THE SAINT MALO ROLLING BRIDGE.

Some time ago we gave a brief description of this curious system of communication between two jetties, and we now return to the subject because of some beautiful photographs that have been sent us, showing the rolling bridge at low and high tide. We shall remind our readers that the two cities of Saint Malo and Saint Servan are so close together as to nearly touch each other. In order to go from one city to the other, it was formerly necessary to make considerable of a detour. It is now more than fifteen years ago that the architect Leroyer, of Saint Malo, remedied this inconvenience by constructing, not a revolving bridge, but a light iron framework—a genuine rolling bridge—which carried foot passengers from one jetty to the other. This iron structure lies upon a carriage mounted upon wheels that run upon rails. This bridge is moved through two chains, one of which pulls it toward Saint Malo and the other toward Saint Servan. These chains wind over a drum set in motion by a steam engine.

At the upper part of the framework there is a platform for carriages, horses, and merchandise. For foot passengers there is a sort of cabin that protects them against sun and storm. The toll is one cent for the open platform and two cents for the cabin.

The bridge operates at high tide as well as at low. In the former case, nothing is more curious than to see the platform suspended over slender iron rods at the surface of the water. Under such circumstances, travelers sometimes experience a certain shock upon gazing at the ocean beneath them.

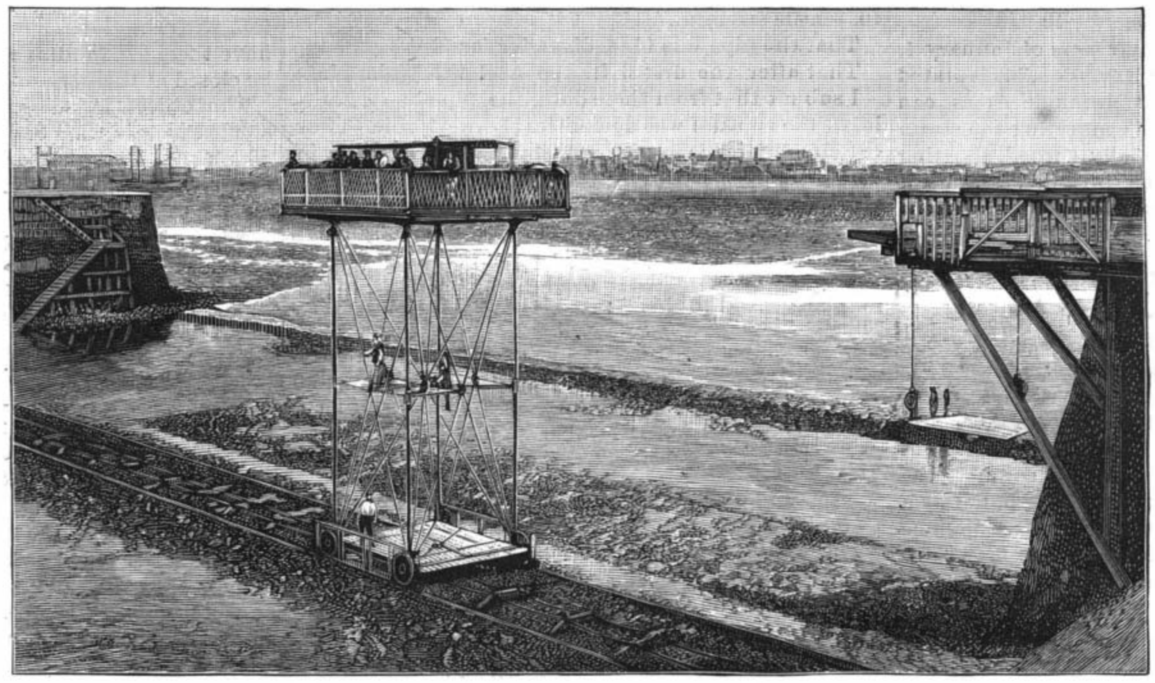

Fig. 1.—THE SAINT MALO ROLLING BRIDGE AT LOW TIDE.

In 1878, at the time of the Paris Exposition, Mr. Leroyer constructed a small model of this bridge, one-tenth actual size. Along with this there was a printed description, which we here reproduce in part.

When at rest, the rolling bridge is entirely out of the way of ships.

On the Saint Malo side it enters a cavity in the wharf wall through its entire length. On the other side there is a short approach, as seen to the right in Fig. 1. The height of the walls above the rails is 34½ feet. At high tide, the bridge is submerged 33 feet. The distance to be traversed is 295 feet, the width of the pass, but it may be prolonged as much as necessary. The velocity of the current to be traversed is sometimes from 5 to 6 knots. The trip is made in 90 seconds, or about 2½ minutes in going and coming.

Since the construction of the bridge in 1871, there has been no accident of any note, and communication between the two cities has been uninterrupted, the structure having operated at all times without the least stoppage, affording a prompt and sure passage from one shore to the other, at night as well as during the day, at high water as well as low, and even when ships could not ride the sea.

The bridge carries horses, carriages, merchandise, and cattle. The platform will hold one hundred passengers.

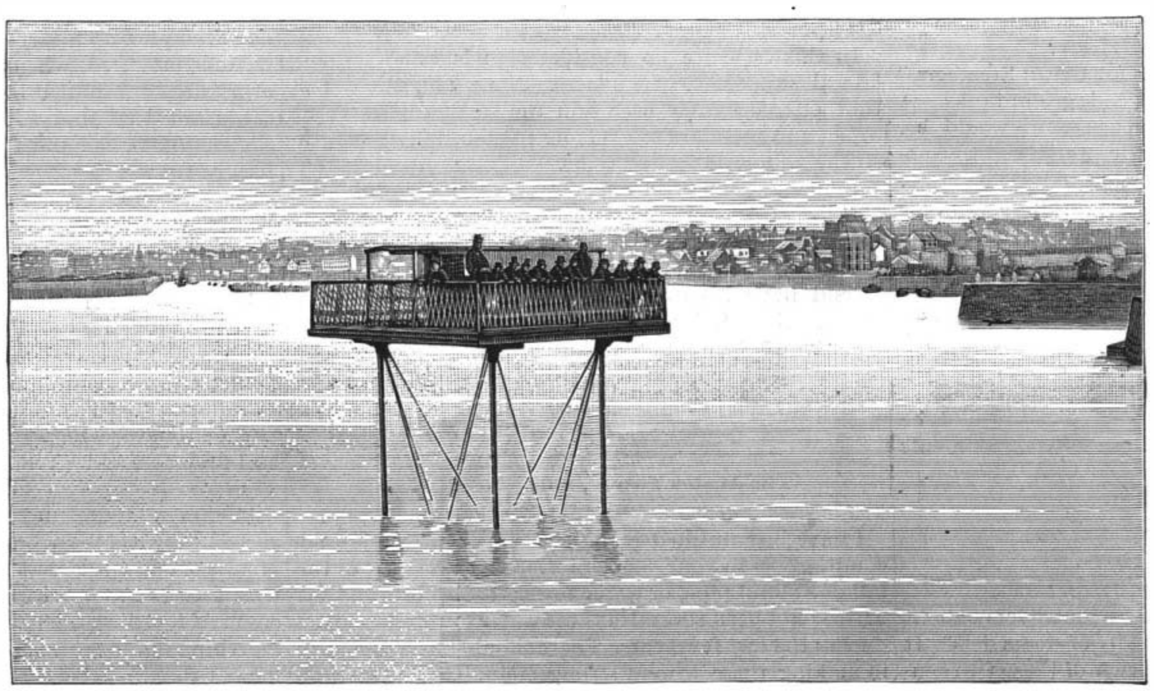

Fig. 2.—THE SAINT MALO ROLLING BRIDGE AT HIGH TIDE.

We are surprised that it has not been imitated in other parts, and we have thought that it would be of interest to again call the attention of engineers and the public to the interesting device.—*La Nature.*

THE remarkable bleaching compound of Mr. Chas. Toppan, of Salem, Mass., consists of 3 parts, by measure, of mustard seed oil, 4 of melted paraffine, 3 of caustic soda, 20° Be., well mixed to form a saponaceous compound. Of this, 1 part of weight and 2 of pure tallow soap are mixed, and of this mixture 1 ounce for each gallon of water is used for the bleaching bath, and 1 ounce caustic soda, 20° Be., for each gallon is added, when the bath is heated in a close vessel, the goods entered, and boiled "until sufficiently bleached."

Packing for Piston Heads and Stuffing Boxes.

At a recent meeting of the Western Railway Club, Chicago, Mr. Johnson said: Metallic packing exclusively has been in use on the Chicago, Burlington & Quincy road since the fall of 1881. We find that piston rods average a mileage of 50,000 miles without turning. We then turn off an average of 1-64 inch. We reduce our piston rods from 3 inches to 2½ inches, or ½ inch, before throwing out, this giving us a wear of 1,600,000 miles on piston rods per engine. Putting the average mileage of all engines at 50,000 miles per year would make the life of piston, so far as packing is concerned, 32 years, or more than the average life of an engine. As a matter of fact, during the past five years that this packing has been used by the Chicago, Burlington & Quincy, in no single instance has there been a piston rod removed on account of wear. There is no case where an engine has been laid in to turn either the piston rod or valve stem, on account of leaking. The wear of the valve stem is greater than the piston rod, though not as true, the valve stem wearing more on the top and bottom, leaving the stem somewhat oblong. We find the average mileage of valve stems to be about 35,000 miles without turning, when they require from 1-64 to 1-32 inch to true up. Of the engines equipped with this packing in 1882, there has yet been no case of a valve stem being removed. This packing costs, complete ready to put on engine, for pistons and valve stems, $23.05. The cost of maintaining this packing is extremely light. Three passenger engines, making 250 miles daily, with our heaviest through trains, being handled by separate crews—there being six crews to run three engines, each following the other around—have, from May 1 to December 1, 1886, only used 36 cents' worth of material each. This represents the 6 pounds of metallic packing rings. Freight engines require a set of packing rings once in three months on an average. Switch engines require a set once each month. I find that the records of the amount of hemp used have been destroyed. Piston and valve stem wear, however, with hemp was very remarkable. The average life of a steel piston rod, with hemp, was four years. The average of a valve stem, with hemp, did not exceed two years. At one shop, where there were 110 engines, it kept one lathe constantly turning valve stems, and two lathes on piston and piston rod work. At the present time, at the same shop, with 120 engines, one lathe does all the piston and piston rod work and a considerable portion of the valve stem work. This includes all new work and repairs.

Mr. Johnson: It is the Jerome packing, somewhat modified. We have made some slight improvements—or what we consider improvements—on the original design given us; but it is practically the Jerome packing. Those engines that I spoke of make about 7,000 miles a month. They are operated by new crews; there is no regular engineer on them. Our practice is to have one man in the shop do all the lathe work, and the work in the roundhouse of replacing the packing rings is all done by one man.

Secretary Sinclair: When engines are running in a yard where they are very much pressed for work, and doing work for double crews, it is often of great importance to have no delay in putting in packing, and where you are using hemp packing it often happens that it blows out just at a most inconvenient time, and if you cannot put a new lot in you must lose a good deal of steam before it is possible to repack the engine. In running engines myself I have had experience with most kinds of packing that have been used. I have used flax and hemp and other kinds of piston packing, and I think that hemp is the most expensive packing that was ever put into an engine for any purpose. Some of the metallic packing does not suit well because it is not mechanically a good arrangement. Unless a packing is made so that there will be some means of compensating for the rise and fall of the piston rod, it is not going to wear well; especially is this true of a metallic packing. A fibrous packing, like hemp, may have enough elasticity to it to fill up an opening when a hole is made by the rise and fall of the crosshead, but metallic packing has not that; and unless there are means taken to let the ring rise and fall with the piston, the rod squeezes a hole in the top or bottom of the ring, makes it elliptical, and the steam blows out there. That has been the cause of difficulty with so many kinds of metallic packing, viz., that they did not make provision for that rise and fall. It would be all right so long as the guides were perfectly fitted to the crosshead, or the crosshead to the guides, but as soon as there was some lost motion the ends of the stroke would destroy the packing so that it would leak badly, and in that way it would never be kept tight; and whenever we screw up on it and try to prevent the leaks, it squeezes the sides of the piston rod. Metallic packing of a bad form is much harder on the rod than fibrous packing is, but metallic packing, if well made, is certainly the most economical that can be used.

I made some inquiries about it a short time ago on a road where it hadn't done well, and I found that they put the packing on just as the engines happened to come in, without truing up the piston rods or valve stem, and they had no success with it at all. Now, I think that you cannot apply that packing successfully without having the rods perfectly true, and if they are true in the first instance they are liable to continue true; but if you apply the packing when they are worn in the middle, it is impossible to get it to keep tight, and the packing will be destroyed in screwing it up and trying to make it tight.

Mr. Reynolds: We are using metallic packing on all our engines. We have one engine fitted with it, that I remember now in particular, that made about 60,000 miles with no expense whatever. The packing costs about $45; but its manufacture costs only about $13. It is only a question of patent.