POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Polytechnic Association held its regular weekly meeting at its room at the Cooper Institute on Thursday evening, March 10th; the President, S. D. Tillman, Esq., in the chair.

The President read a summary of scientific and industrial news, as follows:—

EXTRACTION OF ESSENTIAL OILS.

T. B. Graves' method of extracting wintergreen, peppermint, and other essential oils, is to mix with a watery solution of the essential oil some olive oil, and to make a soapy emulsion by the addition of potash. The soap is then to be decomposed by the addition of acid, when the olive oil will rise to the surface, bringing with it the essential oil, which may be separated by agitation with rectified spirits.

NEW PLAN FOR PRESERVING MEATS.

The British Admiralty is trying a series of experiments to test Dr. Morgan's method of preserving meats. This consists in forcing brine into the arteries, veins and capillaries of the carcase by pressure. The tank of brine is placed 20 feet above the freshly killed animal, and the brine is led by a pipe into the chest, where it enters the arteries, driving before it the blood, which passes out by an incision made for the purpose. After the arteries have been thus cleaned by the first charge, a second is introduced. This consists of 6½ gallons of brine, 10 lbs. of sugar, ¾ lb. of saltpetre, with an infusion of cloves or pepper. The meat is then cut up, thoroughly dried, and packed in sawdust and charcoal. It is said that meat thus prepared will keep in any climate, and that a larger portion of its nutritive matter is preserved than in the ordinary process.

WHITE ANTS IN JAMESTOWN.

The Admiralty is also endeavouring to find some mode of checking the ravages of the white ants in Jamestown, where this intolerable pest was introduced 20 years ago from the coast of Guinea. They have devoured the timber of the buildings with such wonderful voracity that all of the wooden houses have become uninhabitable. Mr. H. W. Bates, who has seen much of these insects in South America, recommends the use of a certain hard wood called Acapù, which it is found the ants do not eat. A paint containing arsenic is also recommended. The sleepers of the railways in India are preserved from the depredations of the white ant by creosote; but the odor of this substance precludes its use in dwelling-houses.

LIVE AND DEAD PARTS OF THE BLOOD.

Professor Beale, in a communication to the *Quarterly Journal of Microscopic Science*, says that the white corpuscles of the blood and the small red corpuscles are the only ones that are alive. The large red corpuscles are dead. He says, also, that the red coloring matter of the blood of different animals closely allied crystallizes in different forms.

IRON MOUNTAIN.

The President invited Dr. Stevens to give an account of his recent examination of Iron Mountain, Missouri.

Dr. Stevens—Mr. Chairman, the Iron Mountain of Missouri is almost exactly in the geographical center of the United States. It is an almost solid mass of specular iron ore, rising from a level plain to the hight of 260 feet, its base covering about 500 acres. Commercially, it is one of the best properties in the country. The ore contains about 67 per cent. of iron, and yields, in the large way, about one tun of pig for two tuns of ore. It costs about 50 cents a tun to quarry, little if any blasting being required. It takes about 110 bushels of charcoal to make a tun of iron. The cheapness of coal enables the pigs to be reduced to wrought iron at a low cost; and I know of no other place in the country where blooms can be made so cheaply as in Missouri. It is a fine opening for iron manufacturers. It has been claimed that Iron Mountain is a true specimen of irruptive formation; that it was thrown up in a melted state, and flowed over upon the surrounding rocks. Upon an examination of the excavations, however, I am satisfied that the ore was deposited by chemical action. Our geologists have generally held that this hill was raised in the azoic period; but the mode in which the sandstone and limestone strata rest—partly conformably and partly unconformably upon its sides and base—show that it came up after the oldest silurian deposits.

[Dr. Stevens illustrated the formation of the mountain by a sketch of its section on the black-board.]

SURFACE CONDENSERS.

The President announced that the regular subject of the evening, "Surface Condensers," was now in order, and called upon Mr. S. H. Maynard to explain Pirsson's condenser.

Mr. Maynard—Previous to entering on the explanation of the principles of that, I will answer a question put by Mr. Stetson at the last meeting—"What advantage is offered to the owners of vessels to induce them to employ surface condensation, since it is admitted that the first cost of construction is greater?" It was replied that nearly the whole extra cost could be taken from the boiler, as, with fresh water, that need not be so large. I cannot agree with the gentleman, for the reason that, with any system of surface condensation with which I am acquainted, the condensing surfaces are certain to give out, and a resort to salt feed becomes necessary. Mr. Pirsson has had unusual opportunity for careful comparison with both systems on the same ships—two particularly—on the *John L. Stephens* and the *Sonora* of the Pacific Mail S. S. Co., each of which made five consecutive trips between San Francisco and Panama, using a jet condenser feeding salt water to the boilers, and five similar trips when using his patent surface condenser, the result of which, as taken from the engineers' logs, is shown in this statement relative to the *John L. Stephens*:—

With jet condenser:—Whole running time, 64 days 14½ hours; coal consumed, 2191 tuns; oil expended, 630 gallons; tallow, 625 lbs.

With patent condenser:—Whole running time, 63 days 6 hours; coal consumed 2009tuns, 511 lbs.; oil expended, 302 gallons; tallow, 205 lbs.

As the vessel was making twenty trips per annum, the money value would be as follows:—Time saved, 5 days 10 hours; coal, 728 tuns, at $25 per tun, $18,200; oil, 1312 gallons at $1.90, $2,492.80; tallow, 1680 lbs. at 12½ cents, $210; 5½ days extra supply of passengers, say average 300, at $1 per day, $1,650; total, $22,552.80.

The log of the *Sonora*, a newer vessel than the *John L. Stephens*, showed, as the money value for the year, a saving of $33,741. She carried for twelve consecutive days, in the month of June, a vacuum of 26 inches, with the temperature of the fresh feed water at 142° Fah., though, of course, it would be less in the hot well of the large air-pump.

I have here a didactic model of Pirsson's condenser, and will premise by calling to mind the fact that, in the ordinary jet condenser, about twenty-five gallons of cold injection water is required to condense the steam made from one gallon in the boiler within the time in which it was made; and the object of employing a surface condenser is to separate the one gallon, which will be hot distilled water, from the twenty-five gallons of salt injection with which the jet condenser would have mixed it, whereby the one gallon could be available to feed back into the boiler. Samuel Hall, of England, was the first to make a practicable surface condenser, though the want of it had long been known. His condenser was well explained at the last meeting, but the leading defect which forbade its introduction into general use was not then stated. It is this: that the alternate heating and cooling of the pipes, consequent upon the periodic action required, causes an alternation of expansions and contractions, which, together with the great pressure upon the tubes, soon produces fractures in the joints and seams. When such occur, the vacuum can no longer be maintained in consequence of the flowing in of the air, and also of the water, which is fatal to the correct operation. The wear of tubes so situated must necessarily be rapid, and hence the time must sooner or later arrive when they must give out. The moment at which this will occur cannot be predicted, but it will naturally be at the time when the powers of all parts are most severely tasked, as during a storm; but then the endurance of all is most desirable. The object sought by Mr. Pirsson was to be able to continue the condensation and maintain the vacuum when such fractures did occur, and he has effected this by enclosing a surface condenser, such substantially as Hall's (and represented by this cluster of pipes which I now take out in a body), within a vessel which will be capable of serving as a jet condenser, if any derangement of the enclosed surface condenser shall require it, thus insuring the continuity of the vacuum, though at the expense of the whole or a part of the fresh water which would have been furnished if the surface condenser were intact. From this construction results the ability to maintain an equal vacuum on both the outside and the inside of the tubes thus relieving those from atmospheric pressure. The danger from leaks and fractures caused by this pressure is obviated, while, as it is no longer necessary that the joints of the tubes in the tube sheets shall be absolutely tight, it is only necessary to secure them at one end, leaving the other free to slide in the tube sheet, and, hence, disruption from alternate heating and cooling does not in this condenser occur at all. The steam is brought into the surface portion of this condenser by the usual exhaust pipe, but this passes through the side of the jet portion and enters the cap which covers the ends of the tubes. These are placed horizontally in order that they may be cooled by a shower of injection water, which effects the cooling more rapidly than an immersion of them in the cold water would do, although the system admits also of that method. A cap covers the other end of the tubes, and in this the fresh water resulting from the condensation of the steam in the tubes is collected. A small air-pump, but little greater in capacity than the feed pumps to the boiler, draws off this hot fresh water, while the large air-pump removes the injection water and the air from the outside of the tubes, in the manner of the ordinary jet condenser. An opening is cut near the upper side in the cap at the end where the fresh water is collected, and any uncondensed vapor or air which came over with the steam may pass out at this opening and be removed by the large air-pump. It will now be obvious that, if a portion of the pipes should suddenly give out, say one-tenth, the condensation would still be continued, for the steam from those would escape into the jet portion or enclosing vessel. One-tenth of the fresh water would then be lost, and, if all should break, all the fresh water would be lost, the instrument resolving itself automatically into a jet condenser of the most approved kind. If the small air-pump should become deranged, a valve can be opened in the bottom of the cap where the fresh water is collected. That will then pass off by the large air-pump and be lost, but the engine would not be crippled or even impaired in its action by either of these breaks.

Mr. Fisher—What advantage, if any, is, in your opinion, gained by tinning the tubes?

Mr. Maynard—When the tubes are made of pure Spanish copper I have not known of any advantage; but if of Lake Superior copper, which contains some iron, or of brass, the durability has been considerably extended by tinning both inside and outside.

The same subject was continued for the next meeting, and the Association adjourned.

FARMERS' CLUB.

From the several subjects discussed at the meeting of the Club on the 15th inst., we select for our columns the following:—

RHUBARB WINE.

Mr. Robinson read a communication asking if there is a market for rhubarb wine.

Mr. Carpenter—A few days since I saw in a cellar in this city 25 barrels of rhubarb wine, but it did not remain there long. It was sold for 80 cents per gallon. It was of a very inferior quality.

The President—It was probably used for extending wine of a better quality. There is a brewery in this city which we call the vineyard; it is devoted exclusively to the manufacture of liquors for adulterating or extending wines. I know the proprietor very well, and he has told me that he could not nearly supply the demand. In most of the manufactured wines the flavor is imparted by a proportion of imported wines, but in some not a particle of grape juice is used. Some of the imported wines are extended by mere water; a little alcohol being added to keep up the strength, and some sugar to maintain the body. The best form in which the saccharine matter is found is in the white liquor of the sugar refineries. This is rock-candy just before it crystallizes, and is the purest and most delicate of any saccharine substance that can be obtained.

Mr. Williams—I am told that the rhubarb wine is much desired by our surgeons for the army. It contains a large proportion of acetic acid, and therefore I should suppose would not be suitable for diluting wines. But it is found to have a very powerful effect in destroying the taste for alcoholic drinks. I have long known that nothing else is so effective in destroying the taste for both spirits and tobacco as a strong acid.

Mr. Robinson—It has been stated here as the result of experiment that 2,500 gallons of rhubarb wine can be produced on an acre.

SENDING SCIONS.

Mr. Carpenter having offered for gratuitous distribution some scions of the American Golden Pippin, Dr. Parker, of Ithaca, remarked, that he had had a great deal of experience in sending scions, having received them from all parts of this country and Europe, packed in a great variety of ways, and that the only safe and proper way to send them, is to touch the ends with a thick solution of gum arabic and wrap them in dry paper. They should, when received, be packed in dry sand in a box, and buried about two feet deep on the north side of a building. The box should have an inclined top to shed the rain.

IMPREGNABLE ARMOR.

The following is an extract from a paper transmitted to the Secretary of the Navy, on January 18, 1863, by Mr. John Ericsson :—

"The English have failed in producing an armor capable of resisting projectiles of great speed and weight. Solid blocks of wrought-iron of the best quality, one foot in thickness, have been split under the impact of the projectile. The enormous dynamic force lodged in the shot, compared with the inadequate cohesive force of the metal at the place struck, together with the incompressible nature of the material, furnishes a ready explanation of the cause of the fractures which have resulted from heavy charges of powder at short ranges with the solid English targets.

"Having attentively studied the subject, and demonstrated satisfactorily the cause of the unexpected destruction of the enormous solid targets, the expedient at once suggested itself to the writer, of applying a *laminated* protection in order to exhaust the *vis viva* of the shot, by degrees, before reaching the solid blocks intended as the real armor. The peculiar feature of the laminated protection is evidently that each successive lamina, or plate, may be split without affecting the next; forming, as it does, a separate body placed at a measurable distance from the neighboring plate. Not so with a solid projectile; a split or crack of sufficient width must inevitably—owing to the incompressible nature of the material—run through the entire substance. Hence the destruction of the enormous blocks of wrought-iron tested in England.

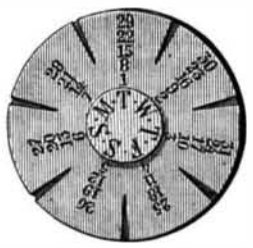
"The condition of my 15-inch target, recently tested by Captain Dahlgren, at the Washington Navy Yard, proves incontestably that, by interposing a laminated protection, armor may be made absolutely impregnable. Not only are the 5-inch wrought slab and the backing of 4-inch plating—together 9 inches—completely uninjured ; but there remain also in the centre of the indentation made by the shot, more than 2 inches thickness of the outer plating. The absolute protection thus afforded by the 6-inch thick plate lining to the 5-inch wrought slabs of the 15-inch target, placed close to the muzzle (34 yards) of an XI-inch Dahlgren gun, fired with 30 pounds of powder, proves conclusively that the side armor of the *Puritan* and *Dictator* will be impregnable. This side armor, it will be remembered, is composed of 6-inch plating, under which is inserted the longitudinal wrought-iron slabs (stringers), backed by the 4-feet thickness of oak, firmly attached to the side of the ship without the employment of the objectionable through-bolts employed in the *Warrior* and other European iron-clads."

Two mines are now worked in Newfoundland—one of lead and one of copper—each employing over one hundred persons.

LARGE quantities of cotton are stored at Huntsville, Ala., now in possession of our forces. Every house or yard has one or more bales.

CROSBY'S POCKET CALENDAR.

This engraving represents a convenient little article for which every one has use at some time or other. The day of the month is always known by a person carrying one of these little calendars in his pocket. This is accomplished in the following manner :—The metallic disk, A, is fitted with a dial, B ; the disk has seven rows of figures radiating from the center, corresponding with the seven days of the week, whose initials are marked on the central dial. It will be seen that by turning the central dial so that the first day of the week which commenced the month comes opposite the figure it began on, the reader can readily calculate any time after that from the other



figures. For instance, the present month, March, began on Monday, the figure 1 on the calendar should therefore be opposite the letter, M ; each succeeding day or week is readily counted when the first one is known. To prevent the central dial from shifting it is held down by a spring shown in the section, this keeps it securely in position. This is a very convenient article, and is sold at the low price of 25 cents. Specimens will be sent to any address on receipt of price. The entire patent or rights for States for sale. Patented Feb. 18, 1864, through the Scientific American Patent Agency ; for further information address the inventor, D. E. Crosby, 32 Fulton street, Brooklyn, N. Y.

Important Circular from the Navy Department.

The Navy Department has issued the following circular to each of its inspectors of machinery:—

"SIR:—The great damage which has been sustained by the Navy Department from the poor materials and bad workmanship used by some contractors in the manufacture of its steam machinery, requires that every possible precaution and vigilance on the part of its inspectors should be exercised to prevent their occurrence in the future.

" The loss to the Government from badly-built machinery is not to be measured by the money cost thus saved to the contractor. It is immeasurably greater; the giving way of a part in which but a few dollars could be retrenched by the substitution of inferior materials, or the employment of unskillful labor, may involve the loss of the use of a steamer at a time when her services may be worth more than her whole commercial value; in fact, at a time when an event of national importance, not to be measured by money at all, may depend on her efficiency. Your patriotism, as well as your honor, honesty, and professional reputation, is involved in the performance of your duty with inflexible fidelity to the Government, and you are expected to give your whole time and your whole mind to the important work which the department has committed to your supervision. For any omission or defects arising from neglect of this you will be considered responsible; and any presents made by contractors to any person in the employment of the department will be viewed by it with strong disapprobation, and the reception of such present will be sufficient cause for removal.

"Your attention is particularly called to the following points:—

"1st. That the boiler plate is of the first quality, highly malleable, ductile and tough capable of being tightly compressed by the rivets, and of being calked in a durable manner. It is impossible to make a tight boiler of inferior iron. The rivets should be of the best quality of iron that it is possible to make, and thoroughly worked. The double-riveted seams are to be made true and fair, and calked on both sides. There are but few places where this cannot be done, whereas it is believed there are many cases where it is not done. The rivets are to be staggered, and not placed too far apart. It should be remembered that the principal object of double-riveting in rectangular boilers is tightness, not strength. Neither acids nor 'quakers' to be allowed in making the seams.

"2d. The tube plates are to be drilled, not punched, and to the precise diameter of the tube, so that the latter fits the hole absolutely tight before being expanded. Immense loss has been inflicted on the department by some contractors making the tube holes from one thirty-second to two thirty-seconds of an inch too large in order to secure a cheap and easy fit of the tube; and the latter, being of too poor material to endure the expansion required to fill a hole so much too large, splits at the ends and leaks ever afterwards. This leakage, even at only a few joints, with iron vertical water tubes, soon destroys all the tubes in the box; the lye formed by the water with the coal ashes and soot on the lower tube plate spreading over the entire bottom of the box and rapidly corroding out the lower part of every tube in it. You will be vigilant to see that the diameters of the tube holes are accurate. Nothing is so destructive to a boiler as leaks, and no pains or cost should be spared to prevent them. The socket bolts of the water bottoms should all have heads on the inside, and on the outside large washers and nuts.

"3d. As the boilers are intended for carrying high steam, and are braced for the same, you will be particular to secure in the crow-feet, half-moons, joints, angle and T-iron, pins, &c., and in the riveting by which the braces are attached to the boiler shell, the same strength which the specifications require in the braces. It is obviously useless to make a boiler for high steam and attach its heavy bracing to the shell by a system of riveting with strength inferior to that of the braces.

"4th. The quality of the iron for the cylinder and its valve should receive your most anxious scrutiny. It should be of the best scrap, carefully selected, tough, with a fine compact grain, and so hard that the tool can barely work it. The cylinder and its valve must be cast at different times and of different metals. With steam of high pressure and superheated, the greatest care is required in securing the proper quality of metal and workmanship for horizontal cylinders with slide valves. The boring of the cylinder and the facing of the valve and its seat should be perfect.

"5th. The main and crank-pin journals must be turned perfectly true from end to end, and highly polished. They must also be mathematically in line and without a flaw.

"6th. The brasses for these journals must be of the composition required in the specifications, and you will personally be present and see the metals weighed out in the proper proportions, mixed and poured. They are to be first bored and channeled, and then scraped to their journals. They are to have sufficient end play to allow for expansion when heated. They are to be closely examined, and, if not of uniform texture, rejected. You will personally see to the securing of the thrust pillow-block, and to the quality and workmanship of its brasses. You will personally superintend the 'lining' of the engine. You will give particular attention to the tightness of the joints, especially of the vacuum joints, and to the packing of the engine. The lignum-vitæ in the pump packings and in the stern bushings is to be thoroughly soaked before being bored to the required diameter."

" GIDEON WELLES, Secretary of the Navy."

THE Michigan petroleum, lately discovered, has been analyzed, and found to be of a very superior quality. It has less odor than the crude Pennsylvania oils, and will yield 20 per cent more of the refined article than the former. Its specific gravity is 40°. That of the Pennsylvania oil ranges from 45° to 47°. Albion petroleum is easily deodorized, and, when refined makes a clear white oil that burns freely, and is entirely non-explosive. It yields but little naphtha, and stands a fire test of 140°.

TO MAKE LARD CANDLES.—To every eight pounds of lard add one ounce of nitric acid, and the manner of making it as follows:—Having carefully weighed your lard, place it over a slow fire, or at least merely melt it; then add the acid, and mold the same as tallow, and you have a clear beautiful candle. A small proportion of beeswax makes them harder.