

MANURING PLANTS THROUGH THEIR LEAVES.

The farmers of Long Island who use great quantities of fish for manure, have discovered that the most effective method of applying this kind of manure is to spread it upon the surface of the ground; if the fish are covered up they do very little good. This fact would be quite inexplicable if plants derived their food wholly through their roots; but this is not the case.

Numerous and careful experiments made many years ago have demonstrated that a large portion of the solid substances of plants enters in the form of invisible gases through the pores of the leaves. After plants are deprived of the water which they contain, just about one-half of the solid portion remaining is carbon, and the whole, or nearly the whole, of this enters the plants through the leaves.

Carbon passes into the leaves of plants combined with oxygen in the form of carbonic acid; which at ordinary temperatures and under the pressure of the atmosphere is an invisible gas. In the leaf, under the action of the sun's rays, the carbonic acid is decomposed, the oxygen returning directly to the atmosphere, and the carbon being carried by the sap to build up the trunks, stems and roots of the plant.

If the plant is heated to a temperature of about 1,000° in contact with the atmosphere, the carbon again combines with the oxygen of the atmosphere, and goes away in the invisible form of carbonic acid gas. But if the plant is covered with sods, or placed in a close oven and heated, the more volatile portions are driven away, and the carbon remains in the form of charcoal.

Manhaden, the fish principally used for manure, are very fat, and fat is composed to a very large extent of carbon. In the process of animal decay the carbon is separated mostly in combination with oxygen as carbonic acid, and if the separation takes place immediately under green leaves, a considerable portion of the carbonic acid will be caught by the leaves, and appropriated to the growth of the vegetable.

OUR MILITARY DEPARTMENT.

We announced, two weeks ago, the addition to our regular establishment of a recruiting station for the purpose of mustering soldiers into the Union army. Our experiment has been eminently successful—so much so that we are encouraged to think we shall continue it "during the war." Within the time specified we have recruited and mustered into the service fifty-one men, the majority of whom are now in the field.

Our experience satisfies us that considerably more work, and a good deal less talk, is now the one thing needful. Mere talk will frequently damage the cause, while a few dollars judiciously expended will encourage a good man to enlist, especially if he has a family depending upon him day by day for support. We know of one rich man who has talked excessively patriotic during the past year and who has abused his neighbors for want of zeal, that was nearly squelched out when called upon to give a few hundred dollars to further the work of enlistment. He has said but little about the war since. We must make up our minds to talk less and to work and give more.

We take pleasure in acknowledging efficient pecuniary aid in our work from the following gentlemen: Joseph Park, Jr., S. T. Hyde, William Sewell, B. & S. D. Cozzens, A. P. Cumings, Roswell Skeel and A. H. Almy.

NEW DISCOVERY IN IRON-CLAD SHIPS.

A new development in the history of iron-clad ships has been made, for which the country is indebted to the genius of Commodore Porter, the gallant destroyer of the once formidable rebel ram *Arkansas*. By the official report to the Navy Department of his daring attack, single-handed, upon the *Arkansas*, under the heavy batteries at Vicksburg, on the 22d of July, we learn the following important facts:—

The *Essex*, although clad with iron plating only one inch thick at the thickest part, was for "two hours and a half under fire of seventy heavy guns in battery, twenty field pieces and three heavy guns on board the ram."

This fire was indeed terrific. In the intrepid Commodore's words, "so rapid was this fire that for half an hour the hull of the ship was completely enveloped in the heavy jets of water thrown over her by the enemy's shot, shell and balls." At one time this cannonading was at so short a range that he says, "we were so close that the flashes of the enemy's guns through my gun holes drove my men from the guns." These astonishing results are due to the scientific skill of Commodore Porter in constructing the now famous *Essex*. She was completed under his own eye and according to his own plans. Unable to adopt for service in the Western rivers, the heavy plating used upon the *Monitor* and the *Ironsides*, Com. Porter conceived the idea of constructing the *Essex* in such a manner that most of the shot would be received at an angle and be compelled to glance off by an elastic backing to the plates.

By careful experiments upon targets he found that by using a peculiarly-prepared lining of india rubber between the iron plates and the wooden backing, an iron armor of only one inch thick would not be affected by a shot that would penetrate five inches of solid iron. The immense saving of weight and of expense effected by this important discovery will at once be appreciated. Indeed, it is the only method by which the use of iron-clad gunboats on our Western rivers is practicable. Gunboats plated in the ordinary manner with inch iron, have proved worthless, and the experiment will no longer be repeated. For patriotic reasons we do not propose to describe, in detail, the mode of construction adopted by Com. Porter, it is enough to announce the great fact. The success of this practical experiment of the *Essex* for two hours and a half under the impregnable batteries of Vicksburg, is decisive.

The result of this terrific fire from "a battery not over one hundred feet off," is thus described in the official report:—

"A heavy ten-inch shot from the nearest battery struck my forward casemate about four feet from the deck, but fortunately did not penetrate. A rifle seven-and-a-half-inch shot from the same battery struck the casemate about nine feet from the deck; it penetrated the iron, but did not get through, although so severe was the blow that it started a four-inch plank two inches thick and eighteen feet long, on the inside. A conical shell struck the casemate on the port side, also, as we were rounding, penetrated the three-quarter-inch iron and came half way through the wooden side; it exploded through, killing one man and slightly wounding three."

During the heavy cannonading most of the shot glanced from the sides of the *Essex*, but "during that time this vessel was heavily struck forty-two times and only penetrated twice." This penetration was by the rifle seven-and-a-half-inch shot and the conical shell above described.

We believe that the annals of the war record no exposure of a gunboat to a cannonading so severe as this, and the results are regarded by military men as perfectly conclusive and satisfactory.

We learn that our Navy Department have already adopted some of the features of this plan in the new iron-clad steamers, and that the thin plating of the decks is to be protected by an under sheathing of india rubber. This will remove one of the great sources of annoyance which has been found in the *Monitor* from the leaking of her decks, and it will effectually prevent any further mortifying occurrences like the penetration of the deck of the *Galena* from the fire of Fort Darling.

Gird's Budding Knife.

Mr. E. D. Gird, one of the inventors of the budding knife illustrated on page 160 of our last volume, brought into our office a few days since, a trunk of a seedling peach tree with a small scion, and requested us to try the knife in the practical operation of budding. We found it a very convenient implement, and have no doubt that nearly twice as many buds can be inserted with it as with the knife in general use. Mr. Gird's address is Cedar Lake, N. Y.

Old England seems to possess almost as much vitality as some new countries. In 1828 there was not a solitary habitation at Seaham Harbor, in the county of Durham; now it contains 10,903 inhabitants, and about 700,000 tons of coal were shipped from it last year.

VALUABLE RECEIPTS.

BEET ROOT COFFEE.—A very good coffee can be made of beet root in the following manner:—Cut dry beet root into very small pieces, then gradually heat it in a close pan over the fire for about fifteen minutes. Now introduce a little sweet fresh butter, and bring it up to the roasting heat. The butter prevents the evaporation of the sweetness and aroma of the beet root, and when fully roasted it is taken out, ground and used like coffee. A beverage made of it is cheap, and as good for the human system as coffee or chicory.

CRYSTAL VARNISH.—First, genuine pale Canada balsam and rectified oil of turpentine equal parts; mix, place the bottle in warm water, agitate well, set it aside in a moderately warm place, and in a week pour off the clear. Used for maps, prints, drawings and other articles of paper, and also to prepare tracing-paper and to transfer engravings. Second, mastic 3 ounces; alcohol 1 pint; dissolved. Used to fix pencil drawings.

ETCHING VARNISH.—First, white wax 2 ounces; black and Burgundy pitch, of each half an ounce; melt together, add by degrees powdered asphaltum 2 ounces, and boil till a drop taken out on a plate will break when cold by being bent double two or three times between the fingers; it must then be poured into warm water and made into small balls for use. Second, linseed oil and mastic, of each 4 ounces; gum benzoin and white wax, of each half an ounce; boil to two-thirds.

FLEXIBLE VARNISH.—First, india rubberin shavings 1 ounce; mineral naphtha 2 pounds; digest at a gentle heat in a closed vessel till dissolved, and strain. Second, india rubber 1 ounce; drying oil 1 quart; dissolve by as little heat as possible, employing constant stirring, then strain. Third, linseed oil 1 gallon; dried white coppers and sugar of lead, each 3 ounces; litharge 8 ounces; boil with constant agitation till it strings well, then cool slowly and decant the clear. If too thick, thin it with quick-drying linseed oil. These are used for balloons, gas bags, &c.

Hall's Arctic Expedition.

Mr. C. F. Hall, who went to the Arctic Regions on the new Franklin Expedition, is on his way home in the bark *George Henry*, which put into St. Johns, Newfoundland, on the 22d ult., short of provisions. From this place Mr. Hall sent the following dispatch to Henry Grinnell, Esq., patron of the expedition:—

HENRY GRINNELL, ESQ.:—
I am bound for the States, to renew my voyage to the Arctic region. I have not prosecuted my mission to the extent proposed on account of the want of suitable craft, but, thank God, he has empowered me to do something.

I have determined the fate, probably, of two boats' crews of Sir John Franklin's Expedition, solved the mystery of three hundred years relative to Sir Martin Frobisher's Expedition under the auspices of Queen Elizabeth, have learned the fate of five men captured from Frobisher by the Esquimaux, found and identified the exact place of his landing and prior account of Warwick's Sound. Therefrom Frobisher attempted to plant the colony of one hundred men. I have recovered Avassa Varede and a large number of relics of said expedition, and have explored over one thousand miles of coast, including the so-called Frobisher's straits, which I have discovered to be a deep bay terminating in latitude 63° 48' north, and longitude 70° west. Have also discovered a great glacier and a mountain of fossils between Hudson straits and Frobisher's bay.

The *George Henry* was about to return for the States, October 13, 1861, but thick-ribbed ice kept her entombed until August 9th. The ship's company subsisted through the winter mostly by the generous hospitality of the Esquimaux. I have with me a family of these people—man, wife and child. The record of my work north exceeds three thousand pages. C. F. HALL.

The Ironsides.

The armor-plated frigate *Ironsides*, which was built at Philadelphia, has gone to sea under sealed orders. Her form is like that of our wooden frigates; the only difference between her and the old screw steamers consists in her having a strong iron frame and armor plating four and a half inches thick laid upon a lining of heavy oak planking. Her armament is very heavy and consists of sixteen 11-inch Dahlgren guns on the gun deck, and two 200-pounder Parrot guns on the spar deck. She is intended to be a good sea-going vessel, but as her draft of water is over 20 feet, she will be able to enter but one or two Southern harbors, as most of them are shallow.

The visitors from the rural districts of England to the International Exhibition now average five thousand a day.