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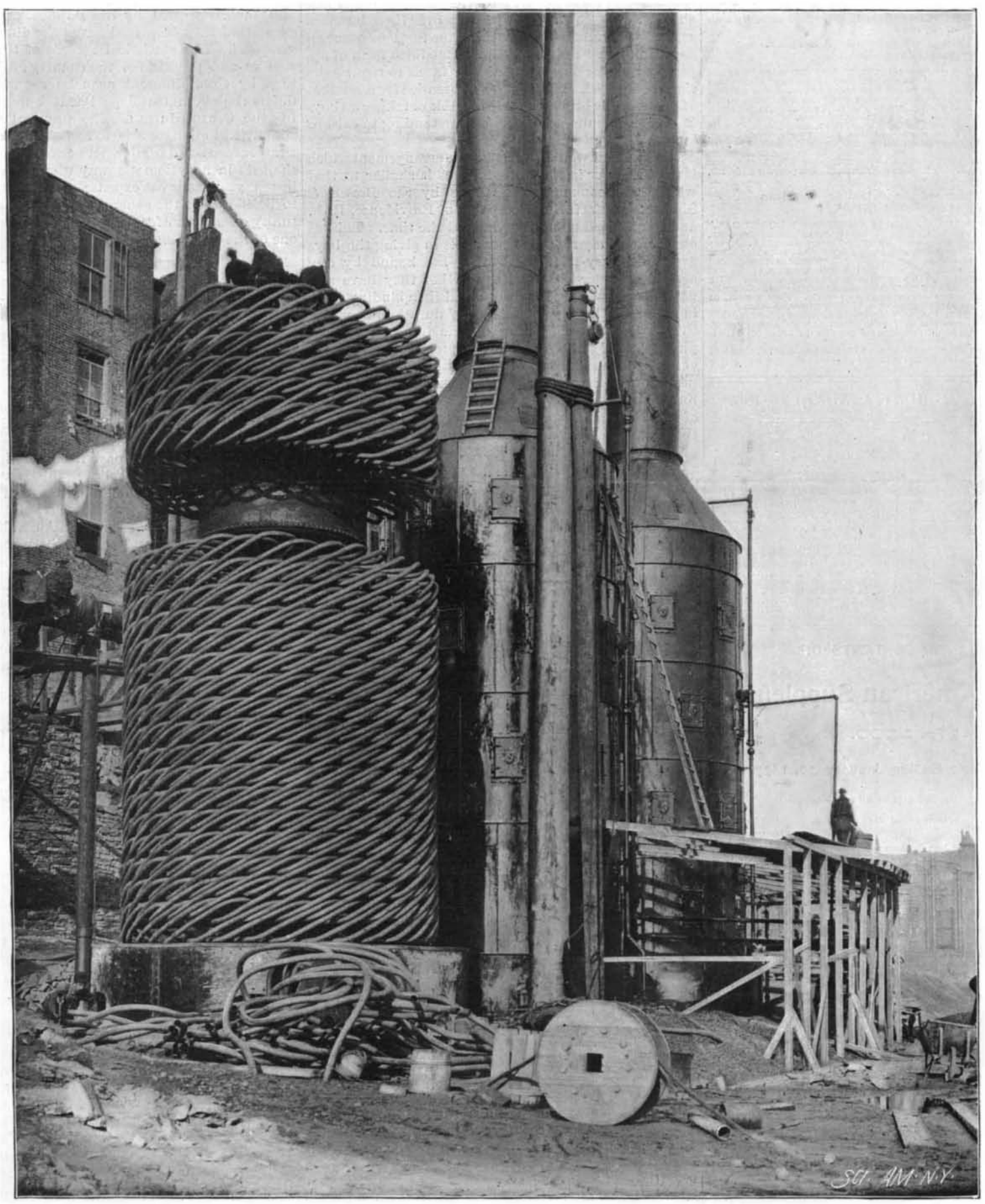
A TRIO OF ONE THOUSAND HORSE POWER BOILERS.

The giant water tube boilers shown in the accompanying illustration have been erected at the new station of the New York Steam Company, near the East River, between Fifty-ninth and Sixtieth Streets. They are the forerunners of a dozen other boilers of this type, which the company proposes to erect for the supply of the upper city. In the downtown plant there are in all fifty-nine boilers, the greater part of which are of the Babcock & Wilcox type. The company was formed to supply steam for heating and power purposes, and the total horse power of its present plant in New York City is 18,000.

Of the three boilers herewith illustrated, the two shown complete with their casing were built by the Clonbrock Steam Boiler Company, the other by the Columbia Steam Boiler Company, both of Brooklyn, N. Y. They are all of the Climax type, the Columbia boiler differing from the others chiefly in the "swell" or enlarged diameter given to the central standpipe at the water level, which is situated between the upper and lower nests of tubes. This was done with the object of maintaining a more even water level, and overcoming the violent fluctuations to which water tube boilers are liable. With this exception and the substitution of an air space for brick lining in the casing, the boilers are practically identical and conform to the well known Climax type.

Each boiler is erected upon a solid foundation of Portland cement concrete, 3 feet thick and 18 feet in diameter, and the whole weight of the boiler proper is carried upon a massive annular cast or wrought iron footing, 8 feet in diameter on the base, with an inside diameter of 5 feet. The inside of the ring is provided with an offset which serves as a footing for the bottom of the vertical standpipe or drum of the boiler, which is 60 inches in diameter, 38½ feet high, and is built of ⅞ inch steel plate, with a tensile strength of 60,000 pounds to the square inch. The standpipe carries 816 3-inch return tubes, which are bent to a bow shape, which corresponds very closely to that of the frame of a tennis racket. Each tube leaves the stand pipe radially, curves out and upwardly at the casing, and re-enters the standpipe 16 inches higher than, and one-third of the circumference distant from, the point at which it started. The tubes are a scant eighth of an inch in thickness. The grate is cir-

(Continued on page 68.)



A TRIO OF ONE THOUSAND HORSE POWER WATER TUBE BOILERS.

A TRIO OF ONE THOUSAND HORSE POWER BOILERS.

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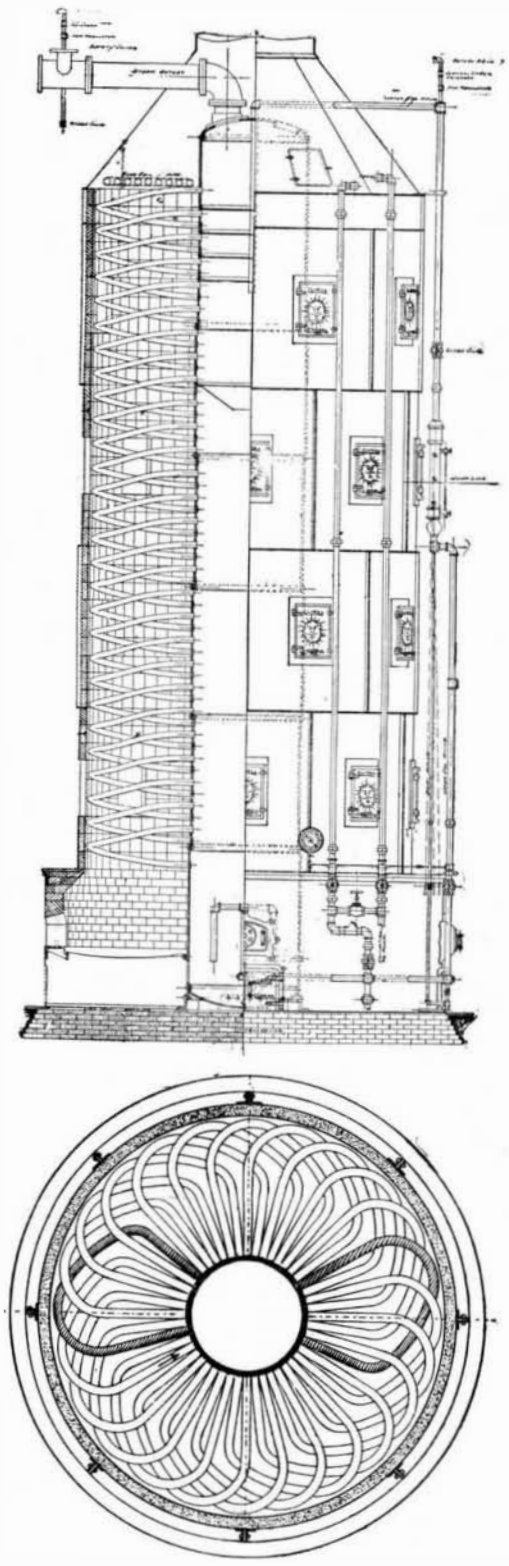
cular and sixteen feet in diameter, the firebox having an outside diameter of eighteen feet. The firebox and boiler are completely inclosed in a plate steel cas-



SECTIONAL VIEWS OF ONE THOUSAND HORSE POWER CLIMAX BOILER.

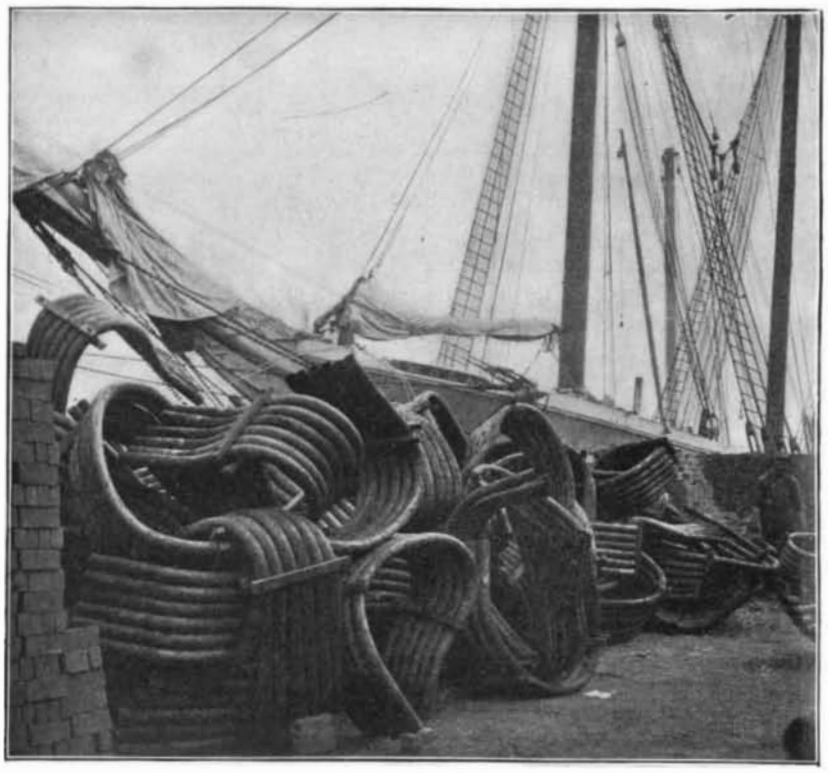
ing which rests upon the outer edge of the concrete foundation. In the case of the Climax boilers the shell is lined with 3 inches of firebrick, and in the Columbia boiler the radiation of the heat is to be prevented by an air space inclosed within a double shell. The total height of the casing is 40 feet; and the smokestacks, which are 5½ feet in diameter, rise to a height of 80 feet above the hoods, or about 125 feet from the ground. Within the hood is located a feed water heater consisting of a coil of 3 inch pipe, with a heating surface of 150 square feet.

From the above description it will be understood that the grate is annular in plan, extending from the outside casing to the central standpipe. The total grate surface is 160 square feet and the total heating surface for the whole boiler reaches the enormous figure of 10,000 square feet. The inner ends of the grate bars are carried on a ring riveted to the standpipe, and the outer ends are carried by the outer casing. Boiler No. 2 is fitted with St. John's wire screen shaking grate, which is the invention of Mr. St. John, the vice president of the New York Steam Company. As its name implies, this grate is of the rocking type; but instead of the customary cast iron bars which form the surface of the ordinary grate, the separate units of the St. John grate consist of an outer cast iron frame which is filled in with a wire screen. The screens are of No. 8 wire, with a ⅜ inch mesh. It will readily be understood that by the substitution of wire for cast iron the total air space has been greatly increased, the average for a cast iron grate being 35 to 40 per cent, whereas it is claimed that this grate presents as high as 65 per cent of air space. The wire screen was adopted as the result of a series of experiments in which it was found that the tendency of the cast iron bars to burn out was lessened as their thickness was reduced. When the minimum thickness of cast iron had been reached the wire screen was tried experimentally and proved to be a great success. The small section of the metal and the abundant rush of cold air effectively prevent any burning of the wires. The grates burn about 26 pounds of No. 1 Buckwheat coal per square foot per hour. There are six fire doors and six ash pit doors to each boiler, and the doors which will be seen in the casing give access for cleaning the tubes.

Subjoined are the results of a test of a similar boiler—Morrin Climax—recently made by Mr. G. C. St. John at the Dey Street station of the company in New York:

Length of test	5¼ hours
Amount of water consumed	193.562 pounds
Coal burned	21,280 "
Average temperature of feed water	139 degrees
Kind of coal used	Shamokin No. 1 Buck
Evaporation per lb. of coal actual	9 pounds
Horse power developed	1,229
Evaporation from and at 212 degrees	10 pounds

For the purposes of the test the boiler was connected up to a meter, which was carefully corrected by running the water through the meter into a tank on scales. The coal was weighed to the boiler from scales which weigh all the coal that goes to the station. The quality of coal was what is known as Shamokin No. 1 "buck." On another occasion 1,000 horse power was developed on the boiler with a fire burning "rice" coal.



A SHIPMENT OF CLIMAX BOILER TUBES.

An Ascension with Tandem Kites.

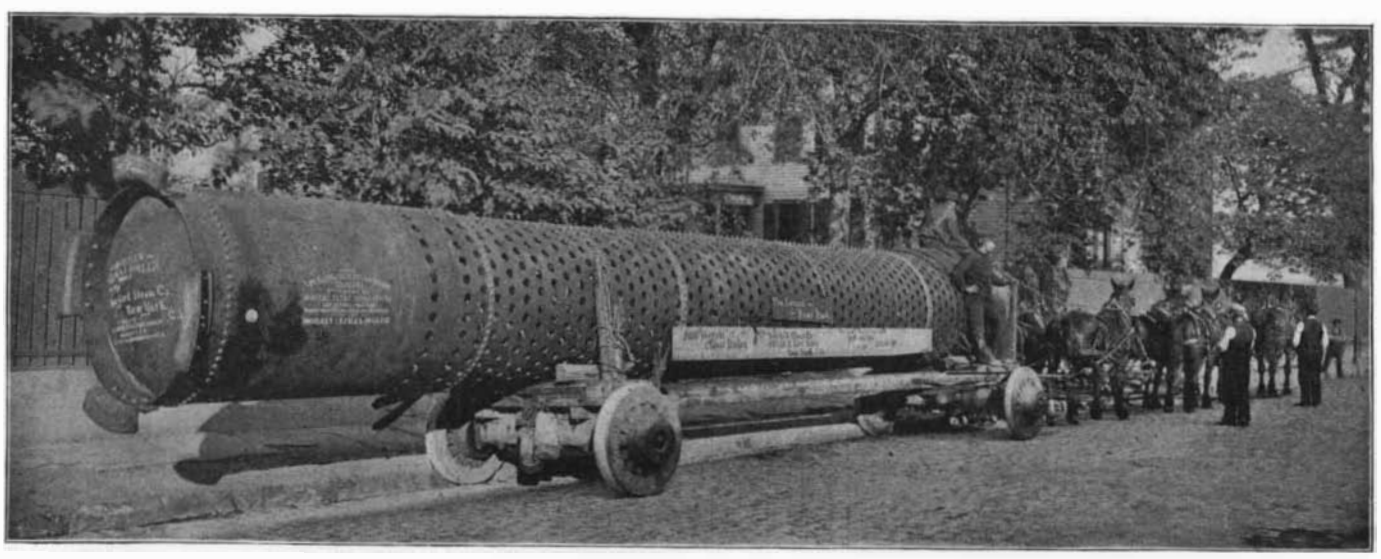
Lieut. Hugh D. Wise, Ninth Infantry, stationed at Governor's Island, New York Harbor, made an ascension with tandem kites on January 21. This is the first ascension by kites in this country. Lieut. Wise's kite experiments have been referred to before in the columns of the SCIENTIFIC AMERICAN. The lieutenant flew four modified Hargraves kites and had no parachute, so that a fall would, without doubt, have been fatal.

The lieutenant, assisted by Corporal Lewis and five privates, put up early in the afternoon two kites, one with 90 square feet of cotton surface and the other, at the top of the string, with 20 square feet of surface. Two other kites in tandem, the higher one containing 140 and the lower 160 square feet, were flown immediately afterward, and just as the two strings below the lowest kite in the tandems—each string 150 feet long—were about to be fastened together, the spine of the 90 foot kite broke and the kite was torn to bits in the high southeasterly wind. The lieutenant had another 90 foot kite at hand and had it floated in a moment. To hold the four kites the services of four more soldiers were enlisted, making nine men in all.

A half-inch manila cord running from a massive iron windlass, made fast to a tree, was bent on to the kite lines, where they had been joined with the aid of an iron ring. To this ring was made fast a block, through which was rove 100 feet of manila rope, to one end of which a boatswain's chair was swung. The lieutenant got into the chair on what he calls the hoisting line, and two soldiers held the other end of the line, ready to send him aloft when he made the signal. The line on the windlass was let out until the block on the kite strings was about fifty feet above the earth. At that time the wind was blowing about fifteen miles an hour, but it diminished rapidly, and for five minutes the lieutenant was just barely lifted and lowered alternately by the sagging of the lines. At about four o'clock the wind became quite brisk from the southeast and lifted the lieutenant about five feet clear of the ground. He gave the signal to the soldiers to hoist away, and they did so with a will, carrying him up to the block.

The wind died down again at this time, and the line sagged so much that the lieutenant came down to within about twenty feet of the ground. He ordered the soldiers to lower away again, and he came to earth once more. The wind was acquiring a good deal more force, and the lieutenant remained in the chair and again signaled the men to haul on the hoisting rope. This time the kite strings were taut; they sagged only a foot or so even after the lieutenant had been hauled up to the block. He was then forty-two feet from the ground. The oscillation of the swing was slight, and he did not feel uncomfortable. He was a little above the eaves of the officers' quarters near by. He might have gone higher, but he did not think it essential, as he had demonstrated the practicability of his idea.

Lieutenant Wise has some sixty kites of various forms, and he is thoroughly convinced that kites may be put to many practical uses. Their portability and their ability to stand a hard gale which would destroy a balloon are all in their favor. Lieutenant Wise now enjoys the distinction of being the third man to be raised to a considerable distance in the air by kites, the others being Lawrence Hargraves, of Australia, who ascended forty feet, and Captain H. Baden Powell, who ascended one hundred feet in England.



CENTRAL STANDPIPE FOR ONE THOUSAND HORSE POWER BOILER.