POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, May 12th, President S. D. Tillman, Esq., in the chair. After the usual summary of scientific news by the President—

A SPECIMEN OF THALLIUM

was presented by Dr. Parmelee, who remarked that it belonged to Mr. Luhme, the dealer in rare metals, 556 Broadway, New York. It was about the size of a filbert, and had much the appearance of lead. The outside had become covered with oxide, but on scraping the surface with the finger nail the metallic luster was exhibited.

The President asked Prof. Joy if he had made any experiments with thallium.

Prof. Joy remarked that he had repeated the European experiments. The green color of the flame is very bright and distinct, and the substance will probably come into use in making artificial lights and signal lights. It occurs in several minerals and mineral waters, and can probably be produced in considerable quantities.

THE USE OF WATER WITH FUEL

being the regular subject of the evening, was then taken up.

Mr. Stevens argued that water introduced into a fire might facilitate the transmission of heat from the fire to the boiler or other article to be heated, as moisture in the atmosphere takes the heat more rapidly from our bodies.

Mr. Stetson suggested that the presence of steam in the furnace might cause a more perfect combustion. It is stated by Prideaux and others that fifty per cent of the oxygen passed into a fire is found in the smoke-stack in a free or uncombined state. And as it is a fact well known to chemists, that the union of two bodies is frequently promoted by the presence of a third, this action may take place in this case.

Mr. Dibden doubted whether, in any good furnace, so large a proportion as fifty per cent of the oxygen passes away uncombined. He believed that in smelting furnaces only five or six per cent had been found in the chimneys.

Dr. Rowell stated that he had recently examined a furnace for burning wet tan bark. At first the grate-bars were made of cast-iron, but they were so quickly destroyed that it was found necessary to construct them of fire-brick. The bark is burned in an oven, and as the flame emerges it is carried through the flues of a boiler to generate steam. Though the chimney is forty feet high the draught is very moderate, much less than in an ordinary fire with dry fuel.

Prof. Seely—"I am satisfied that in many cases where steam is thrown into fire and is supposed to be decomposed, no decomposition takes place. I am obliged to have in my laboratory nearly every day, a very intense heat for melting silver, and since so many schemes for decomposing water have been pressed upon the public attention, I have been accustomed to demonstrate, for the satisfaction of persons visiting my place, that it is only at this high temperature that water is decomposed. I have no doubt that the temperature at which carbon will decompose water depends upon the form of carbon which is employed. It is possible to produce charcoal by a certain process so that it will ignite at 600°; indeed, so that it will take fire spontaneously at ordinary temperatures, while it probably takes 3000° to kindle anthracite coal, and none of us would expect to burn carbon in its purest form—that of the diamond—in any of our ordinary fires. Now it is not probable that carbon will take oxygen away from its combination with hydrogen at any lower temperature than it will take it in its free state from the atmosphere. In all cases of elective affinity, where one element is taken from a compound by another element, there is a change in the sensible heat. When the new compound is gaseous the temperature is generally lowered; when it is solid the temperature is generally raised. This is beautifully explained by the mechanical theory of heat. The heat which disappears is expended in forcing the particles asunder—in performing internal work.

"That heat is absorbed in the decomposition of water by coal is demonstrated at the gas-works of the city of Narbonne, where water has been decomposed on a larger scale than anywhere else. The steam is superheated and the furnace is made intensely hot before the steam is introduced, but in the course of twenty minutes the temperature becomes so reduced that the decomposition of the water ceases, and it is found necessary to shut off the steam while heat is renewed.

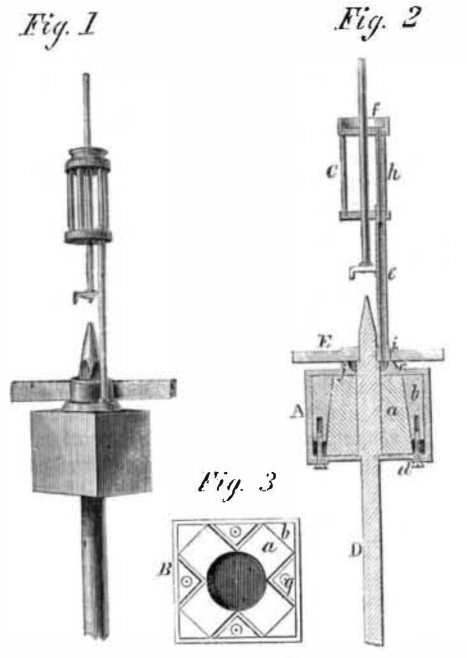
"I think any one who understands the atomic structure of chemical compounds will scout the idea of increasing the aggregate product of heat by decomposing water and recombining its elements as promptly as he would any mechanical contrivance for producing perpetual motion."

The subject of "Fuel" was selected for the next meeting, and the Association adjourned.

LANDON'S MILL-STONE BUSH.

The engravings published herewith represent a new and improved apparatus for mill-stones, oiling the spindle thereof, and keeping the same always in good order. The inventor forwards us the appended description of his invention:—

"Fig. 1, in the engraving, is a perspective view of the bush and oiling arrangement, in



connection with a spindle and driver, which are no part of the improvement, but are used to show its appearance when in use. Fig. 2, is a vertical section through the tubes and spindle, in which A is the casing of the bush, *a*, the journal blocks, *b*, the keys movable up and down by means of the set screws, *d*, to press the blocks to or from the collar, to tighten or loosen it. This may be done when the mill is stopped or running, without throwing the spindle out of trim in the least. C, is the damsel into which a tube, *h*, is fitted, opening at its upper end into the trough or gutter, *f*, and projecting at the lower end about a quarter of an inch, where it fits in the tube, *e*; D, is the spindle, and E, the driver; *c* is the top plate, which is screwed down to the wooden plugs, *g*, Fig. 3. This plate has a hole through its center a quarter of an inch larger in diameter than the collar of the spindle, and also a flange concave inside; *j* is a lid fitting the square of the spindle under the driver. This lid excludes all dust and meal from the collar. The flange forms a dish around the collar, and no matter at what point the oil tubes, *h e i*, are, in their rotation with the damsel, they still conduct the oil into this dish. A lid covers the gutter, *f*, and fits the axis of the damsel loosely so that it may be lifted with one hand and oil poured into the gutter with the other when the mill is in motion. The set screws, *d d*, have a groove cut round them, close to their heads, to receive a yoke which is slipped over them and held in position by projections on the under side of the bush, similar to those which secure the legs on stoves. By these yokes the screws are kept in place, but may be easily turned either way to adjust the keys, *b b*, which, when first made and put in, come within an inch of the bottom, to allow of being drawn down as the collar becomes loose by wearing. Fig. 3, is a view of the top of the bush with the top plate, *c*, Fig. 2, removed to show the position of the journal blocks and keys."

This invention was patented on March 15th, 1864, by George W. Landon, of Graham, Ind. For further information address him at that place. See advertisement on another page.

THE VIBRATIONS OF ATOMS.

In the world of science, while one large class of learned and intellectual men are devoting their labor to the examination of bodies and systems of matter so vast and so remote that the mind is overwhelmed in efforts to conceive the sizes and the distances, another class are engaged in the study of the structure and habits of that innumerable multitude of organized beings which are individually so small as to be wholly invisible to the naked eye; and a third class are directing their thoughts to the size, the weight, the form, and the movements of the still smaller ultimate atoms of matter, which cannot be seen even with the aid of the most powerful compound microscope.

Among the most zealous of the last-named class is John Tyndal Esq., F. R. S., Professor of Natural Philosophy, Royal Institution, (London). Tyndal espouses the theory that all space is filled with a subtle ether, and that light, heat, and the other imponderable forces are vibrations of this ether, each force being a vibration peculiar to itself. Where heat is produced by burning hydrogen, Tyndal says that the atom of hydrogen is drawn or propelled against the atom of oxygen with a velocity and force that produces a vibration, and that this vibration being imparted to the surrounding ether, affects our senses as heat. If the collision produces vibrations shorter and quicker, these are perceptible as light.

At a meeting of the Royal Institution of Great Britain, held on the 18th of March, H. R. H., the Prince of Wales, Vice-Patron, in the chair, Mr. Tyndal read a paper on molecular physics, from which we extract the following explanation of transparency:—

"What then is the physical meaning of opacity and transparency as regards light and radiant heat? The luminous rays of the spectrum differ from the non-luminous ones simply in period. The sensation of light is excited by waves of ether shorter and more quickly recurrent than those which fall beyond the extreme red. But why should iodine stop the former and allow the latter to pass? The answer to this question no doubt is that the intercepted waves are those whose periods of recurrence coincide with the periods of oscillation possible to the atoms of the dissolved iodine. The elastic forces which separated these atoms are such as to compel them to vibrate in definite periods, and, when these periods synchronize with those of the ethereal waves, the latter are absorbed. Briefly defined, then, transparency in liquids as well as in gases is synonymous with discord, while opacity is synonymous with accord between the periods of the waves of ether and those of the molecules of the body on which they impinge. All ordinary transparent and colorless substances owe their transparency to the discord which exists between the oscillating periods of their molecules and those of the waves of the whole visible spectrum. The general discord of the vibrating periods of the molecules of compound bodies with the light-giving waves of the spectrum may be inferred from the prevalence of the property of transparency in compounds, while their greater harmony with the extra-red periods is to be inferred from their opacity to the extra-red rays. Water illustrates this transparency and opacity in the most striking manner. It is highly transparent to the luminous rays, which demonstrates the incompetency of its molecules to oscillate in the periods which excite vision. It is as highly opaque to the extra-red undulations, which proves the synchronism of its periods with those of the longer waves."

BUDDING CHERRIES IN THE SPRING.—At a recent meeting of the Farmers' Club, Mr. Garrison, of Iowa, stated that he had budded several thousand trees in the spring, and with better success than fall budding. The buds start and make a fine growth the same season. The practice is especially successful with cherries, which are so difficult to make succeed by the ordinary practice. The buds are cut from scions the same as those used in grafting.