affinity for sulphur and oxygen. Zinc takes up the sulphur from the ore. In smelting it becomes granular because it is not sufficiently scorified; it is always a semi-steel. The zinc is taken off by anthracite coal and charcoal takes up the sulphur. An oxyd of zinc in a floculent form is a product and passes off. The oxygen and carbon combine and form carbonic acid, and thus produce a mineralizer, a chemical compound between the impurities—the bases of the earthy salts; and the iron is not scorified. A stream of water or steam is let in and acts on the carbon to combine with the oxygen to produce its hydrogen. The hydrogen will take up the carbon and leave it entirely soft and pure. The hydrogen and zinc (both contaminating principles) are taken up and removed. A metal is then made which is graduated in quality according to the degree of temperature. Sulphur is a principal compound for mineralizing, and Franklinite requires a great amount of heat, and is therefore expensive. A little Franklinite was sprinkled in the puddling furnace, with which the iron of the blasting furnace combined, producing a purer quality.

The president remarked that there was a great resemblance in structure between a bar of iron and wood; the operation of lengthening the fibers in each case was similar, as was also their comparative quality.

Mr. Seely said that the president had anticipated his idea of the composition of Franklinite. The scorification was very easy compared with smelting. If Mr. Pomroy has found that hydrogen has a greater affinity for carbon than oxygen it is valuable. The zinc was not so difficult to remove as the manganese. There was a remarkable fact that at a high temperature iron is not oxydized, but the manganese is oxydized. He wished to determine what effect the different proportions of manganese in the Franklinite have on fusibility and hardness; also whether it is possible to make an alloy of manganese and pure iron without carbon. A scale of manganese would become soft if submitted to a crucible.

Mr. Tillman considered that carbon had a greater affinity for oxygen than any substance under the force or heat.

Mr. Seely then said: "Take charcoal at red heat and pass over it vapor of water, which decomposes. The hydrogen will unite, or the oxygen may unite; and one has as great affinity as the other."

Dr. Reuben introduced the subject of illuminating gas. By experiment, hydrogen and oxygen, at a high temperature, united with carbon; then the oxygen and hydrogen separated from each other and united with the carbon, producing an illuminating gas. Professor Sanders passed vapor of water over carbon at a high temperature and obtained a carbureted hydrogen.

Mr. Garvey did not know that carbureted hydrogen was made for illuminating.

Mr. Seely said it was an old statement, and known as water gas.

Mr. Garvey (returning to the subject of Franklinite) said he did not know why the metal would not be strengthened by manganese.

Dr. Reuben replied that the results are to be found in statistics. The alloys of copper and zinc have greater strength than either of the metals; and they acquire greater strength in proportion to the mixture of zinc which by itself is a weaker element. Steel is not pure iron and it is the strongest metal. It is found that tungsten increases the strength of metal, and sustains more than ordinary alloy. Calvert Johnson, of England, says that alloys, to a certain per cent, are the strongest. It is not small atoms creeping into large ones, as stated, but the power of aggregation or cohesion that gives strength. We may take sulphuric acid and water and press them into a volume, and affinity binds them; and it is very easy to suppose that there is an affinity.

Mr. Pomroy said that if hydrogen and carbon did not combine, there would be no gas-light. He was investigating Franklinite continually and produced new conclusions. The zinc took up the oxygen and semi-steel was made. Hydrogen is then introduced to take up the carbon; the oxygen and the carbon are removed, and the base of carbonic acid is destroyed. He had divested the iron from these gases.

Mr. Nash wished to know whether alloys of zinc and copper were not made by electrical action; and if hydrogen and oxygen could be manufactured into water unless by combining electricity.

Mr. Pomroy considered a course of lectures would give some light on it.

Dr. Dick stated that in England an ore was used, like a species of Sweedish ore, which might bear characteristics similar to Franklinite.

Mr. Butler had made an experiment and found an electrical effect. Thus: he partially melted a bar, and on examination afterwards found scales, dissimilar from the soft original which were tough.

Mr. Curtiss said that the Pembroke iron of England has 12 per cent of Franklinite, and was made into chain cable. So in America, at Albany and New York city, water pipes had a certain per cent of it. He had compared bars with a certain per cent of Franklinite and those without, the latter being more brittle.

A motion was carried to refer the whole matter to a committee (of which the president was acclaimed chairman), to make a general report at the next meeting.

[We advise the members of the Polytechnic Association not to be so rambling in their discussions hereafter; because it is exceedingly difficult to understand what some of them mean, as their ideas are either very far from being scientific in their character, or the language employed to communicate them is inappropriate.—EDS.

DEFECTS OF CALF-SKIN LEATHER.

We have heard of persons purchasing several pair of boots at once, in order to lay some of them away for long keeping, under the impression that leather when kept in a dry situation improved in quality by age, like oil-cloth. Upon inquiry we find that such notions are very generally entertained, but why this should be so we cannot imagine, for they are the very reverse of all facts and experience in the case; and we call attention to this question for the first time, we believe, as "a word of warning." Calf-skin leather, instead of improving in quality with age, when made into boots, deteriorates rapidly. It is subject to a species of dry rot—eremacansis; and in the course of three years it becomes as tender as a piece of brown paper. Dealers in boots and shoes experience a considerable loss from this cause when such articles are left on their hands for more than two years. This dry-rot in calf-skin boots first appears at the edge near the soles, in the form of a black glassy sweat, resembling varnish, and from thence it gradually proceeds until the whole leather becomes rotten. The application of grease rather accelerates than arrests the progress of this decay; such leather endures much longer when worn on the feet than when laid aside in a dry situation, but whether this decay is caused by the grease used by the curriers, or is some peculiarity in the skin, is not known at present. Cow-skin and kip leather do not seem to be subject to this rapid deterioration, but all kinds of calf-skin, even the very best French, is just as subject to it as the poorest qualities.

This is a subject deserving of practical scientific investigation in order to discover some remedy for the evil. At present the practical application of this information by purchasers of calf-skin boots and shoes is an easy matter—be careful not to buy aged articles.

VALUE OF OUR FORESTS.—The Baltimore *Exchange* says:—"Those persons who have been accustomed to regard the pine forests of the South as of little commercial importance, will be surprised to learn that the annual value of the hewn timbers, the sawed plank, boards, scantling, resin, pitch, and turpentine, is estimated to be not less in the aggregate, than from twelve to fifteen millions of dollars." This estimate is probably far too low for the present, and certainly falls far short of what may be expected in a few years, when the fact is demonstrated that no point where timber is abundant is inaccessible to the wants of commerce. It appears that the forests constitute not only the staple product but the real wealth of North Carolina. Her tar, pitch, and turpentine, are used in every corner of the globe The amount shipped to England during the year 1859 is valued at $2,176,870.

ZINC NAILS.—These are now extensively employed in the manufacture of boots and shoes in place of wood or iron. It is said that zinc nails are also substituted for sewing in ladies' slippers. An iron last is employed, and the nails, on being driven in, strike the last and become headed or riveted on the inside, thus forming a very secure fastening.

OIL FUEL FOR STEAMERS.

MESSRS. EDITORS:—In the last number of the first volume of the new series of the SCIENTIFIC AMERICAN, there are some very original and sensible opinions expressed on the important subject of coal oil for ocean steamers, yet I think one of the largest items of economy has been rather cautiously dealt with. I assume, without fear of successful contradiction, that one pound of coal oil, properly consumed and the heat economically distributed through the furnaces and flues of the boilers, will evaporate as much water as four pounds of coal. I am of the opinion that there will yet be such boilers constructed, and such combustion effected, that coal oil will be largely used as fuel in steamships and for fire and other engines, where great economy of space and weight are important. All that is requisite for inventors in this field is to distribute sufficient warm air among the gases generated from the oil, so as to effect complete combustion in the furnace. The heat generated must also be applied economically, so as not to allow so much of it to escape up the chimney, as is now the case in most instances where steam power is employed.

Let us suppose the fire-box of a furnace to be constructed with corrugated plates, to take up considerable of the space now required for the burning coal, and that instead of grate bars a perforated bottom plate for small vertical tubes, placed close together and secured by screws or otherwise, to extend about three inches upwards. Now, let the spaces between these tubes be filled with pumice-stone or other incombustible loose material, and let the oil be fed towards the surface to within half an inch of the top of the tubes. When properly ignited and the furnace highly heated, as the oil rises near the surface of the porous material it will be converted into gas, and when it has received its full complement of warm air from the chamber below the tube plate, and through the tubes, perfect combustion will be effected, both with the carbon and the hydrogen of the oil. This is an important subject both for chemists and mechanical inventors, and it will yet bring out some important results.

If one pound of oil can evaporate as much steam as four pounds of coal, of course steamships in which it would be used for fuel could carry a much greater amount of freight, as you have stated in the article referred to. In a large steamer consuming 100 tuns of coal per day, for 11 days steaming between New York and Liverpool, no less than 825 tuns of extra space could be applied for cargo, as 275 tuns of oil would be all that was required. A vast economy would thus result from the use of oil in steam navigation. The large fields of cannel coal situated in different parts of the country will yet, I believe, supply much of the fuel for generating steam, especially for long voyages, where the economy of space is an important consideration.

J. E. H.

Newark, Ohio, Jan. 21, 1860.

GUM-CHEWING.—The Utica *Herald* gives the gum statistics of Jefferson county, N. Y. It makes our jaws ache, now, to think of such gum-chewing. It says:—"Probably few persons outside of Watertown are aware to what an extent the manufacture of chewing gum is carried on at that place. O. G. Staples, the 'gum man,' who keeps some twenty hands constantly engaged in its manufacture, informs us that in the six months ending Nov. 15th, he had manufactured and sold over 35,000 boxes—each box containing 200 sticks or rolls—making a total of 7,000,000 rolls. Allowing four chews to a roll, which is a fair estimate, this would give a 'chaw' each to 28,000,000 persons. Think what an army of gum-chewers this would be! We infer from these figures that gum has become somewhat of a staple article."

AN INVENTOR CREATING A SENSATION.—At the President's levee, last week, a stranger in the room attracted considerable attention by the peculiarities of his attire, which consisted of a military uniform, with a silk scarf thrown over his shoulders. It was said that he had come to Washington as an applicant for a patent for a steam plow, and that his brilliant costume was worn in accordance with the advice of some of his boarding-house acquaintances, who suggested to him that, to succeed in securing his patent, he must make himself somewhat prominent in Washington society, and thus attract the attention of the influential politicians.