Flax Industry---No. 3.

All vegetable fibrous materials are divided into three great classes. *Cortical fibers* of which flax and hemp are the type, derived from the bark of the stems of their respective plants; *Foliaceous fibers*, of which the "Sisal" and "Manilla Hemp," are the types, as well as the "New Zealand Flax," are obtained from the leaves and not the stalks of the stems of their several plants; hence the generic term foliaceous fibers. And thirdly, as cotton is obtained from a pod or capsule, the generic term *Capsular fibers* embraces the different varieties of cotton, and all fibers produced in like manner.

All flowering plants are divided by botanists in two great classes, called *Monocotyledons* and *Dicotyledons*, from the peculiar character of their seeds; or *Endogens* and *Exogens* from the peculiar character of their stems. The stems of all *Endogenous* plants are properly stalks, and receive their growth by increments of matter deposited from within. The stems of all *Exogenous* plants are properly trunks conical and branched; and such trunks increase by the deposition of woody matter on the outer surface. A section of a stalk exhibits a homogenous surface of porous materials, softest at the center, hardest at the circumference and *without bark*. If there is any appearance of a proper bark it is caused by the united bases of the adherent leaves, as will be seen in the palm and palmetto. A *section* of a *trunk* exhibits concentric circles of bark and wood, hardest at the center and softest at the circumference, and with medulary rays from the central pith to the young external wood. Hence plants of the first class may be at once known by the absence of *bark* from their *stalks*; and plants of the second class are always recognized by the presence of bark on their trunks.

All foliaceous fibers are derived from the leaves of Endogenous plants. All cortical fibers are the product of the bark of Exogenous plants.

In Endogenous plants the leaves have nearly parallel veins, and are generally adherents to the stalk. As examples we have the Indian corn, Spanish Bayonet or Yucca, Lily, Common Flax, Palmetto, Agave, Pine Apple, &c., &c.

In Exogenous plants the leaves have mostly branching and reticulating veins, always articulated with the stem, and hence spontaneously falling. As examples we have our ordinary forest trees, and the hemp and flax plants.

The Endogenous plants differ in their geographical distribution from the Exogenous plants, as well as in their botanical structure and mode of growth. In the Equinoctial regions, the Endogenous plants form about seventeen per cent. of all flowering plants. In the variable zone, between 36° and 52°, about twenty-five per cent.; and towards the polar circles, about thirty-three per cent. The most important substances which they produce are, *farinaceous* and *saccharine* materials and *foliaceous fibers*. The smaller grasses which yield wheat, barley, millet, &c., in terminal heads of grain; the large grass which yields maize in lateral ears of corn, and the still larger grass which yields sugar in the juice of its stalk or cane, are all well known to the world, but those Endogenous plants, whose green living leaves yield valuable foliaceous fibers, are comparatively little known, even to the scientific world.

It may not be improper in this connection to pay a tribute of respect to the memory of one of those unsuccessful but remarkable men, whose fortune and the best portion of his life were devoted to the enterprise of securing and developing in the United States that which must ultimately be productive of great agricultural and commercial wealth to the whole country. We allude to the late Henry Perrine.

This gentleman was formerly the United States Consul at Campeachy, and during a long residence in that country and in Mexico, became impressed with the immense value of the products yielded almost spontaneously by the various species of fibrous endogenous plants. In 1838 he presented a memorial to Congress, showing that the *Agave Sisalana* the *Bromelia Pita*, the plants yielding the so-called "Sisal Hemp," the *Musa textalis* and *abaca*, yielding the "Manilla Hemp," and the plants of the pineapple-fiber yielding the "grass cloth fiber," with others of a similar character, were all susceptible of introduction, acclimation, and cultivation in various portions of our southern country. He further showed that the lands best adapted to these plants, were those which were regarded as exhausted and sterile, and that after the labor of introduction, but comparatively little care or attention was required for their successful cultivation.

This memorial was accompanied with a petition, asking for a grant of a township of land in the southern extremity of East Florida, south of the twenty-sixth degree of north latitude, upon which a nursery of the fiber yielding endogenous plants might be established.

The Committee on Agriculture, to whom the petition was referred, were favorably impressed, and reported a bill granting the request of the petitioner, on the condition that the land so granted should be occupied and successfully cultivated for the desired purposes within a certain limited period. The bill was accompanied by reports both from the Senate and House, which embraced a large amount of information on the whole subject, and which is in fact, even up to the present time, almost the only American publications to which any reference for information can be made.

The township of land having been obtained, Dr. Perrine earnestly devoted himself to the prosecution of the work. The various plants were imported at great expense from Central America and the West India Islands, and soon the nursery or plantation was in a forward and flattering condition. Dr. Perrine did not, however, confine himself to the introduction of the fiber-yielding plants alone, but introduced in addition the pimento, the cochineal cactus, the cassave, the ginger, the banana, the sarsaparilla, and various other well-known tropical and semi-tropical vegetables and plants. His idea and purpose seems to have been that, gradually these exotics would become acclimated, and become extended throughout the whole south, in the same manner that the cotton plant, sugar cane, and indigo had been in years previous.

Unfortunately, however, at the very time when the noble undertaking seemed to give the greatest promise of success, the Florida war broke out, and the plantation, situated in the heart of the then Indian country, was necessarily deserted. Dr. Perrine was forced to fly for his life, and abandon everything. Returning subsequently to watch the progress of his plants, he was surprised by the Indians and massacred, and from that time the undertaking was abandoned. Many of the plants, especially the *Agave Sisalana* have remained, become acclimated, and spread over a considerable extent of country. Specimens found in the vicinity have been brought to the north within a recent period, which furnished an uninterrupted and continuous length of fiber, superior in every respect to the best manilla hemp, of upwards of ten feet. There can moreover be no doubt that this enterprise might still be successful, and had it not been for his untimely death, would have probably been carried out by its originator.

With these brief remarks we shall now leave for the present the subject of the Endogenous fibers, and in our next return to the consideration of the *Linum Usitatissimum.*

Cause of Explosions.

In the "Scientific American" of the 8th April, there is an account of the explosion of the steamer "Reindeer" at the first turn of her wheels, &c., there is also in the "Scientific American," of the 24th of September last the criticism of an engineer upon Lieut. Hunt's theory, published by you in the No. for the 3rd of September previous. My idea of the cause of explosions in the main are the same as those of your engineering correspondent, and so must any practical man's. Upon that basis I wish to demonstrate the cause of the explosion referred to, and all similar negligences. When water is below the flues or tubes as the case may be, and the engine stationary, the pressure of steam keeps the water solid and below the flues, but upon the instant action of the engine, the pressure is released, and the water flows over the exposed surfaces of the flues, and the awful results of an explosion follow, so that you perceive explosions can and do take place without any action upon the part of either the force pump or the "doctor," for it is not a general thing for an engineer to put on his water until he has got under weigh, attended to his fires, &c.

One of the Fraternity.

Washington, April 23rd, 1854.

[For the Scientific American.]

Explosion of Boilers—Inspectors, &c.

Being a constant reader of the "Scientific American," I have been much instructed, and often amused, by the remarks you have made, and the ideas put forth by your correspondents, particularly in relation to the late steamboat law, passed August 30th, 1852.

In No. 30, April 8, you have a well-considered Editorial on "steamboat disasters," in which you attribute a large share of those late accidents in the West, to the Inspectors, and "call upon the Government to appoint a commission to investigate their conduct," to which I say *yes*, let the commission be issued at once, as due to the relatives and friends of the lost and wounded; to the community at large, and to the Inspectors themselves. Such a commission must result in good, by comparing the results of practice, as seen and observed by our practical Engineers and Mechanics, with the rules and data laid down by Theorists—as determined by experiments and this collection of valuable information that cannot otherwise be obtained; all of which are highly important and essential to the adoption of laws, rules and regulations, to guide the Mechanic and Engineer having in charge so dangerous an element as steam has proven itself to be. As one of the Inspectors at this place, I feel called upon to unite with you in your call for a commission of investigation, and doubt not but all other Inspectors have no objection to it.

In your last number, April 15, you again allude to the subject, and quote largely from an article in the St. Louis "Intelligencer," which is based on the testimony taken before Commissioner B. F. Hickman, in the investigation into the causes which led to the explosion of the steamer "Kate Kearney." There is only one point in the report alluded to that I wish to call your attention to and that of your readers, viz.: "It was proved that the 'Kearney' boilers bore, some months ago, a pressure by this test (Hydrostatic), of 190 pounds to the inch, 100 being her working limit by law."—This is a mistake certainly, so far as the limit of pressure to 110 pounds is concerned, for Mr. McCord, the Inspector, states that she was allowed 155 pounds, based upon the test of 190. Now the article from the "Intelligencer," and upon which you base some reflections as to the value of the hydraulic pump, places the Inspectors in a wrong position, and thus gives an opportunity to condemn the pump, as an auxiliary to prevent explosions; and requires an explanation as to the authority in this late law for the Inspectors to depart from 110 pounds per inch, as the maximum working pressure allowed, on a 42 inch diam. boiler and made of iron $\frac{1}{4}$ inch thick. The law referred to, 3rd clause, section 9, says that the maximum working pressure allowed on all boilers hereafter built, shall be 110 pounds to the inch, based upon a hydrostatic test of 165 lbs.—or 50 per cent above the working pressure, and thus provides, "that with boilers heretofore made, the Inspectors may depart from these rules, etc., but in no case shall the working pressure allowed, exceed the hydrostatic test." The Board of Supervising Inspectors, at their meeting, gave no construction to this "proviso," as to the amount of pressure to be allowed on boilers heretofore made, but instructed the Inspectors "to put the test at least 15 per cent above the amount of pressure allowed." The Local Inspectors have generally adopted 160 pounds as the maximum working pressure on boilers heretofore built; it is in this the evil lies, and not in the pump, or the incompetency of the Inspectors, as producing these deplorable accidents. But the Inspectors could not well do otherwise than to allow this amount of steam, say 160 lbs., for nearly all our Western boats were in the habit of carrying that pressure, and some as high as 200 lbs., for upon such calculations of pressure were the boilers and cylinders proportioned, at the time this law went into operation. Hence the Inspectors were compelled to depart from the 110 lbs. rule, in order to avoid the loss and total destruction of very many valuable boats, and in doing so, fixed a limit beyond which the engineers should not go, and often below what had been previously carried. The hydraulic pump has detected defects in boilers and flues in several instances. In one case at St. Louis, the shell of the boiler gave way at a pressure of 190 lbs.; in another at Cincinnati, the flue of a boiler $13\frac{1}{2}$ inches diameter, 3-16 inch thick, collapsed at a pressure of 170 lbs. Who can say, but in these two cases the terrible consequences resulting from these disasters have not been averted? Because explosions of boilers and collapses of flues have taken place where the test has been applied, this is no argument against the hydraulic pump—imperfect as it is; for it is very easy to destroy the tenacity of the iron in the shell of the boiler, and the circle of flues of boilers, in one trip of the boat, after the test has been applied, in which, if it were possible for the Inspectors to be informed of such a state of things, and which has no doubt often occurred, the Hydrostatic pump would certainly detect it, particularly the defect in the flue.

But I am glad you have called attention to this pump, and drawn the attention of our engineers to the distinction between pressure slowly and gradually increased, and the sudden generation of it,—applied either to steam pressure or hydraulics. The pump is deficient in this respect; still it has the power, if our boilers and joints could only be made tight; as it is, the leak, is in most instances equal to the capacity of the pump. These remarks have been extended beyond what I anticipated at the beginning; but the subject is interesting, and there are so many points involved in any discussion, relating to explosions, that it is impossible to do justice to any particular requirement of this law without connecting others.—Thus it is, that in your remarks about the pump, you allude to a sudden power, in the generation of steam from "static to dynamic pressure," as a cause of explosions, which involves some other requirements of this law, such as the fusible alloy and the capacity of the engineer. That this sudden decrease of steam pressure takes place, and is produced by the opening of a valve, has been practically demonstrated; and that it is the last act in the drama preceding the explosion, is equally clear; the amount of power depends upon the amount of water thus suddenly converted into steam, and the space in which it is confined. The question now arises, how far does this sudden increase of power affect the temperature of the boiler and its contents, water and steam, and can the fusible alloy be so compounded, and used, as to meet this immediate difficulty, depending as it does upon temperature for its action—so as to prevent an explosion? Upon these points, we of the West would like to have your opinions, with a view to a better understanding of the causes of explosions, and to further legislation. Yours, W. W. Guthrie.

Cincinnati, April 23.

Growing Cucumbers.

The following from an exchange we have tried and proved:—Take a large barrel, or hogshead; saw it in two in the middle, and bury each half in the ground even with the top. Then take a small keg and bore a small hole in the bottom; place the keg in the center of the barrel, the top even with the ground, and fill in the barrel around the keg with rich earth, suitable for the growth of cucumbers.—Plant your seed midway between the edges of the barrel and the keg, and make a kind of arbor a foot or two high for the vines to run on. When the ground becomes dry, pour water in the keg in the evening—it will pass out at the bottom of the keg into the barrel and rise up to the roots of the vines, and keep them moist and green. Cucumbers cultivated in this way will grow to a great size, as they are made independent both of drought and wet weather. In wet weather the barrel can be covered, and in dry the ground can be kept moist by pouring water in the keg.