NOTES ON THE NATURAL PHENOMENA OF FLORIDA.

In the last number of the *American Journal of Science and Arts* there is an interesting article on the natural phenomena of Key West, Florida, by Major E. B. Hunt, Corps of Engineers, U. S. A. We condense some of his notes for our columns :—

Zodiacal Light.—In the month of February the zodiacal light is very distinct at Key West, and it is so clear that a shadow is cast by it. It is singularly beautiful to see this mass of mellow light fading out softly into the clear sky, obscuring the luster of the "Milky Way" by its superior brightness. Sometimes its radiance seemed to be a prolongation of twilight.

Atmospheric Transparency.—At Key West the sky is indeed beautiful. The stars shine out with a clear luster and fullness almost exceeding the display on the coldest and clearest night of a northern winter. It seems singular that a climate so moistened by the Gulf Stream may be seen the starriest of nights. This is due to the prevalent tranquillity of the atmosphere and a nearly unvarying temperature. At Boston Major Hunt has known the thermometer to pass through a greater range in one day than it does in a whole year at Key West, and the winds are generally gentle and steady in direction. He has only known of fogs occurring twice in that place ; the requisites for developing visible vapor are rarely prevalent. The temperature seldom rises above 90° Fah., and never, even after the severest northern winds, does it fall below 45°. The equability of atmospheric conditions affords an explanation for the beauty of the sky and the starry splendor, so attractive amid the soft and balmy airs of the locality. And were it not for musquitoes and yellow fever, the enthusiastic astronomer might there find his Eden in summer equally as well as in winter.

Gulf Stream Cloud Bank.—One of the local phenomena of Key West is the formation, shortly after sunset, of a grand bank of clouds above the Gulf Stream, rising from two to five hundred feet in hight. It stretches from east to west in massive irregular fleeces, dark below and silver-tinged above under the rays of the setting sun. The regular Gulf Stream is twelve miles south of Key West. Rapid evaporation of the warm sea-waters takes place during the day, and when the declining sun acts with decreasing force, the atmospheric temperature falls until, as the sunset approaches, the moisture-laden atmosphere above the Gulf Stream cools to the clear dew point, and the previously invisible vapor becomes cloud masses.

"Northers."—In the winter this warm moist climate is occasionally relieved by dry, cool northern currents of air. The approach of the "norther" is indicated by a low dark line above the horizon in the N. N. W. It comes down rapidly, usually accompanied with a slight dash of rain ; sweeping clouds of dust before it, and removing languor and exhaustion from the inhabitants, cooling the atmosphere and infusing energy and elevated spirits into all. It lasts for about three days and then shades out into a delicious mild N. E. breeze. The "norther" generally brings out a crop of efflorescent crystals on the brick walls of Fort Taylor, making it seem grey with age. The winter "norther" has its opposite in the summer hurricane. Such gales, Major Hunt states, conform to Redfield's theory of revolving storms.

Ventilation.—Owing to the peculiar warm, soft atmosphere, free ventilation and shade are the chief essentials of comfort at Key West. Great difficulty is experienced in preserving from decay all kinds of perishable articles of food. Major Hunt believes that the best way to preserve them is to seal them up in close, shaded chambers in which the air is kept dry. He made an experiment with flour in a close room, opening at the top into the Fort Taylor bakery, the air of which was kept artificially dry. Flour could thus be kept twice as long as when stored in the usual way in a wooden building. He believes that the best way to keep powder magazines dry in such a climate is to exclude all interior ventilation. The magazine, when filled, should have all the moisture extracted from its atmosphere by an absorbent, such as chloride of calcium, and be sealed up. The effect of opening the ventilators in Fort Taylor magazines results in condensing moisture on the floor and other surfaces. The stores in the fort are now soon ruined by the existing practice of ventilation and exposure to a moist atmosphere. Closed inner chambers, artificially dried, with an exterior ventilation to keep down the temperature, would add greatly to the durability of perishable supplies and the dry storage of gunpowder.

Yellow Fever.—Buzzards.—On two separate occasions when there was yellow fever in the Marine Hospital at Key West, Major Hunt saw a flock of buzzards circling over and near the roof of the building, and thus they continued for hours, day after day. A common belief exists in the town that these creatures only hover over the hospital when there are cases of yellow fever in it. Major Hunt says : "I am almost persuaded that this is a fact, and can only interpret what I have myself seen as indicating that an odor is then thrown out on the air, which the keen scent of the scavenger bird detects from afar. . . . . The particles scented may indeed be the actual *fomites* so much talked of, and so little understood, in discussing the controverted questions of contagion and communication."

CHROMIUM IN THE ARTS.

Chromium is a metal which forms several oxides that are much used in the practical arts. Its two native combinations are the chromate of lead and the chromite of iron—a compound of the oxides of chromium and iron. Metallic chromium may be obtained by igniting its oxide intensely with about one-tenth of its weight of charcoal. Its color resembles that of platinum ; it scratches glass and takes a good polish. There are four oxides of chromium, namely : Protoxide, Cr O ; a sesquioxide, $Cr_2 O_3$; an intermediate oxide, Cr O, $Cr_2 O_3$, and chromic acid, Cr O_3. The sesquioxide of chromium ($Cr_2 O_3$) is obtained by heating chromate of mercury or chromate of ammonia to a dull redness ; and it is also formed by the action of a red heat upon bichromate of potassa. In this case neutral chromate of potassa is formed, which may be removed by washing the product. This oxide is of a green color, is not changed by heat and is much used in enamel and porcelain painting, also as a pigment for printing on paper. Chromic acid forms carmine-colored needle-shaped crystals, rapidly deliquescing in the air, and dissolving very easily in water, forming a dark reddish brown or lemon yellow solution. The concentrated acid corrodes paper like oil of vitriol, and, when in dilute solution, it likewise attacks paper and other kinds of organic matter, especially when aided by light or heat, becoming converted into the brown oxide or the green sesquioxide, according to the extent of the decomposition. The chromate of potash is manufactured by heating pulverized chrome iron-ore with carbonate of potassa and a little niter in a reverberatory furnace—stirring the mixture to absorb oxygen. The product thus obtained is digested in water, and the solution obtained is super-saturated with nitric acid, which precipitates silica and leaves the chromate in solution. The bichromate of potash is much used in the arts of dyeing and printing cotton and woolen fabrics ; also in photography. It is obtained by adding a sufficient quantity of sulphuric acid to a solution of the chromate until its taste becomes sour, then setting it aside for a few days, when deep orange crystals are formed, constituting the bichromate. The crystals are anhydrous prisms, and are soluble in hot water. Solutions of these chromates are very injurious to the skin, causing sores which are difficult to heal. Paper impregnated with a solution of the bichromate possesses photographic powers. It has remarkable coloring properties, as one part of it will impart a yellow color to 40,000 parts of water.

The great use of bichromate of potash in photographic operations is due to the ready way in which it parts with some of its oxygen to organic matter under the influence of light. Bichromate of potash may be looked upon as containing one part of chromic acid in the free state. Now chromic acid has a large quantity of oxygen locked up in it (three equivalents of oxygen to one equivalent of chromium) and it is somewhat of an unstable compound, having a tendency to give up oxygen and pass to a lower state of oxidation at the slightest opportunity. When placed in contact with an organic substance, such as paper, gelatine, leather, horn, parchment, the skin, &c., the oxygen of the chromic acid is ready to unite with the carbon and hydrogen in those bodies. The change goes on, however, very slowly in the dark, requiring the stimulating action of light to set it up, but under this influence it speedily passes to the state of brown oxide, Cr O_2, and then to the sesquioxide $Cr_2 O_3$.

This formation of brown chromate of oxide of chromium is the first result of the action of light upon a mixture of bichromate of potash and organic matter, and occasions the brown tint left behind in the paper. If the action of light is allowed to proceed further, the deoxidation ultimately proceeds to the greatest possible extent, and the chromic acid is entirely reduced to the state of sesquioxide of chromium. This has a green color, and its presence may often be observed in photographs printed in this manner. The reduced brown oxide of chromium reacts in several ways, like a combination of an acid and a base, and when washed with metallic and other solutions, give rise to other insoluble metallic compounds of various colors, by a process of double decomposition. Hence the numerous bichromate of potash printing processes in which variously-colored positives are produced. Upon gelatine, in its numerous forms of gelatine, isinglass, glue and the allied bodies, gum, &c., another action takes place at the same time. The reduction of chromic acid is effected in the same manner, but the oxygen which it loses attacks the gelatine and converts it into a slightly different chemical substance, rendering it partially or entirely insoluble in water.

The bichromate of potash is employed as a mordant to prepare woolen goods to be dyed black with logwood. The goods are simply boiled first in a weak solution of it, then in an extract of logwood. It is also employed as a mordant for brown colors on wool. With a preparation of the acetate or nitrate of lead, cotton cloth is dyed yellow by subsequent immersion in a solution of chrome ; and, if immersed afterwards in warm lime-water, it will change into orange. The chromate of lead is employed as a yellow paint, and is applicable to both oil and water colors. The sulphate of chromium combines with the sulphate of potassa, forming a beautiful double salt, which crystalizes in green and purple octahedra, and is called chrome alum. A small quantity of the metal chromium will unite with steel, forming an alloy suitable for the finest cutlery instruments.

Chrome ore is obtained in great abundance in hills near Baltimore, Md., where the manufacture of the bichromate of potash is carried on extensively.

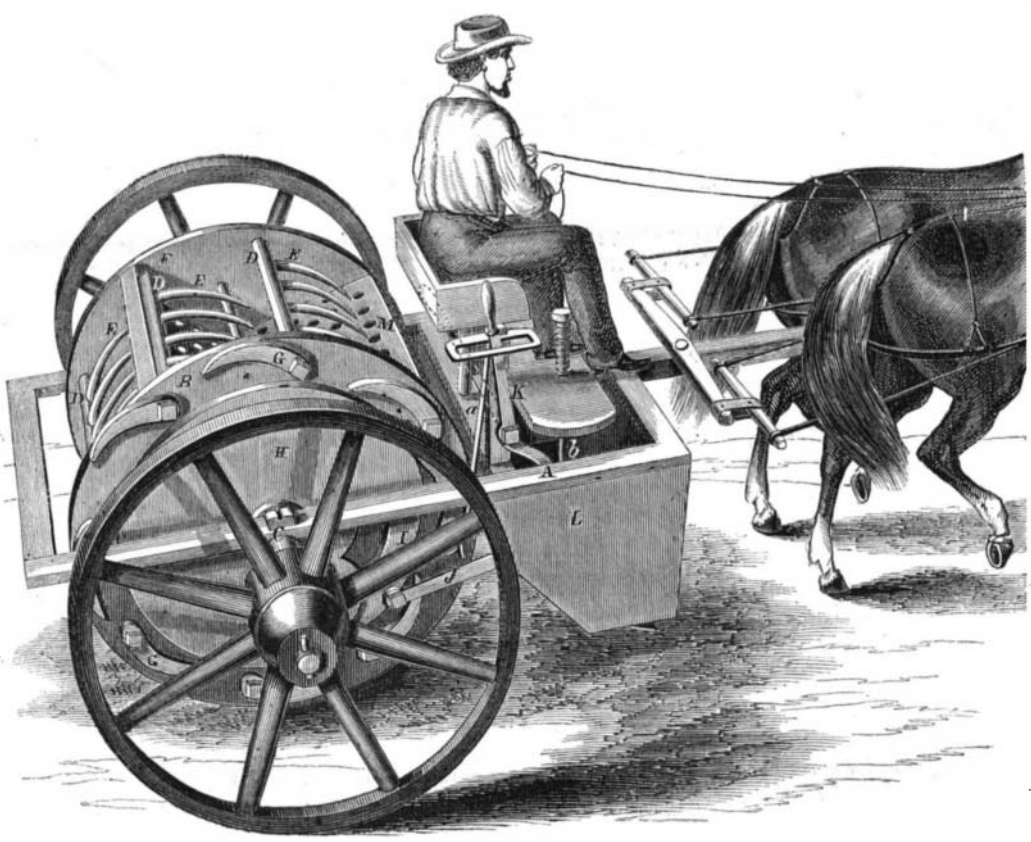
Petroleum Exports.

Since the first of January last, up to the 1st. inst., no less than 10,110,810 gallons of petroleum have been exported from New York to foreign ports, against 2,920,089, in 1862. In addition to the above, 5,180,762 were exported from Baltimore, Philadelphia, Boston and Portland, making a grand total of 15,291,572 gallons. Our petroleum trade is one of the wonders of modern commerce—fifteen and a quarter millions of gallons sent abroad in five months, and in all likelihood as great a quantity has been consumed at home ! The growth of the foreign demand has been unprecedented in rapidity, as only one million of gallons were exported in 1861. At present the stock of petroleum in the oil region is much less than it was at this period last year, and the yield of the wells is said to be less. The amount is about 5,000 barrels—200,000 gallons—per day. At 25 cents per gallon for crude oil, the value of the above quantity, exported this year, amounts to $3,822,893.

Storing Butter under Ground.—A correspondent of the New York *Agriculturist*, writing from Pendleton county, Ky., says, respecting the preservation of the butter :—"Last June I commenced packing butter. I washed it well through two or three waters when it was first churned, and worked it over again before I packed it, putting it in large stone jars, and digging a hole under the floor of the smoke-house, having no cellar or other good cool place. The top of the jar was left just above the ground. I then put strong brine about two inches over the butter, pouring it off each time as I put in fresh butter, adding nothing but salt to the butter ; and, in January last, I sold 60 pounds of butter that was as sweet and good as when first packed."

Improved Potato-digger.

One of the most laborious duties devolving upon the farmer is that of harvesting the crops he has sown in the early part of the year. Of these duties, gathering potatoes has certainly little to recommend it as a pleasant occupation. The continued tension of the muscles of the back and the unnatural position of the body, causes fatigue and a rush of blood to the head, and is often productive of pains in the back that last for a long time. Such disagreeable features it is desirable to avoid, and to this end we illustrate, this week, a machine for the purpose of digging potatoes, which ought to be generally adopted. It will, we think, accomplish the purpose very thoroughly and much quicker than by hand labor. The body of the machine, A, carries a drum, B, in the center, which revolves on the axle, C, of the wheels. This sifting drum is provided with a series of shafts, D, which, in turn, are fitted with the diggers or forks, E; these forks are firmly fastened in the shafts. On the ends of the shafts, which work freely in the side, F, of the drum, there are secured the toes, G. These toes work over the disk, H, made fast to the rotating drum before mentioned. There is also an adjustable cam seen at I; this cam works on the drum shaft and is connected by a link, J, with the hand lever, K. These constitute the principal features of the machine.



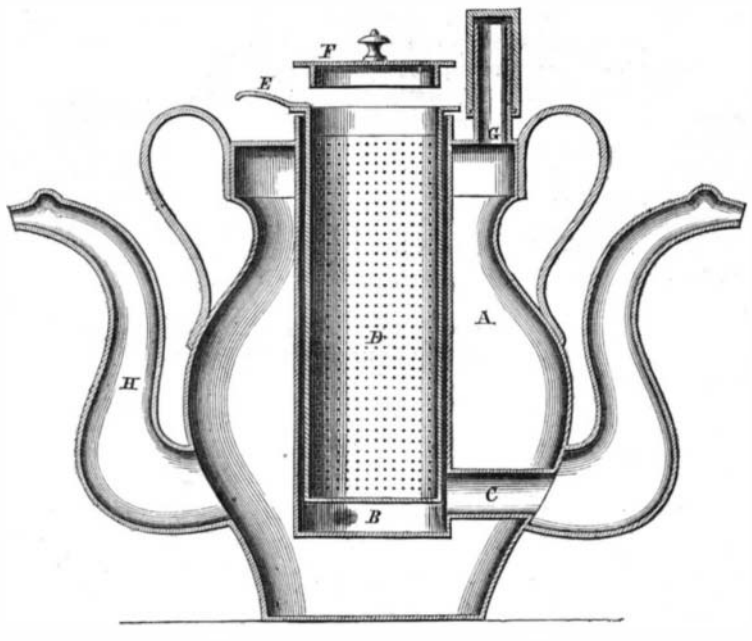
HOLCROFT & SMITH'S PATENT POTATO-DIGGER.

The operation of it is as follows:—When the machine is drawn over the surface of the ground, the forks do not enter when the hand lever is in the position shown by the dotted lines, as in that case the cam is drawn out so that it makes a complete circle with the disk, H, and the toes follow around without changing the position of the forks; should the cam be thrown back, however, the toes will then run over the disk until they come to the break seen in it; the small spring, *a*, seen bearing on the back of the toe, then forces it into contact with the cam, thus throwing the fork teeth out at an angle with the drum and nearly vertical to the ground, in just the proper position for digging. The team then advancing with the machine draws the forks through the hills of potatoes, and as they emerge on the further side loaded with soil and the vegetables, the whole contents fall into the partitions, M. The holes in these permit the dirt to fall out through the bottom of the machine, and the potatoes are, by the continued rotation of the drum, discharged into the box, L, in front, from whence they are easily removed as occasion demands. At the bottom of the box there may be seen a portion of a trap-door; this connects with the rod, *b*, in front of the driver; the spiral spring keeps the door closed and pressure upon the knob causes the bottom of the door to open, and releases the load into bags or any other desired receptacle. The number of forks can be augmented as desired, as also the partitions.

This seems to be a very excellent machine for the purpose and will, we think, so far as the arrangement of the mechanical parts are concerned, do the work intended for it. It was patented through the Scientific American Patent Agency on March 24, 1863, by Henry Holcroft and C. S. Smith, of Media, Pa. Further information can be obtained by addressing them as above.

Combined Hot Water and Tea Urn.

The apparatus herewith illustrated is one of those articles that are convenient in every family. By its use the tea is made very perfectly, and prevented from losing its flavor by evaporation. The invention consists of a kettle or urn with two spouts, and an internal chamber, A. The tea falls into the chamber, B, as it is distilled from the leaves placed in the perforated holder, D, and is poured out through the nozzle, C. The handle, E, is fitted to this holder, and the cover, F, prevents the steam of the tea from being dissipated. At G, may be seen an aperture for pouring in the hot water to the chamber, A. It will be seen that the water completely surrounds the tea chamber, and that there is a separate spout by which it can be decanted as required; the urn being conveniently hung on pivots for that purpose. The water is kept hot by a spirit lamp on the stand in which the urn sits. The manner of operating this apparatus and some remarks on the proper way to make tea are here appended, and they will be found useful, inasmuch as there are very many persons ignorant of this simple duty. It is desirable to obtain from the leaves the largest possible amount of virtue which can be extracted and retain it in the decoction thus made. The thein of tea is combined with tannic acid, and forms a compound which requires boiling water to dissolve it. But on the other hand, the aromatic oil of tea is so volatile that boiling tends to drive it off with the steam into the air. If warm water is used, thein, the most important element of tea, is not obtained. The plan to be pursued therefore, with this improved apparatus, is to fill or partly fill the pot or urn, A, with boiling water, remove the perforated tea-holder, D, put a sufficient quantity of boiling water in the chamber, B, replace the perforated tea-holder, D, containing a quantity of dry tea, and shut or close all the covers and lids to retain the virtues of the beverage. The water in the pot or urn, A, being kept at a high temperature by a lamp underneath or otherwise, prevents the decoction of tea from becoming turbid, and the tannate of thein, being held in solution, is prevented from cooling and forming a skin upon the surface. This is a very useful and convenient apparatus, and should become popular.



BRISTOL'S PATENT TEA URN.

A patent is now pending, through the Scientific American Patent Agency, for this apparatus, which is the invention of Alexander M. Bristol, of Detroit, Mich.; further information can be obtained by addressing the inventor at the above place.

The Farmer's Creed.

A local contemporary gives the following:—"We believe in small farms and thorough cultivation. The soil loves to eat as well as its owners, and ought therefore to be nurtured. We believe in large crops, which leave the land better than they found it—making both the farm and farmer rich at once. We believe in going to the bottom of things, and therefore in deep plowing and enough of it—all the better if with a subsoil plow. We believe that the best fertilizer of any soil is the spirit of industry, enterprise and intelligence; without this, lime and gypsum, bones and green manure, marl or plaster, will be of little use. We believe in good fences, good barns, good farm-houses, good stock, and a good orchard. We believe in a clean kitchen, a neat wife in it, a clean cupboard, dairy and conscience. We firmly dis-believe in farmers that will not improve, in farms that grow poor every year, in starved cattle, in farmers' boys turning into clerks and merchants, in farmers' daughters unwilling to work, and in all farmers who are ashamed of their honorable vocation."

THE Manhattan steam engine, No. 8, went out on the *Great Eastern*, on the 6th inst., to take part in the grand trial of machines of that class, to be held in London sometime in July this year.