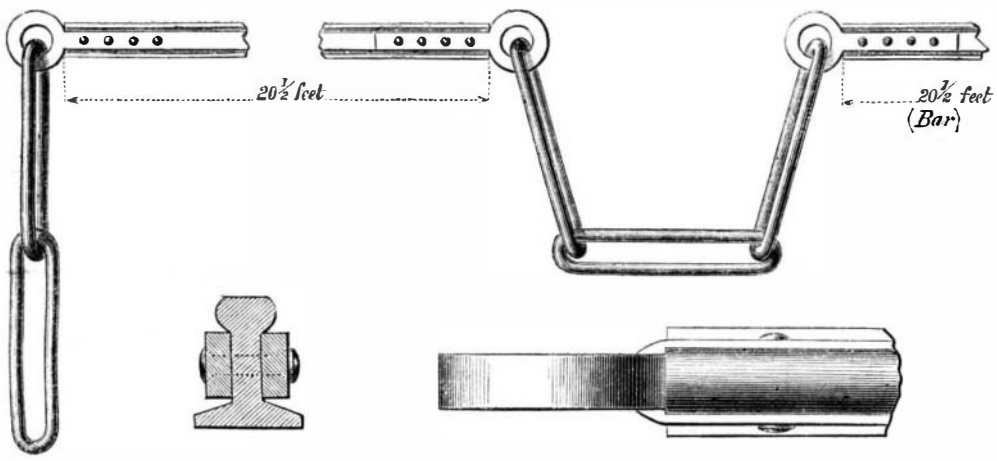
OBSTRUCTIONS OF CHARLESTON HARBOR.

We take pleasure in presenting accurate diagrams of the famous obstructions in Charleston harbor, by which our fleet was prevented from advancing up to the city. The principal reliance was upon the buoys attached to the bars of T-iron; if these had been once destroyed the whole thing would have gone to the bottom. We have no doubt but that if the same spirit had been displayed before Charleston as Colonel Bissel evinced in cutting the canal through the main land near Island No. 10, the obstructions could have been removed as easily as any other. "All things are possible to him who wills." The official report says:—"The obstructions consist of two bars of T-iron, 20½ feet long, to the ends of which strong eyes are fastened to receive three connecting links of iron, 33½ inches long and 2 inches in diameter; the whole weighing 1,500 lbs. They were doubtless supported by logs throughout their entire length, or by buoys at each end, forming a very formidable barrier."



POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting on Thursday evening, March 24th; the President, S. D. Tillman, Esq., in the chair. After the President's usual summary of scientific and industrial news of the week, Dr. Stevens, having just returned from an examination of the district, was invited to give a description of the

CUMBERLAND COAL DEPOSIT.

Dr. Stevens—"Mr. Chairman, I have made a sketch on the blackboard here, of the rocks as we find them deposited in a line extending from the north-east corner of this State south-westwardly 300 miles into Pennsylvania. While the surface of the ground rises gradually, as indicated by this upper line, the rocks still lie in their original horizontal position, so that in going from the north-east to the south-west we meet first with the lowest rocks, and then in succession with those which are lying above. We pass over the sloping edges, first of the Lower Silurian, then of the Upper Silurian, then of the Devonian, and lastly of the Carboniferous. These beds are lying almost exactly horizontal, with a very slight inclination toward the south-west, and with only one break or fault in their whole extent. In the Cumberland coal district of Maryland we find these same rocks lying one upon another in the same relative pasition, but folded in great plications, and affording the most impressive evidence of the tremendous forces by which they have been heaved up and bent from the horizontal strata in which they were originally formed on the bottom of the sea. These lines represent the formation of the mountain when it was first pushed up—the upper stratum or Carboniferous being upon the outside, and the lower strata being rounded up in corresponding form below. But to represent the present condition of the mountain we must not only wipe off its top, but we must scoop out a great valley in its center. We now find the lower Silurian rock paving the bed of the valley, and the Upper Silurian, the Devonian and the Carboniferous cropping out on each side of the valley above, the several formations being of just about the same thickness on each side of the valley, and lying one upon another in the same relative position. This valley is five miles in width and 1,800 feet in depth. There is no reasonable explanation of the mode in which this great mass of rock has been carried away except the wearing of water. When the mountain was thrown up, cracks were doubtless formed along its summit; into these the rain fell, streams were formed, and thus the heart of the mountain was worn away. The debris from those denudations was carried by the rivers to the sea, and is now found spread along the shore, extending inland in some places many miles, and lining the banks of the rivers from their mouths upward to distances proportioned to the size of the streams, being in the case of the Mississippi 600 miles."

The remainder of the evening was spent in listening to a paper by Mr. Heaton, which contained no new statement of facts.

HOW SUGAR IS MADE FROM THE CANE.

A correspondent of the Boston *Trumpet and Freeman*, writing from the Island of Mauritius, describes the process of making sugar in a clear and concise manner. The narration will be found worth reading:—

"My readers doubtless know that the great staple of Mauritius is sugar. While all the productions of the tropics may be grown here, and nearly all are grown here to some extent, yet the great, the almost sole reliance is sugar. The crop of 1862-3—the crop year terminates on the last day of July—amounted to about one hundred and sixty thousand tuns, or upwards of three hundred millions of pounds. Some idea of this enormous quantity may be gained by considering that it is sufficient to load three hundred and twenty vessels of five hundred tuns each. The foregoing statement will also furnish as good an idea as can easily be got of the amazing fertility of the island. For be it remembered that this little dot upon the map of the globe is only about thirty-five miles long, and less than that in breadth, being a little more than one hundred and three miles in circumference. On the estate visited there were about one hundred and fifty laborers, mostly Indians, though with a few negroes. As we approached the building, we saw men busily occupied in bringing forward the canes. These are cut and stripped of all their leaves in the fields where they are grown, and only the thick, heavy, juicy stalk brought to the sugar-house. The machinery here is all propelled by steam. We entered first the grinding-room. Two men were engaged in bringing in the canes, and placing them on the apron of the mill. Two others, one standing upon each side of the apron, fed the mill; while a fifth stood behind the mill to receive and dispose of the crushed canes after they had passed through the mill. The mill consisted mainly of three solid iron rollers, about twelve or fifteen inches in diameter, with shafts running out on one side and connecting with the propelling power. Two of these rollers were at the bottom, and the third directly over neither, but over the line which separated the two lower ones, and in such relations to them that the canes, in passing between them, did, in effect, pass between two pairs of rollers, or were subjected to two grindings. These were so geared that they could be made to press more heavily or lightly upon each other, at the option of the overseer. Once passing the canes through was sufficient thoroughly to expel the juice. As it was expressed it fell into a shallow tank below, from which it was conducted off through an open trough into another apartment. Entering this other apartment, we found the cane-juice pouring through a coarse seive into a large tank, where it was allowed to remain for a little lime, until the grosser impurities had risen to the surface, when the purer liquid below was drawn off through iron pipes into immense kettles or pans, where it was reduced to the proper consistency by boiling, and where men were constantly engaged in skimming off the feculence which the violent agitation threw to the surface. From these kettles or pans the sirup was conducted into what are called 'wetzells'—a machine named from the inventor—in which the sirup is 'cooked.' It is maintained here at boiling heat, and is kept in constant motion to prevent its burning. This machine consists mainly of two parts—one, a half cylinder about ten feet long, placed horizontally, which contains the sirup, and under which, I believe, is a chamber filled with steam; and the other a skeleton cylinder, somewhat smaller in circumference than the aforesaid half cylinder, which revolves within the latter, and the frame, or bones of which, so to speak, is composed of iron tubes also filled with steam. This skeleton cylinder, revolving in the half cylinder, or trough, not unlike the manner of some patent Yankee churns, though not so rapidly as to throw over any of the contents, keeps the sirup in constant motion and prevents its burning. When the 'cooking' is completed, the contents of the 'wetzells' are drained off into large and shallow vats, where the sirup is cooled, and the sugar crystallized. Hence it is passed through a crushing mill, where whatever large or small lumps may have formed are reduced to powder. Then the sugar is put into the 'turbines,' where the sirup still remaining in it is expelled, and the sugar dried sufficiently for bagging or barrelling. These 'turbines' consist of two upright iron cylinders, one within the other. The outer is stationary, and strongly secured in its place. Between the two there is a space perhaps an inch wide. The inner cylinder revolves within the other. Its rim is perforated with small holes; the bottom of it is tight, and the top is open. Into this open place is put the sugar, wet and black with molasses; in from five to eight minutes it is taken out comparatively dry and light colored. The great and sudden change is effected by the rapid movement of the inner cylinder, it revolving no less than twelve hundred times per minute. The sugar is taken hence to the bagging-room, where it is prepared for the market.

"As above described the process of sugar-making seems quite summary; and indeed it is. The cane-juice expressed each day is manufactured into sugar before the work ceases at night: the grinding commencing and ending a few hours earlier than the processes. Unlike the sugar-growers in Cuba, the planters here do not run their mills night and day the season through, but commence anew with every morning. That to do so is much less exhausting to the men may readily be supposed; while a better quality of sugar is thought to be obtained by the closer attention to the work thus secured."

Testing Armor-plates at Portsmouth.

Some testing of armor-plates has taken place at Portsmouth, England. The plates were of 5½ inches in thickness, 15 feet 6 inches in length, and 3 feet 3 inches in width. One from Messrs. John Brown and Co., of Sheffield, was for the iron frigate *Agincourt*, and the other for the iron frigate *Northumberland*. Both were tested in the first place with cast-iron shot from the 68-pounder gun in the ordinary way. Both passed through the ordeal satisfactorily, although tried severely by clusters of shot impacts and edge blows. The maximum depth of the indents was 2 inches and the minimum 1 1-16 inches. On Brown and Co's plate in its upper right centre, four shots struck in a semicular line, that measured but 32in. through the greatest extent of the curve. Throughout this space there was only one small surface crack. On the left lower corner of this plate five shots struck, impinging on each circumference. Two of them were only half on the plate's edge. The plate exhibited wonderful tenacity and solidity, without the slightest appearance of brittleness. The Millwall plate was also struck in several places on its right lower edge, but without penetration being effected, although a small semicircular piece, 24in. in length by 10in. in width, was broken out through half the plate's thickness. The laminæ were opened on the plate's edge in the vicinity