THE WESTERN ARCHITECT

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THE WESTERN ARCHITECT

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THE WESTERN ARCHITECT PUBLISHING COMPANY.

FRED'CK KEES, Minneapolis, Minn., President.

J. WALTER STEVENS, St. Paul, Secretary.

F. A. GREENLAW, General Manager.

Insurance Exchange Building, MINNEAPOLIS, MINN.

ST. PAUL, Commercial Building.

OF INTEREST TO THE HOUSEHOLD.

The Electric Heat Regulator Company of Minneapolis, who manufacture the famous Minneapolis Temperature Regulator, which is applicable to furnace, steam heat, hot water or combination heating systems, report a very large increase in their year's business,—in fact the largest business that they have ever handled. Beginning twenty years ago when temperature regulation was a new thing and unknown, this company has been able by producing an article of absolute merit to establish itself firmly in the lead in its line. The company, knowing the merit of the article they market, and the universal satisfaction given to purchasers, are enabled to offer extremely liberal terms. Their goods are handled in all sections of the United States, and they report a constantly increasing demand from foreign countries.

The company have just received from the press a very handsome illuminated booklet, a copy of which they will be pleased to mail to any architect, dealer or customer, who is interested in the matter of temperature control.

During the past year the company have largely increased their manufacturing department, and have adopted a new system of service in their local department, covering the fields of St. Paul and Minneapolis, and have also been compelled to largely increase their office space, being now located in suite 405-6 Phoenix Bldg., where they at all times will be pleased to see their friends and customers.

A NEW OVERHEAD WINDOW PULLEY.

In the accompanying illustrations we show a new overhead pulley now being put on the market by the Grant Pulley and Hardware Company, of 23 Warren st., New York.

This pulley is made with three styles of bearings—i. e., ball bearings, roller bearings and the plain pinion—which are sold at different prices, according to the requirements of the customer. The housing is made in one piece of iron, which will resist any possible load without fracture. The housing connects with the soffit, so that mortar yill not clog the wheels. The sash chain or cord is easily inserted with a mouse, which is furnished with each order. The manufacturers say that with this pulley even for the heaviest plate glass windows, iron weights may be used instead of lead, thus greatly reducing cost. The pulleys can be cut in the frames with the regular pulley machine. Some of the advantages of using this pulley are referred to by the makers as follows: They can be used in segment head window frames. They hang the weight in the center of the boxes in circle window frames. They are concealed from view when the window is closed, as illustrated in Fig. 2. Only lacquered face pulleys are necessary, as this is the only part of the pulley that shows. They can be easily removed, if required, after the trim is placed. They require 8 inches less of socket room than the side pulleys, and thus an iron weight may be used in many places instead of lead. This it is said will save from 100 to 200 pounds of lead to each sash, with a corresponding reduction in the cost of material. They are made in four sizes, with pulleys 2, 2¼, 2½ and 3 inches in diameter, with lacquered, bronzed, Bower-Barff and bronze metal faces. Fig. 2 shows a single frame and section of pulley, which, of course, is concealed from view in use. Fig. 3 illustrates a twin window without weights in the mullion. These pulleys can also be used in triplet and quadruplet window frames. Used as in Fig. 3, only 2½ inches of head room is required, and even the triplet and quadruplet frames require but 3 inches head room. Another form of this pulley is made embodying the same principles but adapted for metal fireproof windows.

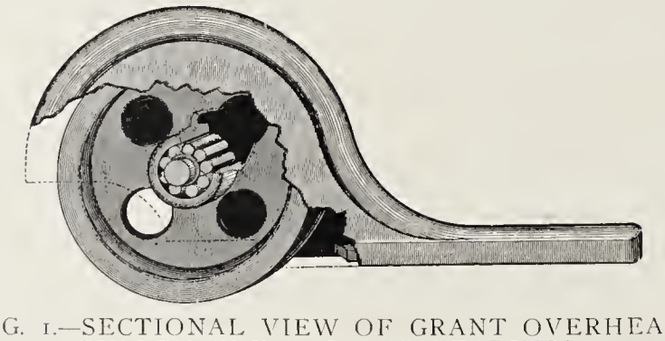

FIG. 1.—SECTIONAL VIEW OF GRANT OVERHEAD PULLEY, WITH ROLLER BEARINGS.

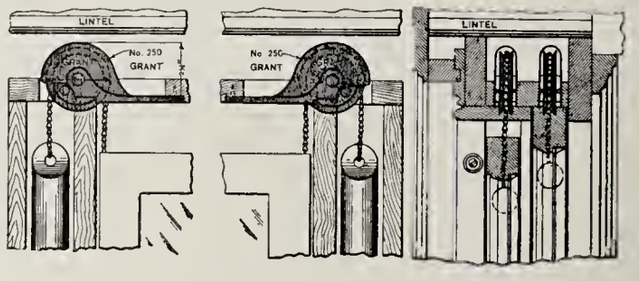

FIG. 2.—SINGLE FRAME AND SECTION OF PULLEY.

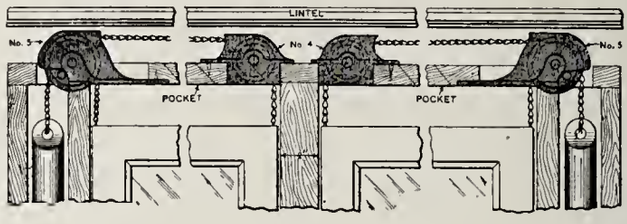

FIG. 3.—TWIN WINDOW, WITHOUT WEIGHTS IN MULLION.

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A REVIVAL of activity on the part of the Minnesota Chapter of the American Institute of Architects seems to be assured by the attitude of a number of members. It is high time. Minnesota is so situated that her three chief cities are likely not only to hold but to increase their lead in the commerce and manufactures of a tract vastly greater than the state itself, and it is altogether desirable that any profession or calling engaged in work of such importance as shaping the character of public and private building should hold itself in readiness to act as a unit when occasion presents itself. Within the few months of the existence of this journal this department has on several occasions called attention to the help that an active chapter might have given to movements in the local art world.

WINDOW glass factories controlled by the largest corporation in that line of production in the country are to close at an unusually early date this year, owing to the immense stocks in the hands of jobbers and manufacturers. It is said also that when the factories of this company start again they will be equipped with machines to do the work of glass blowers or workers, who, by the way, have for years exceeded all other workmen in their skill in devising and carrying out a tight labor combine. Nearly all of them are foreign born, and they are pointed out as about the first labor combine to perfect a system of controlling the ever recurring question of supply and demand in labor. They are credited with having been as autocratic at times as might have been expected of a capitalistic monopoly, and this may have hastened the day of substituting machinery for their skill. Of course cheaper glass is promised as a result of the substitution, and with existing conditions it is likely to result.

The largest plate glass factory in the country has been overhauled during the past year and equipped with new grinding and polishing machinery, which is expected to cheapen cost of production materially, not so much by introducing new processes as by enlarging the scale of former operations. Plate glass makers, although they have had a good understanding among themselves of late years, do not seem to have shown the greed of some of our more prominent monopolies, yet the users of plate need not feel wronged by lower prices. Let there be light.

While the schoolhouse as a building, or as an institution is very far from the stage of progress that any one with intelligence and imagination could wish, it is gaining in both ways. One need go back but a few years to find the school house an utterly dirty and cheerless building, and the site both bare and dirty, as well as cheerless. Within these few years there has been much change as to the dirt and cheerlessness. One may often find a school yard attractive with trees, green sward and well kept flower beds, while within one will be met at every turn with well-meant efforts to make rooms and corridors attractive. Brave efforts are made to make walls pleasing with color, in spite of blackboards. Pictures and music are cultivated, and indeed one often now finds his chief regret in leaving one of our schools to be that it is housed in such a villainous building, architecturally and economically. He feels that, crude as are the efforts of teachers and pupils to cheer and beautify the school building, they are more often than not well in advance of the school board and their architect. In large towns the hideousness of the average school building is less conspicuous, but in the small western towns more often than not, the sight of a school building will make one turn for relief to look at the grain elevator, a structure that has at least the merit of proclaiming its unpretentious utility.

While school boards seem always complaining of the grudging public, one often wonders while looking at their misdirected outlays whether greater grudging might not result in better buildings.

Perhaps there will come from within a demand for good school buildings. Certainly the teaching of our times, no longer restricted to the "three Rs," is bringing to light talent in drawing and doing various things that was more often than not left undiscovered under the old system. Will not this new awakening prove critical and point out the way for better things? There is a still newer movement that may demand intelligence in building for schools. Already the school house is brought into use as a social center, the place of "settlement" work, the "Hull House" of congested populations. This discovery will spread, and buildings will be demanded that, let us hope, will needs express their purpose simply and beautifully.

A civil engineer, being sent out on a railway line to measure the earth of a new embankment as a preliminary to paying the contractor for the work, found it located so far from a public house that he sought and obtained his dinner at a likely farm house hard by. Being most favorably impressed with the quality of the potatoes served at the meal, he bargained with the farmer to deliver a few sacks of them at the station for shipment to his address in town. The agreed price was sixty cents a bushel of sixty pounds, and seeing the farmer, after weighing the whole, laboriously reducing the weight to bushels, as a preliminary to getting the price, the engineer said: "Why do you not reckon it at a cent a pound, or a dollar a hundred?"

Then, having scraped acquaintance with the farmer's boy, who was an observer of all that had passed, the engineer bethought him that the lad could be used to advantage in helping to measure the fill, and engaged his help. The boy, having learned that the contractor was to receive twenty-seven cents a yard for his work, and observing that the engineer, after taking his measurements in feet, was reducing all to cubic yards as a preliminary to finding the cost, said: "Why don't you reckon it at one cent a cubic foot or at a dollar a hundred?"

The engineer, thinking this too good to keep to himself, told it at the office on his return, where it was agreed that the farmer had the better defense of the two for his method. Nevertheless they continue measuring work by feet and tenths, and pricing by the cubic yard in that railway office; and when that boy grows some and comes to town he will wonder why a roofer prices his work by a square of 100 feet while the plasterer and painter uses the yard of nine feet. And having seen the stone work of buildings in his part of the country reckoned in cords of 100 cubic feet, he will be still more surprised on coming to town to find it reckoned in perches, which are not even such as he has read of in the books, but a local invention.

Stories told by those who report the late discoveries in Egyptian tombs will impress readers as having one thing in common with the knowledge that earlier generations obtained by searching the scriptures—the assurance with which the times of ancient occurrences are given us.

Egyptian dynasties we have always heard about, but now we learn of pre-dynastic kings—some half dozen of them—stretching back to 4900 B. C., and the dates of their reign given with more certainty than of English kings before the Norman conquest. Some of these reigned before the days of the potter, but not many; and yet they knew how to write then, at least well enough to inform Dr. Flinders Petrie of all this. From a writer in the "Atlantic" we learn that "from Ka's have come jars of cylindrical shape which bear his name and some other signs written in ink. The writing is rude, but we shall probably agree that writing, even as rude as this, means civilization that has advanced far." Skipping nine hundred years, we come down to about 4000 B. C., and find, according to the same writer, "A double stairway of ninety feet, that descended parallel with the two sides of the tomb chamber to the eighteen underground chambers of the dead. At the bottom, the passage turned south under the archway, the first use of the arch in building yet discovered."

Linseed oil prices have, as predicted, been lowered considerably by the great flax crops of last year. This ought to offset the advance in lead and zinc noted in former issues, so that makers of mixed paints will have less excuse for a threatened advance in prices. The dailies have been publishing interviews with farmers to show how they were going out of flax raising the coming season, but these do not seem to prevent the decline in oil prices.

Among the schools of philosophers to be met every day in the building world perhaps none is so numerous as the believers in the notion that high prices encourage building activity. These lack nothing that goes to the making of true believers. A daily encounter with one after another who intended to build but concluded that prices were too high to see any profit in it never disturbs the theories of these philosophers. Nor can it be made to appear to them that bills must be paid, in building operations as in others—that when building is inordinately costly the money to be had for building purposes will do less of it in fact, although the showing in dollars and cents may be as large. Such people will find less comfort in certain tendencies in prices than the rest of us do. This department has from time to time noted some elements in the price situation other than the very monotonous marking up that has been so much in vogue for some time past. While it is true that some of the materials entering into building have not been marked up beyond reason, yet architects have for months past found altogether too much work in getting reasonable bids on proposed improvements. Now, however, there are more or less frank acknowledgments of over-stocking in some directions, and there are signs of it where there are desperate efforts to conceal the fact. Another feature which always accompanies a period of great profits is a tremendous increase in producing capacity—a building of mills, which, for the time, helps to stiffen the prices which they are destined soon to reduce. This feature is not absent in the present situation. And if building materials were to drop a few notches it is probable that the public can stand it. It is to be hoped that there will be no considerable rebelling at the thought that people will be able to build better for their money.

The following is a list of colors that may be used upon new plaster work, for mixing with distempers, gesso, and stucco work, without being attacked by the lime: For white: zinc white, lithapone, Charlton white. For blue: ultramarine, lime blue, smalt, cobalt, and permanent blue. For red: vermilion, red oxide, Venetian red, Indian red, and madder lakes. For yellow: lemon yellow, cadmium yellow, Naples yellow, yellow oehre, brown ochre, Indian yellow, and raw sienna. For green: emerald green, cobalt green, verdigris, and oxide of chromium. For brown: burnt umber, Vandyke brown, Cologne earth, asphaltum, and purple brown. For orange: orange chrome, burnt sienna, cadmium orange, and Mars orange. For black: ivory black, blue-black and lamp-black.

The agricultural building to be erected on the World's Fair grounds at St. Louis will be the largest of all the buildings to be built. It is to cover more than twenty acres of ground, and the contract calls for its completion by next September.

MINNESOTA'S SECOND OLDEST ARCHITECT.

A. F. Knight was born in the town of Warran, New York, November 22, 1831, of New England parents, his father being Noyes Knight and his mother Sarah Langdon, whose father was a professor in Harvard College.

In 1844 Mr. Knight's parents moved to the city of Buffalo, N. Y., where the subject of this sketch remained until 1857, when with a fellow student and dear friend, Mr. H. P. Thompson, he worked and studied architecture in the office of Sage, Wilcox & Rush, architects. In the spring of that year they, together, acting on Horace Greeley's advice, came west. Their chief object was to see the Mississippi Valley, and more especially St. Anthony Falls.

With the exception of about three years, from 1859 to 1861, Mr. Knight has been in the active practice of his profession in St. Paul. He says he has built no buildings of which, from an artistic standpoint, he is very proud; but, at the same time, there are none of them that he is ashamed of.

We commend this honesty of expression, and we cannot but believe that it is the key to Mr. Knight's character. One may not be proud of his work because he knows how far short of his ideals it comes, but if he is not ashamed of it, he is conscious of having done his best.

The great steel corporation is reported to have purchased two of the larger independent wire making plants, hence the advance of two dollars per ton all along the line in wire products.

When times are dull and people are not advertising is the very time that advertising should be the heaviest. Ninety-nine out of every hundred merchants advertise most when there is least need of it, instead of looking upon advertising as the panacea for their business ills.—John Wanamaker.

TALKS ABOVT ARCHITECTVRE

THE DECORATION OF AN INEXPENSIVE HOUSE.

By George Emil Bertrand.

Assuming that the architect has succeeded in impressing upon the exterior of the inexpensive house a suggestiveness of all those indefinable attributes of the quiet, refined, unobtrusive home life, by a happy disposition of the necessities of his composition—or, as might be truly said, had succeeded in molding the facial expression of the house so that it interpreted the unassuming, but refined and intelligent domesticity within, he will have achieved a great work, which both he and his client may well look upon with pardonable pride.

But the interior walls are white and cold and cheerless, and the man and especially the wife, of cultivated taste and sensitive nerves will be confronted with a most difficult problem; a problem whose successful solution will be of still greater importance, if possible, than the exterior expression of the home.

Happy is the guest who, upon visiting the home of his friend, finds his regard for his host heightened at the first view of his house; and upon crossing the threshold finds the same feeling intensified by a thousand indications and proofs of his friend's symmetry of character, the peace and beauty of his domestic environment, which he had but guessed before.

The decorations on the walls will be either cold, comfortless and inhospitable, or discordant and glaring and irritating, or pale and meaningless, or soothing and unobtrusive, according to the degree of refinement and feeling by which they are prompted. Ordinarily they will be the intellectual (and it might almost be said the moral) manifestations of the individuals they surround. Unconsciously to the tenant perhaps, they will be the mottos of the family; the blazonries of the house, either of peace or war. They will have their effect upon every thought and action of the inmates of the home. They will exert their influence, either baleful or beneficial, upon the sensitive and impressionable minds of little children.

There is perhaps no subject more difficult to discuss understandingly than that of colors, without the assistance of the actual colors before the eyes; but there is a general rule to be observed in the application of colors.

In the realm of sound, the sentiments of peace, quiet, contentment, moderation, find their expression along the middle register; those of joy, excitement, excessive animation, or sorrow, despair, lamentation, ranging to the extremes, full of rhythmic disturbances, discords and irritating contrasts. The same law holds true in the realm of color.

Again, the minor in sound is the key of intellectuality; and the major, that of physical exuberance. Of the primary colors, blue is essentially a minor color, and yellow and red are major colors, but more especially red.

Blue is the color of meditation, coolness, quiet, transparency, lucidity. Red is the color of strength, virility, activity, violence, physical puissance. Red is the color of blood, the life fluid. We think of war, destruction, and great physical disturbances in terms of red. Red is earthy, fleshy, positive, concrete, measurable in quantity rather than quality. Blue is the clear sky; suave, profound, illimitable. Red is the color of aggression; blue is the color of pacification.

Each color has its inherent suggestiveness of intellectual or physical attributes, and the degrees and qualities of these attributes are as unlimited as are the shades and gradations of colors. Again, they vary in proportion as they lend to, or take from each other their inherent qualities by admixture, or influence each other by their relative positions.

Volumes might be written about the inherent suggestiveness of colors, but if the foregoing propositions are even in a measure true, it is evident that the problem of the decoration of the inexpensive house has vastly grown in importance by their consideration.

In the treatment of color, the same rules will apply as in the treatment of form, or of sound, in this respect: that the minor and major, the intellectual and physical, are each necessary to each other. The minor colors should be warmed, and the major colors cooled. It should be remembered that the effect of a color is permanent and persistent.

In music, the effect of an intensely pathetic minor strain is a passing emotion; and it follows that a greater intensity of expression is allowable in music than in the colors of a permanent decoration.

In our inexpensive house, then, the colors will be soft and soothing and wholesome and in broad tints. Whatever ornamentation is used will be simple, conventional, unobtrusive, but full of refinement. The most frequented rooms, which will be the resting places of the house, will be in the minor tints, with sufficient accentuation in major colors to give vitality to the effect.

The less frequented parts, such as the halls, will be in the major colors, to avoid monotony of general effect, and here, again, the positive colors will be subdued and refined by a touch in the minor.

The chambers will be in the most quiet, subdued, refreshing minor tints, and absolutely free from intricate or involved figures, that rack the delirious eyes of fever in their vain efforts to unravel the mystery on the wall.

There will be no rich effects of tapestries in the inexpensive house, no sheen of silken fabrics, or ara-

besques, or gracefully wrought reliefs; but the effect will nevertheless be full of refinement, and will be the most important element in connection with the inexpensive house to promote the peace and comfort of its inmates.

Because the owner of the inexpensive house cannot afford to employ an expensive artist to paint rich ornaments upon his walls, the effect must be entirely dependent upon the suggestive quality of the plain tints, the reciprocal relation of adjacent colors, and the harmony of the whole.

There is a sane and healthy middle ground in the use of colors that avoids sickly paleness and insipidity on the one hand, and obtrusive strength or intensity on the other hand.

There is a true relation between mind and matter, or the intellectual and physical, which produces the highest degree of sanity in man; and in our finite conception neither one ever exists without the other. They correspond to the minor and major in sound and color, and their peculiar qualities are present in some degree in every manifestation in nature that appeals to the external senses.

MILWAUKEE'S SEVEN-STORY CEMENT BUILDING.

A building which is now attracting more than ordinary attention is in course of construction in Milwaukee, Wis., and architects and contractors are watching developments with the greatest of interest. The building is being put up for a large electrical company, and is to be seven stories high, built entirely of concrete.

The reason for adopting this material, says "Carpentry and Building," was the delay that would have ensued in securing the necessary material had a steel frame structure been attempted.

In the new building there will be above the second story neither wood nor iron, except that the window casings and sash across one street front will be wood, and those along the other side and in the rear will be of metal.

The girders will be solid beams of concrete, cast upon the premises as they are required, and the floors will also be of concrete, which will be cast in position as the stories rise one above the other, and will be finished with a smooth surface, the same as street sidewalks. The scheme is known as the Ransom system. In order to construct such a building there has to be a great deal of false or temporary work done in order to mold the concrete in the position in which it is to remain as a part of the structure. False floors have to be constructed and false girders in the form of boxes have to be placed in position in which to mold the concrete.

The building will cover an area of 60x175 feet, with an "L" in the rear, 62x85 feet, which will be three stories high. The supporting columns for the floors in the basement and the first and second stories will be iron incased in concrete. It will be used for manufacturing purposes only.

THE ARCHITECT'S TROUBLES.

The architect was talking about women, says the Baltimore News:

"They're sweet creatures," said he fervently, "if only they hadn't the closet mania. The most intelligent of 'em can't understand why when you're building a small house at a small cost you are not able to put 27 closets in it. Neither can she, though she knit her brows ever so closely, feel satisfied that a clothes press and a fireplace cannot occupy the same space at the same time.

"Tell you what's the fact, I nearly go off my head when I'm building for a woman. I take my plans to her, and she goes over them carefully, after I have made her understand that each drawing is that of a single floor and not of a sliced-off piece of the whole house cut through from garret to cellar.

"When I have explained every detail carefully and have given her the dimensions and told her why everything is at it is, she goes away professing to be well satisfied.

"The next day I receive a note from her something like this: 'Dear Mr. Smith—Now, don't you think I'm troublesome, but couldn't you extend the drawing-room a few feet so that we will have more room for carpet dances? And I've been thinking that I'd like a music room with a bow window built between it and the library. Hoping it will not be much trouble to alter your plans to permit of these improvements, I am,' etc.

"It takes two interviews of an hour each to show her why these 'improvements' cannot possibly be made, and even then she don't understand, or she won't, for she asks sarcastically if putting a stationary wash basin in her bedroom will disarrange my drawings beyond hope of repair.

"You would never believe the windows I have taken out and the windows I have put in at the behest of my fair clients, nor the fights I have had to maintain a symmetrical interior, free from excrescences that are really closets poked in the most surprising places. The housekeeper's point of view is entirely different from the architect's. She naturally demands comfort—he wishes to combine comfort with beauty. They should be able to 'get together' and make a model house out of this union of ideas, but alas! they do not, for the feminines are so unpractical that where the kitchen range is going is of more importance to them than the front.

"They say that the best architects in the time to come will be women. If they are, I'll wager they won't deal with their own sex, for after they've been requested some half a dozen times to give a Queen Anne cottage a Colonial interior, they'll become sick of the business, and post a 'Business-transacted-with-men-only' sign on the door, as I'm sometimes tempted to do."

FRONT VIEW OF JAMES J. WAIT ESQ'S RESIDENCE, CHICAGO, ILL.
Dwight Heald Perkins, Architect, Chicago.

SIDE VIEW OF RESIDENCE FOR JAMES J. WAIT, ESQ. CHICAGO, ILL.
Dwight Heald Perkins, Architect, Chicago.

THE EASTLAND BUILDING, NOS. 517-19 MICHIGAN AVENUE, CHICAGO, ILL.

Robert S. Smith, Architect, Chicago.

Supplement to
The Western Architect.

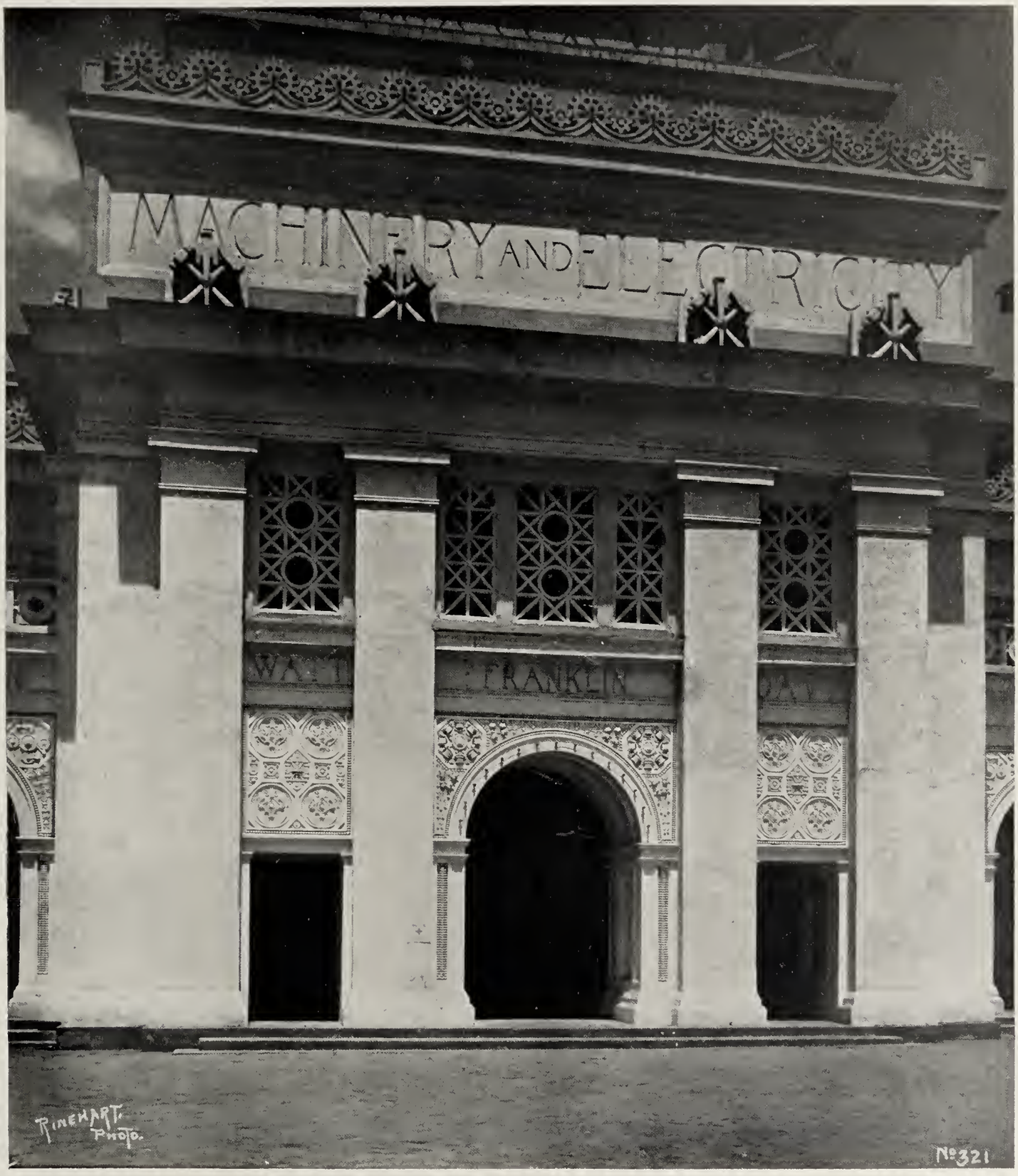
March, 1903.

RESIDENCE FOR W. H. BARRY, ROGERS PARK, ILL.

Turnock & Ohrenstein, Architects, Chicago.

Supplement to
The Western Architect.

March, 1903.



MAIN ENTRANCE TO MACHINERY AND ELECTRICAL BUILDING,

Trans Mississippi Exposition, Omaha, Neb., 1900-01
Dwight Heald Perkins, Architect, Chicago.

CORNER GROUP OF STATUARY, Machinery and Electrical Building,
Trans Mississippi Exposition,
R. W BOCK, Sculptor. Dwight Heald Perkins, Architect.

CORNER GROUP OF STATUARY, Machinery and Electrical Building
Trans Mississippi Exposition,
R. W. BOCK, Sculptor. Dwight Heald Perkins, Architect

VIEW FROM THE EAST, SHOWING MACHINERY AND ELECTRICAL BUILDING,
Trans Mississippi Exposition, Omaha, Neb., 1900-01
(Government Building in Distance.)
Dwight Heald Perkins, Architect, Chicago.

R. W. BOCK, Sculptor.

CENTRAL GROUP OF STATUARY, Machinery and Electrical Building,
Trans Mississippi Exposition, Omaha, Neb., 1900-01
Dwight Heald Perkins, Architect, Chicago.

DETAIL OF PORTICO, MACHINERY AND ELECTRICAL BUILDING,
Trans Mississippi Exposition, Omaha, Neb., 1900-01
Dwight Heald Perkins, Architect, Chicago.

GENERAL VIEW FROM THE SOUTH, SHOWING MACHINERY AND ELECTRICAL BUILDING,
Trans Mississippi Exposition Omaha, Neb., 1900-01
Dwight Heald Perkins, Architect, Chicago.

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RESIDENCE OF FRANK A. BREWER, DULUTH, MINN.

Palmer, Hall & Hunt, Architects, Duluth.

RESIDENCE FOR MR. L. S. LOEB, DULUTH, MINN.

SKETCH FOR A HOUSE FOR W. H. DWINNELL, MINNEAPOLIS.

Bertrand & Chamberlain, Architects, Minneapolis.

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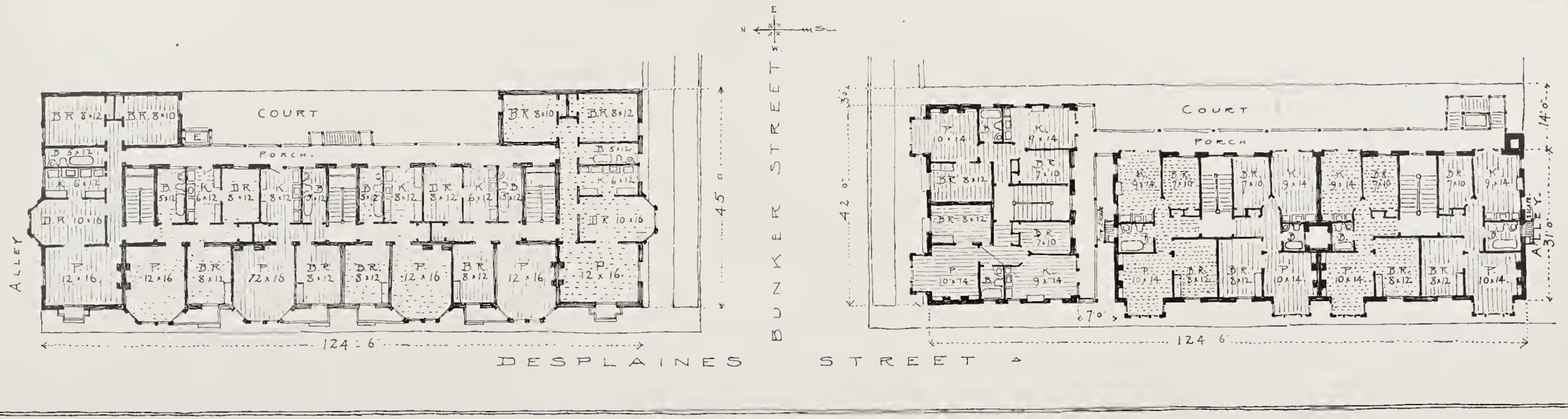
The Western Architect.

March, 1903.



THE LANGDON APARTMENTS.

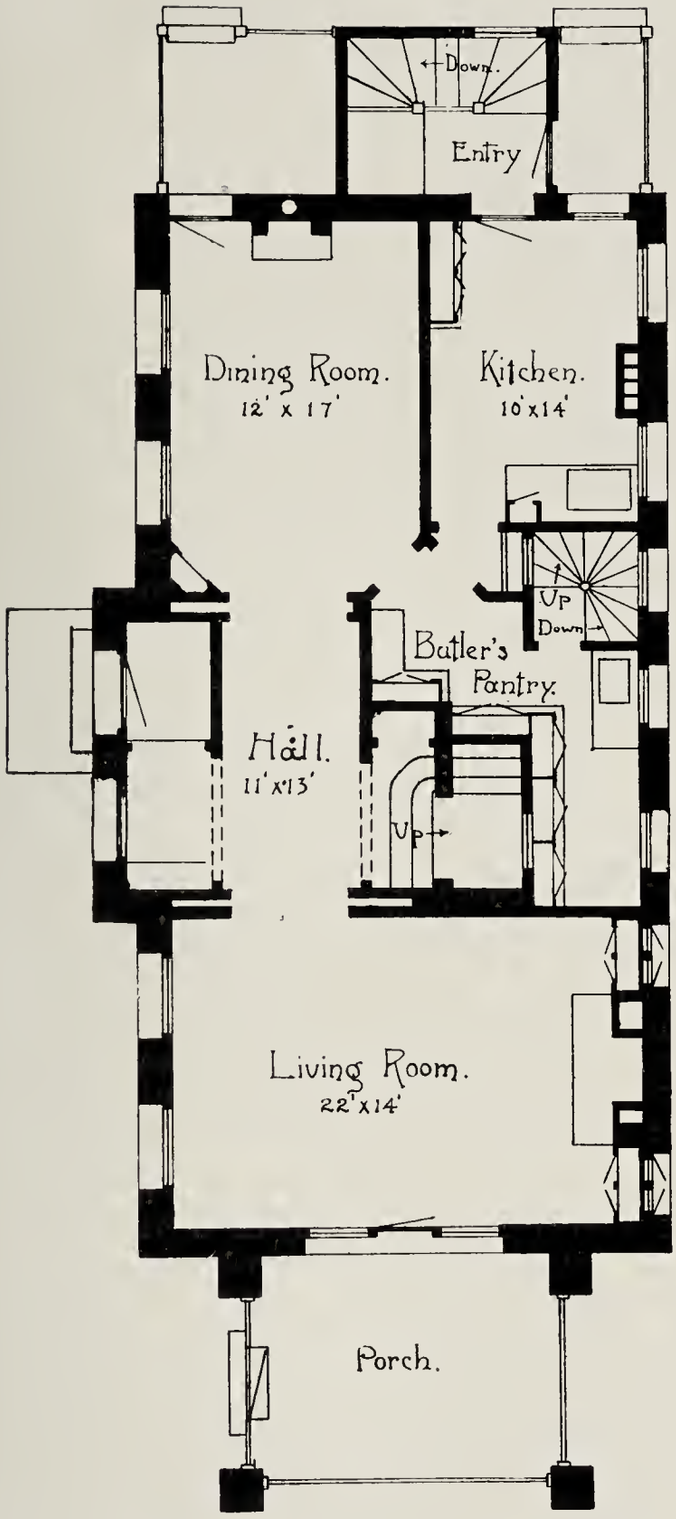
DWIGHT HEALD PERKINS, ARCHITECT. CHICAGO.

THE LANGDON APARTMENTS, CHICAGO, ILL.

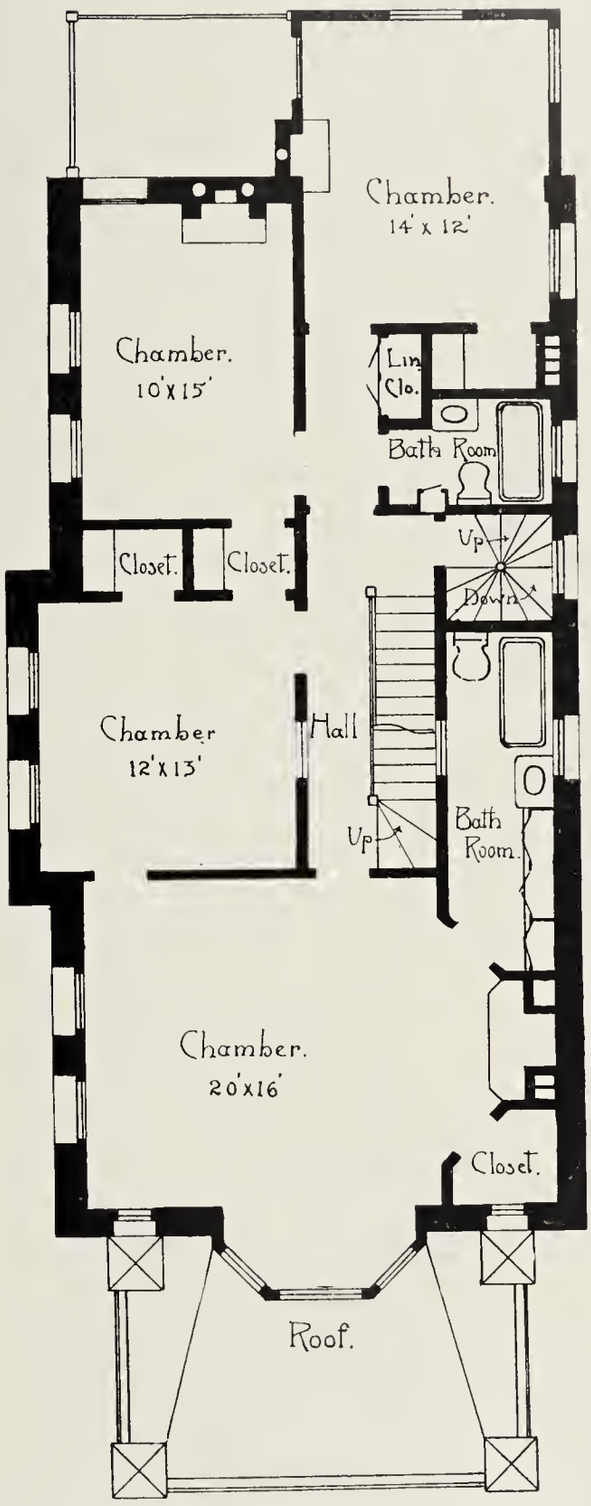
Dwight H. Perkins, Architect, Chicago.

Supplement to
The Western Architect.

March, 1903.



FIRST STORY PLAN.



SECOND STORY PLAN.

FLOOR PLANS OF RESIDENCE FOR MR. JAMES J. WAIT, CHICAGO, ILL.

Dwight H. Perkins, Architect, Chicago.

THE PRINCIPLE OF THE VACUUM SYSTEM.

By Morris R. Ebersole,
Formerly Instructor in Chemistry at Cornell University

To understand the principle of the operation of such an apparatus for this system it may be well to investigate how, under ordinary domestic conditions, a vacuum may be made and maintained, for this is the all-important point of the system. If this can be accomplished easily without entailing any great skill on the part of the operator, we may expect the results from the vacuum system to meet with great favor. Our problem is to exhaust the air from the whole heating system, consisting of boiler, piping, and radiators. In the first place, the entire apparatus must be absolutely air tight, so that when the vacuum is obtained it may be retained. This may be done in three ways: by means of a steam jet working with the same principle as a water aspirator or mercury air pump, by means of a regular air pump, or by condensation. The latter method is becoming most generally used, and is the one general principle khich we shall attempt to explain. Whatever method is used, it may be stated here for the sake of the truth that an absolute vacuum is never obtained, because it is never possible to exhaust all of the air from the apparatus by these methods, but it is possible to obtain a vacuum suitable for the purpose, and one in which water will boil at 180 degrees F. and lower.

Water boiling under ordinary conditions—Temperature 212° F. or 100 C. Pressure 14.7 lbs. or 760 mm.

Suppose we fill a flask partially with water and place it over a Bunsen burner or some other source of heat. The temperature of the water will rise until it reaches the boiling point. At the boiling point (212 degrees F. or 100 degrees C.), the steam arising from the liquid has the same pressure as the atmosphere upon it, which at our elevation is about fifteen pounds to the square inch, or, in other words, it could support a column of mercury 750 to 760 millimeters high. You may add as much heat as you please to this boiling water, but its temperature will remain the same, and not until it has all been converted into steam will the temperature rise above 212 degrees.

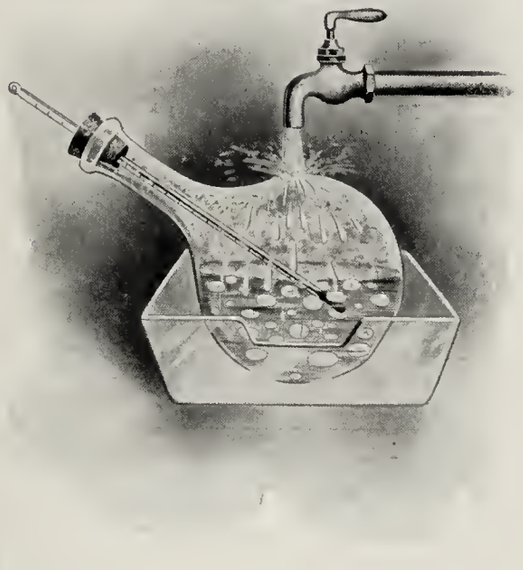
If water is boiled on the top of a very high mountain it will surprise you to observe that although boiling, its temperature under these conditions is very much lower than the boiling temperature under ordinary conditions described above, probably so low that it would be impossible to "boil" an egg in it. The cause of this difference is simply that on the mountain the atmospheric pressure is less than on the plain, consequently the steam or water vapor has less pressure to overcome, and hence boils easier, or at a lower temperature.

This remarkable experiment may be tried without the necessity of climbing mountains. Stopper the flask tightly while the water is actively boiling, using a cork through which a thermometer has been snugly inserted and adjusted, so that the bulb of the thermometer is covered by the water. The temperature will be registered as 212 degrees on the thermometer scale. Now suddenly plunge the stoppered flask under a stream of cold water. The steam which filled the flask when it was corked will be condensed, producing a "partial" vacuum, thus reducing the pressure within the flask, there will be practically no air present, as it has been pushed out by the steam while the water was boiling unconfined. The thermometer which registered 212 degrees will fall far below that point, due to the cooling of the stream from the faucet, but you will be astounded to see the water in the flask at this lower temperature violently boiling and throwing off steam. Here we have boiling water at a temperature lower than 212 degrees because it is under reduced pressure, or it is boiling under a vacuum.

This is the fundamental principle of the vacuum system of heating. The water in the boiler, by virtue of decreased pressure throughout the whole system of pipes and radiators, is made to boil at a temperature of about 180 degrees and lower, and the steam evolved at this temperature is sufficiently hot enough to do the heating required.

It evidently does not require as much fuel to boil water at 180 degrees as it would at 212 degrees, hence the advantage of the system as to economy of fuel. Again, the perfection of heating is obtained when the heat-radiating surfaces (radiators) do their work at a comparatively low temperature. A mild, healthy, and comfortable heat is the result. A heat at a range of temperature, say from 100 degrees to 212 degrees, to

suit any external temperature, thereby producing economy and quality. The hot water system is preferred by many because of this fact. With the vacuum system, we are in possession of facilities to obtain this result by means of steam.



Water boiling in vacuum; no heat supplied—Temperature and pressure far below the normal.

As we used the same flask for boiling and "vacuum" boiling in our experimental demonstration, so we may use the same apparatus for the vacuum system of heating as is used in the regular every-day steam and water heating, modified, of course, by the addition of the vacuum apparatus itself.

Here we see an ingenious application of one of the principles of physical chemistry to the economy and comfort of every-day life.

WASHINGTON AT 64.

(Sketch by Benjamin H. Latrobe, architect of the old capitol, made at Mount Vernon in 1796. It was brought to light little more than four years ago.)

NO FIRE ESCAPES ON SKY-SCRAPERS.

One of the curiosities of the New York skyscraper is the fact that the law which requires fire escapes on a five-story building dispenses with them on a fifteen-story building. Perhaps it realizes that in case of fire no one would ever be able to climb down twenty or twenty-five flights of giddy little iron ladders without losing his head. At any rate it depends entirely for safety in the skyscraper on fireproof construction. There must be nothing about it that can burn. And there is not. Stairways are of marble and iron. There is a little, a very little, wood "trim" about the offices, but even if it caught fire it would leave the building practically uninjured. Of course, wood does go into the construction of the building, but all such wood must, in buildings over twelve stories high, according to law, be fireproofed; chemically treated so that it will not burn. The skyscraper says to its tenants: "There ain't going to be no fire, and, if there is, you can get out by the elevator." Elevator shafts are constructed absolutely unburnable, with not a thing about them to feed the flames. The lesson of the New York Life building a few years ago was thoroughly learned, and today the fireproof skyscraper must really be fireproof.

When one realizes that New York is at present investing some $70,000,000 in these castles in the air, that are even now building, they are enlarging the city by an acreage of one-seventh of its original area, and that they are daily shooting further and further into the air, one cannot but wonder what the skyscraper of the next quarter of a century will be. There seems to be no chance of a return to first principles. Such buildings as the Herald building, up town, and the new Stock Exchange and the new Chamber of Commerce, down town, may be very fine architecturally and beautiful in themselves. But, unfortunately, they are not by themselves. To be appreciated they would have to be seen, and to be seen they would have to be set out on a plain somewhere—not crowded, as they are, into the shadow of twenty-five story air castles which New York's millions are rearing over New York's infinitely precious soil.

WASHINGTON, D. C., NEW UNION STATION.

The house, by a viva voce vote, passed the senate bill providing for the erection of a union railroad station at Massachusetts avenue and First street northeast.

The station, which is to cost $4,000,000, is to be situated north of the present site of the Baltimore and Ohio depot, at Delaware and Masachusetts avenues. The Pennsylvania railroad, by the terms of the bill, is to remove its tracks from the mall and reach the site of the proposed station through a tunnel to run between the Capitol and Congressional Library buildings.

The building will be constructed of marble and will be one of the finest railway stations in the world. D. H. Burnham, architect, of Chicago, will prepare the plans for this magnificent structure.

BUILDING MATERIAL MANUFACTURERS PROSPEROUS.

The ten thousand interests and industries identified in one way and another with building construction in the United States reaped greater profits in 1902 than ever before in a single year. The expansion in these industries has been prodigious; hundreds of cement, brick, plaster, roofing and woodwork manufacturing concerns having entered the field for business since the year opened.

Some of the older companies have doubled, and others quadrupled, their working capital; many more have been gathered into combinations for self-protection in prices; some few have suffered a nominal effacement by accepting large stock compensation from erstwhile competitors that have gone through the soul-stirring performance of swallowing them whole; and still others have had gumption enough to retire from the field when the odds were ten to one against them.

No previous year has ever seen such general and uniform activity all over the continent in building construction. From '85 to '92 the central west experienced such a fever of steel building construction as to make that period historic in the annals of the republic's growth. Even the great moneyed centers of the east stood back aghast at the building boom which swept over Chicago and the great cordon of cities stretching from Duluth to Kansas City. Then came a reaction which put a quietus on these young giants of the Mississippi river section, and between 1896 and 1900 the big eastern cities all showed far larger building construction totals than their hustling rivals around the lakes.

But the conditions which have prevailed since 1900 have been favorable alike to east and west, and central west and south. The west is no longer beholden to the east for working capital. When huge amounts are wanted for great building enterprises these days in Chicago or St. Paul they are raised on the spot, and the enterprise is financed and put through without outside aid.

CONSTRUCTION OF WINTER HOMES.

A matter to which attention ought to be paid is the construction of houses with a view to economizing fuel. Solidity, good workmanship and compactness are obvious means of protection against cold weather. The suggestion has been made that the winter sunshine ought to be utilized more extensively than it is at present. The verandas, which are now becoming every year more common, might be incased in glass during the winter months, and so converted into sun parlors. Even when there is no scarcity of fuel it is pleasant and healthful to bask in the winter sun, and it is customary to advertise the sun parlor as one of the attractions of winter resort hotels. There is no reason why this luxury should not be more generally enjoyed; the cost of the glass would be soon paid for in the saving of coal, and a pleasant room would be added to the house.

PLANS FOR NEW YORK BUILDING.

The sketch plans for the New York building have been received by Director-of-Works Taylor from G. S. Heins, state architect of New York, who drew them.

The building, which is of the renaissance style with Italian feeling, is to occupy a prominent position near the center of the Plateau of States, as befits the importance of the Empire State. Its main facade, in which is the main entrance, will front east along the big plaza in the center of the Plateau of States. The building is to be two stories high and to be crowned by a towering dome highly ornamented with molded ribs, and elevated on a square drum perforated at frequent intervals with ornate window openings. The dome is flattened somewhat from a hemisphere though it is not as flat as that that crowns the government building. The interior of this dome will be visible from the rotunda on the first floor. It will have an interior diameter of 35 feet.

The building is roughly in the shape of a Greek cross. Its dimensions are 160 by 117 feet. The lower floor, which contains the Exposition's conveniences, is entered through a loggia and vestibule which leads to the rotunda squarely in the center of the building. To the north is the men's reception room, 60 by 36 feet; to the south the women's reception room, of the same dimensions.

Continuing through the rotunda the banquet hall or lecture room is reached, a monumental composition 71 by 53 feet, which occupies both floors of the building.

On the second floor is the governor's suite and living rooms for the commissioners.

The building shows very little sculpture; a grand spread eagle on the pediment over the main entrance and four seated figures at each corner of the drum of the dome completes the list. A noteworthy feature of the building is the large amount of blank space, undecorated and unbroken by ornament of any kind, which is placed back of the pediment over the main entrance and forms a restful foil for this ornate composition.

A London cable to the Associated Press states that a full report is expected soon from Somers Clark, the architect in charge of St. Paul's, but there seems to be small question, in spite of the denials of the dean, that the chapter is seriously worried over the condition of the cathedral, whose foundations have been weakened by bad draining, coupled with extensive excavations in connection with the tube railroads and sub-surface work. It is stated on good authority that prompt and extensive repairs, estimated to cost $1,100,000, are imperative to insure the safety of the historic building.

"I like to read American advertisements. They are in themselves literature, and I can gauge the prosperity of the country by their very appearance."—William E. Gladstone.

HEATING WATER.

Some time ago there appeared in one of the mechanical papers the statement of a case where the owner of a steam plant was heating water by exhaust steam, at a great disadvantage, on account of the back pressure it created on his engine, which amounted to nearly fifteen pounds per square inch. This made it necessary to burn more than five times as much coal as would be needed if the same amount of water was heated by live steam.

It appears that the engine exhausted into a coil of two-inch pipe, and, although the diameter of the exhaust pipe was not stated, it is supposed to be much larger than two inches.

When the owner found that the arrangement was costing so much he had it removed and afterwards heated the water by live steam.

If the use of live steam cost one-fifth as much as exhaust steam, he saved 80 per cent by the change, but the 20 per cent it now costs him is a total loss, because he might have heated the water by exhaust steam absolutely without cost if his piping had been properly arranged.

We have no illustration of this plant, hence cannot point out the mistakes in detail, but the following rules apply to all cases, and if they are followed all of the exhaust steam from an engine may be used for heating water or other purposes without causing loss by back pressure:

First. Never reduce the area of a pipe through which exhaust steam must pass, until a point is reached where the volume of said steam is made much less by condensation, then reduce the area gradually.

For illustration, suppose that the exhaust pipe of an engine is six inches in diameter, and this is necessary in order to allow the free escape of steam. The area of this pipe is twenty-eight square inches, therefore it should be maintained until some of the steam is condensed. If it is carried into a tank for heating water it may reach the water full size, then branch off into four-inch pipes. After continuing this size long enough to condense half of the steam it may be reduced to three-inch pipes, then to two-inch for the remainder. This may seem expensive, as the pipe is comparatively large, but when we consider that its greater diameter reduces the required length, it appears reasonable.

Second. Always carry an exhaust pipe to the top of a water tank, then let the coil incline towards the bottom, allowing the outlets to discharge through the side. In this way the falling water acts as a siphon and draws the exhaust steam from the engine, thus preventing the possibility of back pressure on the piston.

Steam fitters are nearly always inclined to put an exhaust pipe through the side of a tank near the bottom, then continue it upward through the water, until it discharges into the air. If such a pipe is fitted with one or more drip pipes it is less objectionable, but even then it is far inferior to the before-mentioned plan. This is not the first time this matter has been explained but it will bear repeating, for there are a great many people who have never heard of it, and some of those who have do not profit by their opportunity to learn a better way.

TO LAY CORNER STONE OF ART PALACE.

The Director of Works, Mr. Isaac S. Taylor, of the St. Louis World's Fair, has notified Acting President Spencer that in two weeks, or before the end of March, the corner stone of the million dollar art building can be laid. The work on the building has advanced so rapidly that the contractors assured Mr. Taylor that the corner stone could be laid by the 20th, or at any later date fixed by the Exposition. The executive committee has authorized Acting President Spencer to take up the matter with Mayor Wells. In view of the fact that this is to be a permanent buiding and represent an expenditure of $1,000,000 it is deemed entirely proper that the municipal government take a conspicuous part in the corner stone ceremonies, and it is probable that Mayor Wells will suggest a program that will make the corner stone laying largely a municipal affair, the municipal assembly and the board of public improvements engaging in it.

This event is, in the opinion of the executive committee, one altogether different from the dedication of the other buildings and one which concerns the city government deeply.

Several officers of the Exposition visited the site of the Art Gallery recently and were surprised at the progress made. The walls of masonry are going up rapidly, being in some places half way up the first story.

It is somewhat startling to note that during the last month nearly 100,000 tons of iron and steel material were imported through the three ports of New York, Philadelphia and Baltimore. The shipment included pig iron, steel billets, steel and iron rails, structural steel, and wire rods, and plate bars. The immediate demand in this country for such products is so great that the domestic plants, extensive as they are, cannot meet it. The continued prosperity of this country has been a blessing to the producers of iron and steel elsewhere. The business depression in Germany has been such that if American industrial activity had not opened a market to the iron masters of that country they would be in sore distress. Conditions change quickly in the industrial world. Six years ago men in the American metal industries, unable to find domestic consumption for their products, had to offer them in foreign markets at prices which were so low as to defy foreign competition. Had it not been for the foreign sales hard times would have lasted longer than they did. It was assumed then by many that the American prices of steel and iron would remain low and that it would be only a question of time when the United States would supply all other countries with those products. The situation has changed suddenly. Prices are higher here than elsewhere, and the United States has become again an importer of iron and steel. When the home demand slackens, as it will some time, exportations will be resumed and foreign producers will again be alarmed by American competition.—Exchange.

ALL STATUARY CONTRACTS FOR TERRACE OF STATES LET.

All the contracts for the statues symbolical of the states and territories in the Louisiana Purchase have been awarded to the sculptors who will model them. The complete list is as follows:

Colorado—Arthur Zeller, Jr., Weehawken, N. J.
Montana—Antonin C. Skodik, New York City.
South Dakota—L. O. Lowrie, Tottenville, N. Y.
Indian Territory—Carl A. Heber, New York City.
Arkansas—Albert Jaegers, New York City.
Minnesota—Gustave Gerlach, Weehawken, N. J.
North Dakota—Bruno Louis Zimm, New York City.
Missouri—Sterling Calder, Philadelphia, Pa.
Nebraska—F. H. Packer, Weehawken, N. J.
Kansas—Adolph Weinmann, New York City.
Iowa—Carle Tefft, New York City.
Wyoming—C. F. Hamann, Tremont, N. Y.
Oklahoma—John S. Conway, Tenafly, N. J.
Louisiana—Rudolph Schwarz, Indianapolis, Ind.

These statues will be seated, single figures. They will occupy pedestals 14 feet wide, which will stand in a semi-circle on each side of Festival Hall between that building and the restaurant pavilions on the east and west spur of Art Hill. Each statue will be framed by an exedra made up of eight ionic columns crowned by a massive architrave.

NEW BOOKS.

The Insurance Engineering Department Station, Edward Atkinson, director, Prof. Charles L. Norton in charge, has issued Report No. V. on Slow-burning or Mill Construction.

This station, some of whose reports have been noticed in these columns, is mainly supported by the Factory Mutual Insurance Companies, although contributions are received from architects and engineers, and Mr. Atkinson is trying to accumulate sufficient funds to warrant the establishment of a permanent engineering experiment department in the Massachusetts Institute of Technology. Reports on fireproofed woods, sound-proof partitions, corrosion of cement steel construction, etc., have excited much interest, and although results have only confirmed the beliefs of intelligent and observing practitioners, they have done more to check reckless ventures in some of the comparatively new lines of construction than any other influence that occurs to us.

This report (No. V.) contains all the old plates showing typical mill construction, and at least two new plates. Much of the data which long experience has produced is brought together here in convenient form, as well as the little essays on what slow-burning construction is and what it is not. This report is sold singly at 25c, and should be in the hands of every student of architecture, nor can any office find so much in so little for ready reference.

APPROXIMATE COST OF BUILDINGS.

A contributor to Carpentry and Building has the following suggestions to offer on estimating the cost of building:

When people begin to figure on how much they can get for a certain sum of money, they are invariably disappointed, because they have assumed that if a house can be built in St. Paul or Minneapolis for a given sum, or was built in their own vicinity eight years ago at the same cost, that it can be done now, when, as a matter of fact, it will cost at least 20 per cent more today, with no immediate prospect of reduction.

Published plans are responsible for this tendency to error, but they can not always be blamed, for estimates may be correct for a certain locality, or, if a building has been built for a stated amount, it may have been done in the past when material and labor were much cheaper.

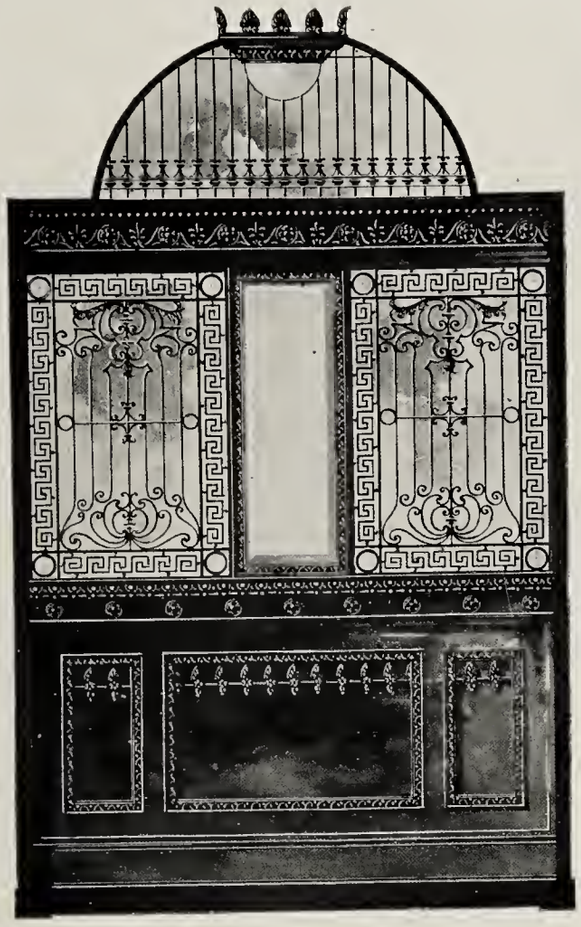
Select a house already built in your vicinity, which represents in construction and finish about what you desire to build, and find out its cost. Compute the area of the ground covered and divide the number of dollars of cost by the square feet thus found, and the price per square foot is ascertained. The cost of a similar house of a different area may be based on this unit cost. The house chosen for comparison should have been built the same season if possible, so that prices of material and labor will be identical.

A GREAT CATHEDRAL.

The plans which were recently on exhibition at the Architectural club in New York of the cathedral, if constructed according to the model, will be the most magnificent structure in the world. The proposition is to erect on Fifth avenue, in the neighborhood of Seventy-sixth street, a cathedral that will outdo St. Peter's of Rome, both in size and beauty, an edifice that will be the wonder of the world, and will cost in the neighborhood of $25,000,000. Ever since the Roman church began its work in this country it has been the dream of ecclesiastics to build a structure of this sort, something that would be a visible realization of Catholic devotion. It has remained for a Canadian priest to unfold the project.

Canon Bouillon, of Ottawa, has just finished eight years' work on the project. Part of the time he lived in Rome studying the architecture of St. Peter's, and, being a skilled draughtsman himself, he has been able, with the assistance of the best artists in Italy, to plan a temple that will be superior in many ways to the famous "Monument of Thirty Popes."

The plans are being photographed for distribution far and wide. It is proposed first to canvass the church for opinions on the project, and, if the movement appears popular, to open subscriptions and urge every member of the Catholic church in the New World to contribute.



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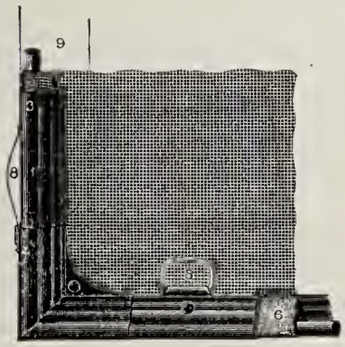

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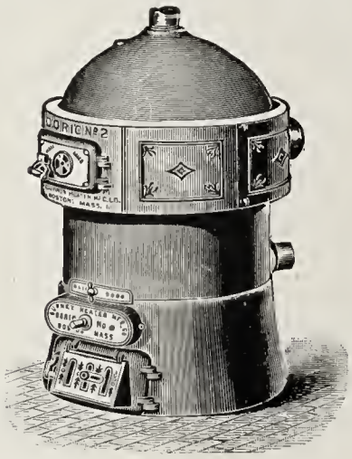

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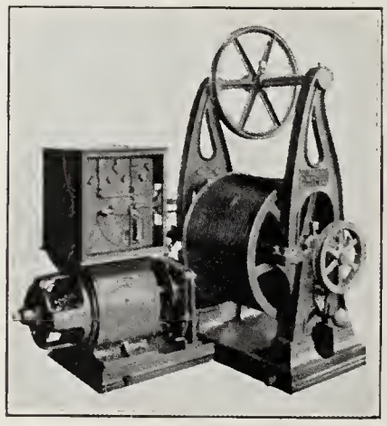

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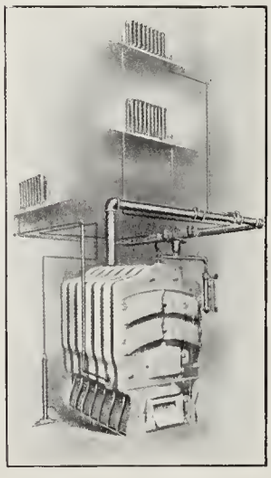

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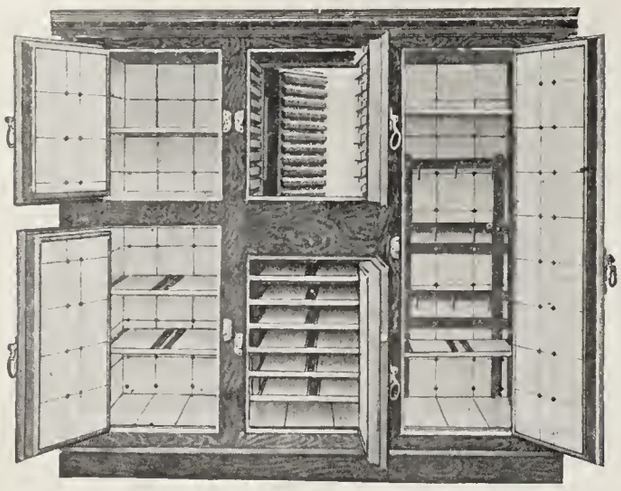

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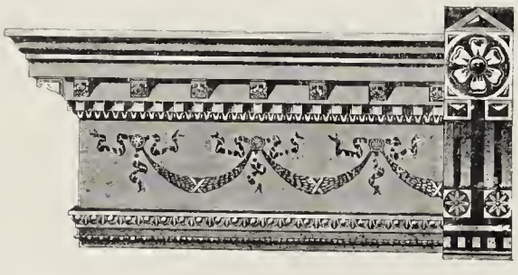

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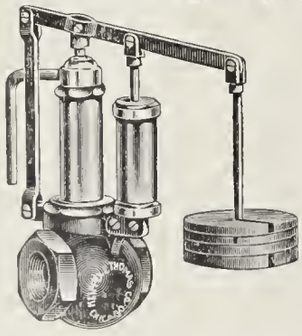

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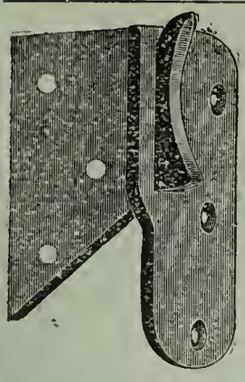
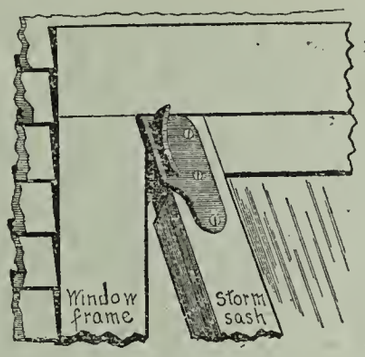


No. 1716
Visible Hanger



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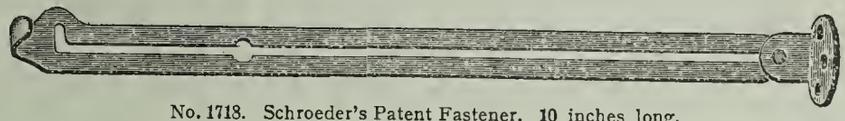

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