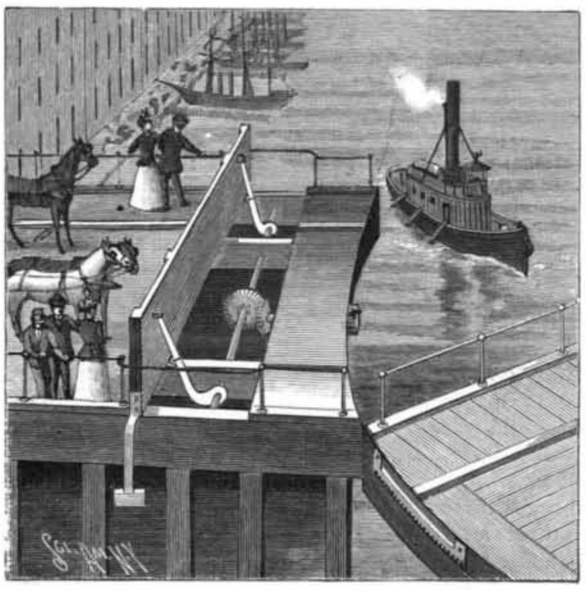
AN AUTOMATIC SAFETY-GATE FOR BRIDGES.

A safety-gate which is automatically opened and closed by the action of the draw or swing sections of bridges has been patented by Wallace W. Heffron and Frank T. Rice, of Tower City, North Dakota. Referring to the accompanying engraving, it will be observed that the gate is pivoted upon the upper face of a bridge span, and can be raised into a vertical position or lowered into a horizontal position. When lowered, the gate constitutes a portion of the driveway and foot-path of the bridge. Below the gate a shaft is transversely journaled. To the shaft and to the gate, jointed levers are attached in the manner indicated. A second, longitudinal shaft is journaled at right angles to the lever-shaft, and at one end has geared connection with the lever-shaft. At the other end,



AN AUTOMATIC SAFETY-GATE FOR BRIDGES.

the second shaft is provided with a pinion adapted to engage two cog racks on the draw. One rack is attached to the end of the draw at one side, with its teeth directed downwardly, as shown in the engraving; the other rack, not pictured in the cut, is secured to the draw at the other side, extends some distance below the first rack, and has its teeth directed upwardly. A transverse as well as a vertical space is left between the two racks, which space is occupied by the pinion in its normal, inoperative position. Counterweights are employed to facilitate the operation of raising the gate. When the draw is swung toward the left, the upper rack will engage the projecting pinion of the longitudinal shaft, and, communicating its motion to the jointed levers, through the medium of the two shafts, will raise the gate to form a barrier extending across the driveway and footpaths. When the gate has attained its vertical position, the rack will have passed the pinion. In closing the draw, the rack will engage and turn the pinion in the reverse direction to cause the gate to be lowered. When the draw is to be moved toward the right, the lower rack is brought into action.

THE UNIVERSITY OF BOMBAY.

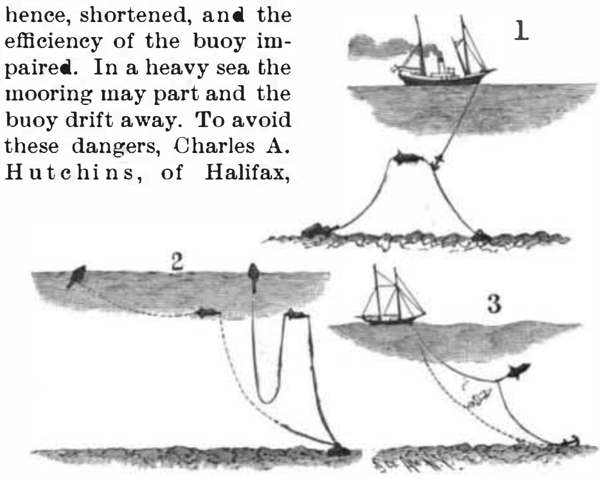
Doubtless few of our readers have visited India, but we are very certain that those who have, found a great surprise awaiting them. We naturally associate India with the peculiar style of architecture which is indigenous to that country, but the truth of the matter is that in a number of cities, and especially in Bombay, there are many buildings which would be notable in London or Paris. We have already illustrated the great railway station at Bombay, which is one of the finest buildings for this purpose in the world, and the University is also specially worthy of note.

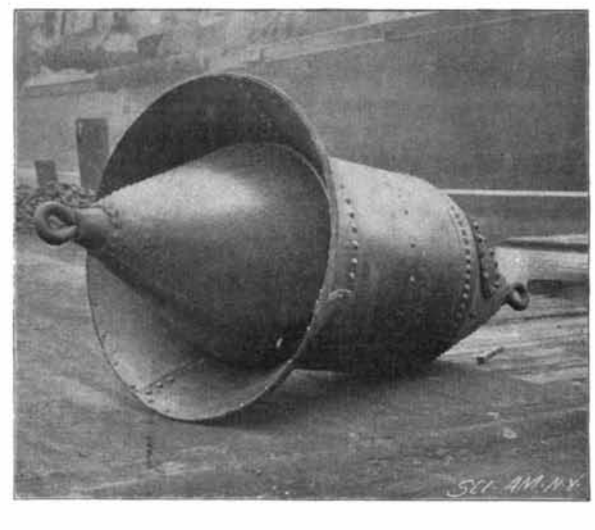
Through the courtesy of Mr. I. N. Parmanand, of Bombay, we are enabled to present an interesting engraving of one of the University buildings. Next to the huge Secretariat are two smaller buildings, both by the late Sir Gilbert Scott. The first is the Senate Hall of the University, and the second the University Library and Rajabai Clock Tower, which forms the subject of our engraving. The University Hall is 104 feet in length, 44 feet in breadth, and the height is 63 feet to the apex of the groined ceiling. The semicircular apse is 38 feet in diameter. The University Library and clock tower were designed by Sir G. G. Scott and carried out by the detail drawings prepared by Mr. Molecey, the resident architect. The total length of the building is 152 feet. The ground floor contains two side rooms each 56×30 feet and a central hall 30×27¼ feet. On the west front is the tower forming a carriage porch 26 feet square inside measurement and 36 feet outside, so the walls are each 5 feet thick. Along the west front is an open arcade 14 feet wide with round open staircases at either end leading to the floor above. The upper floor is devoted to the library and reading room, which consists of one room extending the whole length of the building, and the height to the apex of the arched paneled roof is 32 feet. The tower itself forms a conspicuous feature in the panorama of Bombay. It is 280 feet high from the ground to the top of the metal finial. The height of the first stage, where the square form is changed, is 68 feet. The second stage, to the top of the tower, is 118 feet, and the third stage, to the top of the finial, is 94 feet, making a total of 280 feet. The height to the center of the clock dial is 167 feet. The external diameter of the dial is 16½ feet. The staircase of the octagonal vestibule is groined in porbunder stone, the ribs springing from corbeled dwarf columns. The landing to the staircase is 9 feet wide. This is also groined underneath, the two cross arches springing from the carved corbeled heads of Homer and Shakespeare, which are ingeniously carved out of the capitals of two large columns supporting the walls above. The belfry contains the peal of bells, struck mechanically. From the top of the tower a magnificent view may be obtained, not only of the town and harbor, but also of the country on one side and the sea on the other for many miles. Fifteen feet above the gallery, in niches cut in the pillars which form the corners of the octagon, are large figures, each 8 feet high, representing the different races and costumes of Western India, and higher still, some thirty-odd feet above the gallery, where the octagon ceases and the cupola commences, are another series of figures of the same description standing out boldly on the tops of the pillars supporting the angle ribs of the cupola. From the top of the octagon, the cupola gracefully rises about 52 feet, to a point on which is fixed a large round ball. The original plan contemplated a crowning feature of ornamental iron work, but this has been dispensed with. The only metal about the cupola is the lightning conductor, a copper tube 2½ inches in diameter, which runs down to the ground, and is then carried away and embedded 12 feet below the surface at a point where water was found. The work was commenced in 1869 and was completed in 1878. The entire cost of building with the clock and chimes was contributed by Premchund Roychund, and it was named the "Rajabai Tower" in commemoration of the donor's mother. The total cost of the building was 5,047,603 rupees, which is equivalent to $2,438,000, which was more than covered by the munificent gift of four lakhs and the interest thereon.

THE UNIVERSITY LIBRARY AND CLOCK TOWER, BOMBAY, INDIA.

A NOVEL WAY OF PROTECTING BUOY-CABLES.

In the use of floating buoys, it frequently happens that changes in the winds and tides cause the cable to be dragged about on the bottom and to become fouled either with itself or with the bottom. The cable is, hence, shortened, and the efficiency of the buoy impaired. In a heavy sea the mooring may part and the buoy drift away. To avoid these dangers, Charles A. Hutchins, of Halifax,





A NOVEL METHOD OF PROTECTING BUOY-CABLES.

Canada, superintendent of lighthouses for Nova Scotia, has invented and patented a buoy which, when submerged, holds the cable off the bottom, so that it is payed out and taken in according to the strain on the floating buoy.

The submerged buoy, as shown in Fig. 4, has a cylindrical body with tapering ends adapted to receive the cable. The body at one end is provided with an outwardly-flaring rigid skirt, constituting a drag against the movement of the buoy through the water.

In Fig. 2 the submerged buoy is shown interposed between the sections of the cable of a floating buoy. The full lines in the figure indicate the position of the cables and buoys in calm weather, the cable in this position being at all times held above the bottom. When the floating buoy yields to the action of the sea or of the winds, the cable becomes taut, as shown in the dotted lines. When a heavy sea strikes the floating buoy, the strain on the upper cable-section is conveyed to the submerged buoy, the skirt of which, constituting a drag, breaks the greater portion of the strain and transmits but little to the mooring. It is therefore evident that the submerged buoy performs the double function of relieving the mooring of strain and of preventing the fouling of the cable. When thus insured against fouling, a cable rarely parts.

In Fig. 1 the submerged buoy is shown holding up the bight of the moorings of a sunken buoy. A cable supported in this manner may be readily grappled and the sunken buoy recovered. Without the use of the submerged buoy, grappling on rocky bottoms would be difficult, perhaps impossible.

Fig. 3 shows a vessel riding out a gale on a lee shore. The buoy in this case is attached by one end to the anchor-chain, so that when dragged under the surface of the water it will form an effective sea-anchor in addition to the anchor at the bottom.

The inventor states that his buoy has been used for over a year, on the most exposed places on the coast of Nova Scotia, and has stood the tests to which it has been subjected with gratifying results.