THE METROPOLITAN TOWER AND THE "ZEPPELIN II" TWO STRIKING COMPARISONS.

Two very big structures which are more or less constantly in the public eye are the new Zeppelin airship, which recently met with disaster, and the Metropolitan Tower, which overtops every building in New York. Very few of us realize, perhaps, how huge the Zeppelin airship and the Metropolitan Tower are, largely because we must ordinarily deal with their dimensions in numbers. To present their immensity more forcibly, we have performed on our front page the photographic miracle of overturning the Metropolitan Tower and of floating the "Zeppelin" over the "Louisiana," one of our newest battleships.

The immensity of the tower is never more keenly realized than when the city of New York is viewed from the Orange Mountains of New Jersey. On a clear day, the white shaft rises magnificently in the sunlight to a height which justifies the title "Campanile of New York," that has been given to the building. Only to the suburban dweller is this spectacle vouchsafed. The thousands of New Yorkers whose peregrinations are confined to journeys on the street railways or subway from one end of the city to the other have few standards of comparison. They throw their heads back and wonder how high the tower is. For the benefit of these New Yorkers, we have photographically caused the building to topple and settle itself intact in Madison Square. The stupendous shaft of pure white marble towers to a height of 700 feet above the sidewalk. It has a base measurement of 75 feet by 85 feet. Madison Square extends from 23rd Street to 26th Street. If the tower were overthrown and laid on its side, as we have shown on our front page, the tip of the flagstaff which surmounts the summit would fall beyond the upper boundary of Madison Square, somewhere near 27th Street. The building is 85 feet wide on Madison Avenue, a width so great that were the building laid on its side, it would be impossible to see the dwellings behind it from Broadway. Only the cupola of the church on 24th Street would be visible. In other words, the tower is wider than an ordinary residence is tall, a fact which is probably not appreciated when we contemplate the lofty pile in its normal position.

We have previously had occasion to comment upon the height of this marvel of American tall building construction, and we cannot do better than to recapitulate briefly some of the facts previously brought out. Fully one-half of the tower looms above the skyline drawn by New York's cornices. So tall is the structure, that the snowy pinnacle catches the rays of the rising sun while the street below is still in darkness. When the sun sets behind the Orange Mountains of New Jersey, and the street lamps light up one by one, its rays will fall upon the top story of the Metropolitan Tower. It is a significant comment upon the height of the structure to state that the highest of the Montclair hills is lower than the tower by thirty feet. In other words, the man whose office is situated on the topmost story does his day's work on an artificial hill.

The Metropolitan Tower is the loftiest habitable structure in the world. For sheer height, however, it is surpassed by the Eiffel Tower, which is not an office building, and therefore hardly falls in the same class. The Zeppelin airship, on the other hand, stands without a rival in aeronautic hugeness. Since the craft was primarily intended for military use, it is but fitting to compare it with a modern battleship, for the "Zeppelin" is a warship of the air, even though it is not likely that it will ever be armed with guns, because of the enormous volume of explosive hydrogen carried in the gas bags. Absolutely accurate figures of the "Zeppelin's" size are not available, but from the best information at hand, we gather that the airship is 446 feet long, and that the diameter of the gas bag is 38 feet. That the "Zeppelin" is comparable in size with a modern battleship is fully borne out by one of our front-page illustrations, in which the craft is shown hovering over the United States battleship "Louisiana" in a position never likely to occur in actual experience. The "Louisiana" measures 450 feet on the water line, and 456¼ feet over all, so that a very good idea of the bigness of the airship may be gained simply by contemplating the "Louisiana." Unfortunately, the two vessels are so widely different in character, that further comparison is practically impossible. The battleship floats on water, the "Zeppelin" on air. A rather far-fetched comparison might therefore be drawn between the tonnage of the "Louisiana" and the lifting capacity of the "Zeppelin"; in other words, between the 16,000 tons of the "Louisiana" and the 7,062 pounds of the "Zeppelin." The result shows simply how little can be expected of an airship in carrying capacity, and how very necessary battleships will always be in order to carry heavy guns.

Death of Louis Prang.

Louis Prang died at Los Angeles on June 15th at the age of 85, while on his way to the Seattle Exposition. Mr. Prang devoted more than forty years of his life to the creation of standard colors, a problem that is of the utmost scientific importance. It is all the more remarkable that he should have succeeded so admirably, in spite of the fact that his education was not obtained in a university. When he was 13 years of age his father began training him in calico printing in Germany. In 1848 he fled to this country because of his affiliation with German revolutionists. He rapidly made his way in the lithographic art, and was soon regarded as one of the masters in his profession.

The Rapid Aging of Wines and Whiskies.

The mere fact that alcoholic beverages must be allowed to mature for a period frequently extending over many years, naturally raises the question: Why is it not possible by chemical means to produce the same effect in the laboratory in a very much shorter time?

The idea is not new, for attempts innumerable have been made in the last one hundred years to cure distilled liquors of their "rawness." It can be safely said that they were never completely successful. A method which applied excellently to one liquor, failed utterly when applied to another. It was not until organic chemistry had advanced so far that the nature of the substances which are usually grouped under the title of "fusel oils" was known, and their reactions studied, that a successful method of aging liquors artificially could be hoped for. It is now recognized that the disagreeable odor and taste of a newly distilled liquor are due to a group of higher alcohols in the "fatty" series, amyl alcohol being the most prominent. There are besides buryl and capryl alcohols, and corresponding acids in the free state. The organic chemist found that by storing liquor for years, the higher alcohols are transformed into "esters" by combination with the acids. The old idea, which still finds expression occasionally in books, that the "fusel oil" is gradually removed by the charcoal lining of the charred casks, is quite wrong, for it has been found that in some cases old brandies contained even more fusel oil after long storage than when freshly distilled. It seems that the more agreeable flavor of an old liquor is due entirely to chemical changes produced by time, among which is the transformation of the free higher alcohols into aromatic "esters."

It remained for the late Mr. James Howden, a Scotch chemist, to apply the discoveries made in organic chemistry to these baffling problems. His process, which has been patented both in this country and abroad, is based upon the fact that the water solutions of the alkyl-acid salts, of potash and lime bases, can be boiled for protracted periods without allowing the alcohols to escape. He first thought of trying this principle to the improvement of inferior grape brandies. He first digested the raw brandy for a suitable time at temperatures ranging from 120 to 160 deg. Fahr. with the addition of a fraction of one per cent of sulphuric acid. The raw flavor was promptly removed by the acid. After lime carbonate was introduced to neutralize the acid, the distillate was immediately salable and quite free from rawness.

An investigation of Mr. Howden's process has been made by distinguished chemists and alcohol technologists, among them Prof. E. W. Hilgard of the University of California, and the experts of the Internal Revenue of the United States. It seems to be the general consensus of opinion that Mr. Howden succeeded in solving a problem which has so long perplexed the distiller and the chemist.

The Howden process is applicable not only to brandies, but to most other distilled liquors as well, with modifications depending upon the nature and amount of their respective flavoring compounds or fusel oils. The amount of acid used, the time of digestion, and the temperature employed can be so nicely regulated, that a liquor can be almost completely deodorized, and practically every drop of objectionable fusel oil removed, or enough fusel oil left in the liquor to suit the requirements of the trade or of the individual taste. Prof. Hilgard states that if sulphuric acid should be undesirable, it is possible to employ other polybasic acids, such as phosphoric, tartaric, oxalic, etc.

The amount of sulphuric acid employed in the case of whiskies is almost negligibly minute, for it ranges from one-quarter to two-thirds of one per cent by volume to 100 of proof spirit.

The brooding temperature is usually maintained between 145 and 150 deg. Fahr. for whiskies. The time of digestion ranges from one to three days, this depending upon the amount of acid used. As soon as the desired flavor is obtained, the liquor is passed off through a refrigerating coil, and neutralized with pure lime carbonate or with sal soda in amounts previously determined. The free acids in the liquor, so far as they have been combined into "esters," are also eliminated in the final distillation. The distillate is entirely free from any of the reagents employed. In other words, it is a whisky, wine, or other liquor, such as would be obtained only after years of storage. In many cases it excels in quality the liquors which have thus been stored. The residues remaining in the retort contain valuable by-products.

In Prof. Hilgard's opinion, the improvement is in the main due to the elimination of the fusel oils, but "it is highly probable that the formation of well-flavored esters from them and the original free acids also have their part therein. In this respect the process is exactly parallel to the ordinary process of aging in casks, but there can be no doubt that the partial removal of the free alcohols not only improves the flavor, but also renders the liquor less liable to produce the serious cerebral and nervous disorders which are all known to result from the use of such fusel-laden raw liquors as the potato whisky of Europe or the French absinthe. The large-scale trials made in Kentucky have shown, within a few months, a most pleasantly flavored, soft liquor which, according to the analyses made at the Internal Revenue Office at Washington, contains but a fraction of the obnoxious fusel oils originally contained in the raw distillate."

One of the most praiseworthy features of the process is to be found in the fact that the distillate is quite free from any foreign addition or flavor. In other words, it has withdrawn from the original liquor the objectionable qualities, and has not added to it a new flavor, which serves to disguise the intrinsic rawness of a new liquor.

Almost every product hitherto obtained has contained some flavor foreign to the quality of the liquor, and has for this reason been discarded. At the present time, the most widely-employed expedient for rendering freshly-distilled liquors acceptable to the palate is this objectionable method of adding flavoring compounds to conceal the rawness. Still another method is to dilute, or "blend," the raw liquor with a large proportion of spirits, whose distillation has by the use of rectifiers been carried so far as to approximate pure ethyl alcohol.

This whole subject of the rapid maturing of liquors is peculiarly timely, in view of the fact that the United States government is now endeavoring to define the term "whisky," and to compel the makers of "blended" whiskies to label their product truthfully. The rectifying system is so extensively practised in the United States, that it may be said our whiskies are almost all "blends." The Howden process, if it is ever commercially introduced, will enable the straight-whisky maker to label his product honestly, to place on the market within a few months a liquor which in quality and flavor cannot be produced except by long years of storage, and to remove the odor of mash without disturbing the congeneric flavors.

Preparation and Constituents of Tea.

The preparation of tea for market comprises four processes: wilting, turning and rolling, fermentation, and roasting. In the course of these processes the proportion of tannin in the leaves is greatly diminished, for example, from nearly 23 per cent to 12 per cent. The characteristic aroma of tea is developed gradually in the process of fermentation, during which the ethereal oils or their chief constituents are set free from the glucosides. The freshly plucked leaves contain about ½ per cent of free caffein (thein) and 3 2/3 per cent of combined caffein, but after roasting three-fourths of the caffein of the leaves is in the free state. The increase of free caffein is proportional to the decomposition of tannin, a fact which indicates that the two substances were originally combined together. The oxygen of the air assists in the decomposition of tannin, but atmospheric organisms play no part in the fermentation, which must, therefore, be caused by ferments already present in the leaves. In the "bud" tea made from the youngest leaves, apparently by simple drying, two-thirds of the caffein remains in the combined state. Burmese tea, which is prepared by crude methods, contains the smallest proportion of combined caffein. Green Chinese tea contains less combined caffein than black tea, and also less tannin.

The Current Supplement.

An elaborate article on the North German Lloyd steamer "George Washington" opens the current SUPPLEMENT, No. 1747. Mr. C. K. Baldwin writes on automatic feeders for handling material in bulk. The relation of the character of coals to the prevention of smoke is considered by D. T. Randall, engineer of the Fuel Engineering Department of the Geological Survey. A thoughtful article is that entitled "The Tyranny of Scientific Dogma." Few animals are more interesting than ants; just how interesting, Prof. K. Escherich sets forth in a popular article entitled "The Ant and Her Ways." Charles E. Monroe contributes an article on the consumption of nitrate of soda in the United States. At the beginning of the twentieth century there was no automobile industry. To-day we see an industry of imposing magnitude. The demands of motor-car construction are proving a wonderful stimulus to the metallurgy of steels, a subject which is considered by Dr. John A. Mathews in a paper entitled "Alloy Steels for Motor-Car Construction."

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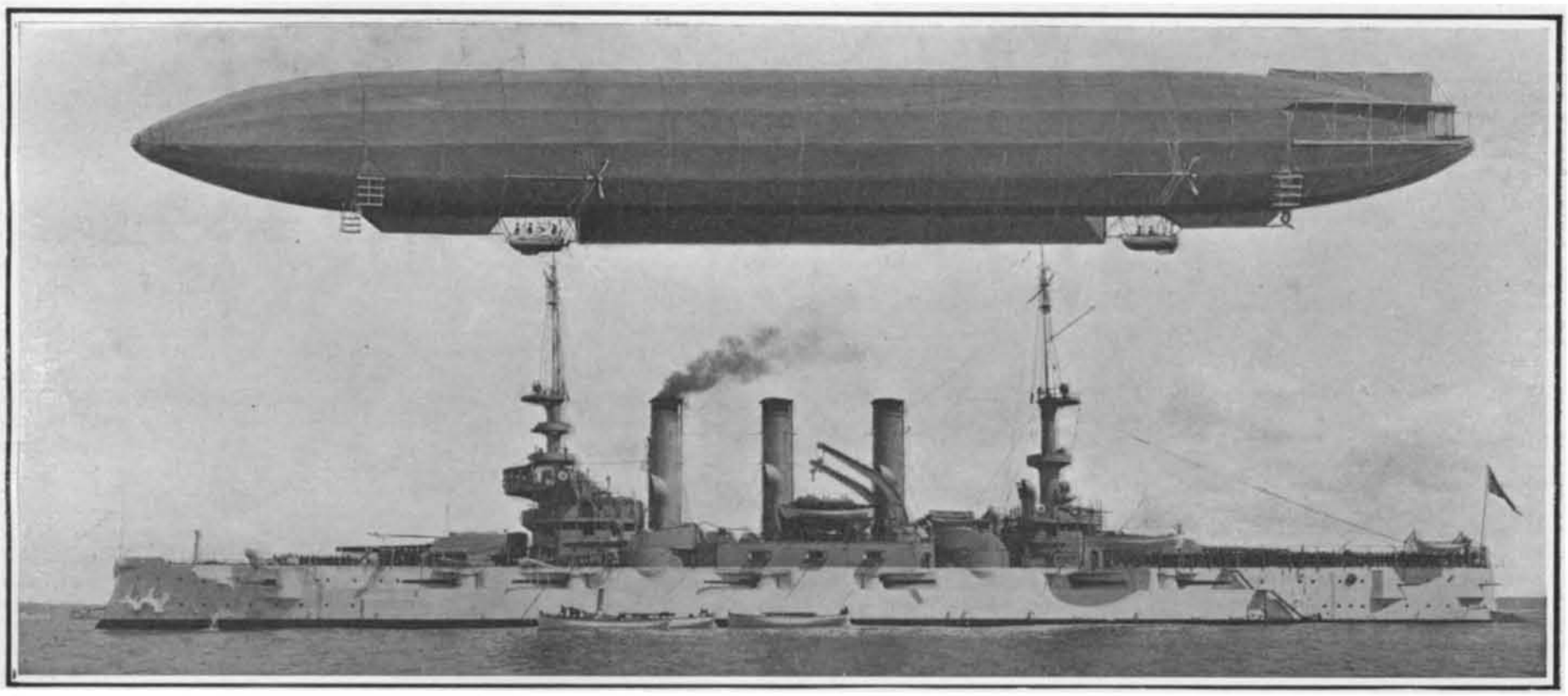

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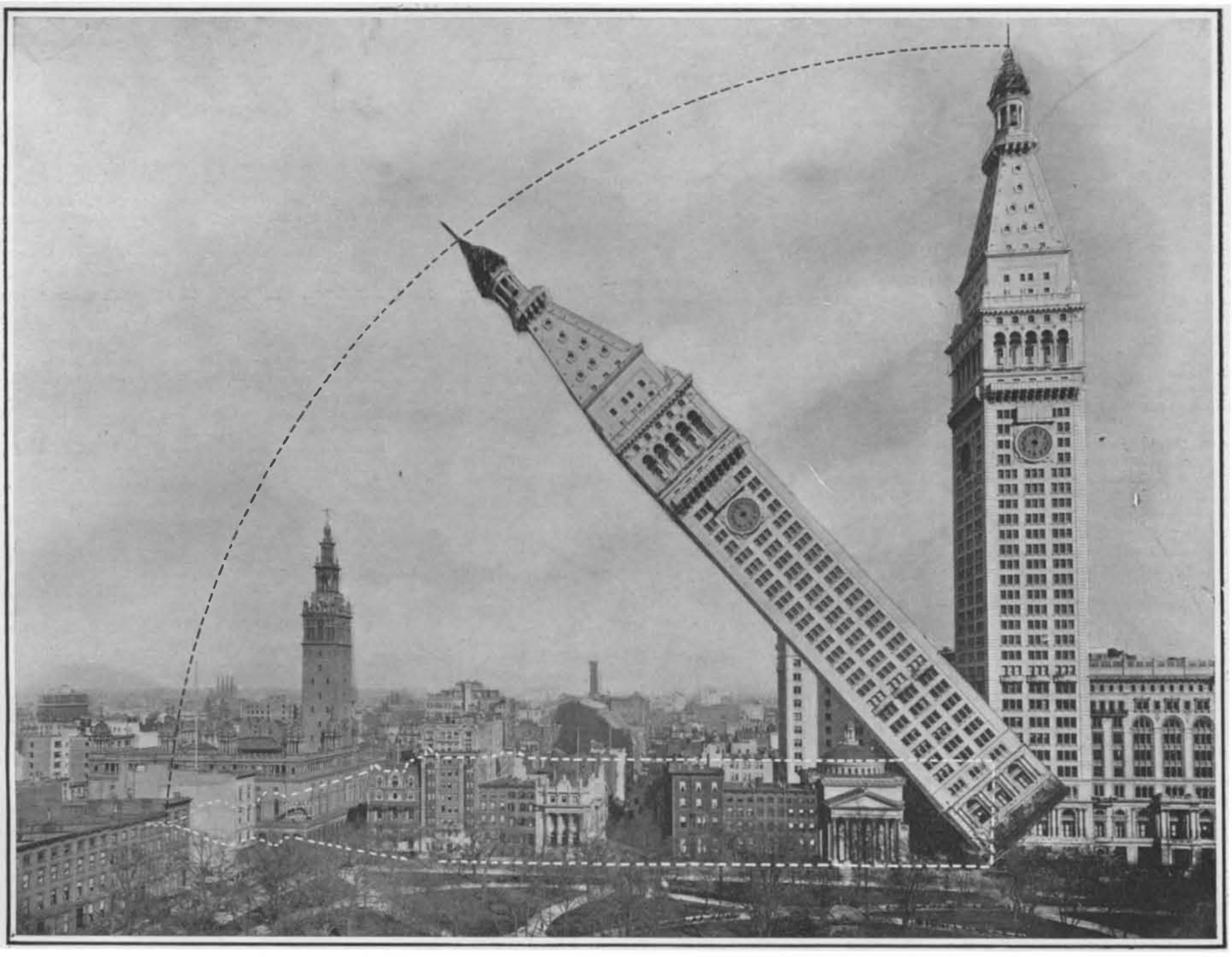
The "Zeppelin II" is nearly as long as the battleship "Louisiana."



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If the Metropolitan Tower were to fall, how far would it extend?

THE METROPOLITAN TOWER AND THE "ZEPPELIN II."—[See page 478.]