of gypsies, balancers, dancers, court gentlemen, love-lorn swordsmen out of Old Spain—The Edgewood Beach Hotel Orchestra—and the world premiere of Fox National's "The Lady Who Lied" with Lewis Stone and Virginia Valli.

...  
*Drop Everything and Be There!*

*View of Grand Lobby  
from Mezzanine Balconade*

*The 1925 Wittenmeier CO2 refrigerating plant at the Central Park Theatre, Chicago*



## FOOTNOTE: UPTOWN THEATRE, CHICAGO

What follows are screenshots taken from the 2006 video documentary *Uptown: Portrait of a Palace* (available under this title on the internet). These three black and white pictures date from the mid-1920s.

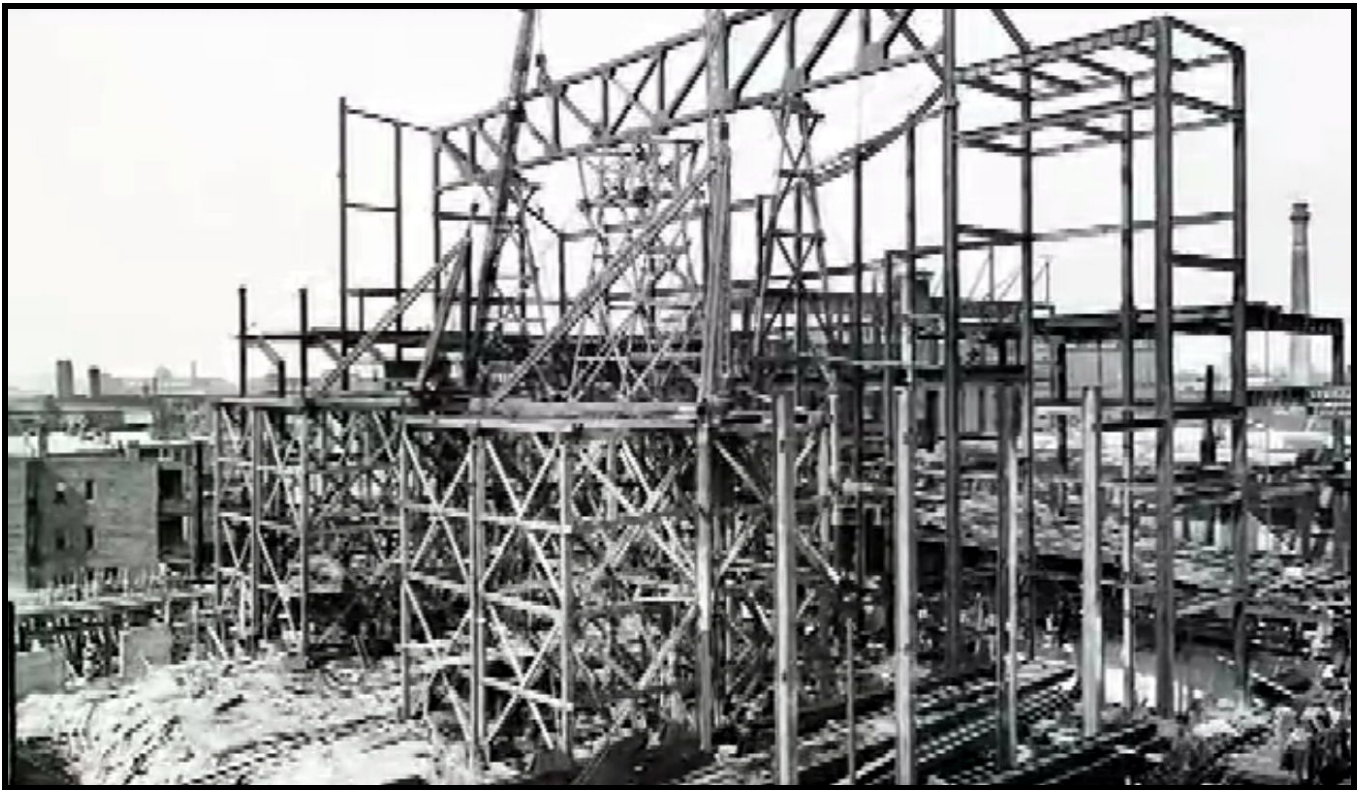
The Uptown Theatre, designed by famous architects Rapp & Rapp\*, was commissioned by Balaban & Katz, opened in 1925, with air conditioning which included a Wittenmeier CO<sub>2</sub> refrigeration plant. The Uptown had over 4300 seats, covered 40,000 square feet, was the 2nd largest in the USA (second only to New York's Radio City Music Hall) and is said to have had the largest internal volume of any theatre. It had the most elaborate internal architecture and decoration, considered a wonder by its audience. The theatre closed in 1981, being left unused and unheated in severe Chicago winters resulting in terrible deterioration and damage. Attempts to restore its former glory have stalled due to financial restraints.

\* Rapp & Rapp also designed a number of these early Balaban & Katz air conditioned theatres including Central Park, Chicago, Oriental, Riviera and Uptown.



*The newly-opened Uptown Theatre in Chicago, about 1925*





*The Uptown Theatre under construction*



*Early days at the Uptown*

## SOME OTHER WITTENMEIER MOVIE THEATRE INSTALLATIONS



*Keith's Fordham Theatre, New York, opened 1924*



*Loew's New Rochelle Theatre, opened 1926*





*United Artists Theatre, Los Angeles, opened 1927*



*Metropolitan Theatre, Boston, opened 1925*

# APPENDIX I: F WITTENMEIER PATENTS

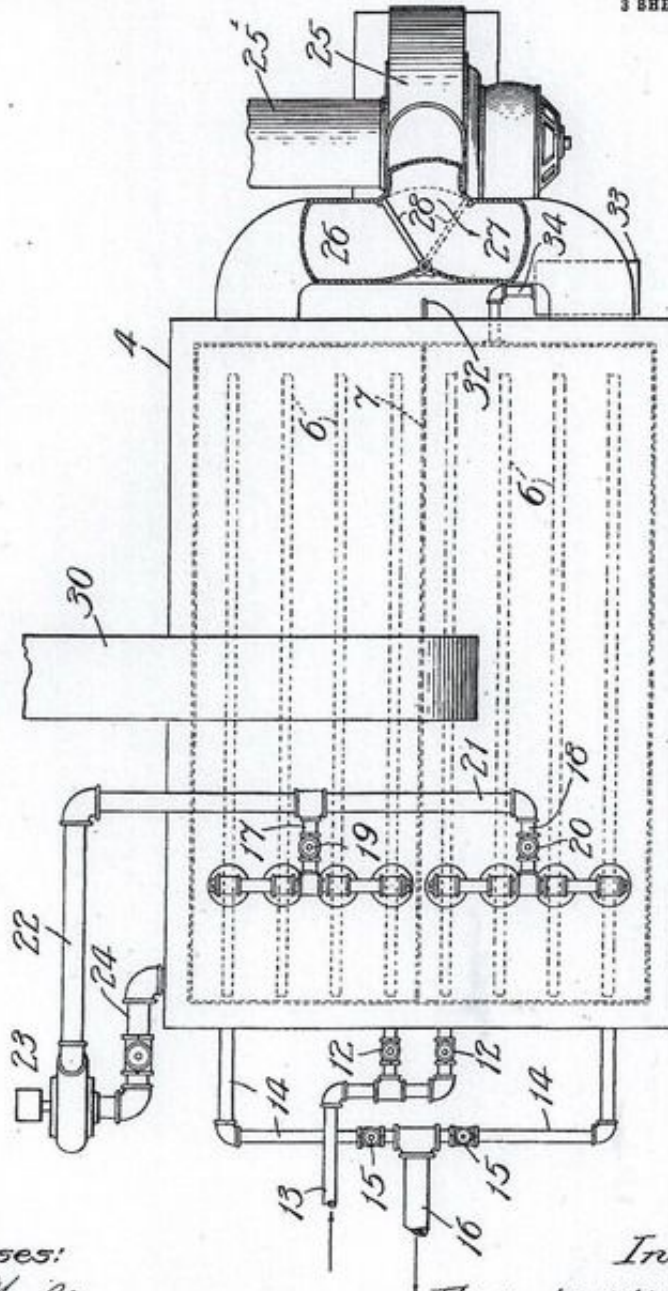
F. WITTENMEIER.  
AIR COOLING APPARATUS.  
APPLICATION FILED OCT. 28, 1910.

988,613.

Patented Apr. 4, 1911

3 SHEETS-SHEET 1.

Fig. 1.



Witnesses:  
*Edw. J. Boyd.*  
*Chas. H. Buell.*

Inventor:  
*Frederick Wittenmeier.*  
*Tracy D. Smith, Esq., Charles W. Miller,*  
*Attys.*

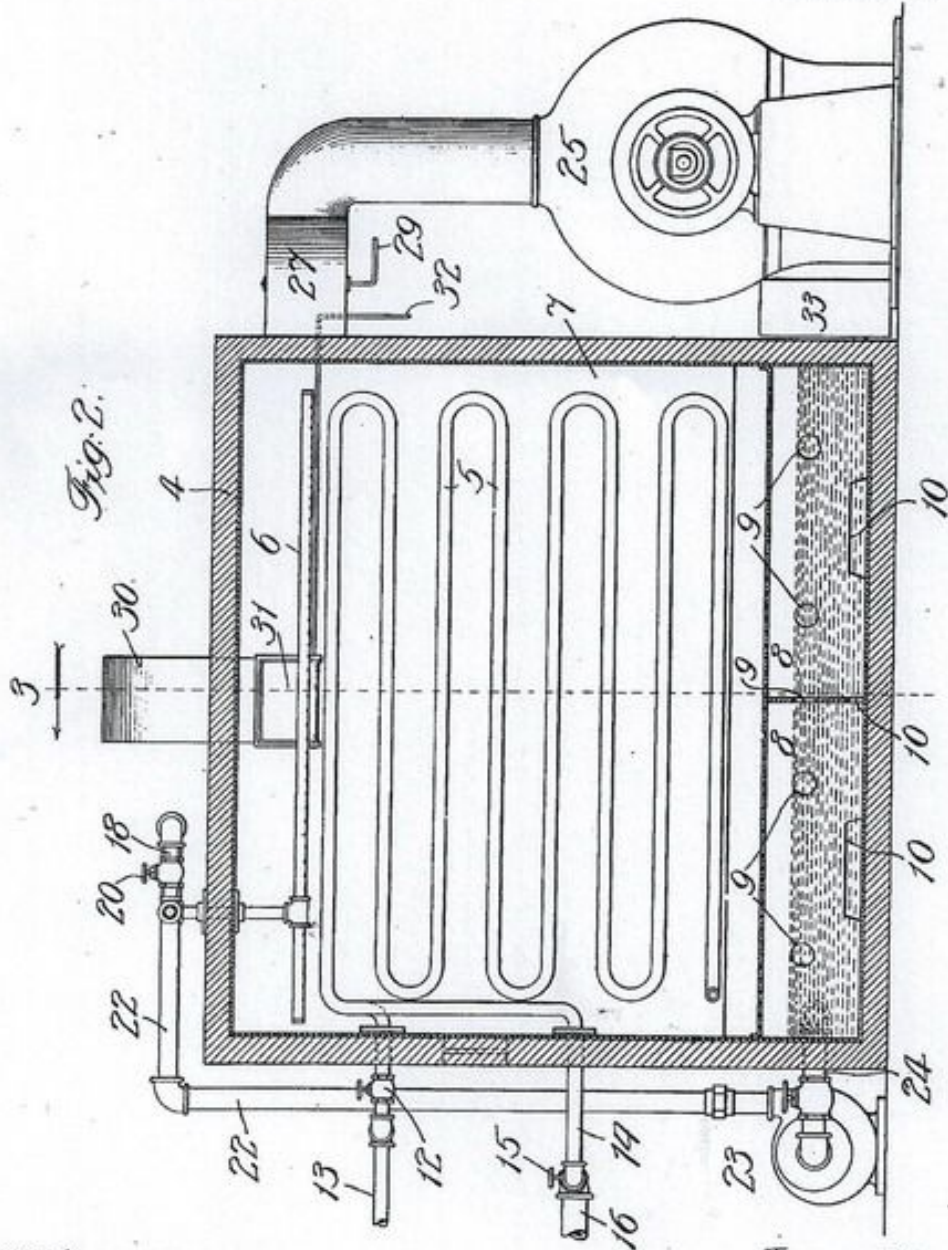


F. WITTENMEIER.  
AIR COOLING APPARATUS.  
APPLICATION FILED OCT. 28, 1910.

988,613.

Patented Apr. 4, 1911.

3 SHEETS-SHEET 2.



Witnesses:  
Edw. J. Gaylord,  
Chas. H. Bull.

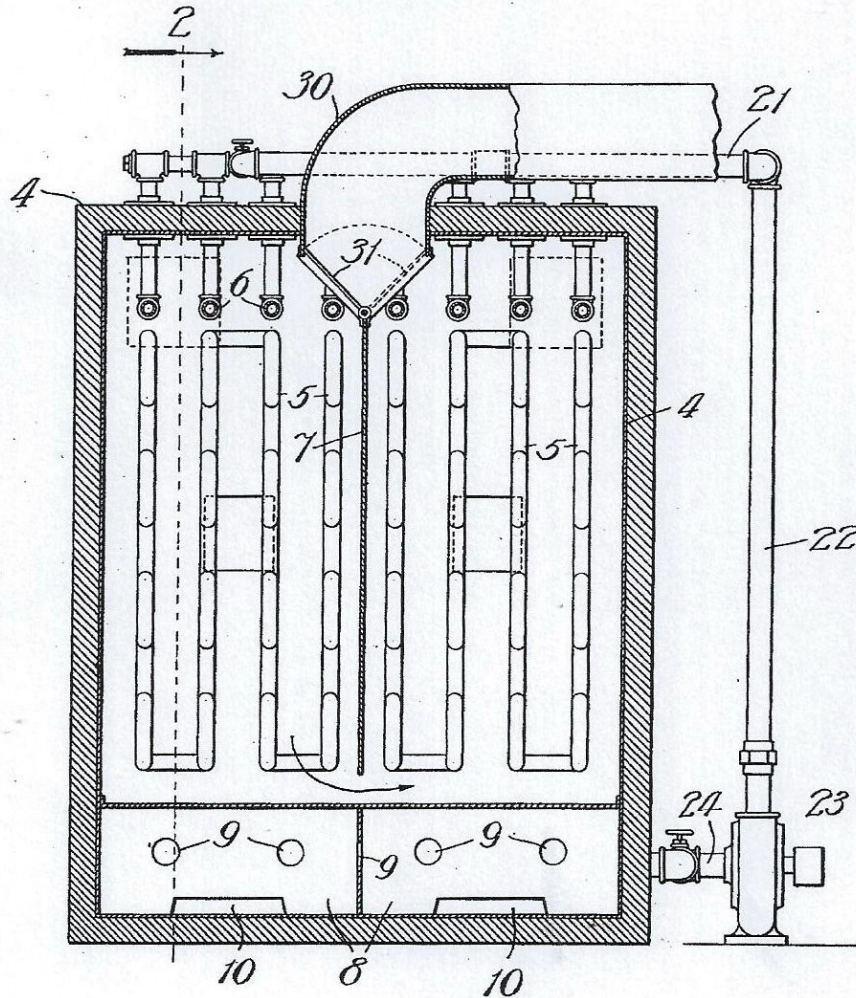
Inventor:  
Frederick Wittenmeier,  
By Deupfuth, Lee, Christen & Nelson,  
Attys.

F. WITTENMEIER.  
AIR COOLING APPARATUS.  
APPLICATION FILED OCT. 26, 1910.

988,613.

Patented Apr. 4, 1911  
3 SHEETS—SHEET 3.

Fig. 3.



Witnesses:  
Edw. Gaylord,  
Chas. A. Bull.

Inventor:  
Frederick Wittenmeier.  
By Dymally, Lee, Christman & Miles,  
Attys.



F. WITTENMEIER.  
AIR COOLING APPARATUS.  
APPLICATION FILED MAY 18, 1911.

1,003,129.

Patented Sept. 12, 1911.

2 SHEETS-SHEET 1.

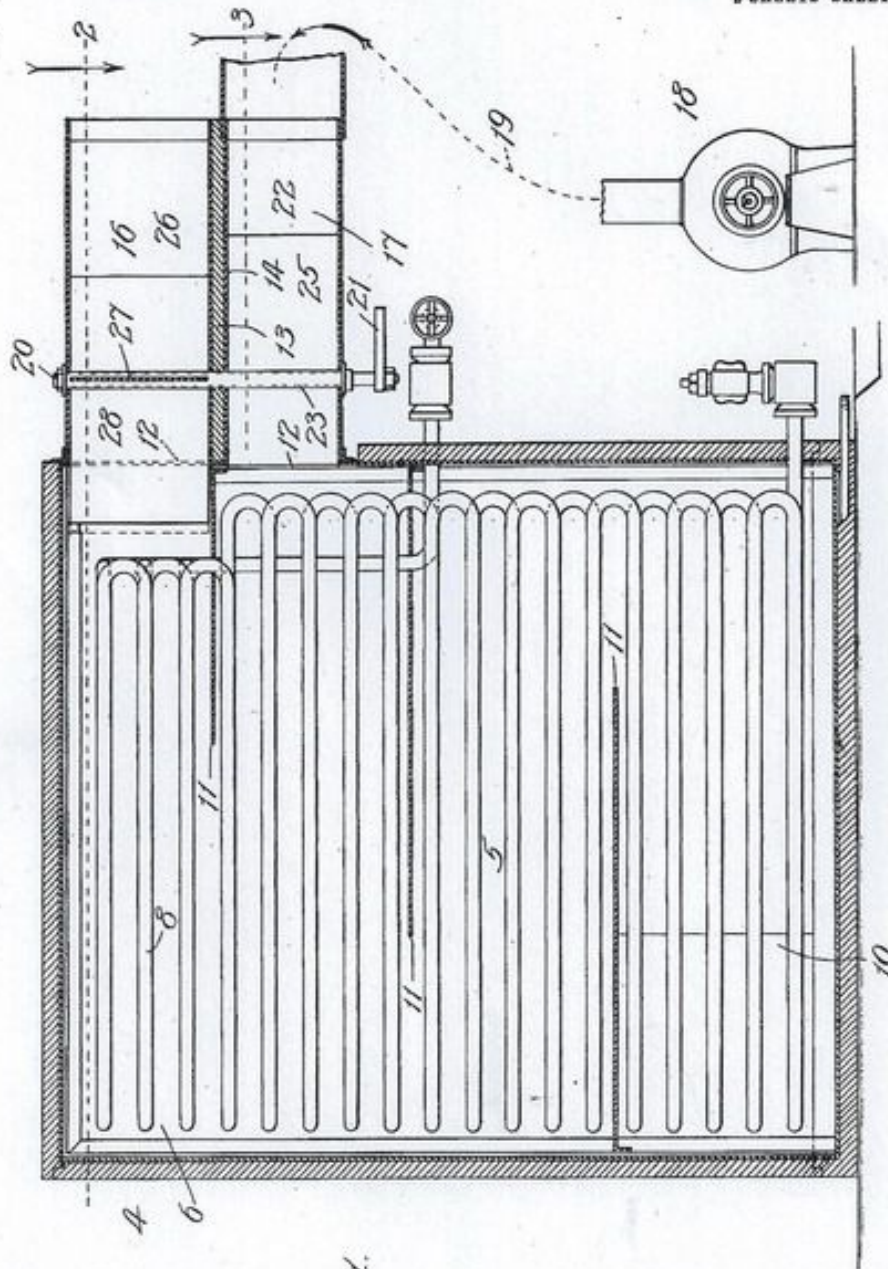


Fig. 1.

Witnesses:  
Chas. H. Bull.  
G. J. Chase

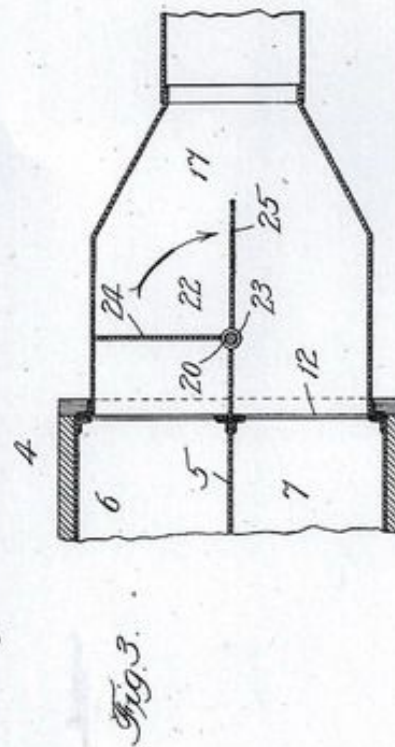
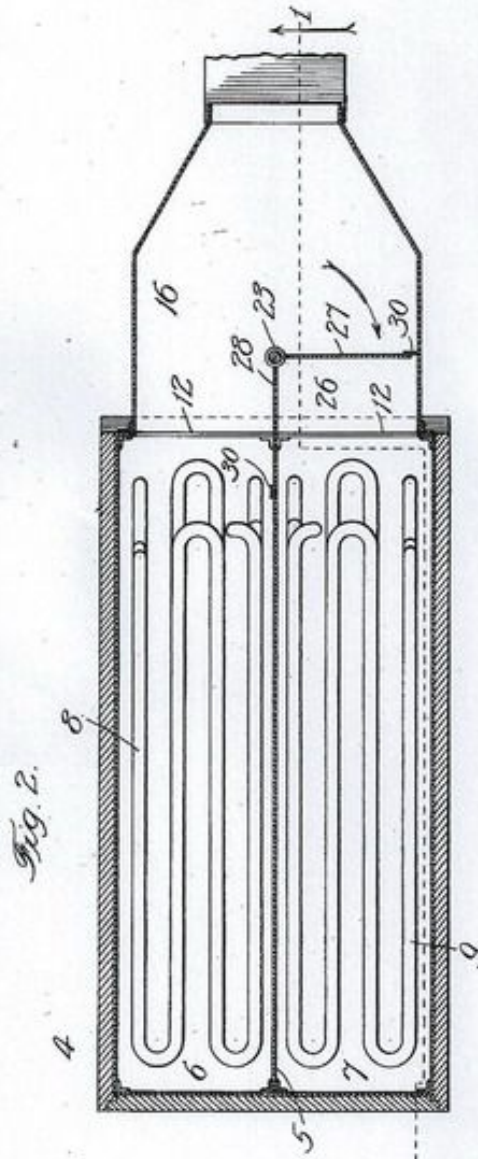
Inventor:  
Frederick Wittenmeier  
By Deaneforth, Lee, Britton & Silas  
Att. 25. 4

F. WITTENMEIER.  
AIR COOLING APPARATUS.  
APPLICATION FILED MAY 18, 1911.

1,003,129.

Patented Sept. 12, 1911.

2 SHEETS-SHEET 2.



Witnesses:

*Chas. H. Bull.*  
*A. F. Chase*

Inventor:

*Frederick Wittenmeier.*  
*By Duganford, Lee, Christen & Wiles.*  
*Attys.*



## BIBLIOGRAPHY

- 1922 *Cooling of Theatres & Public Buildings*, Fred Wittenmeier, Refrigerating Engineering, pp. 115-118, October
- *F Wittenmeier*, US Patent Office
- *J Sedlacek*, US Patent Office
- *Wittenmeier Machinery Company* catalogue
- 1928 *Fred Wittenmeier Deceased*, Ice & Refrigeration, No. 64, April
- 1928 *Fred Wittenmeier*, Refrigerating Engineering, p.171 Obituary, June
- 1979 *Warner Brothers Present.....: (Warners' Theatre, New York): The Movie*, Issue 1: Orbis
- 1998 *The Best Remaining Seats*, Ben M Hall, Da Capo Press, New York
- 1994 *Heat & Cold: Mastering the Great Indoors*, Barry Donaldson & Bernard Nagengast, ASHRAE
- 1998 *Air-Conditioning America: Engineers and the Controlled Environment, 1900-1960*, Gail Cooper, John Hopkins University Press, Baltimore & London
- 1999 *The Rise and Fall of Carbon Dioxide Systems*, William S Bodinus, ASHRAE Journal, April
- 1999 *Early Twentieth Century Air Conditioning*, Bernard Nagengast, ASHRAE Journal, March
- 1999 *The First Century of Air Conditioning: Early Twentieth Century Air-Conditioning Engineering*, Bernard Nagengast, pp. 21-28, ASHRAE
- 2000 *The Comfort Makers*, Brian Roberts, ASHRAE
- 2004 *Cinema Treasures*, Ross Melnick & Andreas Fuchs, MBI, USA
- 2005 *Ice and Refrigeration, ASRE Centennial Booklet (advertises from 1905)*, Bernard Nagengast, ASHRAE
- 2006 *The Chicago Movie Palaces of Balaban & Katz*, David Balaban, Arcadia Publishing, USA
- 2007 *Documentation of 1920's Carbon Dioxide Air Conditioning System, Orpheum Theatre, Minneapolis*, Bernard Nagengast, ASHRAE Historical Archive, 22<sup>nd</sup> December
- 2014 *Cool: How Air Conditioning Changed Everything*, Salvatore Basile, Fordham UP, New York
- <https://babel.hathitrust.org> (A digital library providing access to copies of the American Magazines: *Ice & Refrigeration* and *Refrigerating Engineering*)
- [www.hevac-heritage.org/electronicbooks/cinemas](http://www.hevac-heritage.org/electronicbooks/cinemas) (*HVAC in Early Theatres & Cinemas: Part 3- Early Twentieth Century American Cinemas*, see also *Prologue*, Brian Roberts)
- [www.compassrose.org/balaban-and-katz/Balaban-and-Katz-Theatres.html](http://www.compassrose.org/balaban-and-katz/Balaban-and-Katz-Theatres.html)
- <https://en.wikipedia.org/wiki/Balaban-and-Katz>