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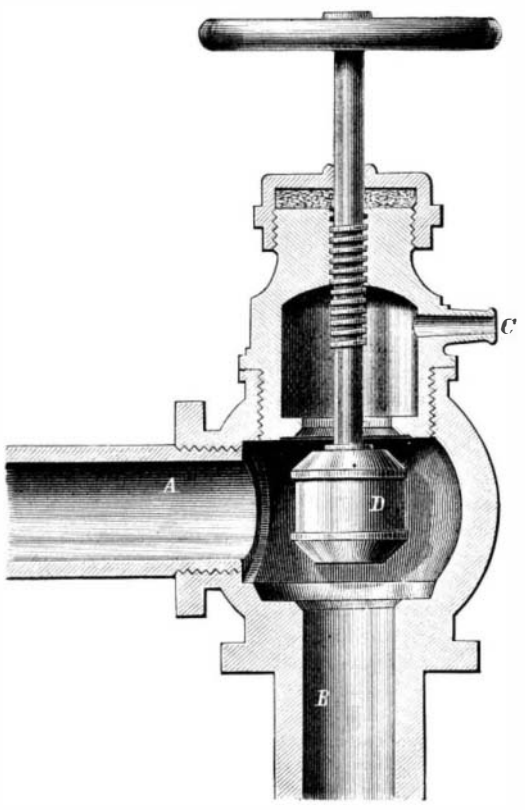
The Speaking Telephone in New York.

Professor A. Graham Bell has recently completed a series of three lectures, in which he introduced his speaking telephone to New York audiences. There can be no question but that the instrument is a most wonderful invention. Without the aid of any battery, using only the current induced in the circuit by its permanent magnet, the telephone on the occasion of the last lecture transmitted musical sounds and speech from Yonkers to New York, a distance of 26 miles. With the battery attached, melodies and chords played on a small organ at Yonkers were distinguishable throughout the large hall where the lecture took place. It is a most bewildering sensation to hear a song faintly emitted first from a box on the stage, then from another suspended overhead, and finally from a third across the room, as the operator switches the current from one telephone to another.

Professor Bell prefaced the exhibition of his instrument with a brief account of the principles on which it is based, and gave an interesting statement of the investigations leading to its invention.

WIGGINS' IMPROVED RELIEF AND SAFETY STOP VALVE.

The improved stop valve illustrated herewith is designed to prevent the accidents due to the careless closing of the feed pipe while the pump is in motion. It is so constructed as always to leave an open discharge. In the annexed engraving, A is the opening leading to the pump. B is the conduit to the boiler, and C opens into the atmosphere. There are two valve seats, one on each side of the opening, A. D is a double valve which may be adjusted to rest upon the lower seat, and so close the passage to the boiler, or upon the upper seat, and so shut off the discharge. It can never close both openings at once; so that there is always a free discharge for the water. In the shell above the upper seat, there is a chamber through which the water passes to



the discharge opening. The stem is screw-threaded, so that the valve may be easily adjusted to either seat. It will be seen that, should the discharge of water into the boiler be stopped while the pump is at work, the water will escape through the passage, C; and there will be no danger of bursting the pipes or breaking the pump.

This valve is used exclusively on the Atlas farm engine, made at the Atlas Works, 700 North Second street, St. Louis, Mo.

Patented through the Scientific American Patent Agency, March 20, 1877. For further information, address the inventor, Mr. Charles P. Wiggins, 1940 O'Fallon street, St. Louis, Mo.

THE SOUTH STREET BRIDGE, PHILADELPHIA, PA.

The large and handsome engraving on this page is a perspective view of the South Street Bridge, Philadelphia, Pa. We select the engraving from the pages of *Engineering*, which journal published the following description, from the pen of Mr. W. Barnet Le Van, a well known engineer of Philadelphia.

The bridge commences at the intersection of Chippewa and South streets upon the eastern side, to the high ground of the Almshouse property beyond the Junction and West Chester Railroads on the west side of the river, connecting with Spruce street. The entire length of the structure is 1,934 feet 7 inches, consisting of two fixed spans 195 feet 8 inches each, and a draw 198 feet 2 inches in length, supported by a pier at each end of the draw and one in the center to receive the pivot. Each end pier is formed by two columns of cast iron 8 feet in diameter, cast in sections 10 feet in length, 1¾ inches thick, with inside flanges 2¾ inches wide by 1¾ inches thick at top and bottom of each section. The flanges are pierced with holes 5 inches apart, from center to center, to receive 1¼ inch bolts. The bottom flange is omitted in the section forming the bottom of the column, when in position, for greater facility in penetrating the soil.

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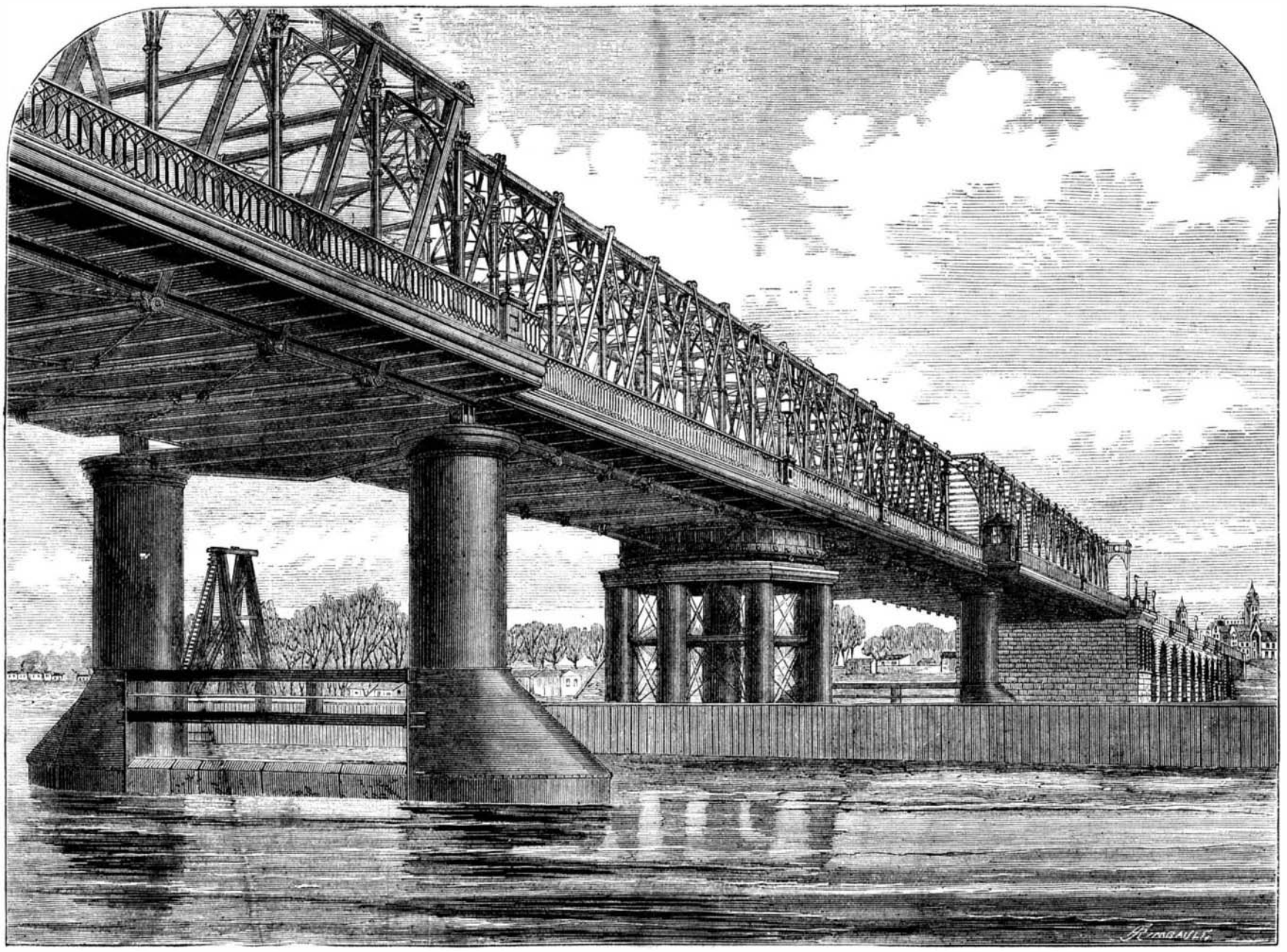

SOUTH STREET BRIDGE, PHILADELPHIA, PA.

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This end is not beveled, as is generally done, but left square, so as to retain the full value of the thickness of the column for a bearing surface on the rock, each section weighing about 14,600 lbs., averaging seven sections to each column.

The pivot, or center pier, is formed by a cluster of nine columns, a 6 foot column in the center supporting the pivot of the draw, and a surrounding circle of eight columns 4 feet in diameter, carrying the track on which the draw revolves. This circle is 36 feet in diameter from out to out, while the pier columns are placed with their centers directly under the main chords of the bridge, making them 36 feet apart from center to center, and at right angles to the center line of the bridge, giving an opening of 77 feet on each side in the clear. The section of 6 foot columns average 10,800 lbs., and the 4 foot columns 6,800 lbs. each. These columns were cast from government cannon, originally made from cold blast charcoal pig, being an exceptionable material for this purpose. The columns were placed in position by the use of compressed air, by the plenum pneumatic process. In sinking these pneumatic cylinders, the late Mr. Murphy, the engineer who erected the bridge, introduced a more economical air lock than was heretofore used, which enabled the workmen to pass from the normal atmosphere outside the column to the denser atmosphere of the interior, and to prevent the escape of the compressed air while so doing. He also adopted, for the first time, brackets in sections, and extending clear round the whole inner circumference of the bottom of the column, and secured to its side by four 1¼ inch tap bolts, and to the rock by four bolts 18 inches long, with fox wedges at the lower end, and thread and nut on top, thereby adding much to the stability of the work. This was necessary on account of the small amount of holding ground for the cylinders, overlying the bed rock.

The bed of the Schuylkill, at the site of the bridge, is a micaceous gneissic rock, undulating in surface, with overlying strata of sand and tough, compact mud, intermingled with gravel and small boulders. Lying directly on the rock, considerable quantities of driftwood were found, its appearance evincing great age and a long occupation of its present position. The average depth of this bottom material is about 30 feet at the western pier columns, diminishing to only 5 feet at the eastern pier. At the draw the thickness is about 18 feet. The draw span of this bridge is 198 feet 2 inches long from end to end of chords, and 23 feet wide between centers of trusses, with two outside footways of 6 feet 8 inches in the clear, making the total width from out to out 39 feet 4 inches, equal to the outside diameter of the pivot cluster of columns supporting the span at its center, leaving two water ways of 77 feet each, as required by the specification. The decrease in the width of the bridge at this point from 55 feet (the width of permanent span) to 39 feet 4 inches is unfortunate, but to have maintained the width of 55 feet would have made not only a wider span, but also a much longer draw span (necessary because of the requirements of navigation) adding enormously to the weight, already very great (being now nearly 400 tons), and involving increased dimensions throughout, and as a consequence increased cost of pivot, curb, and supporting columns. The truss of the draw span is similar in design to the two permanent spans, but modified in section and position of members so as to meet the duties of a bridge supported on a pivot at its center, and as a permanent span, which it practically becomes when closed.

The pivot on which Mr. Murphy originally proposed to rest the draw span was one of his own design, and consisted of two smooth lubricated surfaces 6 feet in diameter, made of gun metal with spiral grooves, being arranged so as to equally spread the lubricating material. From the large area of the working surfaces the distributed load would have been only about 200 lbs. to the square inch. This was a feasible plan, and perhaps the most economical way of solving the problem. But this was changed to a pivot center of two sets of small conical rollers running on steel plates, which is now working satisfactorily. The entire draw is carried directly by the stone filling of the central 6 foot cylinder; an arrangement of radial arms with wheels under the circular curb (which is 32 feet in diameter) which prevents any undue tipping of the span when open or during the opening or closing of the span. The width of the approaches is 55 feet, consisting of carriage way 35 feet wide, and two footways 10 feet wide on each side. The eastern approach is 518 feet 10 inches in length, consisting of 363 feet 6 inches of broken range ashlar retaining wall of sandstone, and 114 feet 6 inches, being three conoidal or flue arches of original design, composed of brick with stone rings and a granite abutment of 40 feet 10 inches, with pilasters and Doric capitals.

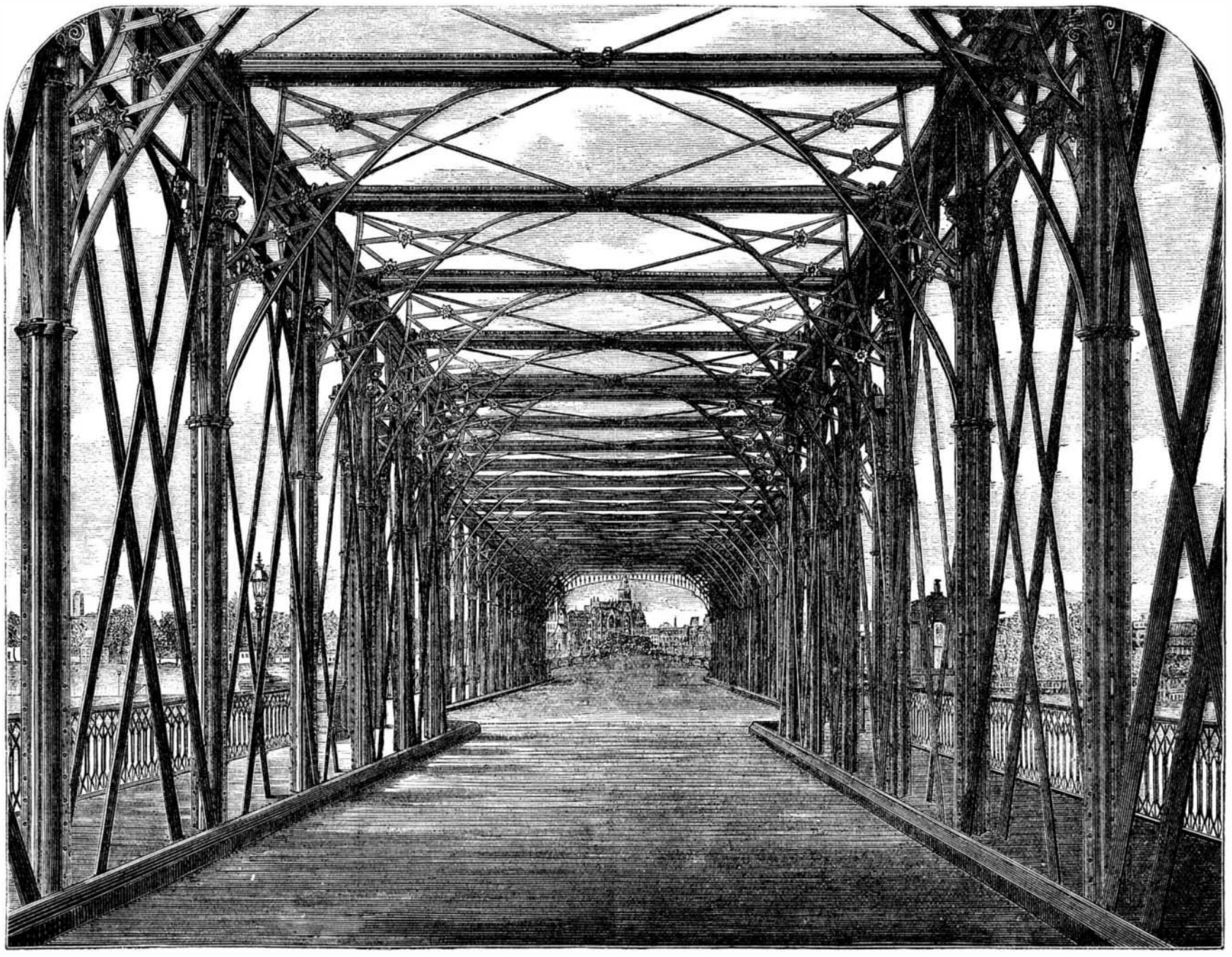
The western approach is 826 feet 6 inches in length, consisting of 87 feet 4 inches of regular range ashlar retaining wall of granite, and three trussed spans 244 feet 9 inches in length, supported by eight wrought iron columns over the Junction and West Chester Railroads, to an abutment of 62 feet 4 inches in length, and thence by nine brick arches 43 feet 6 inches span, from center to center, with stone rings, 391 feet 3 inches long, with granite piers, to a granite abutment of 40 feet 10 inches, same character as eastern abutment.

The contract price for the bridge was $770,000, but the ice breakers or fenders for the center pivot pier of the draw span formed an extra contract, for which Mr. Murphy received $65,000 additional.

Improved Whaling Gun.

During last year, Captain Eben Pierce, the well known manufacturer of bomb-lances, and Selmar Eggers, after much planning and experimenting, perfected an invention which is destined to prove vastly beneficial to our community in swelling the revenue accruing from the whale fishery. This is a breech-loading whaling gun, varying from the ordinary weapon as much as a modern sixteen-shooting rifle does from the flint-lock shot gun of our ancestors.

The weight of the gun is 18 lbs., or nearly the same as the old style, while it is much better balanced and proportioned, reducing the comparative weight of the barrel that renders it so difficult to steady and aim the ordinary guns. The length and base of the barrel is the same, admitting the use of the usual size bombs. The great superiority of this weapon lies in the manner of loading. The old guns were loaded with loose powder, and were more dangerous to handle when charged; the powder would also become dampened with flying spray when in a boat that was going through the water at a lively rate, and it has often occurred that, when the pursuers had arrived within easy range of their prey, they would find the charge moistened and the weapon consequently useless. Mr. Eggert's gun is so constructed that, by touching a spring in the butt, a chamber in which the barrel terminates is opened; in this a cartridge with a seven-eighths inch copper shell is inserted, charged with 2½ drachms of powder, or about half the quantity required to load the ordinary guns. The chamber is then closed upon pulling the trigger, the hammer strikes a sharp blow upon a cap in the end of the cartridge, and the piece is discharged. The whole operation of loading, fixing, and reloading can be accomplished in two minutes' time. It will be seen at once that the gun is much surer and safer, as these cartridges can be kept in the pocket until needed; and no water can lessen their power after they are placed in the chamber. With the breech-loader a lance can be sent with destructive effect over 750 feet when fired at slight elevation. The weapon is constructed of gun metal, and thus is almost impervious to wet, another weakness to which the old style gun was susceptible.—*New Bedford Mercury.*



INTERIOR VIEW OF SOUTH STREET BRIDGE PHILADELPHIA PA