his government,and raised Brazil to a position of undisputed pre-eminence on the South American continent. As a man, Dom Pedro possesses great literary and scientific acquirements. He was a warm friend of Agassiz, and rendered that naturalist invaluable aid in his studies on the Amazon; he is a member of the French Academy of Sciences, and for many years has been a reader of the SCIENTIFIC AMERICAN. His ideas on scientific subjects are broadly liberal. To a correspondent on board the vessel coming from Rio Janeiro, while discussing Darwin's theory, he said: "The theory advanced by Darwin is undeniable, but I do not agree with the deductions of some of Darwin's followers. I often recommend our young men to read Darwin's work, because I am a partisan of truth; and the more I read the more I am convinced that all truth is one, and that all Science meets in the point of truth. Therefore no obstacle should be thrown in the way of the development of any science." With such an advocate in the cause of Science, progress and enlightenment in Brazil will make rapid strides.

In conclusion we desire especially to bespeak for the Emperor a warm welcome from the scientific and progressive people of our land. And that welcome, we ask, shall not be meaningless displays or ovations, but the careful exhibition and explanation to his majesty of all industrial operations, of all new machinery,and all engineering and mining works which he may encounter in his journey. We can assure inventors, mechanics, engineers, and all scientific men that they will meet a most appreciative and eager listener, one who is well informed as to what American genius has already accomplished, and beyond all a man who discards the name of Emperor for the self imposed title of student.

SELF--IMPROVEMENT.

There are many young working men who are anxious to improve their minds by reading and study out of business hours. But too many grow discouraged and fail in their efforts for self-improvement, although they begin with the best intentions.

A want of thoroughness in whatever is undertaken is, perhaps, one great cause of such failures. A practical writer on that topic gives the following good direction: "Never leave what you undertake to learn until you can reach your arms around it, and clench your hands on the other side." It is not the amount of reading you run over that will ever make you learned; it is the amount you retain. Dr. Abernethy maintained that "there was a point of saturation in his mind," beyond which it was not capable of taking in more. Whatever was pressed upon it afterwards crowded out something else. It is probable that few of us have minds more sponge like than that of the great doctor.

Every young man should endeavor to perfect himself in the science of the business he has chosen. Without this, he must always content himself in the lower walks of his calling. The cost of a few cigars will buy all the books he requires, and his own diligence may be made to well supply the place of a tutor. Without such diligence, the best teacher in the world could not manufacture him into a scholar. If once going over a point will not master it, he must tackle it again. Better give a week's study to a page than conclude that you cannot comprehend it.

But though it is wise to give your main strength to your own specialty, you should not confine yourself to such studies exclusively. The perfection of all your powers should be your aspiration. Those who can only think or talk on one subject may be efficient in their line; but they are not agreeable members of society in any of its departments. Neither have they made the most of themselves. They become one sided and narrow in their views, and are reduced to a humiliating dependence on one branch of industry. It costs nothing to carry knowledge; and in times like these, to be able to put his hand to more than one branch of industry often serves a man a good turn.

Do not attempt too much in the way of study to begin with; you will surely lose heart if you do. Be humble and modest in your aspirations, and if you are diligent never fear but that you will hear a voice saying: "Come up higher." Be content to gather the precious gold of learning grain by grain; you will soon be able to see the pile growing, and will learn from it the wonderful power of the littles, which is felt and shown in mental as well as in golden gains.

THE GREAT SUSPENSION BRIDGE BETWEEN NEW YORK AND BROOKLYN.

It is a curious circumstance that, while the government of the United States has, at an enormous expense, undertaken the removal of the Hell Gate rocks from our East river, it has at the same time given its formal sanction, through the Secretary of War, to the erection of new impediments to navigation on the same river, at a point only a short distance from the firstnamed obstructions. We allude to the suspension bridge over the East river, between New York and Brooklyn. In our paper for August 7, 1869, Vol. XXI, page 85, we gave a diagram showing the elevation of the intended bridge; and public attention was called to the fact that,unless the level were fixed higher,it would seriously obstruct the navigation of the river. But no notice was taken of the matter by our shipping merchants, and the construction has gone steadily forward until the towers are almost ready for the stretching of the wire cables. A vigorous protest is now in circulation by prominent citizens, who are making an effort to have the level of the bridge altered or the work stopped.

They aver "that the Brooklyn bridge will, if completed, inflict almost incalculable damage to the commerce of this port by preventing the passage of sparred vessels of any considerable size, as the hight of the roadway at the towers will be 115 feet, and the center of the span will be only 135 feet above high water mark, while the masts of ships and barks vary in hight from 150 to over 200 feet. The petitioners also state that subscriptions are now being made by the citizens of New York, with a view of legally contesting the right of the Secretary of War to authorize the erection of the bridge, believing it to be at variance with the spirit of the Constitution of the United States, and in non conformity with the acts of Congress."

The principal objection to the raising of the level is the additional expense, and the increased grade of the approaches to the bridge. But these are minor considerations, compared with the importance of preserving unimpaired the splendid water way now existing, which will be still more necessary to commerce when the Hell Gate and Harlem river improvements are completed.

We give in our this week's SUPPLEMENT views of the great towers of the bridge, with particulars and dimensions of the various parts. We also give an engraving and description of the new drawbridge proposed for the Thames river at London. It will be seen that the Brooklyn Suspension Bridge,even if carried out on the present level,will be a very small obstruction to navigation as compared with the proposed London structure.

OPENING OF A REMARKABLE RAILWAY IN LONDON.

The London papers announce a further extension of rapid transit in that city by the completion and opening for public traffic, on April 5, of the East London Railway, which is another of those gigantic underground enterprises for which the metropolis of England is so distinguished. The most remarkable feature of this new work is the fact that a considerable portion of the line is built under water. The commerce of the world may be said to float and navigate directly over a part of the roof of the tunnel, which extends south easterly,from the Liverpool street station of the Great Eastern Railway, passing directly under the warehouses and water basin of the London Docks, thence under the embankment, across and under the Thames river, to the New Cross station of the Southeastern Railway, thus connecting all the roads named, and also the London and Brighton and South London lines. At Shadwell and Whitechapel, magnificent stations, each four hundred and fifty feet in length,have been erected. The total cost of this new line, which is a little less than six miles in length, has been £3,200,000, or sixteen millions of dollars. Of the advantageous nature of this line to the public, the London papers say there is no doubt. That portion of the line under the Thames passes through the old Thames tunnel, built by the celebrated engineer M. I. Brunel. This work was commenced in 1824, and opened for foot passengers in 1843, but never proved of much value to the public until brought into use several years ago as a railway tunnel. The masonry comprising this remarkable work is 38 feet wide and 22½ feet high, and was carried across underneath the bed of the river by means of a great shield, within which the masonry heading was erected,and the shield then pushed ahead step by step, by jack screws, the masonry being built up as fast as the shield advanced.

ARTIFICIAL EYES MADE SENSITIVE TO LIGHT.

Among the curious developments of Science is the recent production, by Dr C. W. Siemens, of an artificial eye that is sensitive to light. We wish we could add that it gives vision to the blind; but we cannot, though perhaps it contains a germ of promise in that direction. The new eye is composed of an ordinary glass lens, backed by an artificial retina of selenium. This mineral resembles and is allied to sulphur; it is distilled from bodies that contain sulphur in conjunction with metals, such as iron pyrites, a compound of sulphur and iron.

Mr. May, a telegraph clerk employed at the Valentia station of the Atlantic cable line, first observed, in 1873, that the electrical resistance of selenium was instantly altered by light, the resistance being diminished by increase of light.

Dr. Siemens makes use of this peculiarity of selenium in the construction of his novel eye. An electrical circuit is arranged, of which a bit of selenium forms a part, and constitutes the retina. When a strong light is admitted into the lens and falls upon the selenium retina, the current of electricity flows (and by acting upon small magnets) may be made to work the artificial lids of the eye, opening or closing them according to the intensity of the light.

It is well known that the vibrations of musical sounds may, by an ordinary conducting wire, be electrically transmitted and successfully delivered to the ear. It remains to be determined whether light vibrations can, by means of selenium and electricity, be transmitted to the brain in the absence of the natural eye.

THE WOODBURY PLANER WAR.

The contest between the Woodbury Patent Planer Company and the manufacturers and users of woodworking machinery continues with undiminished acrimony. The former seem to be leaving no means untried to compel the payment of an unjust royalty for the use of the pressure bar from people who have undisturbedly employed that attachment on their planing machines for many years, while numbers of the latter have organized defense associations, banded together to resist the extortion to the last. The most recent tactics of the Woodbury people,if we may credit the assertions of the Northwestern *Mechanical Journal*, the organ of the Northwestern Planing and Molding Machine Association representing some 300 machines, is to avoid the consolidations and confine their offensive efforts to individuals not included in the membership. The associations are wealthy; and can afford to fight the aggressors for any length of time, but on the other hand few isolated concerns would care to undertake a conflict with the Planer Company, when a sum comparatively small to that which defending an expensive lawsuit would cost them, would secure their immunity. Of course yielding to the demand would be a sacrifice of principle and a submission to the superior force, but on the other hand there are scores of small manufacturers who care nothing for either side of the controversy and would willingly keep themselves and their business clear of it. The Woodbury Company are evidently aware of this fact, and therefore naturally prefer bringing their forces to bear upon isolated opponents rather than upon members belonging to associations likely to prove powerful antagonists. Even if this course has no better results, it is probable that it may secure to the company the means of existence until a decision of the courts settles the question definitely. Obviously the present work of the Association is to strengthen their memberships, otherwise it may be found that the present tactics of the Woodbury people, so far from being a sign of weakening on their part, as our abovementioned contemporary intimates, are likely to work more harm than the open system of attack which they have abandoned.

THE LOUGHBRIDGE AIR BRAKE.

The use of the air brake has for many years been persistently advocated by Mr. William Loughbridge, of Baltimore Md., who ranks among the earliest inventors and patentees in this line. To some extent others have obtained laurels that were in strict justice his due. Recent trials upon the Baltimore and Ohio Railroad appear to have practically established the superiority of his devices.

On one of these occasions a train of ten cars, drawn at the highest attainable speed, by the best engine owned by the company, was brought to a stop, from a velocity of 42 61 miles per hour, within a distance of 590 feet, in 16 seconds time. This, we believe, beats anything heretofore accomplished, either in this country or England. The following are the particulars:

EXPERIMENT WITH LOUGHRIDGE AIR BRAKE, AS TRIED ON WASHINGTON BRANCH, B. & O. R, BETWEEN BRANCHVILLE AND ALEXANDRIA JUNCTION, 1876.

No. of engine	323
Direction of movement	southward.
Weight of engine	76,700 lbs.
Weight of tender	38,370 "
Average weight of cars	37,608 "
Total weight of train	245 1150-2240 tuns
No. engine driving wheels	4
Diameter engine driving wheels	69 inches.
Size of engine cylinder	17x24 "
Size of air cylinders under cars	11x11½ "
No. of cars	10
Total length of train	635 feet
Total number of wheels in train	96
No. of wheels to which brakes were applied	92
State of steam gage at start	130 lbs.
" " " on shutting off	120 "
" " " when train stopped	125 "
" air gage at start	60 "
" " at time of applying brakes	80 "
" " when train stopped	50 "
Distance run forspeed	12,180 feet.
Time consumed in running last 1,000 feet before shutting off	16 seconds.
Distance run after shutting off steam before applying brakes	300 feet.
Speed of train when brakes were applied	42·61m. per h.
Time occupied in making stop	16 seconds.

REMARKABLE OCEAN STEAMING.

The recent voyage of the Pacific Mail Steamer Company's new steamer City of New York, from this port to San Francisco, was in some respects remarkable. The total distance, 13,552 miles, was performed in 59 days, the actual steaming time being 54 days 14 hours The entire passage was made on the coal shipped at New York, none having been taken on board *en route*. The runs made were as follows:

New York to Cape Virgin, west entrance of the Straits of Magellan	7,074 miles.
Through the Straits	340 "
Cape Pillar, east entrance of Straits of Magellan, to San Francisco	6,138 "
	13,552 "

Prior to the famous first trips between England and New York, of the steamers Sirius and Great Western, in 1838, when the subject of ocean steam navigation was under discussion in England, Dr. Dionysius Lardner predicted that steamers could not be run with commercial success across the Atlantic until the consumption of fuel was reduced, as the cost and bulk of coal would eat up all profit. And he was right. For over twenty years after the opening of the Cunard line in 1840, it required the payment of enormous special subsidies by the governments, in order to make good the losses to owners. First class steamers between New York and Liverpool consumed nearly 100 tuns of coal a day. The largest vessels now only require about one fourth the above fuel, and are also in other respects more economical than formerly. The following are some of the particulars of the City of New York's voyage;

Total revolutions of the engines	3,338,105
" distance by observation	13,552 miles.
" distance by screw	14,235 "
" amount of coal consumed (dock to dock)	1,495 tuns.
Total amount of coal consumed at anchor (port consumption)	45 "
Total amount of coal consumed for steaming	1,440 "
Average consumption of coal per day	26·4 "
" " " mile	239 lbs.
" revolution per day, running time	61,250
" " minute	42·53
" speed per day, running time	248⅛ miles.

The dimensions of the City of New York are as follows: Length 353 feet, beam 40½ feet, tunnage 3,019. Engines 1,000 horse power.