

THE MEZZANA-CORTI BRIDGE OVER THE RIVER PO.

We extract from *L'Illustrazione* the annexed engraving of an iron railway bridge, which extends across the river Po, near Mezzana-Corti, Italy. It was constructed for the Southern Railway Company of Italy, by Messrs. Gouin & Co., of Paris, and its total length is 3,310 feet, comprising ten clear spans of 196.2 feet each, supported on nine piers and two abutments in masonry. It is constructed for a double line, and the upper part of the iron girders supports a carriage way 28.8 feet in width. It is calculated to support a load of 11½ tons per 32 feet running, besides its own weight. The total quantity of iron employed was about 5,706 tons.

The foundations for the piers and abutments were sunk by the aid of wrought iron caissons, closed at the top and charged with compressed air. In putting in the foundations, the excavations had to be carried down some 67 feet through the gravel, and even more, below the level of low water, so that the work was necessarily prosecuted under very considerable pressure. The caissons were eventually filled with concrete, and they remain as permanent portions of the work.

The superstructure consists of lattice girders connected at their tops and bottoms by plate iron girders, the lower series of the latter supporting the double line of rails, and the upper series carrying an ordinary roadway, having foot ways on each side formed over the flanges of the main girders. The two main girders of each span are 24.6 feet deep between top and bottom flanges, and they are placed at a distance apart, transversely to the line of the bridge, of 27.26 feet from center to center. The lower cross girders are connected by short intermediate longitudinal girders extending between them, under the timbers on which the rails are placed. The cross girders forming the upper series have a slightly arched form on their upper sides, and they are connected by longitudinal timbers on which the planking forming the roadway is laid. The clear height from the rail level to the under sides of the upper cross girders is 17.8 feet, and the latter are well connected to the main girders by strong gusset stays. The bridge was completed in 1866.

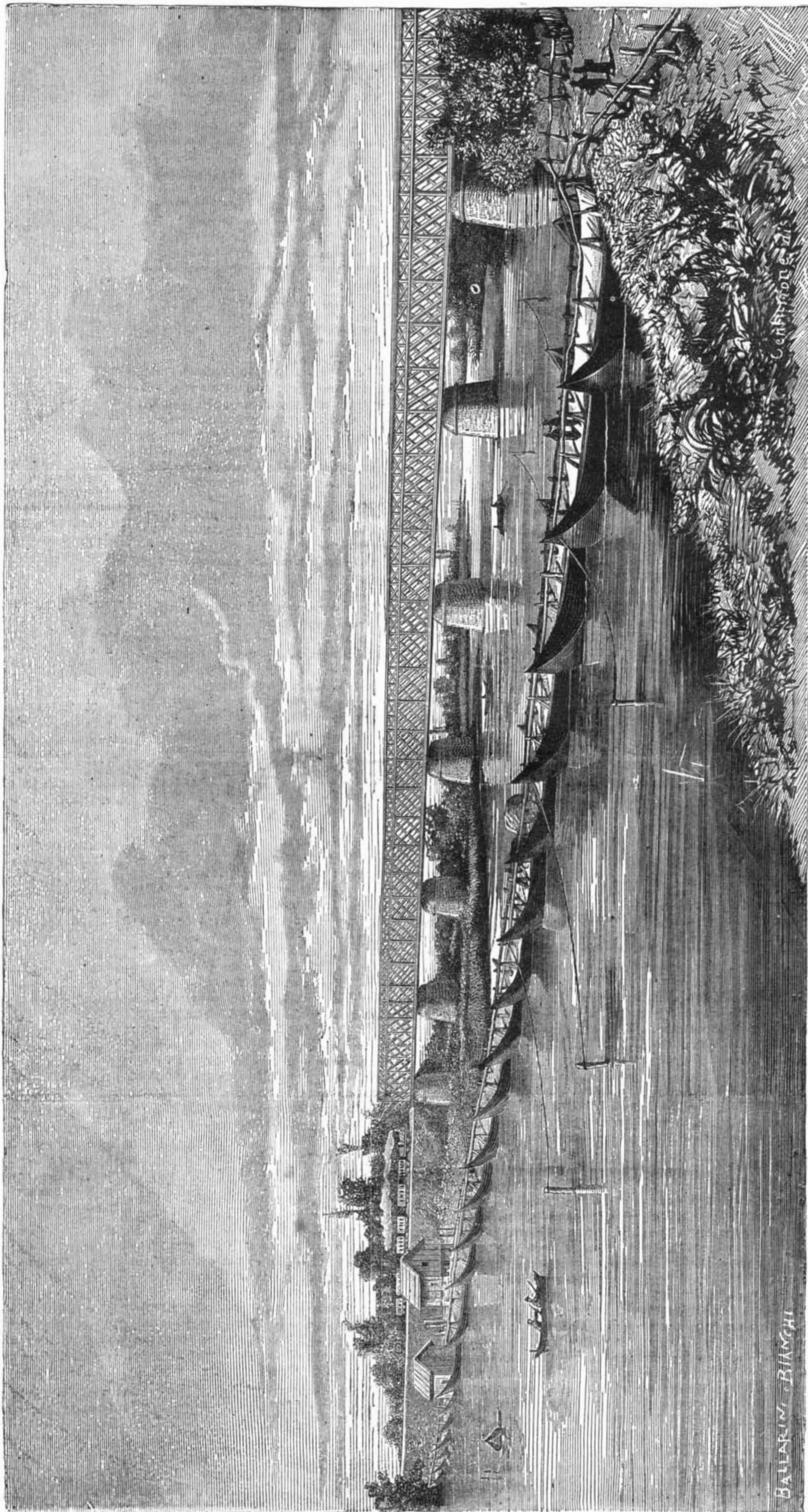
The Syrian Sponge Divers.

The English Vice Consul at Beyrout, in a report to his government, gives some interesting particulars regarding the sponge fisheries. The industry, as prosecuted upon the Syrian coast, yields sponges to the value of \$100,000 annually, and employs about 300 boats and 1,500 men. Although they vary much in quality and size, sponges may be generally classified as: 1. The fine white bell shaped sponge, known as the toilet sponge. 2. The large reddish variety, known as *sponge de Venise*, or bath sponges. 3. The coarse, red sponge, used for household purposes and cleaning. Two thirds of the produce of the Syrian coast are purchased by the native merchants, who send it to Europe for sale, while the remainder is purchased on the spot by French agents, who annually visit Syria for the purpose. France takes the bulk of the finest qualities, while the reddish and common sponges are sent to Germany and England.

Diving is practised from a very early age up to forty years, beyond which few are able to continue the pursuit. It does not appear, however that the prac-

tice has any tendency to shorten life, although as the diver approaches forty he is less able to compete with his younger and more vigorous brother. The time during which a Syrian diver can remain under water depends, of course, on his age and training. Sixty seconds is reckoned good work, but

there are rare instances of men who are able to stay below eighty seconds. The diver (naked of course), with an open net around his waist for the reception of his prizes, seizes with both hands an oblong white stone, to which is attached a rope, and plunges overboard. On arriving at the bottom



IRON BRIDGE OVER THE RIVER PO, NEAR MEZZANA-CORTI, ITALY.

the stone is deposited at his feet, and, keeping hold of the rope with one hand, the diver grasps and tears off the sponges within reach, which he deposits in his net. He then, by a series of jerks to the rope, gives the signal to those above, and is drawn up.

ROLLING BRIDGE BETWEEN ST. SERVAN AND ST. MALO.

The towns of St. Servan and St. Malo, in France, are situated on either side of the river Ronce, or, more strictly, of the arm of the sea into which that river empties. The tide is here subject to great fluctuations, retreating so that the bed of the estuary may be crossed on foot, and again rising to a height of several yards. The mode of crossing the stream, until the construction of the curious bridge represented in our engraving, consisted in taking a wide *détour* to a point where an ordinary bridge spanned the river, or else in using boats. To avoid such inconvenience as we have referred to, M. Leroyer, town surveyor of St. Malo and architect to St. Servan, designed and had constructed the bridge we illustrate. It consists of a platform supported on wheels, which run on rails laid on the bottom of the estuary. The platform is supplied with accommodation for horses and vehicles at either side, and two classes are provided for passengers, the fares being one and two cents respectively. The platform stands level with the quay at each side, so that nothing is more easy than access to it; and, as our illustrations (from *L'Illustration*) show, it is worked at all states of the tide with perfect safety. One of the engravings represents the bridge traveling on its ways at low tide, and the other, crossing the river when the water is high.

The bridge appears to be exceedingly popular with the inhabitants of St. Malo and St. Servan. It is novel in design, and reflects no small credit on M. Leroyer.

THE DEGERFORS IRON WORKS, SWEDEN.

There is a marked contrast between the relations of employer and employed in Sweden and the similar relations existing in England and the United States. In both English-speaking countries strikes and lockouts are rather the rule than the exception. Master and man are arrayed on opposite sides, each seeking to get the better of the other, and neither attempting in any very appreciable degree to lessen the existing antagonism. In Sweden, exactly the reverse is the case. The practice so earnestly advocated and followed in the past by the man most prominent in the development of the iron industry of the country, of regarding his workmen as living fellow beings, and not as mere machines from whom the utmost labor possible must at all

compulsory schooling for his children. Again, the iron masters do not concern themselves with the buildings and plant of their ironworks only. They are intimately associated with every detail of the existence of the communities of which they are the leaders; they build dwellings and schools, even hospitals or infirmaries; they own and cultivate lands, and rear crops for the maintenance of their industrial allies, or enable them to do so; they possess, directly or indirectly, their own mines for ores; they own large tracts of forest land, and burn huge quantities of charcoal. Finally, they utilize the natural resources of their country by turning to full account all the water power available.

These considerations will lend additional interest to the following description of one of the greatest Swedish iron

by a large turbine of 800 horse power; two shearing machines for plates and bars, to be worked by steam power; and a 4 ton steam hammer; with additional founderies and repairing shops, etc. Since the union of the two works, the upper and lower Degerfors, under one administration, both the waterfalls have been united, by the construction of a canal, giving a combined total fall of 25 feet, and producing a water power of 1,400 effective horse power, utilized in the operations of the works; this, however, is estimated to be only about one third of the total effective hydraulic power of the river Leth-elfven, which exceeds 5,000 horse power—a truly magnificent prime motor and basis for industrial operations.

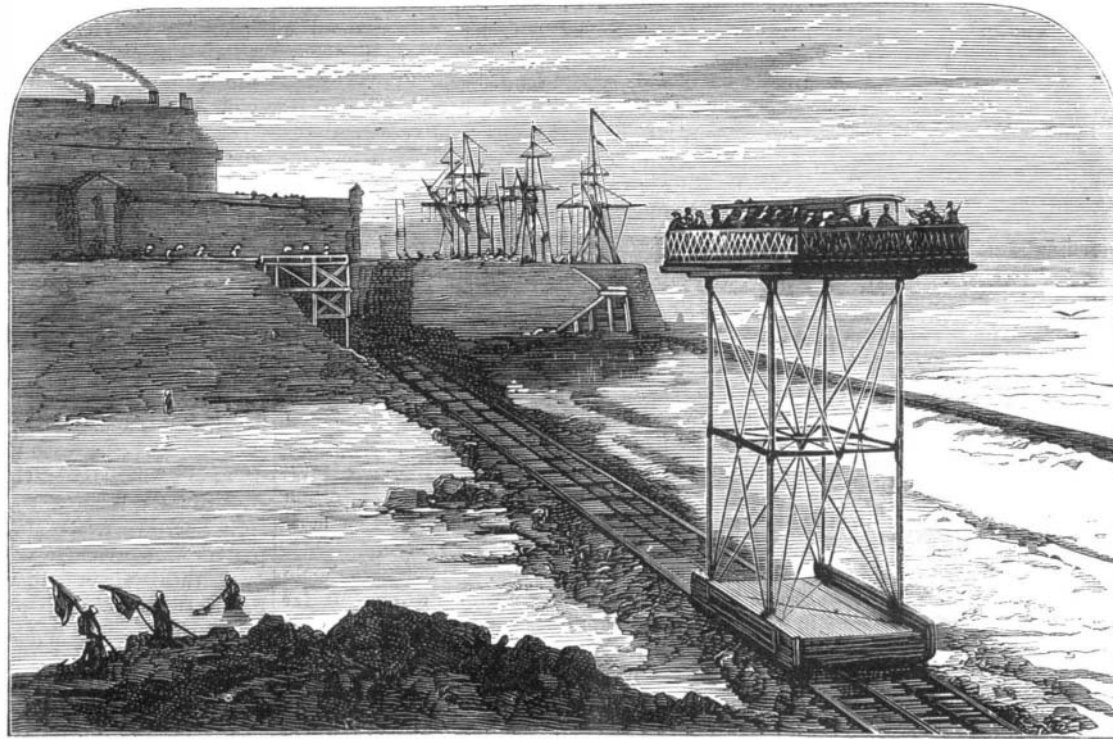
The finished products of the works for the last year of operations, 1873, amounted to 5,000 tons; but of this total quantity about 2,000 tons were rolled for and on behalf of other ironworks, as yet unprovided with rolling mills of their own. Of the remaining 3,000 tons the bulk was converted principally into nail rods and wire rods, a small quantity being rolled into bars of various sizes, some also being used up for axles, piston rods, etc. It is confidently anticipated that, owing to the increased facilities offered as regards the transport of ore and raw materials, the proportionate make of iron will largely increase during this and subsequent years.

There are 156 skilled hands constantly employed at the iron works; these men are mostly married, and live, rent free, in convenient and substantial cottagedwellings, provided for them by the proprietors. None of the women of the families are employed at the works, but several boys are provided with constant employment; these, however, are engaged in work for a limited

period only, their attendance at school daily, for a specified time, being compulsory, until they have attained the age of sixteen years. In addition to the foregoing, about 200 daily laborers are regularly employed at Degerfors; and about the same number of hands are engaged in the pursuits of charcoal burning and the work connected therewith, and in agricultural occupations, on the proprietors' estate at Lassona.

All the male and female adults of the little community can read and write, without exception; all the children, except as above named, are kept at school until they are fifteen or sixteen years of age, when they are examined and confirmed by the vicar of the parish. Thereafter they are freed from compulsory school attendance. The school buildings are provided by the company, and maintained by them under the management of two teachers.

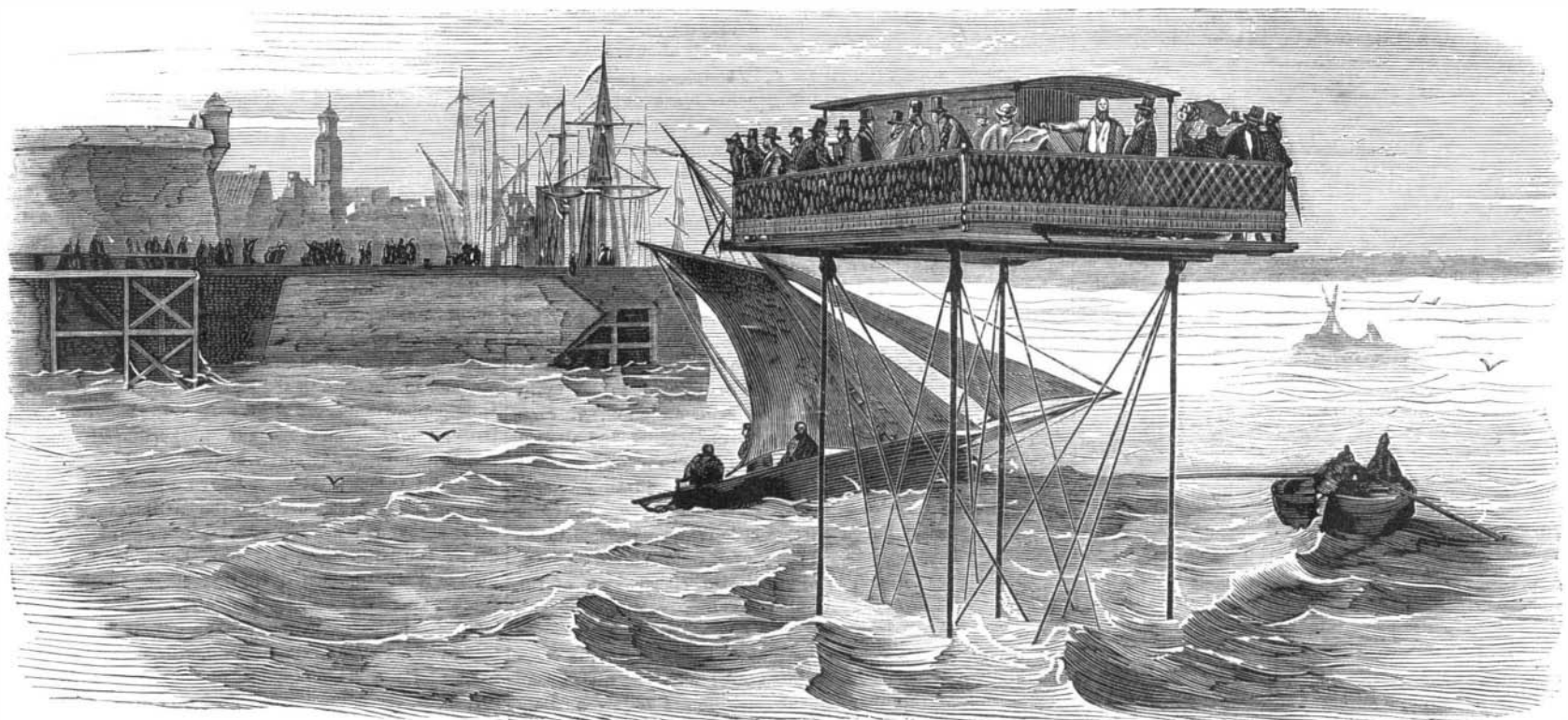
All the men employed at the works in any capacity are engaged by the year; but they are paid in various ways, according to the nature and conditions of the work, some of



ROLLING BRIDGE AT ST. MALO, FRANCE, AT LOW TIDE.

works, the "Degerfors Aktie Bolag," for the details of which we are indebted to *Iron* :

These works are most eligibly situated at the southern extremity of the Lake Mökeln, in the parish of Carlskoga, and province of Wermland. It is only of recent years that they have attained their present rank among Swedish industries. At the present time the works comprise, in addition to the residential premises, the following structures and plant: One blast furnace; one calcining furnace; seven Lancashire furnaces, which are constructed according to the patented system of Messrs. Lagerhjelm and Nanfelt, these having been found by experience to yield iron in greater quantities for the same period of time, and throughout more homogeneous in quality, than those of the usual form; two guide mills, worked by two large turbines, of 150 horse power each; one newly erected 18 inch rolling train for blooms and iron of large size, say up to 5 inch round, etc.; with all needful fitting and repairing shops. These are in



ROLLING BRIDGE AT ST. MALO, FRANCE, AT HIGH TIDE.

hazards be ground for the least pay, holds in the great establishments of the present. The example of Samuel Owen was a grand one. In lieu of unions, drawing upon the earnings of the industrious for the support of the lazy, flourish sick and benefit clubs and cooperative societies—while we read besides of yearly engagements, dwellings and land provided free for the workman by the employer, free fuel, free medical attendance and medicines, and free and

operation, but they do not give the full measure of the future productive capacity of the works, for there are other important extensions which are now fast approaching completion. They comprise a complete set of cupolas, converters, and all the requisite plant for the manufacture of Bessemer steel; also another blast furnace and a calcining furnace; one 22 inch rolling train, for rolling boiler plates; one 22 inch rolling train for puddled bars; both these trains to be driven

them, for example, such as the rollers and all assistants employed at the rolls, blast furnace men, and those employed at the charcoal burning furnaces, are paid at specified rates per ton, by agreement; others, such as shinglers, weighing machine men, and the like, are paid by the day, and earn from 50 cents to 75 cents and \$1 per day of 10½ hours. The piece work men work in shifts or turns of eight hours, and may earn from 75 cents to \$2 per day, according to circum-