the island, just above Fort Richmond, and upon the signal being given of the approach of the enemy's fleet, the flood-gate could be opened, and a stream of oil could be poured down into the channel, which, when set on fire, would envelope the vessels in a perfect fire of Pandemonium. If the tide should be flowing at the time, the fleet could be allowed to pass up the Narrows, and thus the oil would create a fire in the rear which would be bound to overtake and destroy the fleet. In order to protect the city from the devouring element, steam fire-engines could be posted along the docks, and especially at the battery, by which instrumentality the flames could be successfully fought away, should an attempt be made, in their progress, to swallow up the city. The plan here proposed would be better than the one suggested by our correspondent, as we doubt if pipes laid across the channel could be relied on as able to supply a sufficient quantity of oil for the purpose. Petroleum oil is now selling at 38 cents per gallon, and we suggest to the Goverement that now, if ever, is the time to gather up this destructive weapon of naval warfare.

PHOTO-LITHOGRAPHY.

A very interesting paper was lately read before the Glasgow (Scotland) Photographic Association by Mr. Andrew Mactear on the art of taking photographs on lithographic stone and printing therefrom. Perhaps there is no branch of the ornamental printing art which deserves so much attention as this. The power of taking copies of objects by photography on stone, then etching and printing direct from these copies, is wonderful. The following is the mode of preparing the stone and taking the photographs as described by Mr. Mactear and published in the *Photographic News*. The system is that of Mr. Gibbons, of Glasgow, and has been practiced by him since 1859 :—

1. Grain a lithographic stone with fine sand or emery flour, taking care to avoid scratches ; wash it well and thoroughly dry it before using.

2. Sensitive solution. Copal varnish, one ounce and a half ; raw linseed oil, half an ounce; bichromate of potash, two ounces and a half. Grind these three very finely and put into a bottle ; then add Brunswick black, one ounce ; mastic varnish, half an ounce ; turpentine, one ounce. Put these three also into the bottle and mix well together.

3. Coat the stone carefully with the above solution, by pouring a little on the stone, and roll over with a clean lithographic roller till it has evenly and thinly spread over its whole surface, which dries in a short time.

4. The picture is first taken in the usual way on glass to form the negative, which is placed collodion side next the stone, and is kept from shifting by being stuck down by gummed paper round the edges. It is exposed from one to five hours, according to the strength of light.

5. After exposure, remove the negative picture, and with a tuft of fine cotton-wool, soaked in linseed oil, rub gently over the stone, when the parts of the picture not acted on by the light will gradually come away, leaving the graduated tints quite firm.

6. The oil is now cleaned from the stone to prepare it for etching, as follows :—Take a pitcher containing clean water, add to it concentrated dissolved gum arabic until it supports the hydrometer at six degrees, then add nitric acid until the preparation is seven degrees in strength.

7. Take shoemaker's rosin or common clay and make an enbankment around the edges of the stone about one inch deep. The etching solution, prepared with gum arabic and nitric acid as described, is now poured over the face of the stone and allowed to remain upon it for about fifteen minutes. The parts of the picture on the stone not acted upon by light are etched by the nitric acid, while the other parts remain unaffected, and thus the photographic copy is obtained for printing on the stone. The etching acid is next washed off ; the stone is charged with ink by a roller in the usual way and the printing proceeded with. The stone must be used quite cold. About 3,000 copies have been printed from a stone thus prepared.

The original inventor of this art is Mr. Niepce de St. Victor, of France, who used bitumen dissolved in essential oil of lavender, and took his pictures on steel plates, which were afterwards etched and printed from. The action of light renders the bichromate of potash insoluble in the preparation. There is still wide scope for improvement in this beautiful compound chemical and mechanical art. It promises to become a most important practical art at some future day. Hitherto it has been practised to a very limited extent.

UNSAFE RAILROAD BRIDGES.

The *Railroad Record* directs attention to the insecurity of wooden bridges for railroads, and says :—

An accident recently occurred on the Ohio and Mississippi Railroad, which fully demonstrated our proposition. A construction train, consisting of a locomotive and two cars, was stopped on a bridge for some cause, and while standing there quietly, the whole structure gave way, precipitating the locomotive into the river, and killing a mason who was at work below. A human life was lost, and a large amount of property destroyed. Had this been a passenger train instead of a construction train, there is no telling what extent of damage might have been caused. Now in all this the railroad company were perhaps but little to blame. The bridge was not over six years old, and the company had taken every precaution in the outset to procure good material. The timber of which it was made was brought from New York for the purpose of having the very best that could be obtained ; and yet this is the second bridge within a year that has thus unaccountably failed on this line alone. The fault, if any can be found, dies in the material. Wooden structures are not fit for railroad purposes, and should be abandoned for those of iron or stone.

Such suggestions should not only arrest the attention of civil engineers and railroad companies, but the whole people ; as all persons are interested in the safety of railroad traveling. A few years ago a large number of persons lost their lives by the breaking-down of a rotten railroad bridge, at Whitestown, N. Y., on the Central Railroad, belonging to one of the most wealthy corporations in the country ; and many similar cases could be cited to prove that such structures are unfitted for railroad purposes. The nature of timber is such that it commences to decay from the very moment it is exposed to atmospheric influences in a bridge. As such structures are composed of so many parts, and some of these are so much more exposed than others, it frequently happens that some portions will become quite rotten, while others are sound. And as the strength of a bridge is just in proportion to its weakest part, it follows, as a matter of course, that wooden bridges are very unreliable, on account of the perishable material of which they are made. Wherever it is possible to erect a good stone bridge, or one of iron, wood should not be employed. It is far more costly to build stone and iron bridges at first, but in the "long run" they are the cheapest, because they are more durable and safe, and require less repairs. A single accident like that to which we have alluded on the New York Central Railroad costs more to a company, for damages, than would suffice to have built a score of iron bridges. As a question of economy as well as safety, therefore, railroad companies would consult their best interests by building all their bridges of the most reliable and enduring materials.

"HOW NOT TO DO IT."

A withering blight seems to have fallen upon the once proud prestige of our navy. Where, in former years, it bore the flag of the Union triumphantly on all seas, it now contents itself simply with *not* being annihilated by the assault of a patched-up rebel ram or two, or else glorifies its achievements in taking some audacious blockade-runner. The *Florida* and the *Alabama* pursue their ravages unchecked ; they sink, burn and destroy in their own time and at their own sweet will ; and we are told semi-officially through some "our correspondent," how impossible it is to capture them. A gratifying assurance truly !

Only a few days since the telegraph brought us news that our gallant ram, the *Queen of the West*, had been disabled and captured through the treachery of the rebel pilot temporarily placed in charge. While we were recovering from this shock, another one was communicated to us by the announcement of the capture of the bran-new iron-plated gunboat *Indianola*. She is four hundred and forty-two tuns burthen, and was built to carry two guns. She was constructed according to plans issued from the Navy Department, and is one hundred and seventy-five feet in length, fifty-one and a half feet broad, six feet in depth of hold, and draws, with all on board, but six feet three inches of water. The thickness of her bottom planking is five inches, of her lining three inches, of her sides four inches, and of her deck four and a half inches. Over all is a strong layer of iron-plating. Her flooring timbers are ten inches square. She is flat-bottomed and without a keel for navigating shallow waters. Her sides spread out from the bottom to the deck at an angle of forty-five degrees, and fall in above deck at a similar angle, for the purpose of glancing off shot aimed at her. The gunners are protected by a kind of casemate formed by the construction of the vessel, which gives it the appearance of a mud turtle. The cost of building this vessel was about one hundred thousand dollars. Lieutenant Commander George Brown was the last officer reported having charge of her. The *Indianola* was on her first trial trip, it seems, and signalized her advent into rebel regions by falling into rebel hands. The Government has five more vessels similar to the one lately lost, but we suggest that they be laid up in ordinary until some thing be done with those in command on the Mississippi. To build a new navy for the rebels would seem to be rather an unwise and costly undertaking at present. Where are the Decaturs, the Porters and the Perrys of ancient renown?

SLEEPERS FOR RAILWAYS.

Some very useful information on the subject of preserving railway sleepers was lately presented at the Institution of Civil Engineers (England) by Mr. B. MacMaster, C. E., who has had much experience in India, where the decay of sleepers is very rapid owing to active atmospheric influences in a tropical climate. He stated that between thirty and forty per cent of the sleepers on the Madras Railway required renewal annually. Thirteen hundred sleepers made of sixteen different kinds of wood were submitted to careful experimental tests, and were examined twice in twelve months. Some of these were entirely covered with ballast to the depth of four inches, while others were left uncovered. It was found that those which were completely covered decayed most rapidly. The plan of leaving the sleepers uncovered saved ballast, kept the sleepers drier and permitted defects in them to be more easily observed. It was noticed that the sleepers commenced first to rot under the chairs, owing to the retention of moisture at these parts, which might be prevented by tarring the seats. Mr. Bryce stated that sleepers charged with creosote had been sent from England and used on the Madras Railway and were found to answer admirably, and it was suggested that establishments for creosoting the Indian woods for sleepers and tree-nails be erected in convenient positions near the jungles where the timber was obtained. We understand that the creosote, so called, used in England for preserving sleepers, is coal tar, which contains creosote. Mr. MacMaster recommends that unprepared sleepers be tarred under the seats of the chairs, that they be laid in dry ballast raised slightly at the middle, and then sloped off towards the ends to throw the water off. As a vast expense is annually incurred for the renewal of sleepers on our railways such information is instructive so far as it relates to their treatment with creosote.

CONVEYING PETROLEUM IN PIPES.—The project for conveying oil by means of pipes, laid under ground from one point to another, is now being practically tested upon the Tarr farm. A 2-inch pipe is now being laid from Tarville to Plumer, Pa., a distance of about two miles and a half in a straight line. It is proposed to force the oil through this pipe by means of powerful steam engines. The parties concerned are sanguine of success. We understand that Barrows & Co. for some time past have been conveying their oil from the burning well to their refinery, a distance of from 800 to 1,000 feet, and the plan works admirably.—*Exchange.*

THE iron-clad *Sangamon*, now on her way to Fortress Monroe, is provided with a newly invented elastic raft, composed of six india-rubber buoys. These buoys are so constructed that they can be inflated and cast over-board in three minutes, when the raft will be thrown on them, making a space of sixty feet. In case of accident to the vessel the lives of the entire crew can be saved.