## PORTABLE STEAM ENGINES.

The increase in the use of steam, and consequently in demand for mechanic's work, by the spread of portable engines, is great. There have been many valuable inventions to adapt these engines to the consumption of different kinds of fuel. We read in a book on the portable engine just published in England that the absence of fire-wood and heavy cost of coal on the steppes of Hungary and south Russia appears to have almost excluded the use of steam in those districts, until the application of straw and other vegetable substances as fuel became known. The want of steam power is equally felt in other agricultural districts besides those already mentioned. In India the dried leaves of fibrous plants, the scrub or brushwood, and the stalks of the cotton plant supply an excellent substitute for coal in boilers properly constructed. In Egypt the cotton plants are pulled up after having attained a certain growth, and the stalks, which are about one-half inch in diameter and four to five feet in length, contain all the calorific properties of good wood, and will burn perfectly well if properly inserted into the furnace. In the large wheat-growing districts of the Maremma and the Puglia, in the west and south of Italy, wood and coal are very scarce, and as the grain requires to be threshed very shortly after harvest, on account of the nature of the climate, the farmer would gladly avail himself of steam power provided he could use his straw, which he has always at hand and in superfluous abundance. In South America, New Zealand and the extensive prairies of the River Plate, Chile and Mexico, the universal demand of the farmers is for steam machinery which can be worked with indigenous fuel; and the time may come ere long when the land in these countries shall be plowed, the crops harvested and threshed, and the grain ground into flour by steam engines fed with straw, brushwood and vegetable refuse grown on the estate. But the great recommendation of some improved portable engines appears to be that with slight changes in the arrangements of the fire bars they will burn not only coal, wood and the various vegetable substances already enumerated, but also peat of all kinds, sawdust, chips and megass, the refuse of the sugar cane, and, in fact, almost any vegetable refuse within reach. There can be no question that the adoption of this class of engine would permit of the introduction of steam power in almost innumerable localities from which it has hitherto been excluded, and as all the fittings attached to it are of the best and most approved form, it may be hoped that its use will be widely extended.

UTILIZATION OF SEA-WEED.—The *Quarterly Journal of Science* says: At the chemical works at Aalbourg, in Jutland, Denmark, where about 30 tons of alkali are made per week by the ammonia process for obtaining alkali from sea-weed, Mr. Thowald Schmidt, the director of the manufactory, proposes to work, in conjunction with this process, a method devised by himself of treating sea-weed so as to obtain iodine, potash salts, and other marketable products therefrom. In[illegible]rk a very heavy duty is levied on the importation of common salt, whilst enormous quantities of sea-weed, rich in iodine and potash, can be obtained at small cost in the neighborhood of the works. Mr. Schmidt's process is as follows: After the sea-weed is dried and burnt, a concentrated solution of the ash is made and added to the liquor containing chlorides of sodium and calcium, left after the ammonia has been recovered in the ammonia-soda process by boiling with lime. The sulphates of potash, soda and magnesia contained in the ash of the sea-weed are thereby decomposed, and hydrated sulphide of lime and hydrated magnesia are precipitated in a form which may be available for paper-making as "pearl-hardening." The last traces of sulphates are got rid of by adding a small quantity of solution of chloride of barium. To the clear solution nitrate of lead is now added until all the iodine is precipitated as iodide of lead, which is then separated by filtration and treated for the production of iodine or iodides. After filtration the liquid is boiled, nitrate of soda is added to convert the chloride of potassium present into nitrate of potash. The latter is separated by crystallisation. There remains a solution of common salt containing traces of ammonia from the previous soda operation and a trace of chloride of potassium. This solution is again treated by the ordinary ammonia-soda process for the production of bicarbonate of soda and white alkali.

THE NEW STAR.—Prof. C. A. Young, of Dartmouth college, describes the coming of a new star in the *Journal of Chemistry*. On the evening of November 24th, 1876, Prof. Schmidt, of Athens, distinguished for his researches upon variable stars, observed in the constellation Cygnus a new star of the third magnitude, which by midnight was well up toward the second. On the 25th, the last clear night preceding, no such star had been visible. He immediately telegraphed the discovery to Paris and Vienna, but the weather was very unfavorable, so that no observations could be made until December 24, when the star had already fallen to the fifth magnitude; by the 12th it had become invisible to the eye,—of the seventh magnitude according to Hind,—and it is now (January 10th) not above the eighth. The position of the star is near L. Cygni, in right ascension 21h., 36m., 50.4s., and in north declination 42° 16' 38.5", where none of the catalogues indicate any star at all; so that hitherto it cannot well have been brighter than the eleventh or twelfth magnitude.

LADY DOCTORS IN EUROPE.—The London *Medical Record* says that 40 lady medical students are pursuing their studies in the schools of the faculty, and in the hospitals of Paris, of whom fourteen are English. Of the rest the majority are Russian, and the remaining number are American, German and French ladies. Several ladies have already graduated M. D. of the University of Paris, including Mrs. Garrett Anderson, Mrs. Putnam Jacobi, Madame Eros and Madame Ribard; the last three all graduated with great distinction, their theses being honorably noted by the faculty. Three lady graduates of Zurich are now practicing in England, Mrs. Hogan and Mrs. Atkinson, in London, and Mrs. Walker Dunbar in Bristol.

## WHITE REDWOOD.

T. J. Alley writes the Sonoma (Cal.) *Democrat* an interesting account of a curious *lusus naturæ*, the white redwood: The white redwoods are on my place, Altamont farm, which name may lead you to class your humble servant, in one sense at least, among the "way-up" folks. If ocular demonstration should be more desirable, just step to your west window and cast your eyes upon the Tabletop mountain, almost due west, (a little north,) and 15 miles distant from your city, and you will not wonder that I am disposed to look down upon the lower classes. This mountain is upon the western rim of the Green valley basin, and one mile from Latham & Streeter's mill, on the railroad in Dutch Bill canyon. When I bought the property, nearly 11 years ago, the white redwood was a small, compact cluster of suckers at the base, on the south side of a common redwood tree, some two feet in diameter. I supposed from the compactness of the suckers that they grew from an excrescence on the root of the parent tree, and that the green suckers in the vicinity came from the natural roots of the same tree; but the extension, year by year, of the white cions in every direction, has lead me to believe that the excrescence extends entirely around the tree, and that the growth of the white suckers comes from it.

It differs from other redwoods in three particulars, viz: The non-secretion of the coloring matter for the foliage; the less vigorous growth, owing, perhaps, to its crowded condition; and a disposition, towards the beginning of winter, to blight in spots.

The frequent molestations of visitors (now strictly forbidden), have prevented their attaining any considerable hight; and this is, no doubt, one principal cause of the density of their growth. Many efforts at propagation have proved unsuccessful, and we predict that Mr. William Sexton, of Petaluma, will soon record another failure, though I entertain a faint hope that his plan may succeed.

A new feature presents itself to my mind, which is damaging to my theory as given in the foregoing. About eight feet from the tree that I have denominated the "parent" stands another redwood, somewhat larger. Within the last two years this tree has flaunted a snow-white branchlet, at the hight of about 60 feet; and near the end of the main branch, 20 feet from the trunk of the tree; and there it swings and tosses in the breeze, evidently to contradict my recently hopeful theory.

DOES THE FARM PAY?—Hon. George Geddes one of the foremost farmers of central New York, has an original method of arguing that agriculture is profitable. His method is approved by the experience of many men of our acquaintance. He writes to the *Country Gentleman* as follows: When we go into *paper* estimates of the profits of agriculture, it would be well to credit the farm generally with those comforts that make our quiet and happy homes. Let us consider what the farm gives us in the way of food, of house and of fuel for our fires; horses to draw us, and the many nameless things that people living in cities and villages buy at great cost. I have seen more than one comfortable and well-to-do farmer sell broad acres for narrow town houses, and under the delusion of educating their children, of living more easy lives, to get nearer lecture and church privileges, and by various other devices of self-deception, persuade themselves into the fatal move which soon proved that farming was better to support families than the price of farms at interest. Generally, these mistaken men have found that money received as interest had a way of going easily, and a very few years has been sufficient to cause them to wish themselves again the owners of farms, and to teach them (as no other experience could) that though it might be easy to prove on paper that wheat could not be raised for its selling price, and that no animal (from a chicken to a horse) could be raised on a farm for its market value, yet that somehow all the final results proved just the reverse; for farmers do live well, educate their children well, and leave them, at their own deaths, valuable estates—accumulated, it is true, by slow process, but nevertheless entirely the fruits of their own labor on their farms. Can any other body of men show more uniform success, and more real enjoyment of life?

## BEES BITING BLOSSOMS.

We read in the latest book of Charles Darwin, the English naturalist, the following interesting observations on flower-cutting by bees:

"The motive which impels bees to gnaw holes through the corolla seems to be the saving of time, for they lose much time in climbing into and out of large flowers, and in forcing their heads into closed ones. They were able to visit nearly twice as many flowers, as far as I could judge, of a *Stachys* and *Pentstemon* by alighting on the upper surface of the corolla and sucking through the cut holes, than by entering in the proper way. Nevertheless each bee, before it has had much practice, must lose time in making each new perforation, especially when the perforation has to be made through both calyx and corolla. This action therefore implies foresight, of which faculty we have abundant evidence in their building operations; and may we not further believe that some trace of their social instinct, that is, of working for the good of other members of the community, may here likewise play a part? Many years ago I was struck with the fact that humble-bees as a general rule perforate flowers only when these grow in large numbers near together," etc.

THE HIVE-BEES TAKE THE HINT.

It appears that the cutting of these holes is done only by humble-bees, never by hive-bees. Yet the latter are quick to take advantage of them. "In the early part of the summer of 1857 I was led to observe during some weeks several rows of the scarlet kidney-bean (*Phaseolus multiflorus*), whilst attending to the fertilization of this plant, and daily saw humble and hive-bees sucking at the mouths of the flowers. But one day I found several humble-bees employed in cutting holes in flower after flower; and on the next day every single hive-bee, without exception, instead of alighting on the left wing-petal and sucking the flower in the proper manner, flew straight without the least hesitation to the calyx, and sucked through the holes which had been made only the day before by the humble-bees; and they continued this habit for many following days. Mr. Belt has communicated to me (July 28th, 1874), a similar case, with the sole difference that less than half of the flowers had been perforated by the humble-bees; nevertheless, all the hive-bees gave up sucking at the mouths of the flowers and visited exclusively the bitten ones. Now, how did the hive-bees find out so quickly that holes had been made? Instinct seems to be out of the question, as the plant is an exotic. The holes cannot be seen by bees whilst standing on the wing-petals, where they had always previously alighted. From the ease with which bees were deceived when the petals of *Lobelia Erinus* were cut off, it was clear that in this case they were not guided to the nectar by its smell; and it may be doubted whether they were attracted to the holes in the flowers of the *Phaseolus* by the odor emitted from them. Did they perceive the holes by the sense of touch in their proboscides, whilst sucking the flowers in their proper manner, and then reason that it would save them time to alight on the outside of the flowers and use the holes? This seems almost too abstruse an act of reason for bees; and it is more probable that they saw the humble-bees at work, and understanding what they were about, imitated them and took advantage of the shorter path to the nectar. Even with animals high in the scale, such as monkeys, we should be surprised at hearing that all the individuals of one species within the space of 24 hours understood an act performed by a distinct species and profited by it."

COLUMNS IN MOMUMENT PARK, COLORADO.

NEPTUNE THE MOST DISTANT PLANET.—After a long-continued labor, M. Leverrier has at length, with the theory of Neptune and Uranus, completed the study of all members of the solar system. The author's chief object was to decide the question whether there is an ultra-Neptunian planet, which might be detected, as Neptune was, by the perturbations produced by it on planets already known. The conclusion is negative; there is nothing indicating the existence of a body outside of Neptune.

ARTIFICIAL BEESWAX.—A mixture of paraffine and common resin has found its way into the market as a substitute for beeswax. It resembles the genuine article very closely in color, fracture and adhesiveness. The cakes are generally covered with a thin coat of genuine beeswax.

## TESTING TENSION ON IRON RODS.

A writer for the *Railroad Gazette* submits for the consideration of engineers having charge of the erection and maintenance of railroad bridges, the subjoined suggestion of a plan for enabling the bridge inspectors to determine whether or not each rod under tension in a bridge has been properly set up in the erection of the structure; and at any time afterward whether or not each such rod is doing its duty.

When a bridge is about to be set up, let one rod out of each lot of a certain length and diameter be suspended at one end and loaded at the other end with an actual weight equivalent to the strain that every rod of that length and diameter ought, according to the calculations of the designer of the bridge, to be subjected in the structure when ready for the imposition of its live load. Then put upon the rod, with white paint, a ring, at, say, five feet above the highest point at which the rods will be held in the angle-blocks, on the lower chord of the bridge. Then provide a steel hammer of a known weight, fitted with a handle of a known length, and as many tuning-forks as there are sizes of rods in the bridge. Then with his left hand, with his left arm fully extended, let the inspector hold a tuning-fork firmly against the rod at the painted ring, while with his right hand with the arm fully extended, he strikes the rod at the ring, a smart blow with the hammer. Then, immediately removing the tuning-fork, let him note the sound given out by the rod and the fork respectively, and by filing the fork bring the fork into tune with the rod. Then let a designating number be stamped upon both rod and tuning-fork; and repeat the operation for each set of rods in the bridge. Thereafter, when the bridge is set up, and still thereafter, when the inspector is to go through that bridge, he will take the hammer and set of tuning-forks belonging to that structure, and tune his rods. Thus he may guard against, or detect the condition too frequently existing in bridges, under which some rods are unduly strained and some others are doing almost no work.

## POULTRY FOR FARMERS.

The enterprising farmer now improves his poultry as well as his other farm stock, and for the same reason, that is, because the improved breeds pay best. But to make poultry pay they should be regularly and properly cared for, supplied constantly with plenty of fresh water, a variety of food, comfortable quarters, kept clean with a supply of lime, a good dust bath, and a good run on a grass lot. When the hens are not molting in July and August, you will be sure of a good supply of eggs all the rest of the year, if you have almost any of the improved breeds. The Asiatics are the best adapted to the farm. Either the Light or Dark Brahmas are hardy, good large size and mature early. They make great improvement in size when crossed with the common fowls, as is shown by a great many of these young half-breeds coming into market. When compared with the little scrub chickens they are so much larger and bring more money at the same age. And the farming interest to-day is greatly benefited by the introduction of improved poultry; a direct gain of thousands of dollars to the West, where the improved breeds have been most generally introduced.

Farmers who adopt the improved breeds of poultry should not attempt to get fancy prices for their chickens, as that takes experience and liberal advertising to estaldish a reputation. But it will pay to have only the improved breeds for eggs and market poultry, and no farmer can afford any other than a full blood rooster on the place, even if it does cost from $5 to $10; it will pay two-fold in a single year.—*Western Agriculturist.*

## GEOLOGICAL FORMATION IN MONUMENT PARK, COLORADO.

We take the following from Professor Hayden's third annual report of 1867: There is one locality in the valley of Monument creek, called Monument park, from the great number of columns which are standing thickly over the surface, each one surmounted with a cap of harder material. The shaft of the column is usually thick at the base, rising up 10 or 20 feet, tapering to the cap, composed of a coarse aggregate of quartz grains, small pebbles, all water-worn, very loosely held together with rather coarse sand cement. The cap is a deep rust-color, composed of sand cement with oxide of iron, and, by its greater hardness, has resisted more effectually the eroding agencies. Professor Hayden does not believe that all the effects now seen were accomplished by the ordinary atmospheric agencies at present in operation in the region referred to, although the air, rain and snow may have done much to give the monuments their present form. The greater part of the erosion must date back into the past, at least to the post pliocene period.

THE MAGNET IN SURGERY.—A curious experiment was tried recently on the son of Sir Benjamin Brodie. The lad had contrived to break a needle in the calf of his leg. He was taken to the Royal Institution, in London, and a powerful electro-magnet was used to detect the position of the needle, and the possibility of moving it. The exact position was indicated by the disturbance of a magnetised needle, but no change could be produced in its position. After the experiment, however, the limb could be moved about, the pain having ceased; and, finally, the broken needle having shifted to the other side of the leg, as was shown by the index attached to the magnet, it came sufficiently near to the surface to be extracted. The experiment, though giving a negative result so far as "drawing" the needle was concerned, was so far satisfactory that it enabled the lad to use his leg without pain.

PENSION TO AN INVENTOR.—The Societe d'Encouragement Nationale has been petitioned on behalf of the inventor of the pneumatic lever, Mr. Barker, who has resided in France for some time, and has made in that country the discovery of the above mentioned lever, and of the method of applying electricity in aid of organ playing. An international committee was formed for purchasing an annuity.