STUART W CRAMER

By EurIng Brian Roberts, CIBSE Heritage Group

Stuart Warren Cramer, 1868-1940

Stuart Cramer was born on 31 March, 1868, in Thomasville, North Carolina. He studied Naval Engineering at the United States Naval Academy, graduating in 1888. From 1888-1889, he studied Mining Engineering at Columbia University, leaving to become Assayer at the United States Mint in Charlotte, North Carolina.

In 1893, Cramer went to work for Daniel A Tompkins, a leading textile mill engineer, rapidly being promoted to Chief Engineer & Manager of Tompkins' company in Charlotte, which represented the Westinghouse Electric Motor and other textile mill supply companies. After two years, he left and set up in business as an Engineer & Contractor specialising in designing and equipping cotton mills (At this time, there was a region-wide boom in textile production).

In 1905, Cramer worked with Tompkins and Westinghouse to help establish the Duke Power Company which invested in hydro-electric power plants. He encouraged the widespread installation of electric-drive motors in textile mills to replace water power and Corliss steam engines, with the added advantage of providing electric lighting, enabling the mills to run full-time.

From 1905 onwards, Cramer carried out the design and construction of his own textile mills, notably Highland Park No. 3 Mill & Mill Housing. He planned the spinning and weaving mill beside its railway tracks to "facilitate an integrated work flow from unloading the cotton from railroad cars to shipping out the finished gingham. It was one of the first textile mills planned specifically for electric power and had its own generating plant."

Cramer's major contribution to the cotton industry was his work on improving spinning efficiency by his innovative invention of a water-spray humidifier to control relative humidity levels, reducing yarn breakage and improving worker comfort levels. He is credited with coining the term *air conditioning* which he introduced in his paper of 1906, *Recent Developments in Air Conditioning*, read before the American Cotton Manufacturers' Association. It is believed the term was suggested by the use of the term *conditioning* in the treatment of yarn, cloth or raw materials before manufacture. Cramer also used term in his US Patent of 1907. He wrote *Useful Information for Cotton Manufacturers* in 1909. (Cramer discovered independently some of the psychrometric relationships set out in 1911 by Willis Carrier). In 1913, Cramer obtained a further patent for his *Air Conditioning (Humidifying) Apparatus.*

In 1918, Cramer sold his air-conditioning business to the G M Parks Company of Fitchburg, Massachusetts and ceased his interest in air conditioning. The new Parks-Cramer Company was formed with additional offices in Boston and Charlotte and, in 1924, published the classic textbook *Air Conditioning in Textile Mills* based on his work.

In 1929, Stuart Cramer was awarded an Honorary Doctor of Science Degree by the present North Carolina State University. He died on 2 July, 1940, at the age of 72 and was buried in Charlotte's Elmwood Cemetery. In 1962, Parks-Cramer published a revised, simplified book *Textile Air Conditioning.*

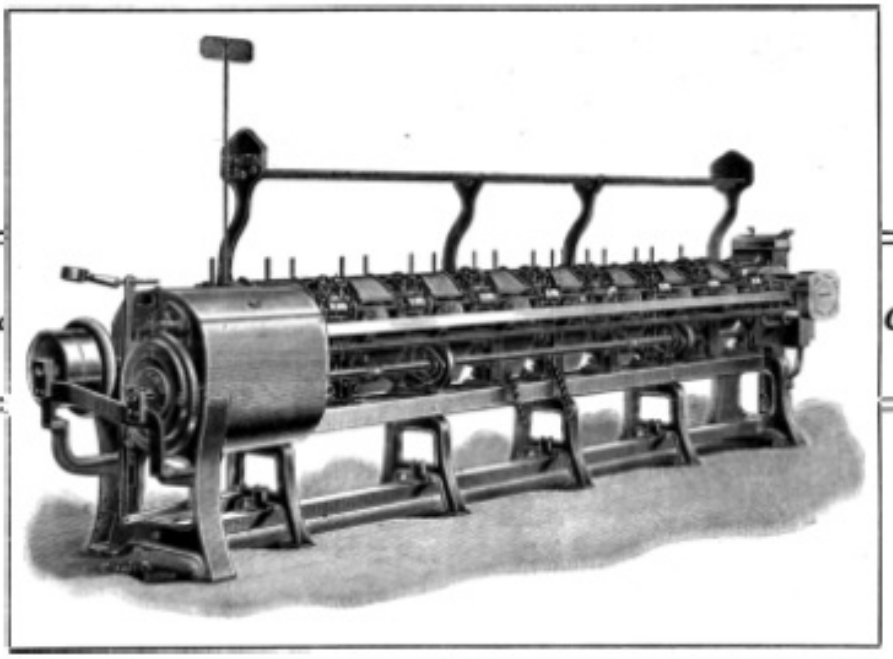
Ceiling-hung humidifiers in a textile mill

THE WHITIN MACHINE WORKS

WHITINSVILLE, MASS.

BUILDERS OF

COTTON MACHINERY



High-Speed *Comber*

CARDS, COMBERS, DRAWING FRAMES, SPINNING FRAMES, SPOOLERS

TWISTERS, REELS, LONG CHAIN QUILLERS, LOOMS

SOUTHERN AGENT

STUART W. CRAMER

CHARLOTTE, N.C., and ATLANTA, GA.

No. 852,823. PATENTED MAY 7, 1907.

S. W. CRAMER.

HUMIDIFYING AND AIR CONDITIONING APPARATUS.

APPLICATION FILED APR. 18, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

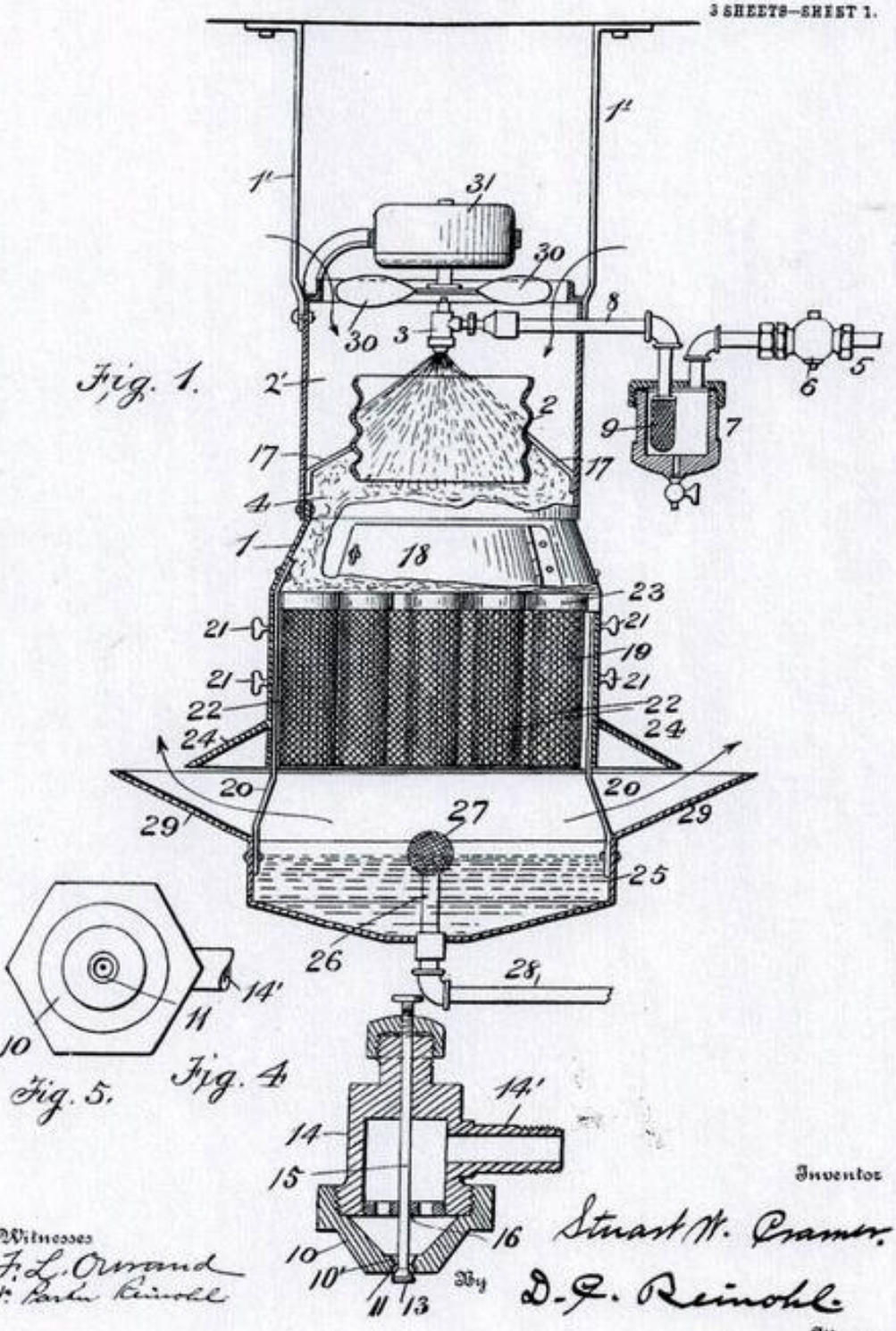


Fig. 5.

Fig. 4

Witnesses
F. L. Ormand
H. Barlow Reinohl

Inventor
Stuart W. Cramer.
By D. G. Reinohl.
Attorney

No. 852,823. PATENTED MAY 7, 1907.

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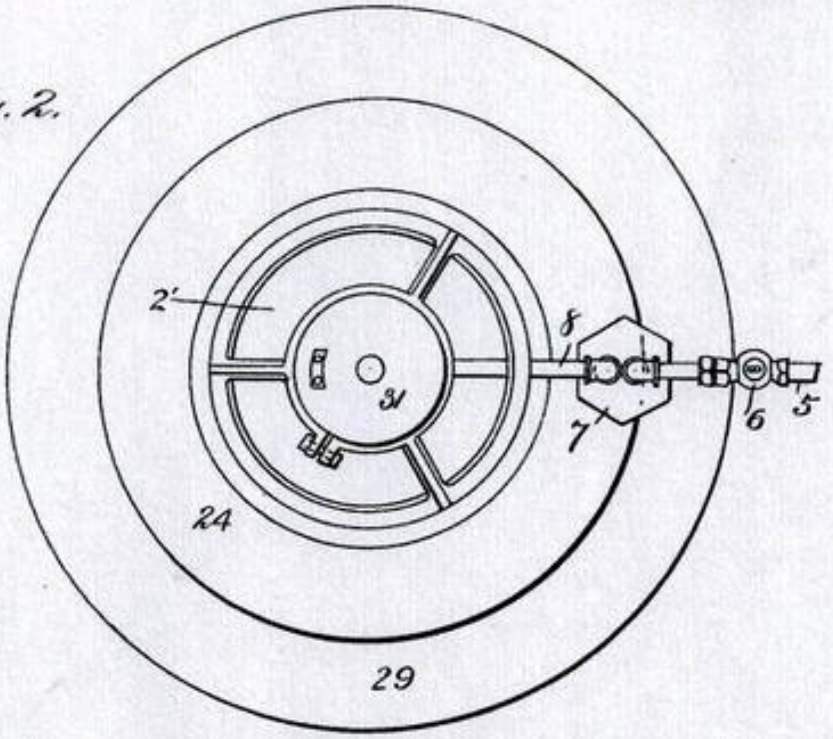
3 SHEETS—SHEET 2.

Fig. 2.



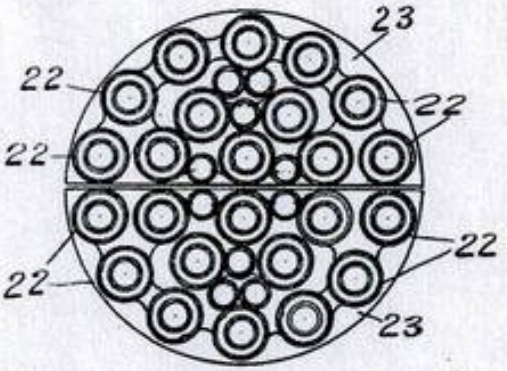


Fig. 3.

Witnesses
F. L. Ourand
H. Baker Reinohl

Inventor
Stuart W. Cramer.
By D. C. Reinohl.
Attorney

No. 852,823. PATENTED MAY 7, 1907.

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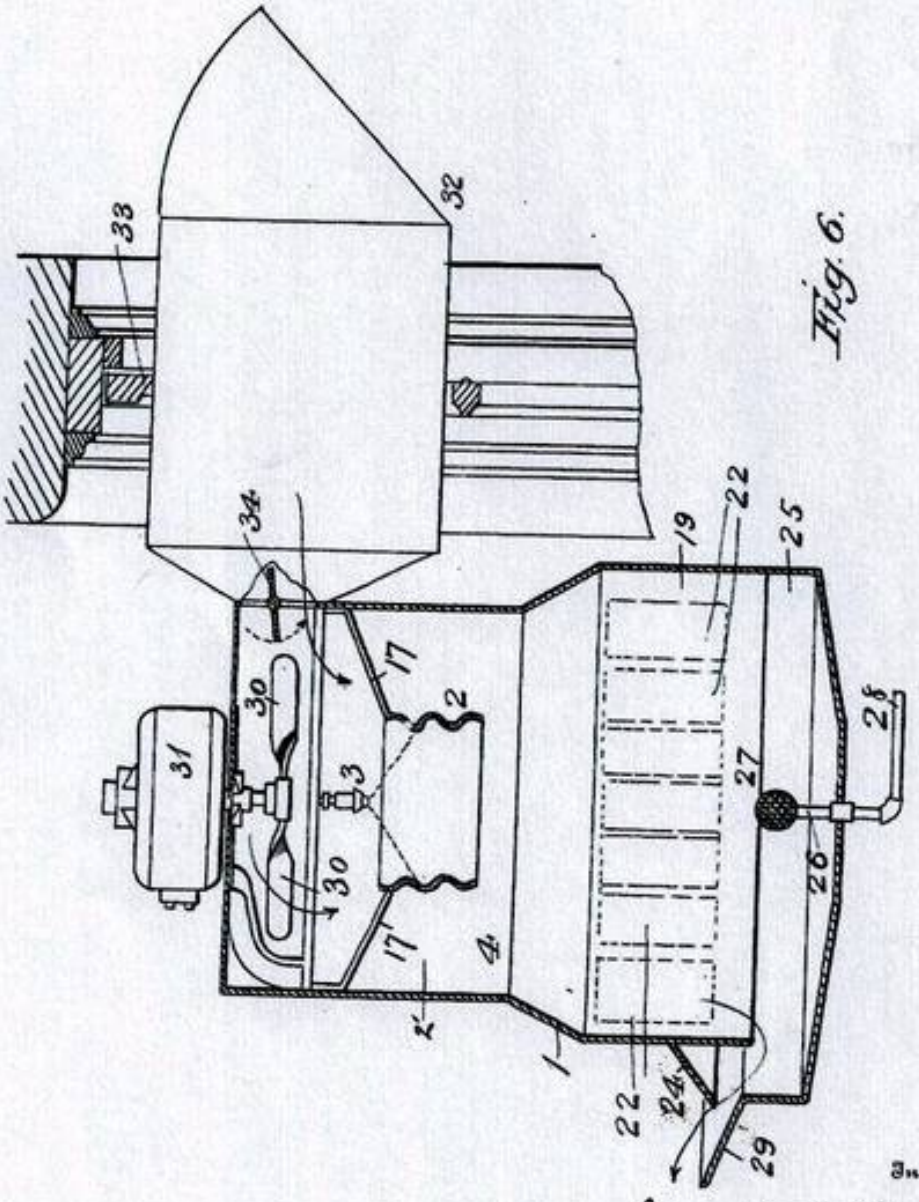


Fig. 6.

Witnesses
F. L. Durand
H. Barlow Rinell

Inventor
Stuart W. Cramer.
By D. C. Reinhold
Attorney

UNITED STATES PATENT OFFICE.

STUART W. CRAMER, OF CHARLOTTE, NORTH CAROLINA.

HUMIDIFYING AND AIR-CONDITIONING APPARATUS.

No. 852,823. Specification of Letters Patent. Patented May 7, 1907.

Application filed April 18, 1906. Serial No. 312,453.

To all whom it may concern:

Be it known that I, STUART W. CRAMER, a citizen of the United States, residing at Charlotte, in the county of Mecklenburg and State of North Carolina, have invented certain new and useful Improvements in Humidifying and Air-Conditioning Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to humidifying and air conditioning apparatus for textile and other factories, is designed for use in systems of automatic regulation of the humidity and temperature in such factories, disclosed in my Patent No. 811,383, dated January 30th, 1906 and No. 813,083, dated February 20th, 1906, and the invention consists in certain improvements in construction, which will be fully disclosed in the following specification and claims.

This apparatus is designed for placing along the wall between the windows in a room in a factory, mill, or other building, taking air from the outside, and by a system of dampers also from the inside in varying proportions, as may be desired. The incoming air is thus treated or uniformly conditioned so that its introduction into the room does not disarrange or disturb the conditions that the whole object of the apparatus seeks to establish.

It is a well-known fact that ventilating textile factory buildings by opening windows or doors, is not only injurious from a manufacturing standpoint interfering with the proper running of the work, but also positively disarranges and disturbs the normal uniform conditions of the fibers of the material which are required for the most favorable conditions to manufacturing. It is also a well known fact that air containing lint, dust, and other impurities when blown or conducted past wetted surfaces, or sheets of water, will not readily part with its impurities. The surface tension of the water operates in antagonism to air cleansing, at least so far as relieving it of any dry foreign matter is concerned. In my apparatus therefore, when the air is first drawn into the apparatus by a fan, I provide for a thorough dousing or wetting of the air by a strong spray or cloud of vapor; in the second place, realizing that water directly discharged into the atmosphere in however finely an atomized condition, is not a benefit, but, on the contrary, an objection until it is evaporated, and realizing furthermore, the practical impossibility of evaporating fine particles of water when discharged or blown into the atmosphere, especially after a moderate percentage of humidity has been attained, I next provide for removing all of the coarse particles of water, including the fine spray and vapor, from the air, that it may issue from the apparatus colorless and free from even a fog-like appearance, but thoroughly cleansed from all solid impurities. Furthermore, just before the air issues from the apparatus, it impinges directly and normally upon the surface of a body of water, that will catch or arrest any coarse foreign matter that may have escaped being deposited upon the wet surfaces to which reference has already been made.

In my present apparatus I provide first a casing in which to treat the air; a fan for drawing in and forcing through the casing a current of air either from without the building or from within the building itself, or a mixture of both inside and outside air; a spray chamber in which the air is driven through a dense cloud of fine spray and vapor; a collecting, condensing and evaporating chamber, in which wetted woven fabrics of an absorbent and evaporative nature, geometrically or otherwise arranged to the best advantage, are kept moist by the spray deposited on them by the current of air as it comes to them direct from the spray chamber. Said woven fabrics presenting surfaces upon which deleterious and foreign matter in suspension in the air are readily deposited by their having been wetted in the spray chamber; and finally, an open basin of water at the bottom of the casing, upon which water the air must impinge before it can issue radially from the casing, thus collecting the last traces of any coarse particles of lint, fly, sweepings, etc., that may have been too heavy to remain on the fabrics in the collecting chamber above, but which in their heavy and wetted condition are readily caught in the basin of water instead of being allowed to skip out (as a stone is glanced or ricochetted on a pool or water) with the air in the casing, which has heretofore been the case in apparatus of this type.

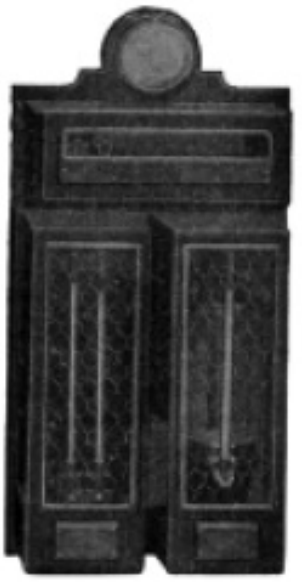
The invention will be fully disclosed in the following specification and claims.

Carolina cotton mills in 1908

(Photographs by Lewis W Hine, from "Children at Work," Vicki Goldberg, Prestel, 1999)

Cramer System
of
Air Conditioning

Cramer "High Duty" Air Conditioner



Cramer Automatic Regulator

FACTS

In several large mills equipped with humidifiers of other makes, we have entirely reorganized their system, installing our "High Duty" equipment with automatic humidity and temperature control and the average improvement during the succeeding twelve months test is:

A—Seconds reduced over 50%.
B—Production uniform day after day (No big jumps.)
C—Actual waste account halved.
D—Large saving in "invisible waste."

What Would Similar Results Be Worth To You?

STUART W. CRAMER

50 Church St. New York — **Charlotte, N. C.** — **Tremont Bldg. Boston, Mass.**

S. W. CRAMER.

AIR CONDITIONING APPARATUS.

APPLICATION FILED JAN. 11, 1910.

1,073,475.

Patented Sept. 16, 1913.

3 SHEETS—SHEET 1.

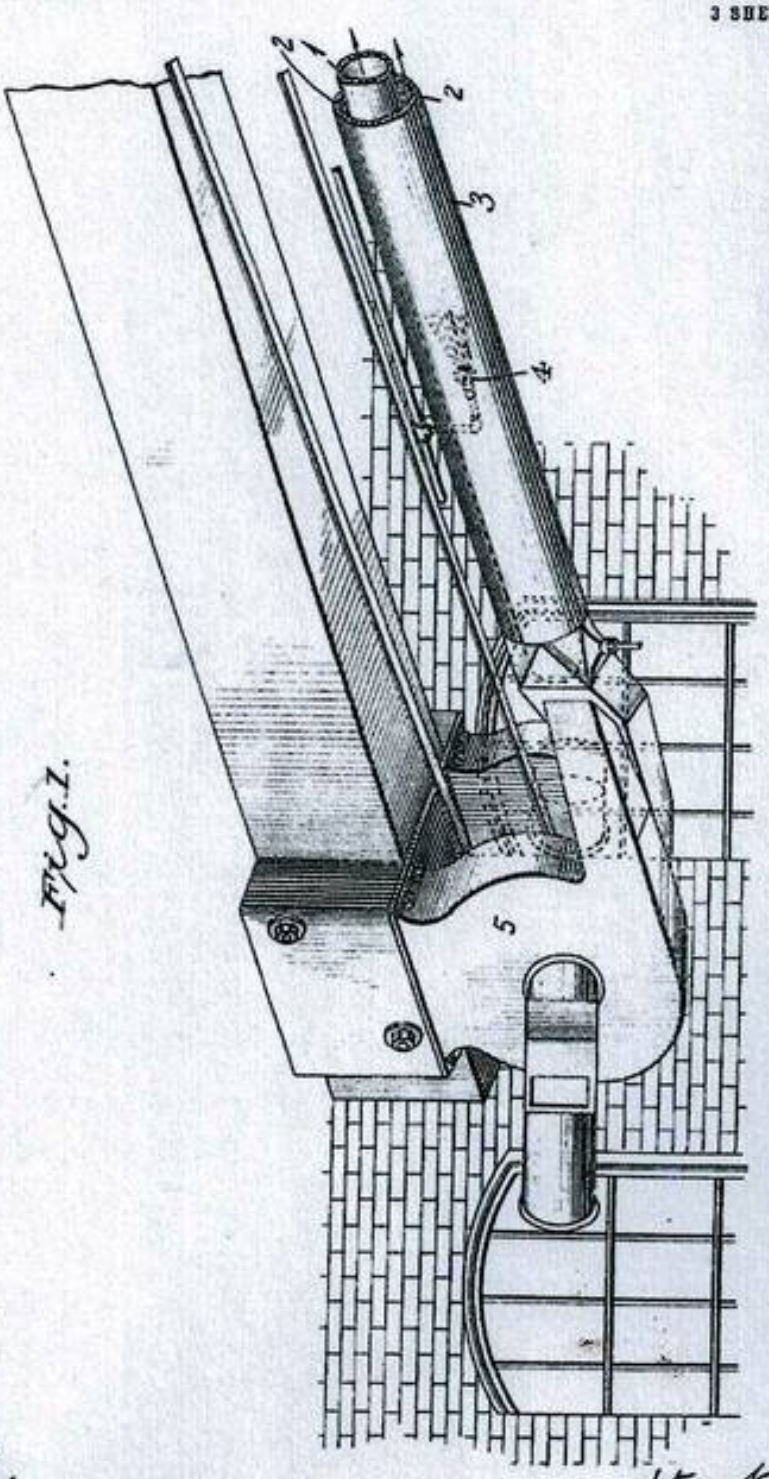


Fig. 1.

Witnesses
F. L. Ourand
M. Parker Kinsell

Inventor
Stuart W. Cramer.

By D. C. Reinhold
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S. W. CRAMER.

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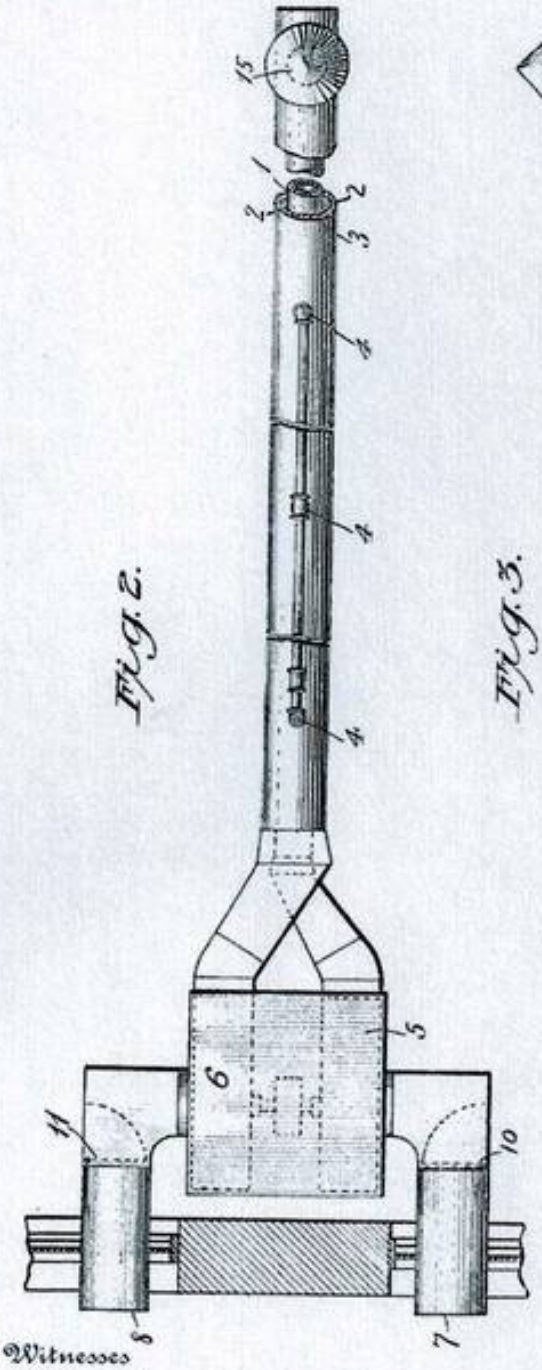

Fig. 2.

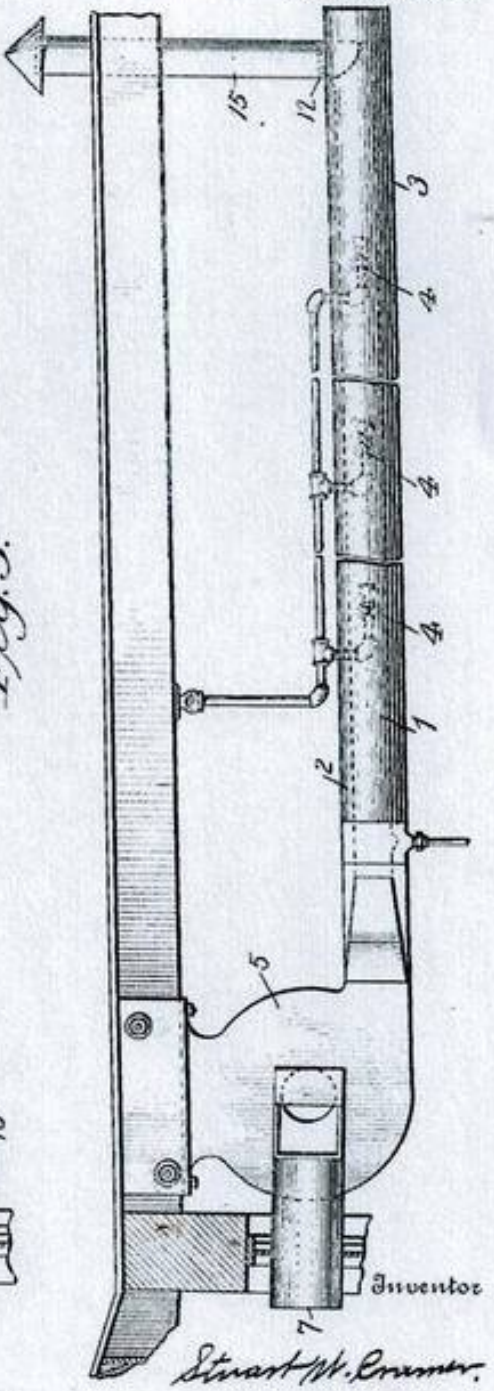

Fig. 3.

Witnesses

J. L. Cowgill

M. Reichl Reimbold

Inventor

Stuart W. Cramer.

By

D. C. Reimbold

Attorney

S. W. CRAMER.

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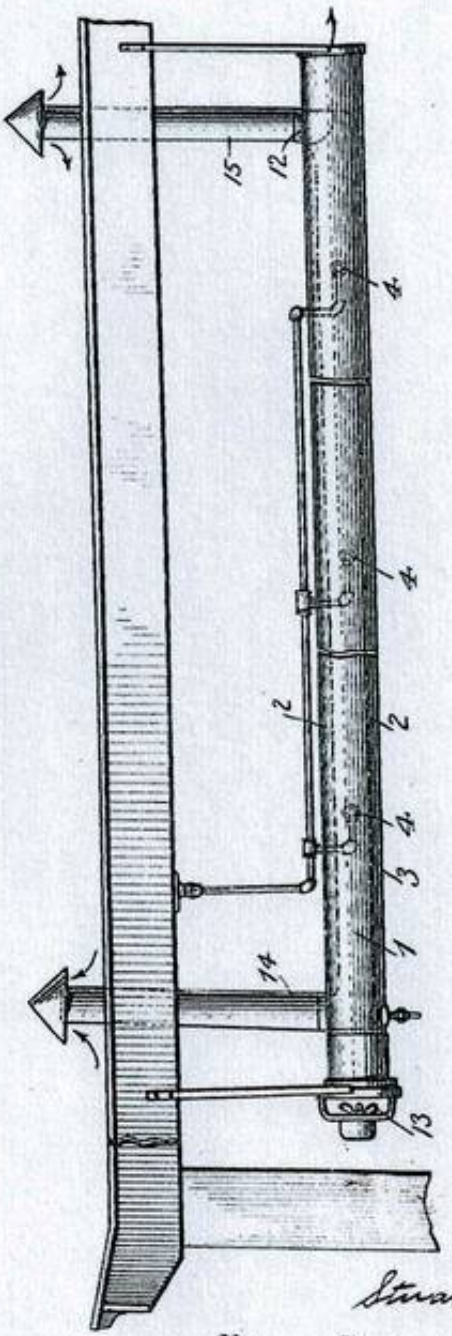


Fig. 4.

Witnesses

F. L. Ourand

W. Bailey Rinsel

Inventor

Stuart W. Cramer.

By D. C. Reinsohl

Attorney

UNITED STATES PATENT OFFICE.

STUART W. CRAMER, OF CHARLOTTE, NORTH CAROLINA.

AIR-CONDITIONING APPARATUS.

1,073,475. Specification of Letters Patent. Patented Sept. 16, 1913.

Original application filed April 15, 1909, Serial No. 490,079. Divided and this application filed January 11, 1910. Serial No. 537,568.

To all whom it may concern:

Be it known that I, STUART W. CRAMER, a citizen of the United States, residing at Charlotte, in the county of Mecklenburg and State of North Carolina, have invented certain new and useful Improvements in Air-Conditioning Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus for treating air, whereby the air is cleansed of its impurities, and is conditioned by the addition or subtraction of moisture and heat as may be desired.

The object of this invention is to provide an apparatus whereby air cleansing, moistening, heating and cooling are attained as heretofore in similar types of apparatus, with the further advantage that cooling may also be continued even though moistening be discontinued, and without the aid of refrigeration, the circulation of cold water, or other liquids, or the like.

The invention consists in certain improvements which will be fully disclosed in the following specification and claims.

This application is a division of my application for a patent filed April 15th, 1909, Serial Number 490,079.

In the accompanying drawings, which form part of this specification:—Figure 1 represents an isometric view of an apparatus using a single cold air tube, being an adaptation of my invention to the individual head type of air conditioning apparatus. Fig. 2 represents a plan view of the same. Fig. 3 represents a side elevation of the same, and Fig. 4 represents a side elevation of a modification of the same type of apparatus.

Reference being had to the drawings and the designating characters thereon, the numeral 1 indicates an inner tube which forms the spray or moistening chamber, 2 an annular air cooling chamber between the tube 1 and the outer tube 3. 4 the spray-heads, 5 and 6 the fans. 7 and 8 the ducts for supplying air from outside the building and 10, 11 the dampers.

The operation of this device is readily discernible without further elucidation. In the tube 1, one or more spray heads 4 may be used, a fan 5 may be used to move the air in said tube, or it may be moved by the inductive effect of the sprays alone. It will be noticed that in all of the types embodied in this invention, it is possible to control the humidity in a room by opening and closing the damper 12, which either admits the moistened air to the room or directs it out through the roof or side wall of the building as may be desired.

In Fig. 4 air may be supplied from inside the building by a fan 13 to supply the air cooling chamber 2, and air drawn through pipe 14 from outside the building to supply the spray or air moistening chamber. 15 indicates the pipe through which moistened air may be conducted outside the building, under control of damper 12.

Further elucidation is deemed unnecessary, as the foregoing description with the accompanying drawings will suggest to anyone skilled in the art to which my invention appertains some of the various modifications of which the invention is susceptible.

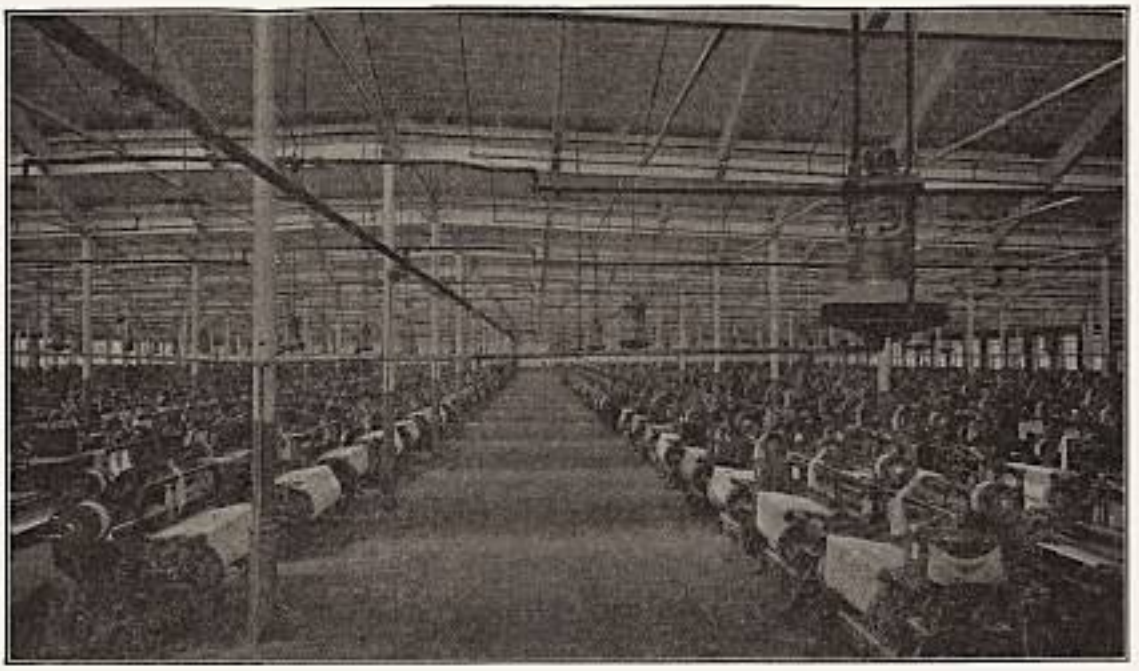
It is obvious that in lieu of the spray heads shown, other devices may be employed for cooling by the evaporation of the moisture, and that changes in form and arrangement may be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim is—

1. In an air conditioning apparatus, an air chamber, a fan for producing a current of air through the air chamber, a spray chamber within said air chamber, spray heads for moistening, cooling and inducing a secondary current of air through said spray chamber, and means for controlling the supply of air from said fans.

2. In an air conditioning apparatus, a spray chamber, spray heads within said spray chamber, and arranged for inducing a current of air through said spray chamber, an air cooling chamber surrounding said spray chamber, a fan for producing a current of air through the cooling chamber but closed from the spray chamber, and

Machinery on the Ceiling Would Double Production



HUMIDIFIERS ARE EQUAL TO USING THE CEILING FOR PRODUCTION

YOU place your machinery on the floors of your mill, mostly in response to the application of the laws of gravity.

But if some one would design textile machinery to operate successfully on your ceiling—and you could get operatives that had the faculty of working and walking upside down—this additional equipment would have some effect on your production.

Wouldn't it?

And also on your profits?

Turbo and Cramer humidifying equipment—scientifically designed for your specific manufacturing problems are the equivalent of just this.

They are just as if you used the ceilings of your plant for additional machinery.

Only.

The operatives still stay on the floor.

Machinery on the ceiling would present quite a problem.

Humidifiers near the ceiling—out of the way—solve problems.

Don't think—just because you have a humidifying equipment—you have gotten all there is out of it. Installations of humidifiers—are engineering problems. We have made much and exhaustive study of the subject—have learned much during the past few years particularly.

If you have not had the benefit of our data as applied to your problem, there is something more in humidifiers for you. Even if you have humidifiers now.

One of our customers installed Cramer humidifiers—he was already equipped as he thought—and saved $28,000.00 the first year. The humidifiers cost him less than that amount.

Our engineers can determine accurately.

Parks-Cramer Company

Engineers & Contractors

Industrial Piping and Air Conditioning

Fitchburg **Boston** **Charlotte**

Air Conditioning

in

Textile Mills

A Handbook on Humidification

for

Textile Manufacturers

Engineers and Students

—

Edited by

Albert W. Thompson

Vice-President

Parks-Cramer Company

—

Price $5.00

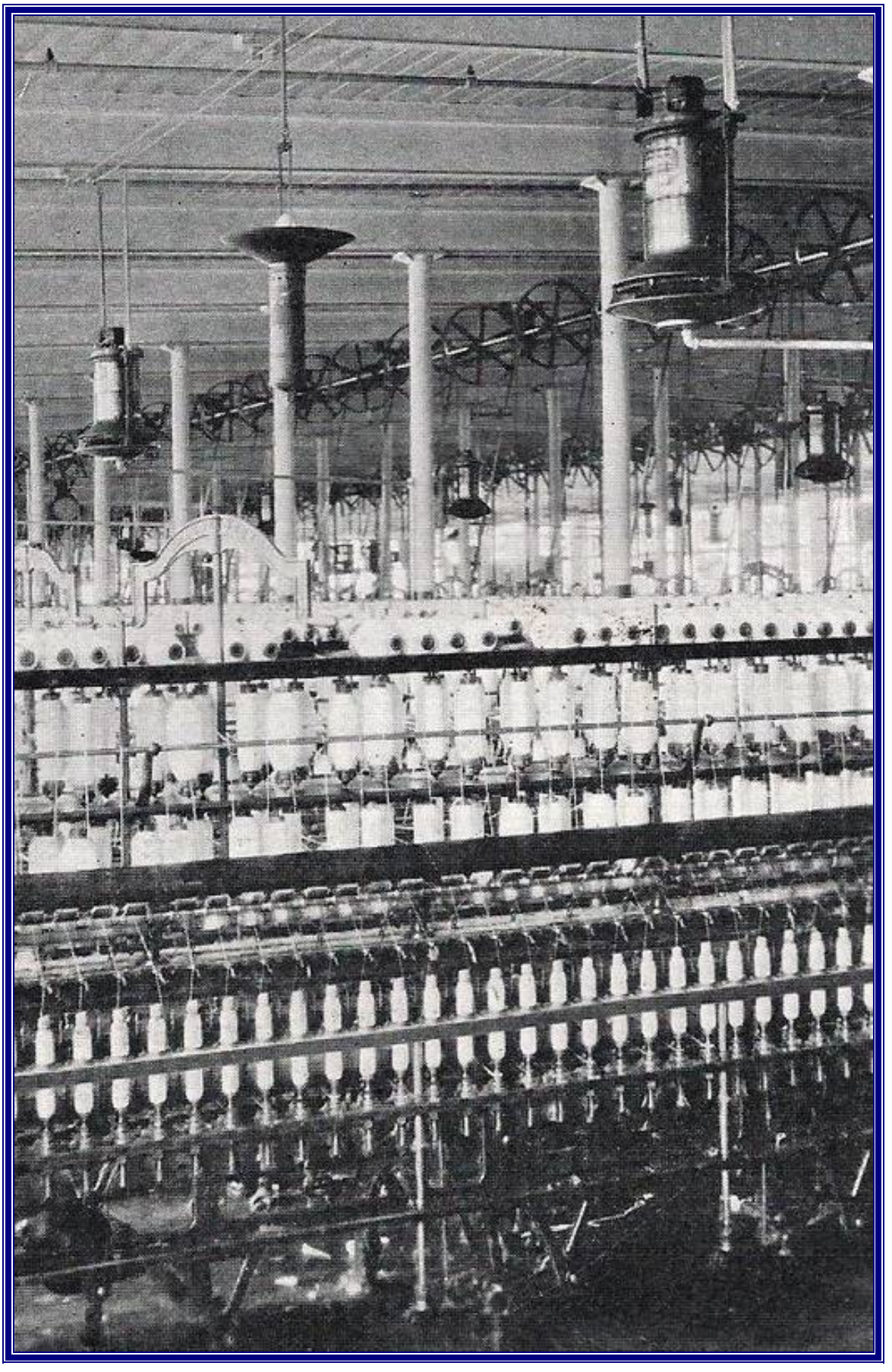
Parks-Cramer Company

Engineers & Contractors

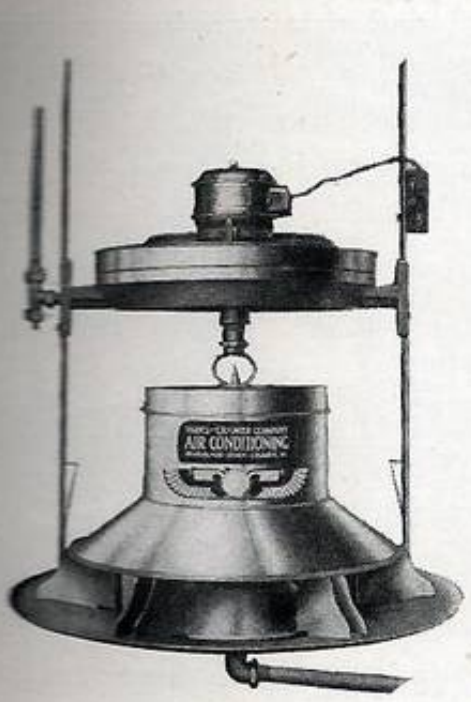
Industrial Piping and Air Conditioning

Fitchburg Boston Charlotte

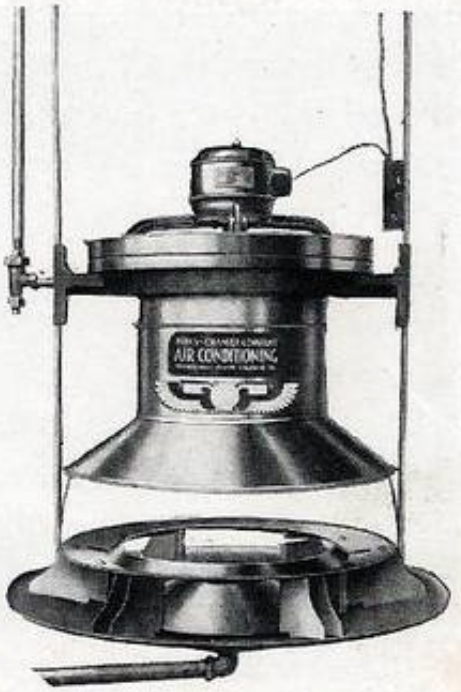
1924



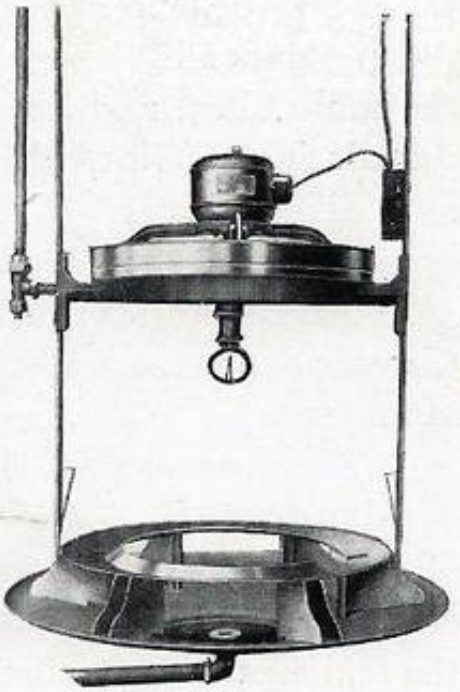
High level humidifiers in Ring Spinning Factory, 1924



Upper casing lowered.



Lower casing raised.



High Duty Humidifier—showing accessibility for cleaning

Parks-Cramer humidifiers, 1924

Stuart Warren Cramer

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