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THE PROPOSED HARLEM RIVER BRIDGE.

Last year, in accordance with an act of the New York Legislature, three commissioners were appointed by the Mayor, Comptroller, and President of the Board of Aldermen of New York city, for the purpose of constructing a bridge across the Harlem River at 181st Street. On October 15, 1885, the commissioners advertised for competitive designs for the proposed bridge, and offered the following premiums for the three best designs they might select: $1,500 for the first, $1,000 for the second, and $500 for the third best design.

The designs were to be accompanied with specifications and approximate estimate of cost, and were to be presented before the first day of December, 1885.

The designs submitted for competition were to be made in accordance with the profile and memorandum furnished by the engineer of the commission, Mr. Wm. J. McAlpine. This provided for a clear river space of 400 feet between bulkhead lines, and specified that the grade of the roadway should be at least 145 feet above mean high tide, and the clear width of the bridge at least 80 feet, viz., 50 feet of roadway and two sidewalks, each 15 feet clear. It further specified that the superstructure shall be of steel or iron; piers, abutments, etc., of stone, to be founded on solid rock wherever practicable; that the structures must be designed to sustain their own weight and that of the roadway and footwalks of an estimated weight of 200 pounds per square foot; also a wind pressure of 400 pounds per lineal foot of bridge, and a live load of 100 pounds per square foot of roadway and footwalks; besides a floor strength to carry a twenty ton road roller of the usual pattern. The memorandum required a concrete floor on corrugated iron, with granite pavement laid in asphalt for the roadway and a pavement of bluestone and marble tiles for the footwalks.

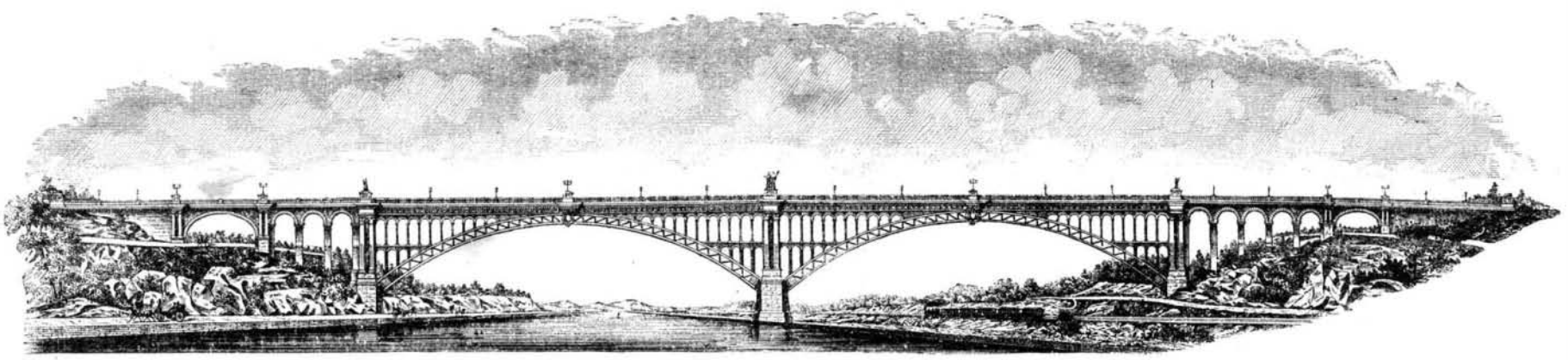
The commissioners received about twenty designs for the proposed bridge, from engineers of all parts of the country. From among these designs that submitted by Mr. C. C. Schneider, of New York city, was selected as the best, and awarded the first prize, and that submitted by Mr. Wilhelm Hildenbrand received the second prize. Both of these designs are illustrated upon this page.

Mr. Schneider's design consists of two metallic arches, each 410 feet clear span, and masonry piers and approaches. One of the metallic arches spans the entire width of the river, and the other the whole distance from the easterly bank of the river to Sedgwick Avenue.

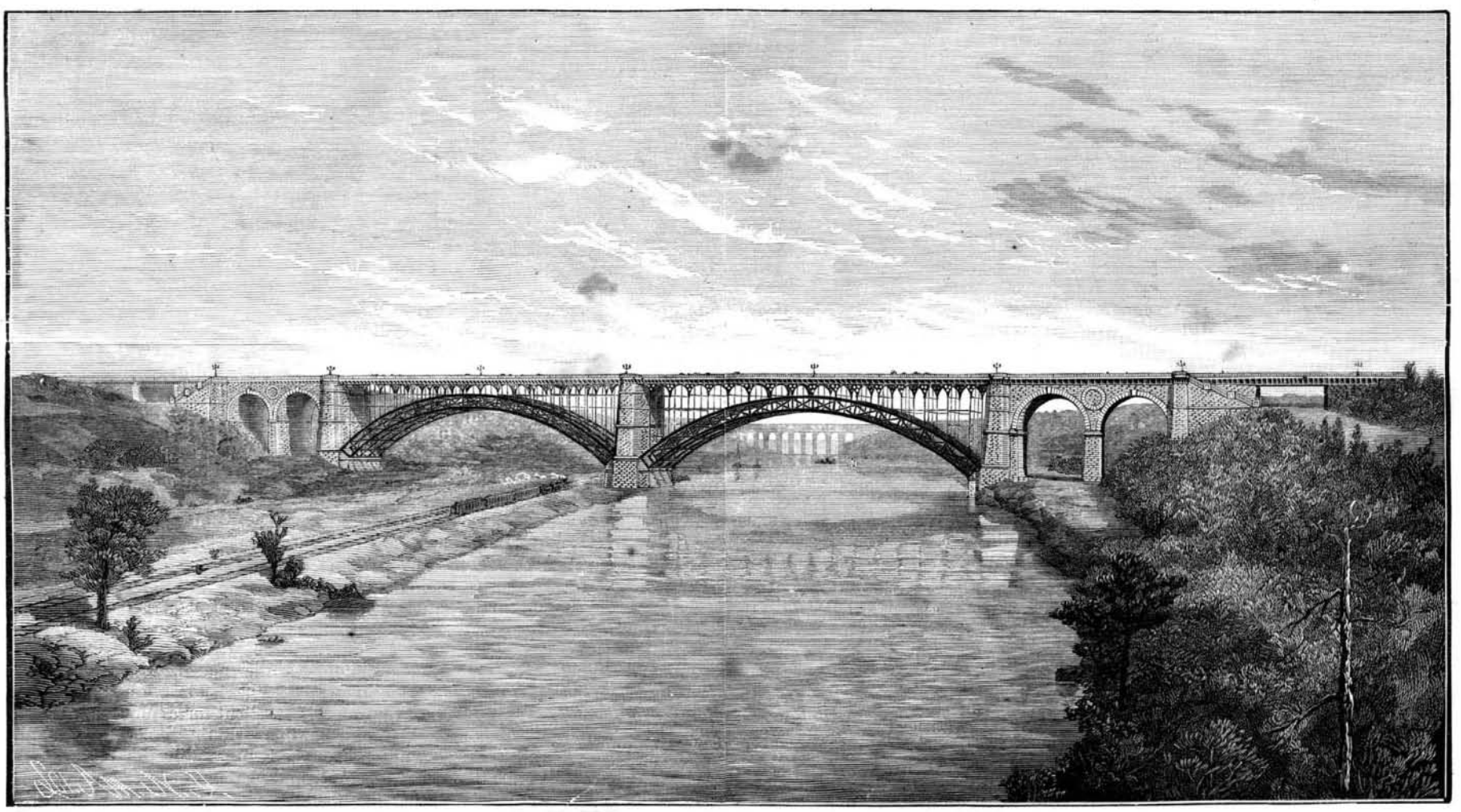
The masonry approaches are as nearly symmetrical at both ends as practicable, to accommodate the street crossings and the conditions of the profile. They consist of masonry arches, of 80 feet clear span, plate-girders across the Boulevard and Boscobel Avenue, and earth embankments, kept in place by retaining walls. The grade of the roadway is 150 feet above mean high tide.

The floor of the bridge is 80 feet wide, consisting of a roadway of 50 feet and two footwalks of 15 feet each. There is an ornamental iron railing on the outside of each footwalk over the metallic structure, and a cut stone balustrade over the masonry structure. There are stone steps on each side, leading from the Boulevard and Boscobel Avenue to the footwalks of the bridge.

Each of the large spans consists of six separate braced steel arches, spaced 14 feet between centers, connected transversely and laterally by a system of lateral and sway bracing. The arches are hinged at the springing in order to allow a correct analysis of the strains in all the members. The floor system is carried on vertical columns, supported by the arches. It is composed of longitudinal iron girders, resting upon and secured to the tops of the columns, and on them the transverse floor beams are placed, consisting of iron plate girders, which carry the roadway and footwalks. The transverse floor beams project 6 feet beyond the structure below,



DESIGN FOR HARLEM RIVER BRIDGE LOOKING NORTH.—SECOND PRIZE.



DESIGN FOR BRIDGE ACROSS THE HARLEM RIVER AT 181st STREET, NEW YORK CITY LOOKING SOUTH.—FIRST PRIZE.

thus forming a deep cornice with ornamental brackets underneath. The metallic structure is of the American pin-connection type, all parts being designed for mild steel or wrought iron. Cast iron is used only for cornices and ornaments.

The chords of the arches are made of steel plates and angles; they are 2 feet deep, latticed top and bottom. The web system of the arches consists of radial iron struts, made of 12 inch channels latticed and diagonal tension bars. All pins are of steel. The end pins which form the hinges are 20 inches diameter, and are supported on a steel pedestal. These pedestals rest on steel bed plates on the masonry skew-backs, and are adjustable by means of keys. The bed plates and pedestals are anchored to the masonry by heavy steel bolts. The vertical posts which carry the floor system consist of 12 inch iron channels, latticed; they are hinged to the pins of the upper chords of the arches, and stiffened by longitudinal struts and braced transversely by struts and sway rods. Laterally, the arches are connected by a strut at each panel point, attached to the main pins and braced transversely and laterally by iron rods. The lateral struts are composed of two 7 inch channels, latticed.

The roadway consists of corrugated iron plates ½ inch thick, resting upon the floor girders, covered with concrete shaped to the transverse form of the roadway. On top of the concrete there is a layer of Trinidad asphalt, and above that blocks of granite, 7 inches thick, set in asphalt.

The footwalks are paved with diagonal tiles of bluestone with a row on each side of tiles of white marble, with a cut granite curb.

The footwalk pavement rests on a layer of concrete or corrugated iron plates, the same as the roadway.

The foundations for the piers are intended to be carried to the solid rock.

The masonry will be faced with granite, laid in courses of 20 to 30 inches thick. The interior stone is to be of good quality of durable limestone, or such other stone as may be approved by the engineer of the commission.

All masonry will be first-class rock-faced work, with beds and joints dressed to a quarter inch. Copings, cornices, and parapets will be of cut stone.

The structure is designed strictly in accordance with the requirements of the specifications, and the construction details are all so arranged as to be accessible for cleaning and painting. This is a very important consideration in metallic structures, as the endurance of the iron and steel in works of this kind depends upon how they are protected from corrosion.

The structure, as designed by C. C. Schneider, is well proportioned in all its parts and details, and conveys the impression of strength and durability; it is symmetrical in appearance, and in harmony with the picturesque surroundings. The estimated cost of the whole structure is $2,075,000.

In Mr. Hildenbrand's design, shown in the upper view, which we take from *Engineering News*, the two center spans are each 540 feet, and the clear height of the arches above high water is 135 feet. The arches are to be constructed with three hinges. There are five arches in the entire width of the bridge, which is 80 feet. The center depth of the arches is 16 feet, increasing toward the abutments to 18½ feet. The main floor beams are supported upon latticed columns placed on these arches, 16 feet apart. The floor beams are 42 inches deep, and carry a series of longitudinal girders 20 inches high and spaced 10 feet apart. On the girders are placed 9 inch I beams 2½ feet apart, which support a corrugated iron floor covered with concrete and Belgian pavement for the roadway and marble tiles for the sidewalks. The chords of the arches are box-shape and composed of channels and plates.

The main bridge approaches consist of a number of stone arches, each 32 feet span, with two large stone arches over the Boulevard and Boscobel Avenue. The approaches are carried on earth filling, confined by retaining walls from the avenues to the termini. The total length of the bridge is 2,105 feet, the main arches with their abutments occupying 1,180 feet, the avenue arches 160 feet, the fillings 390, and the stone viaduct 395. The estimated cost of this structure is $2,250,000.

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(Illustrated articles are marked with an asterisk.)

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No. 581

For the Week Ending March 6, 1886.

Price 10 cents. For sale by all newsdealers.

A REMARKABLE SNOW PLOW.

Much interest has been excited in railway circles at the West during the past few weeks by the performances of the new Leslie rotary steam snow shovel, on the Chicago and Northwestern Railroad Co.'s lines. The head of this machine is provided with angular cutting blades, which rotate with enormous velocity and cut and loosen the snow, which then passes behind the blades, where it is received on the flat spokes of another wheel, turning in a contrary direction, and is thereby thrown out sidewise from the machine with tremendous power. The snow is delivered in the form of a great stream, forming an arch through the air, and strikes the ground at a distance of from one to two hundred feet from the track. The machine, when in operation, is said to be a wonderful sight to behold. It is mounted on a special car, which also carries an engine for driving the mechanism. During the late heavy snow storms, when tracks were blockaded with from 3 to 10 feet of snow, packed so hard that the ordinary slow plows would make no impression on it, and could not have been cleared except by hand shoveling, involving several days' delay, this machine went through some of the worst drifts at the rate of a mile an hour, and through the lesser drifts at much faster speed.

PAINT, FINISH, AND POLISH.

The improvement in fit and accurate workmanship on machine tools and other productions of the machine shop is being fitly supplemented by finer finish and other exterior decoration, so that, properly enough, taste and utility, beauty and durability, are combined.

For many years, one fashion has prevailed in the painting of cast iron and of the unfinished portions of wrought iron; all being of one uniform lead color, or the color of blue slate. No difference was made on account of the weight or the contour of the pieces, and there was absolutely no relief from the depressing dullness of the leaden paint.

But on recent visits to shops where the best work is done, it was an agreeable surprise to see glossy black on the castings, complementing the sheen of the polished work. On some of the lighter machines the black itself was relieved by fine hair stripes of chrome green and Scheele's green, not brilliant and bold enough for contrast, but just enough to relieve the plain black and to define corners and curves.

An excellent effect is produced by rubbing faced castings with old files, washing with lye or soda, drying, and going over the surface with a swab dipped in dilute sulphuric acid, only strong enough to make a coat of rust, which will form in two or three hours. Then wipe with clean waste. The result is fine, the surface being of a warm russet tinge, closely mottled by the varying effects of the acid on the filed or brightened parts and the untouched skin of the casting. Treating the bed of a lathe or planer in this way, and painting the legs black, make a very satisfactory combination with the polished work. As a general rule, only the moving parts of machinery should be bright finished.

Finishing or polishing are matters of taste and choice; some mechanics are rigid in admiring nothing but a finish; a polish to them is a finical whimsey. But these effects may be judiciously combined in the same machine. Thus, a draw file finish may offset shining rouge polish, the draw file for straight surfaces or planes and the polish for curves and mouldings. Draw file finish is very satisfactory to the eye of the practical mechanic, as it denotes skill of hand and exact work; if it is the least bit wavy, or slanted, or crossed, the effect is spoiled; the marks of the file must be parallel. Some prefer a dead smooth cross cut finish file for this work, but the result is excellent with a fine cut float file, half worn, and used with plenty of oil, enough to "float." For this purpose, ordinary kerosene oil is better than the thicker lubricating oils.

Stoning for ornamentation is common, but it is not generally used judiciously; there is usually too much stoning. The work is very inviting, as it will readily half conceal the lack of file or scraper finish. For stoning, only small slips should be used or the points of larger ones; broad smutches of stone rubbing are coarse and crude. Let the work to be stoned be well surfaced with file, scraper, or, where permissible, with emery, before the stone is used—and better work can be done with water than with oil. The stone makes a nice ornament rubbed in straight lines and angles—better than curves. The writer saw a pattern known as Grecian border put around the sides of a lathe apron with stone on an emery and rouge ground of shining polish. It was rich, consisting solely of straight lines and right angles.

Stone in powder is excellent for a plane surface of considerable extent where shining polish is not desired. The stone used is preferably the yellow, not the white, oil stone, and the powder is of a fineness almost impalpable to the fingers, but showing grit when placed on the tongue and lips. This is applied with water and a stick of soft white pine, or white-