

and keels of ships: oaks have also been discovered there, above one hundred feet long. The dimensions of an oak from this moss are given in the Philosophical Transactions, No. 275, which must have been larger than any tree now existing in the British dominions.

"In the same moss of Hatfield, as well as in that of Kincardine and several others, Roman roads have been found, covered to the depth of eight feet by peat. All the coins, axes, arms, and other utensils found in British and French mosses, are also Roman; so that a considerable portion of the European peat-bogs are evidently not more ancient than the age of Julius Caesar: nor can any vestiges of the ancient forest described by that general, along the line of the great Roman way in Britain, be discovered, except in the ruined trunks of trees in peat."



Proportion of Power Obtained by the Steam Engine.

MESSRS. EDITORS:—One of your correspondents seems to doubt if there be so much more efficiency in fuel than is obtained from it by the best steam engines. A few figures showing that it is so may, at the same time, suggest to him in what direction to apply his ingenuity to make the fuel more available. Chemists tell us that one pound of carbon completely burned furnishes 14,500 units of heat as they are termed, each of which will raise the temperature of one pound of water one degree, and also that each unit of heat may be converted into force sufficient to raise 772 pounds one foot high. The total energy of the pound of carbon will be 14,500 times 772, or 11,194,000 foot-pounds. A steam engine burning four pounds of coal per horse power per hour furnishes for each pound of coal 495,000 foot-pounds, since it raises 33,000 foot-pounds per minute, and one pound of coal lasts fifteen minutes.

Let us now examine the causes of this great difference in the result obtained in practice and the theoretical one. Charcoal contains about nine-tenths its weight of carbon, anthracite the same, and wood, if dry, one half as an average, so that the quality of the fuel may reduce the effect one half. Next, if the carbon be partly burned into carbonic oxide with six pounds of air to the pound of carbon, instead of being burned into carbonic acid with twelve pounds of air, the number of units of heat obtained from it is reduced from 14,500 down to 4,400.

Another cause of the difference is the quantity of unconsumed air passing through the furnace and thus lessening the volume of gases as it cools them, for if the pound of carbon burned with the proper quantity of air gives off its heat at an estimated intensity of 4,580°, it will have a temperature lowered to 2,440°, if twice as much air is admitted as is required for combustion. Besides these grounds of difference between theoretical and actual effect there is still another very important one. Carnot first pointed out the fact that the effect of an engine using heat depends upon the limits of temperature between which the engine works and not on the nature of the substance conveying the heat: and Rankine on "Prime Movers," page 304, remarks, that the difference between the whole heat absorbed and the whole expansive energy exerted depends on the initial and final conditions of the substance alone and not on the intermediate process. The true path for improvement, therefore, would seem to be in endeavoring to use water or some substance to which a given quantity of heat can be applied at a greater intensity or higher temperature than that at which it is used at present, and to expand it to the ordinary temperature of things around us. M.

Newburgh, N. Y., April 18, 1865.

Gas for Balloons.

MESSRS. EDITORS:—Will you please inform me what kind of gas is the best for inflating balloons—the gas that will lift the greatest weight per cubic foot—and how such gas can be made. I would also like to know if gas would have the same lifting power in a hollow wooden or tin globe as it does in a balloon-

shaped receptacle. I would also like to know what weight the lightest gas will lift per cubic foot.

S. S. R.

Petersburg, Ill., April 3, 1865.

[The lightest substance known is hydrogen gas. It is obtained by decomposing water; water being formed by the combination of oxygen and hydrogen in the proportion of 8 lbs. of oxygen to one of hydrogen. Chemical affinities generally change with the temperature. At ordinary temperatures there is no cheap substance for which oxygen has a stronger affinity than it has for hydrogen, but at a red heat it has a stronger affinity for iron, and at a white heat for carbon. Iron is therefore used for decomposing water on a small scale, and carbon on a large scale. If a gun barrel be filled with iron filings and heated red hot, and a stream of water or steam be passed through it, the water will be decomposed, the oxygen combining with the iron, and the hydrogen being set free, when it takes the gaseous form. On page 280, Vol. III., SCIENTIFIC AMERICAN, new series, we published an illustration of an apparatus employed for decomposing water on a large scale by means of carbon.

Atmospheric air is $1\frac{1}{2}$ times heavier than hydrogen, and 100 cubic inches of air weigh 31.01 grains; hence it would require about 14 cubic inches of hydrogen to raise 1 lb. in the air. The form of the balloon does not affect its buoyancy, but if the material be so heavy as to balance its whole lifting power, of course it will raise nothing else in addition.—Eds.

FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its Room at the Cooper Institute on Tuesday afternoon, April 11, the President, N. C. Ely, Esq., in the chair.

From the several subjects discussed we select the following:

WHITE MAPLE SUGAR.

Solon Robinson presented from a correspondent a sample of maple sugar which was nearly as white as the best loaf sugar. A letter accompanying the sample stated that it was made by simply boiling down the sap slowly without any clarifying.

Prof. Mapes explained that if that was the case the result was due to the sugar having been crystallized from low-proof sirup—that is, sirup which was not boiled down to a very concentrated condition. This plan is not economical, as the sirup retains a large portion of the sugar in solution.

His practice of slow boiling is also wasteful. The longer sugar is kept at a high temperature in contact with the atmosphere, the larger the proportion of it which will absorb oxygen and be converted into molasses. The more rapidly sap can be evaporated, therefore, the larger the yield of sugar. The principal advantage of the vacuum pan is to prevent the conversion of the sugar into molasses by oxidation; this it does in two ways—by effecting very rapid evaporation, and by shielding the sirup from contact with the atmosphere.

CARBONIZED SHINGLES.

Professor Mapes exhibited some shingles manufactured by Tenney & Bennett, of Hubbardston, Mass., and explained that they were partially carbonized by passing them between red-hot rollers; the object being to render them more durable. The bearings of one roller are pressed down by springs so as to equalize the pressure throughout the length of the shingle. The expense of the operation was stated to be about one dollar per thousand.

THE CANKER WORM.

Dr. Trimble read a letter from a correspondent in relation to some insects which were inclosed, and stated that they were specimens of the male and female moth of the canker worm. He remarked, further, that this is the insect which he had spoken of as having been found in the crop of the cedar bird. Unlike other span worms, the chrysalis of the canker worm passes the winter in the ground, and the female being wingless her ascent of the tree is effectually prevented by surrounding the trunk with some impassable obstacle.

BLACK KNOTS ON PLUM TREES.

Dr. Trimble also replied to the question of a correspondent in relation to the cause and remedy of

the black knots on the plum tree. They are caused by an insect of which there is a large class—the cynips. The effectual remedy is to cut them off when they are first formed, in the month of June. Some people cut them off in the winter or spring, but that has no effect in destroying the insect. These knots are used sometimes by the curculio as a deposit for her eggs before the fruit is sufficiently grown for the purpose. I have hatched numbers of curculios from eggs in these knots.

LIGHT MILK BETTER THAN HEAVY.

An article was read from some French *savant* on a new grass, in which it was stated that the grass made better milk than lucern, as shown by the hydrometer, the milk from the new grass being of greater specific gravity than that made from lucern.

Professor Mapes remarked that the richer milk is in cream the lower its specific gravity, cream being lighter than water.

Several other subjects were discussed but none of special interest for our columns.

Effect of Saleratus on the Teeth.

A correspondent of the *Dental Quarterly* makes the following statement in regard to the effect of saleratus on teeth:—

"I do not think it is generally known how much of this article is used in the community. To satisfy myself, I took the trouble to ask each of the grocers in Portsmouth, how much saleratus and cream of tartar they sold in a year, and the amount of all was—*saleratus*, 50,198 lbs.; *cream of tartar*, 15,100 lbs. Thus over twenty-five tons of the former, and more than seven of the latter, are probably used in Portsmouth and vicinity in a year! Portsmouth has 10,000 inhabitants.

"I subjected a handful of teeth to a strong and warm solution of saleratus, for about fourteen days; the consequence was, they became as brittle as burnt bones. The same time I subjected some to a solution of cream of tartar; the consequence was not the same, but equally, if not more injurious. This also may be called an extreme case, but subjecting them to common water for *fourteen months* would have but little or no effect on them. The saleratus removes the gelatine, the cream of tartar removes the lime, the two principal ingredients of the teeth; and between the two evils the teeth stand a poor chance, and hence the result."

Hunt's Feed Cutter.

A good feed cutter is a very essential thing on a farm, or, indeed, where cattle of any kind are kept. For some time past one has been standing in our office, which is pronounced by persons using it, whose testimonials have been shown us, to be a perfect thing. It is entirely self-operating, and can be worked by boys or persons of moderate strength with great efficiency. This machine is known as "Hunt's Hoosier Feed Cutter," and an advertisement of it can be seen in the last number of the SCIENTIFIC AMERICAN. A machine can also be seen at this office.

THIRD DENTITION.—In a letter from Brazil to the *Dublin Medical Press*, Dr. Richard de Gumbleton Daunt states that "in this city, Campinas, San Paulo, exists a person (a mulatto girl, with a severe chronic cough, a chronic discharge from the ear, with occasional severe ear ache, but not rachitic) in whom the second set of teeth were shed during convalescence from a fever at the age of 14, and were succeeded by a third dentition, which resulted in as fine and perfect a set of teeth as may anywhere be seen."

EXPORT OF FISH BAIT.—A Boston paper states that the schooner, *M. C. Rowe*, is loading at Gloucester a cargo of some six hundred barrels haddock spawn for France direct. They are used by the French fishermen in the Sardine fishery for bait, and a small number of barrels have been shipped from Boston. It is stated that this is the first fishing schooner from the United States direct with a cargo for the fishermen of France.

As cold articles taken into the stomach, are warmed by the circulation of the blood, and as muscular exercise increases the circulation in every part, it should always be used when any chill is felt at the stomach after taking anything cold.