frame two broad tables of wood or metal corresponding in length and width with the sections, so arranged that one will overlap the other at whatever angle they may be inclined; each end partition is provided with two pawls, which engage on the uppermost table, and serve to hold both of them down.

An improvement in breast collars for harness has been patented by Messrs. R. Pattin, of Harmar, H. L. Sibley, of Marietta, and T. M. Beagle, of Harmar, Ohio. This improved device is constructed of a rod or stout wire bent into the required shape, thus forming a skeleton arch, to which a bridge plate is attached at the center, and is applied to a breast collar by a rivet, so that its ends are free and cushioned on the latter.

Mr. Herman T. Detert, of Faribault, Minn., has patented an improved pad for horse collars, which is so constructed as not to rest upon the top of the horse's neck, thus preventing the neck from being made sore, and allowing it to heal if previously injured. The invention consists in the angular iron plate having the front and rear parts of its middle or angular part cut away.

An improved washboard has been patented by Mr. Franklin M. Smith, of Thivener P. O., Ohio. The invention consists in a novel construction of the frame of the washboard, and of bars used in connection therewith, to form a rubbing surface for the clothes, whereby provision is made for placing the bars in position, and for removing them and changing their positions when they become worn.

Mr. Benjamin P. Morrison, of Abingdon, Va., has patented an improved fence post, which may be readily set in the ground without its being necessary to dig a post hole, and which, when set, will support the fence firmly.

Messrs. John McL. Wood and William N. Bellah, of Saint Jo, Texas, have patented an improved iron saddletree fork, consisting in a combination of plates made with a curve or swell, and provided with the plain flanges and the notched flanges, with the arms of the fork having their inner sides recessed and provided with the plain flanges and the notched flanges.

An improvement in lamp stove ovens has been patented by Mr. Charles W. Daly, of Brooklyn, N. Y. This invention relates mainly to the construction of cooking ovens for lamp and gas stoves, steam heaters for cooked food, and other similar apparatus, the object being to render them simpler and less expensive in construction than when made in the usual way.

An improved drill sharpener has been patented by Mr. Thomas J. Williamson, of Carson City, Nev. The drill to be sharpened is heated, and then the end or point placed between dies in the recess that corresponds to the diameter of the drill, and the blocks and dies closed upon the drill point; then, by striking a few blows with a hammer on the drill head, the point is spread and caused to take the shape of the recess and the edge sharpened.

An improvement in feeding apparatus for nail machines has been patented by Mr. John T. Jones, of Chattanooga, Tenn. This device insures a definite vibration of the feeding devices, so that the nail plate or rod is fed a uniform distance, thereby preventing making the nails too large. It also adjusts the throw or vibration of the forks, and thereby regulates the feed as required for nails of different sizes.

Export Paper Trade.

A contemporary notes, as an important feature of the paper industry, the steady increase in the exports of American paper, especially of the finer kinds. The total exports last year amounted in value to $1,108,318, having grown from the comparatively insignificant amount of $3,777 in 1869. The imports, on the other hand, have dwindled down from the maximum of $1,326,460, in 1873, to the total amount of $135,487 for papers of all kinds last year. These latter were largely made up of wall papers of the more expensive designs, only a trifling quantity being fine writing papers. The superiority of the home-made paper is now fully conceded at home as well as abroad, and large orders have lately been received from new customers in Holland and other countries. Recently there were representative buyers here from Japan and China, who have hitherto been accustomed to have their wants supplied in the British markets. The qualities for which the fine domestic papers are noted are their purity, tenacity, freedom from blemish, and beauty of finish. The machinery used is brought to the greatest degree of perfection, and new improvements are constantly being made.

Home Chemicals.

Among the articles of merchandise formerly imported in large quantities, but which have been largely superseded by home production, are chemicals. Tartaric acid, the importation of which last year reached only 183 lb.; not long ago 500,000 lb. came from abroad annually. Of citric acid, 27,018 lb. was imported, against a previous annual importation of 250,000. The lime juice, from which the acid is made, is still imported on account of the small growth of limes and lemons in the United States. If Southern agriculturists, suggests a contemporary, gave attention to these fruits, a new industry, in extracting the juice, could be developed. Last year but 3,492 lb. of borax was imported, owing to the working of our new borax mines. Formerly from 600,000 to 1,000,000 lb. was annually received. Of cream tartar, none was received in 1878 from abroad. About six years ago the receipts were 9,000,000 lb. annually.

TORTOISE SHELL

The horn-like epidermoid plates which cover the dorsal buckler or carapace of the sea tortoise, are in some species so fine and of such beautiful colors as to be employed for various purposes of art. It is only those, however, of the hawk bill (*Eretmochelys imbricata*) and caret species that possess any great trade value, the plates being stronger, thicker, and clearer than in other species. There are usually thirteen plates on the carapace, called collectively in trade, 'the head'—four on each side and five on the back, the last bent in the center. Of the side plates, the two middle are the most valuable, being the largest and thickest, those on the back and margin, known as the "hoofs' or 'claws," are comparatively of less value. There are twenty four marginal pieces, which are termed the 'feet' or "noses." The *lamellæ* or plates vary in thickness from 1/8 to 1/4 of an inch, according to the age and size of the animal, and weigh collectively from 4 to 6 pounds or upward. In an animal of ordinary size, about 3 feet long and 2½ feet wide, the largest plates weigh about 9 ounces and measure about 13 by 8 inches, and are 1/4 of an inch thick in the middle.

Tortoise shell is usually detached from the carapace and bony framework by placing heat below, or sometimes by soaking it in boiling water. In the West Indies the plates or blades of tortoise shell are removed by burying the carapace in the ground or sand for ten or twelve days. When taken up the blades fall off, and the thirteen dorsal pieces are easily collected. A small hole is bored in each, so as to string them together, for no experienced buyer will purchase a case of tortoise shell unless the whole of the shell is thus presented. The "feet" or "noses" of the tortoise shell are chiefly in demand in China.

The blades of the hawk bill or imbricated turtle are very transparent, and more beautifully mottled than those of the caret turtle; the scales of the latter are thinner, and are not used for the same purposes, but employed for veneering and inlaying work. The shell of the hawk bill has a blackish-green color, with yellowish spots, while the color of the plates of the caret turtle is blackish, with irregular transparent spots of golden yellow and veined with red and white, or of a brownish-black of various shades. The plates of the green or edible turtle (*Chelonia mydas*) are thin and flexible, and of slight manufacturing use. The scales of the loggerhead turtle (*Thalassochelys caouana*) are of a dark chestnut brown, very thin, and neither clear nor beautifully colored, hence they are of little value; but latterly some use appears to be made of them, for the English imports of turtle shell (as it is named in contradistinction to tortoise shell) have averaged in the last four or five years $30,000 in value.

Tortoise shell is worked upon like horn, and is usually softened or rendered plastic by placing in boiling water containing a handful of salt to the quart; by this means it is rendered so soft that it can be pressed into moulds. The moulds employed are double, so as to contain the shell between them. When all is ready the mould is put into a press, and the upper half gently pressed down upon the shell. The whole is then put into boiling water, and as the shell becomes more and more softened the upper half of the mould is from time to time screwed down, until at length the shell is completely pressed into the lower mould, so that any devices that may have been engraved or embossed upon the two halves of the mould leave corresponding impressions upon the shell. When two pieces of tortoise shell are to be joined together the two edges are beveled off, so that one inclined edge may lie on the other. The edges are then scraped perfectly clean, contact with the fingers or any greasy substance being carefully guarded against. A piece of paper is then bound around the overlapped edges and fastened with a string. A pair of tongs or pincers are then heated and applied to the shell, one jaw above and the other beneath, by which the shell is grasped throughout the length of the seam or overlap. By holding it for some time in this position the heat of the iron softens the shell and causes the two pieces to unite or weld firmly. For modern uses thick tortoise shell is more valuable than thin. The uses of the article for ornament are varied, and the number of articles made from it are very numerous. Brown and light colored shell is imported from India and China to France for fans, the former costing $6.25 per pound and the latter as much as $20. In China and Japan very beautiful cups and saucers and fancy boxes are made from this material.

Tortoise shell has always been a favorite material for combs, but it is only in recent years that jewelry made from it has become fashionable in Europe and America. England imports annually large quantities of tortoise shell, and, according to Mr. P. L. Simmonds, from whose "Commercial Products of the Sea" these notes are borrowed, maintains the monopoly of this artistic material. The material is received from India, China, the Eastern Archipelago and Pacific Islands, Australia, the West Indies, South America, and Africa.

The Last Bicycle Race.

The six days' bicycle race, which took place at Agricultural Hall, Islington, England, during the first week of September, resulted in a victory for the present champion long distance rider, Mr. Waller, of Newcastle-upon Tyne, who obtained the lead at mid-day of Monday, and held it until the close of the contest, winning the belt, valued at £100, and £125 in money. He totally eclipsed all his previous brilliant performances, being credited with the remarkable record of 1,404 miles 6 laps; Terront, a plucky French rider, secured second place, with a score of 1,390 miles 5 laps; Higham, third, 1,145 miles 3 laps, Cann, fourth, 1,100 miles 1 lap, several other participants making smaller scores The attendance was large and enthusiastic, especially on the last day, when 10,000 persons were present.

THE LOCALIZATION OF ARSENIC IN THE BRAIN.

The important discovery made a few years ago, says the *Lancet*, by MM. Gauthier and Scolosuboff, that arsenic administered to an animal becomes deposited in considerable quantities in the brain, has suggested to two French investigators, MM. Caillol and Livon, a further series of experiments for the purpose of ascertaining in what condition the arsenic is accumulated, whether as a simple deposit or as an organic compound. The cerebral substance contains two elements—phosphorus and nitrogen—with which arsenic has many common characters. The three bodies form similar compounds, and in many of these one element may be substituted for the other without affecting the general characters of the compound.

Phosphorus exists in the brain in the form of lethicine, it is supposed as a phosphoglyceric acid, combined with a base—neurine In the waste of the brain, lethicine probably breaks up, and phosphoric acid ultimately results and passes away by the urine. Arsenic may replace either nitrogen or phosphorus, and in the former case may form a compound analogous to neurine, in which the nitrogen is replaced by arsenic, and in the latter case the replaced phosphorus may be expected to be eliminated in undue quantity, combined with oxygen or in some organic compound. The first object of the experiments was to ascertain whether the elimination of phosphorus underwent any change during the administration of arsenic in small doses, which produced death in about a month. It was found that during the period of arsenical poisoning the quantity of phosphorus eliminated was considerably increased. It is inferred that this phosphorus must have been turned out of its compounds of the brain, but it may be thought that this conclusion is scarcely beyond criticism, for the excretion may be the result of a morbid state depending on the presence of deposited phosphorus.

CHLOROPHYL.

The green coloring matter of leaves has been recently reinvestigated by M. Frémy, and his results shed some light on the cause of the coloration of autumn leaves, although further study is still necessary to account for the manifold brilliant tints found in American autumnal foliage. M. Frémy's previous studies on chlorophyl tended to prove that it was not a simple coloring matter, but composed of two different substances—a yellow, which he named *Phylloxanthin*. and a bluish-green named *Phyllocyanic acid*. His more recent investigations have had for their object to ascertain in what condition these constituents of chlorophyl exist in the organic tissue, whether mixed or combined, suspended in the liquid, or united with the cellular tissue.

By means of experiments, which are given in detail in the *Journal de Pharmacie et de Chimie* (tom. xxvi., s. 5), but which it is unnecessary to quote here, he finds that they exist in the leaves as a mere mixture. It yet remained to ascertain whether the phyllocyanic acid existed in a free state, or combined with a base, or united with the cellular tissues by a sort of capillary affinity. Analysis showed the presence of a notable quantity of potassa. The green matter of leaves, then, can be considered as a phyllocyanate of potassa mixed with phylloxanthin.

"It has long been known," says M. Frémy, "that leaves in autumn lose their green appearance, changing to yellow, and also give off a large portion of their alkali. Now we know that this process depends upon the decomposition of the phyllocyanate of potassa."

A Successful Year.

The year 1879 will pass into American history as a year of wonderful agricultural prosperity. The cotton crop is larger by half a million bales than ever before, the tobacco crop 12,000,000 pounds greater; and the sugar crop exceeds by some 200,000 hogsheads all previous yields. These are crops which belong almost exclusively to the southern half of the republic. In behalf of the Northern States the excess of products this year over the crops of any previous year is, according to the Chicago *Journal of Commerce*, 20,000,000 bushels of wheat and from 80,000,000 to 100,000,000 bushels of corn. The hog crop also is larger this year than for a number of years past—if it be not the largest ever raised.

The Use of Spectacles Delayed.

Dr Cheatham recommends, in the *Louisville Medical News*, the use of sulphate of eserine as a means of delaying the use of spectacles, so that they will not be required for several years, this alkaloid having the power of stimulating the ciliary muscle and thus assisting accommodation. The strength of solution recommended is one grain of the sulphate of eserine to an ounce of water. One drop of this solution is to be put in the eye at night, or when required.

CURRENTS OF AMPÈRE.—Ampère asked if the molecular currents of magnets are entirely created in the magnetic substance during magnetization, or if the magnetizing cause merely determines a circulation of currents pre-existing in the metals in their natural state. He inclined to the latter opinion. The author thinks that there is every reason to admit, with Ampère, that the particular currents pre-exist in the magnetic metals, and that the current of the battery merely determines the circulation and the direction.—*M. Trève, in Comptes Rendus.*