POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting on Thursday evening, March 17th; the President, S. D. Tillman, Esq., in the chair. From the President's summary of scientific and industrial news we select the following items:—

AGE OF THE EARTH.

The Rev. Prof. Haughton, in a paper recently read before the Dublin Geological Society, gave the result of some computations, based on the earth's rate of cooling, to determine the limits of the time during which animal life can have existed upon our globe. As the albumen of the blood coagulates at 122° Fah., he regards it as impossible that animal life can exist in an atmosphere above that temperature. He therefore attempts to calculate the time from the period when the polar regions of the earth were at a temperature of 122° down to the period when the mean temperature of the British isles was 77°, the latter being the London clay tertiary epoch of tropical mollusca. His computations give the time between the two periods as 1,018,000,000 years.

UTILIZATION OF SEA-WEED.

It is estimated that 21,000,000 tuns of sea weed are annually thrown upon the coasts of the British isles, and that only 1,000,000 tuns are used for kelp and for green manuring. It is proposed to dry it by the process for burning wet fuel, by which a portion of the weed will be burned to dry the rest.

Mr. Garvey—"Does any one present know the process by which sea-weed is made into artificial horn?"

Mr. Maynard—"I believe that the Indian sea-weed is used for that purpose."

The Association then passed to the consideration of the regular subject of the evening—

SURFACE CONDENSERS.

Mr. Root—"There is one plan of surface condensation which I have tried and found to work very well. It was suggested, I believe, first in some German publication. The end of the exhaust pipe was enlarged in funnel form, and closed with a thin sheet of metal. Then a jet of cold water was thrown with force against the outside of the thin sheet. With a plate only a foot square, I condensed successfully the steam from a 20-horse-power engine. I found that the rapidity of the condensation depended very much upon the force with which the cold water was thrown against the plate."

Mr. Stetson—"I should like to ask the gentlemen present who have devoted much time to the study and practice of surface condensation, if the plan has ever been tried of exhausting into open air down to the atmospheric pressure, and then condensing the remainder of the steam. It is manifest this would economize the cold water, permitting a smaller air pump to be used with a jet condenser, or a smaller number of pipes in surface condensation."

Mr. Root—"I built an engine a few years ago at Madison, Ind., on that very plan. It was for a river boat, and would not work for the same reason that no condensing engine will work on the Western waters."

Mr. Sewell—"One advantage of this plan would be that the steam exhausted into the open air might be used to heat the feed water. In the ordinary condensing engine the advantage of the vacuum is balanced to a considerable extent by the necessity of feeding the water to the boiler at a lower temperature than is obtained in the non-condensing engine. Every 11 degrees is equal to one per cent., and if you have to feed at 100 degrees lower temperature it costs you nine per cent. of your fuel. I think this idea of partial condensation is well worthy of attention."

Mr. Fisher—"The reason why it will not be introduced is that no patent can be secured. The idea has been published, and no man can now claim to be the first inventor, and if any one goes to the expense of the necessary experiments to reduce the idea to practice, he will work for the public, and will have no means of remunerating himself."

Mr. Stetson—"The idea thrown out by Mr. Fisher is correct, and is very important. Still there is an erroneous impression prevailing in relation to patents of these origipal principles. Though the thing itself cannot be patented, the means of carrying it out generally can be, and in most cases patents on these methods can be obtained which will secure a man the business."

Mr. Sewell—"I was going to remark that though the idea of carrying the water through the pipes, and having the steam outside of them, was not *first* suggested by me for a surface condenser is was original with me. This plan has the great advantage of making all the joints water-joints, which are much more easily kept tight than steam-joints. The Pacific Mail Steamship Company's steamer *Golden City* has one of my condensers in use. She is 340 feet long, 45 feet wide, and draws about 18 feet. Her engine has a cylinder 105 inches in diameter with 12 feet stroke. Her regular schedule time, one day with another, is 280 miles per day, and she burns 32 tuns of coal in 24 hours. I think that performance will challenge the world."

The President—"There is one branch of the subject that we have not yet considered—the effect of surface condensers on the durability of the boilers."

Mr. Sewell—"It is supposed that the copper tubes of the surface condensers cause the rapid corrosion of the boilers, but the Government had an engine in Philadelphia for pumping out the dry dock, in which no copper was used, and the boilers rusted out very rapidly indeed."

Mr. Giffin—"I am running an engine in Brooklyn which is supplied with two boilers, one having a feed pipe of iron and the other of brass. The boiler with the iron pipe is perfectly sound and good, and the other is pitted with corroded spots, extending both above and below the water line."

Several other members made remarks on this branch of the subject. "The Constitution of Iron" was selected for the next evening's discussion. and the Association adjourned.

The Danish Iron-clad "Rolf Krake" in Action.

The first trial of a "monitor" in Europe took place when, on the 18th of February, the Danish iron-clad turret battery *Rolf Krake* went to Ekensund to attempt the destruction of the Prussian bridge into Broager. The *Rolf Krake* was under a constant fire from the land batteries on three sides for nearly two hours, yet when she returned to Sonderborg, the ship, turrets, artillery, machinery, and everything was uninjured, and fit to go under fire again at any moment. There were about 100 marks about her, where the shot had hit the plating, and some of the crew had been wounded by pieces of shells bursting just over the gratings in the top of the turrets. The reason why she had to return was that the water being so shallow she could not get near enough to see the bridge, which was protected by a projecting piece of land, and consequently she had to fire at the bridge at random, without being able to judge of the result. She however succeeded in doing considerable damage to the enemy.

[If we knew the range, projectile and charge used, the above account would have more interest. A description of the *Rolf Krake* is here appended:—She is 185 feet long, 35 feet beam, and 16½ feet deep, having two cupolas or revolving turrets, 4½ feet above deck, and 21 feet in diameter. She is clad with 4½ inch solid plates, all round, increased to 7½ inches at the gun-ports. The engines are 240 horse-power. She is a sea-going vessel, and attained a speed of 10 knots per hour.—Eds.

Nativity of our Population.

The census returns of 1860 give the following totals of the birth-places of the free inhabitants of the United States:—

Born in the United States	23,301,403
Born in foreign countries	4,136,175
Birth-place not stated	51,883
Total free population	27,489,461

The different races and nations of foreigners in the United States are represented as follows:—

Ireland	1,611,304	China	35,565
Germany	1,301,136	Holland	28,281
England	431,692	Mexico	27,466
British America	249,970	Sweden	18,625
France	109,870	Italy	10,518
Scotland	108,518	Other countries	60,145
Switzerland	53,327		
Wales	45,763	Total foreign born	4,136,175
Norway	43,995		

NEW EXPERIMENTS IN WORKING STEAM EXPANSIVELY.

We made a brief announcement, some months since, that our Government was about to initiate a series of experiments for the purpose of fully and fairly testing the value of working steam expansively. So much has been said for and against this theory and the practical adaptation of it, that any thing tending to increase the common stock of knowledge in this branch of engineering, will no doubt be gladly welcomed by the intelligent and unprejudiced reader.

The engine chosen is a simple vertical cylinder working upward with a connecting rod, cross-head and slide valve; and the cylinders (for there are several of various diameters) are, respectively, one of 12 inches by 24 inches stroke, one of14 inches adapted to the same frame, &c., one of 26 inches, and one of 30 inches. These are capable of being worked at either high or low pressure by a simple arrangement The duty done by the engine must, in order to measure the relative economy at different grades of expansion, be constant, and therefore the following plan has, after due deliberation, been determined on:—

"This plan depends on the use of fans, having vanes of same area, run at same velocity and under the same circumstances, to furnish the required resistance. A single line of shafting, of adequate length and suitably supported, is to carry all the fans, to be run together, if need be twenty in number. This shaft is to pass through an inclosure twelve by forty-eight, formed by sides and ends fifteen feet high, and this inclosure is divided by partitions fifteen feet high, into compartments three feet wide. In each of these compartments, thus 3x12x15, open at the top, the shaft is prepared to receive four arms on each of which is a vane, the centers of the vanes being two to three feet from center of fan shaft. The structure and dimensions of the arms and vanes of the fans to be in every particular the same in all the fans. The inclosure of the fans (12x48) is to be within a building 30x90, so that all outside currents of air are shut out. At each end of each compartment a door gives access to the fan in that compartment. The shaft carrying the fans will receive its motion by a pinion on it, from a mortise wheel on engine shaft, of such proportions that 50 revolutions of engine produce two hundred revolutions of fan shaft. For the resistance required for a full stroke cylinder, it is proposed to use ten fans, placed in alternate compartments. The vanes on these ten fans to be, at the commencement, of larger area than necessary, and then cut down on trial until that area of vane (all the vanes being reduced to precisely the same area) is obtained, which at two hundred revolutions will furnish the resistance, which will require all the power developed by the full stroke cylinder at fifty revolutions, and full pressure of steam throughout the stroke. As each of these fans will be of precisely same dimensions, will of necessity be run at same velocity, and will in every respect be under the same circumstances, any one of the ten will require one-tenth of the power required to revolve the ten. On removing the full stroke cylinder, and substituting an expansion cylinder, having a capacity of one cubic foot at the point of cut-off, such additional number of fans of exactly the same dimentions and structure will be attached to the shaft, in compartments adjacent to those already occupied by the ten, as the power furnished by the expansion cylinder may prove able to drive. The dimensions, revolutions, and circumstances of the additional fans being the same in every particular with those of the standard ten, the total number driven by the full stroke cylinder will embrace the facts by which to compare the two developments of power. In both cases the power required to drive the shafting, without the fans, will be common to both performances. It will therefore be necessary to determine what that power is. An additional fan driven, with the allowance referred to for friction of apparatus, will show ten per cent. more power developed; two additional fans twenty per cent. and so on.

"For cases where the increase of development of power is more than one more fan will measure and less than two more fans can measure, resort must be had to vanes of less area on one fan, and to deduction, based on the area for the relative power. The use of fans for the source of resistance presents the advantage of the easy and favorable introduction of some form of dynamometer between the engine shaft