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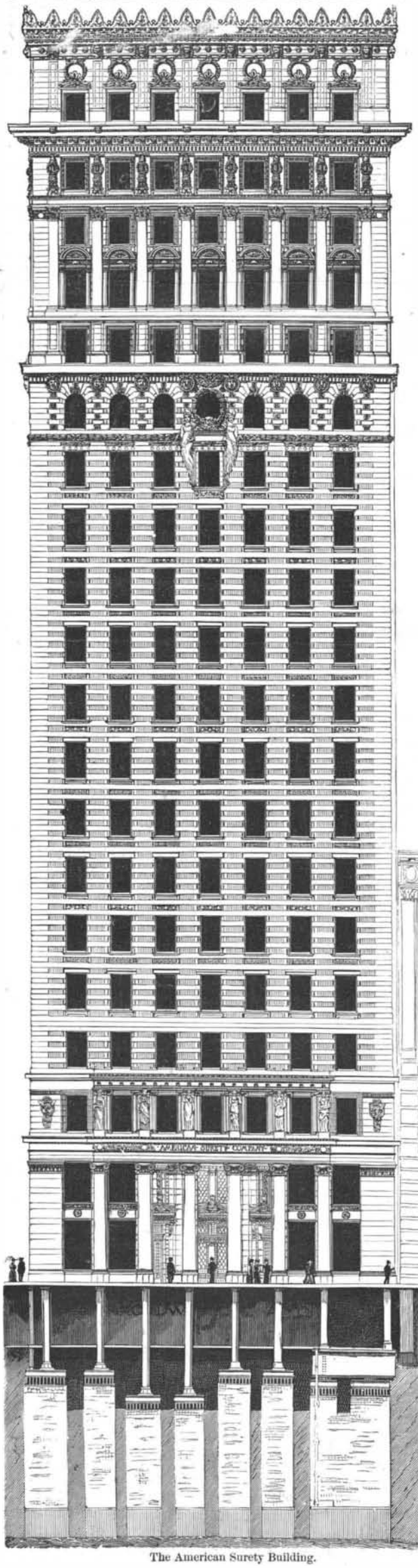
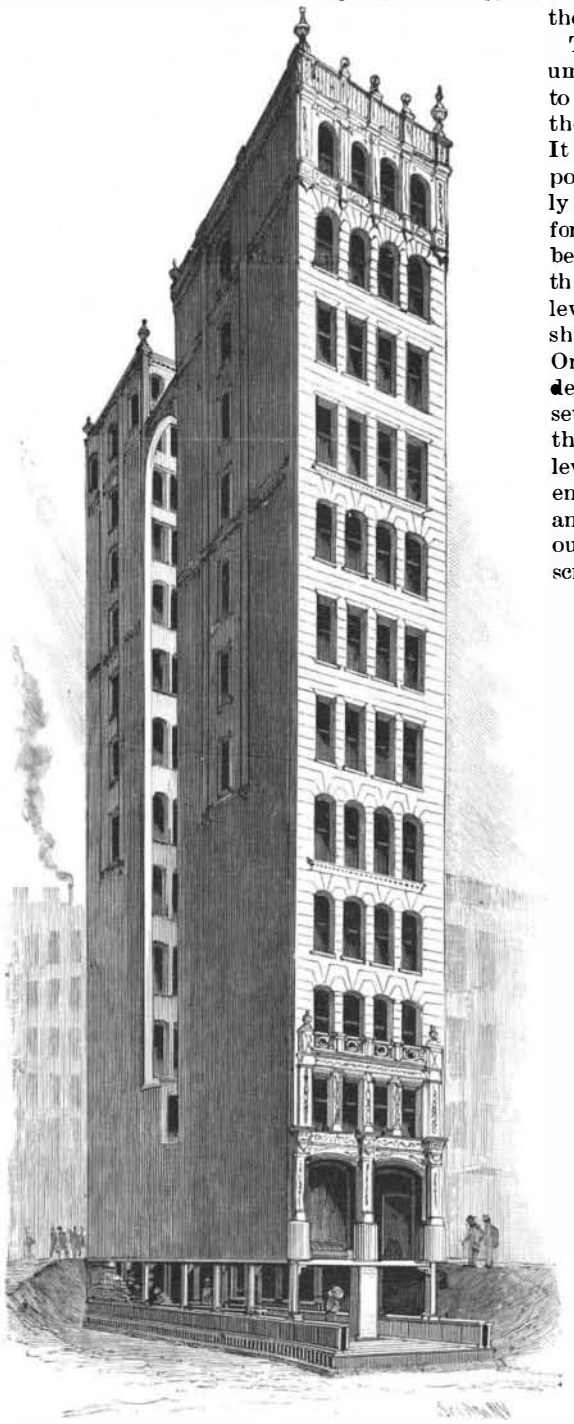


The American Surety Building.

STEEL FOUNDATIONS OF TALL OFFICE BUILDINGS.

The contour of the city of New York is undergoing a very striking change in the increasing number of tall office buildings now being erected. The construction of these buildings is made possible only by the use of steel frames. The older type of building, whether of brick, of stone, or of iron, depended for its strength upon its walls. The modern tall office building has a steel frame. This carries nearly the whole weight, and the walls, solid and massive as they appear, do not support the structure, but simply fill the interstices. It is startling to think of the entire superstructure of a twenty-story building resting upon thirty or forty columns. Yet without this modern development, without the use of steel, the walls of these buildings would have to be so thick at the lower story that there would be no room left for offices.

In a recent issue we illustrated the placing of the piers of the American Surety Company Building, in



Fahys Building.

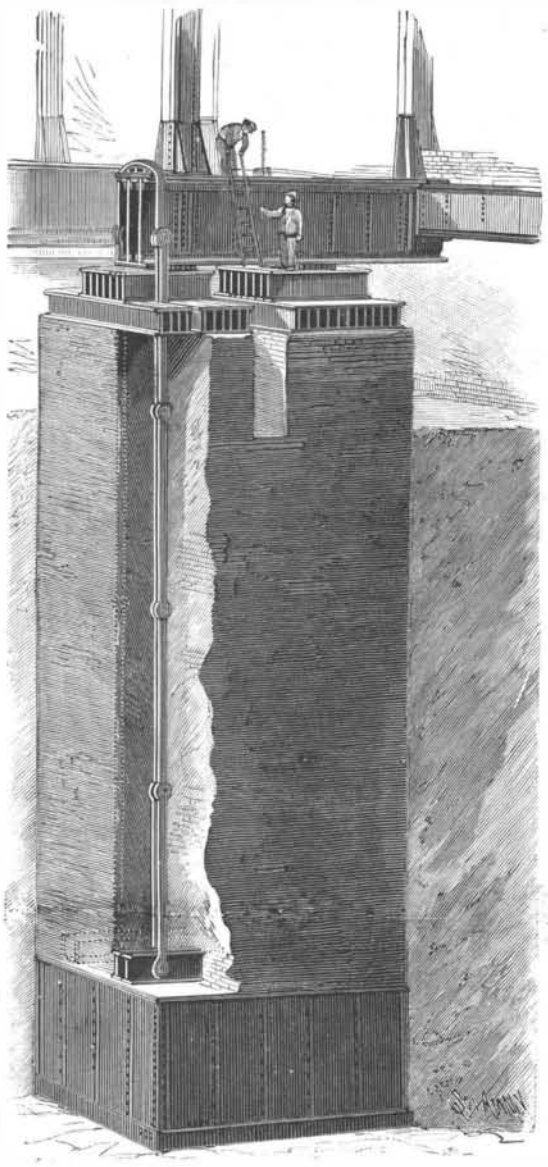
this city. This showed one of the first operations incident to the establishment of a foundation of a tall office building.

In our present issue we illustrate the construction of the steel foundation work of such a building, representing at the same time the superstructure resting on the foundations in question.

In the cuts two buildings are shown, both drawn to the same scale. The one on the left hand of the page represents the American Surety building, designed by Mr. Bruce Price, the well known architect of this city, with its foundation or substructure exposed. The building is 303 feet high from the street to the cornice line. It covers a lot approximately a square, 85 feet 4 inches by 84 feet 8 inches in area, yet none of whose sides are quite parallel. The general design of the tower-like structure speaks for itself, though much of the detail is very rich, and cannot be shown in a cut on so small a scale. At the base are shown the different piers sunk by the pneumatic method described in our issue of August 25. The bearing of the columns has to be distributed over the tops of these piers. A steel plate covers the top of the masonry. On this is placed a grillage, whose first course is made of ten 24 inch I beams weighing 80 pounds to the foot. These beams are just long enough to extend across the top of the pier, which is covered by them laid close together. Transversely to these, five 20 inch I beams, weighing 64 pounds to the foot, are laid, covering about one-half of the area, only in the center. A course of steel billets, 4 inches square each, rests on these beams, and on this third course of the grillage the base of the column is placed.

This description applies to the direct bearing columns. As this building is erected, no party walls are to be employed; the foundation had to be restricted to the limits of the lot where bounded by other houses. It is evident that a directly bearing column for some portions of the side wall would have rested dangerously near the edge of the foundation piers. To provide for this difficulty, cantilevers are employed to shift the bearing of the outside column back to the center of the pier. Referring to the large cut, one of such cantilevers is shown on its right hand, and the same is shown on a larger scale in the larger scale or detail cut. On precisely such grillages as already described, a very deep plate girder is established, which rests on two sets of steel billets, each set placed approximately over the center of a pier top. The inner end of the cantilever is held down by massive iron straps. Its outer end projects for several feet beyond the steel billets, and on its outer extremity is placed the column of the outer wall. As the building progresses, the tie just described holds the inward end of the cantilever down in

(Continued on page 359.)



Details of Cantilever, American Surety Building.

THE STEEL FOUNDATIONS OF TALL OFFICE BUILDINGS.

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(Continued from first page.)

its place. On the same inner end is established another column, which in the completed building supports such a share of the weight as to take the strain from the anchorage. It seems a daring conception to base the wall of a 300 foot building upon an end of a plate girder overhanging as this one does, yet precisely this method of construction is adopted in many buildings, and is recognized as one of the best ways of solving the problem of their construction.

The American Surety building rests on thirty-two of these steel columns. Two of them bear a weight of 584 tons each; one of the columns on the north side carries 1280 tons; these are the extremes of weights carried; the other twenty-nine columns sustain various loads intermediate between these. There are two cantilever columns, and they support respectively 746 and 663 tons. The columns support all of the building except these lower two stories.

Our other cut shows a building termed the Fahys Building, now erecting in this city, by Messrs. Clinton & Russell, architects, in which a type of foundation is adopted which has been used to a considerable extent in Chicago. Over the entire area of the building, after a sufficient depth is reached, is placed a layer of concrete. Over this concrete 20 inch I beams weighing 64 pounds to the foot, and extending across the lot, are laid, twelve inches between centers, and are completely bedded in cement. On the platform thus established longitudinal plate girders 4 feet deep are placed, on which rest the columns, twenty-six in number, for carrying the superstructure. The load carried by a single column varies from 172 to 357 tons, the building being 150 feet high.

This is an example of the shallow type of foundation, but one which has been found to answer admirably, even where the soil is of soft consistence. In this city there is a temptation to use deep foundations in many places where the solid rock can be reached. In a soil like that of Chicago, however, there is little advantage in this, and the present example shows the application of this platform type of foundation in New York. The ground at Chicago is such that the buildings settle a little, and the extent of this settling is so well understood that in erecting a building it is allowed for, and it is only when the building reaches its approximate size that the lower story sinks to its final and predetermined level.

As regards the wind bracing of these buildings, this is provided for by the general rigidity of the frame and by bracket plates introduced where the columns and horizontal members intersect. It has not been found necessary to use diagonal tension members. In special cases, such as the dome of the Manhattan Life Insurance Building, however, a very elaborate system of wind bracing may be employed, but for the main structure the frame gives ample strength.

Athletics as a Mental Training.

In England we are apt to take the necessity for sports in some form for granted, but in America the subject of athletics is discussed with a seriousness which hardly obtains in this country. Dr. Conant, of Boston, in a very suggestive article in the Boston Medical and Surgical Journal, pleads earnestly for the general acceptance of athletics, not as a mere sport or pastime, but as part of the system of education which the universities supply. There can be no question that while the "sitstill system" of education has done much harm to children, free muscular activity has been conducive to brain development, partly, probably, by supplying it with more healthy blood, but partly, also, by the cerebral activity involved, the muscle and the nerve being, in fact, but two parts of one machine.

Much as one might imagine that carefully planned gymnasium exercises could be arranged to give the exercise required, the gymnasium does not seem a popular place; nor does Dr. Conant seem to think much of it as a means of education. As usually arranged it is under cover, and so lacks that great essential—fresh air; and it lacks the stimulating influence of outdoor sports, and especially of games. Nevertheless, gymnastics, although not the most useful form of exercise, are of great advantage as a training for a crew or team. If, however, says Dr. Conant, there is to be any attempt at regular and systematic development, not only of the body, but of the mental faculties as well, one must have, in order to get the highest good from such training, a certain amount of stimulus in the work to be done, the stimulus arising from competition and from public appreciation.

Speaking of football, he says that there is a considerable risk of injury in the game, especially to men who have not been carefully trained in the sport at school. What is wanted is some constant and careful supervision over the players, so that they shall be in a condition both of physical and mental health. A list which is given of the injuries received by the Harvard men during the last four seasons shows a considerable number of accidents, but comparatively few of a serious nature, and those appear to have occurred chiefly among the "class" rather than the "'Varsity" teams, showing that the better-trained men are far the least liable to injury. There seems no doubt that rowing is one of the best means of developing a man in an all-round way; but both in regard to it and "track" athletics much of the benefit arises from the individual training or "coaching" given to each man.

We come round, then, to the old point that athletics should be looked on as part of the education of that inseparable neuro-muscular arrangement of which man is principally made up, and to the activity of which all expression of either intellect or emotion is due. In considering the further bearing of this question, the influence which an athletic training has upon a man after he has left college must not be lost sight of. Many a man feels that his success in after life is largely due to the excellent condition of his mind and body brought about by the athletics which he practiced when in college.

This athletic training never entirely leaves him in after life, and although he may be much occupied in other ways, he still finds opportunity for indulging in some form of athletic work which keeps him physically a healthy man and mentally a bright one.—British Med. Jour.

Some Experience with Mosquitoes.*

BY HOWARD EVARTS WEED, AGRICULTURAL COLLEGE, MISS.

While it has been known for some time that a small amount of kerosene placed upon water containing the larvæ of the mosquito will kill the larvæ and thus to some extent lessen the number of mosquitoes in a locality, it was not until Mr. Howard gave his experience with the remedy that we realized how easy it was to rid a locality of the mosquito pest. In the French quarter of New Orleans it has been a common practice for many years to place kerosene in the water tanks to lessen the number of mosquitoes in that locality; but I know of nothing that has been written showing that such is the case, and in this age of advancement we can no longer go by hearsay evidence. Everything must be founded upon known facts, and these facts can only be ascertained by experiment. Thinking that some experience with the kerosene remedy for mosquitoes which I have had this season might be of interest, I wish to state the following as corroborative of what Mr. Howard has shown in regard to the simplicity of the remedy.

On the college campus are eleven large water tanks, two of which are used for drinking water and the others for irrigation and fire protection. Not far from the limits of the campus are also four pools of standing water, three of which are used for watering stock and the other for irrigation in the horticultural department. These pools, however, are well stocked with fish, and as I have never found any mosquito larvæ in the pools, I am under the impression that the fish keep the pools clear of them.

Before the water tanks were built the college campus had been quite free from mosquitoes, but the evil has been constantly upon the increase, reaching its climax early the present season. I have often advised that a small amount of kerosene be placed in each of the water tanks, and the college proctor several times informed me that he "had a nigger put kerosene in the tanks every week, but it did no good." The college physician also stated that he had placed some kerosene in a jar of water containing some of the wiggletails, but that the kerosene had not killed them, thus regarding the remedy recommended as ineffective.

By the 20th of June of the present year mosquitoes had become so numerous on the college campus as to make life a burden, and sleeping without a mosquito bar was out of the question. Wishing to demonstrate the effectiveness of the remedy which I had recommended, I took a large glass jar and filled it nearly full with water from one of the tanks, which was fairly alive with the mosquito larvæ. The jar contained several hundred of the larvæ and I took it to the college physician, poured a little kerosene in the jar, and asked him to please watch the effect. This was as expected, for within fifteen minutes all the larvæ were dead. Upon visiting the various tanks I found that four of them contained the mosquito larvæ in very large numbers, as I had expected to find. The other tanks, with one exception, are within closed buildings in which the mosquitoes are not apt to breed, as they are situated in dark garrets and used for fire protection. The exception noted was a tank used for general household purposes, and the gentleman owning it assured me that he placed a cup of kerosene in the tank every Monday morning. June 26, I placed in each tank a gallon of kerosene, with the result that ten days later the mosquitoes had almost entirely disappeared from the campus, and we were able to sleep without mosquito bars. The amount of kerosene used was much more than would have been necessary, and I am sure the same work would have been accomplished had only five of the tanks been treated, these being the only ones that are outdoors and not protected much. All the outdoor tanks are covered, but there are many cracks where the mosquitoes can get in and out. An examination of the tanks has been made about once a week since the kerosene was put on, and on July 18 more kerosene was put in two of the tanks. Upon all the outdoor tanks a thin film of kerosene has remained since the kerosene was put in. The campus is now nearly free from mosquitoes, and has been so since ten days after the kerosene treatment. Hereafter during the summer kerosene will be put in the outdoor tanks, putting in enough to keep a thin film over the top of the water.

I have also found that kerosene is also a good article to use to prevent mosquitoes from annoying one when the mosquitoes are numerous. To use it for this purpose a little is smeared on the back of the hands and also upon the face. At first thought this would seem to be a disagreeable operation, but a trial of it will prove that it is not disagreeable in the least. It is quite effective in keeping the mosquitoes away and is much better than the Florida method, which I have been told is to remain secreted under a large iron kettle and with a hammer clinch the bills of the mosquitoes as they are thrust through the kettle.

*Read at the Brooklyn (1894) Meeting of the Association of Economic Entomologists.—From Insect Life.

Aerated Bread.

In 1859 Dr. Dauglish, an Edinburgh physician, devised a process of bread making which did away with the use of yeast and its consequent evils of fermentation and deterioration. Aerated bread is made from dough that has been raised by the mechanical introduction of carbon dioxide. Dr. Dauglish's process consisted in using water charged with CO_2 in place of yeast, and for mixing the flour and water by a mechanical contrivance instead of by hand. The aerated bread is said to be more nutritious and more digestible than the ordinary yeast bread. It can be made in one and a half hours, while it requires from four to five hours to form the sponge of yeast bread alone, not including the time necessary for kneading, raising and baking.

There is, therefore, a considerable saving of time and labor, and the aerated bread might be sold at a very low figure. Its manufacture, however, would be economical only when it is made in great quantities, since the plant for manufacture is costly. Aerated bread bakeries have been established at various times in New York, Chicago, and Philadelphia, but none have proved popular, and it is probable that at the present time not a loaf of aerated bread can be bought in America. In England, however, aerated bread has been popular for twenty years. There are at present eighty-three stores selling it in London alone, employing over 1,000 operatives. The stores have an average of from 250,000 to 300,000 customers a week, or about 15,000,000 customers a year.

Electricity as Bait.

The Prince of Monaco has invented a fish trap which is said to have proved highly successful. In the first place he has provided a trap net which can be sunk to a depth of two miles, and this is furnished with an electric light and plunge battery, protected against the pressure of the water by large air cushions. When the trap has been sunk into position, the current is turned on, and the light from the lamp attracting the fishes, these are caught in large numbers, many of them being such as have not been previously seen. The apparatus consists of a small incandescent lamp of three candle power, having a piece of wire twisted around it to keep it from shaking against the quart bottle in which it is placed, the bottle being weighted to insure its sinking to any depth required. Attached to the lamp and passing through the stopper are two light weight electric wires, which run out to any length desired, the depth of the lamp in the water being regulated by a large float board.

A Ship Pierced by a Swordfish.

A curious account of the injury sustained by a vessel from the thrust of swordfish has recently been reported by the captain of the Norwegian bark Lorenzo. The sword or projecting bone of the fish passed through the metal sheathing of the hull, through 6 inches of planking and 3 inches of inside ceiling. The sword was found firmly wedged into the hole it had made, and when extracted with some difficulty, it was found to be 20 inches in length and of an oval shape. The larger end measured 5 inches in diameter and the sharp point 2½ inches in circumference. The water made a passage for itself at the side of the sword, and it was found necessary to work the pumps at intervals of six hours to keep the vessel afloat.

Lactola.

This relates to the improvement of skim milk, whereby its deficiency in fat is restored. One hundred gallons of the milk with 50 to 200 pounds of white sugar are boiled in a vacuum pan to one-third or even one-fourth of its bulk. The mixture is transferred to another pan, and 1½ to 2 ounces of refined cottonseed oil are added, and the whole stirred until thoroughly blended. This artificial milk is termed "lactola." The admixture of coffee, cocoa, tea, or extract of meat with "lactola" is also claimed.