

THE
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PLANTERS' LABOR AND SUPPLY COMPANY.

INCORPORATED MARCH, 1882.

OFFICE—HONOLULU, HAWAIIAN ISLANDS.

ANNUAL MEETING IN OCTOBER OF EACH YEAR.

OFFICERS ELECTED OCTOBER 12, 1885.

S. B. DOLE.....President	L. A. THURSTON.....Secretary
H. P. BALDWIN.....Vice-President	J. B. ATHERTON.....Auditor
P. C. JONES.....Treasurer	

TRUSTEES ELECTED OCTOBER 12, 1885.

DOLE, S. B.	BALDWIN, H. P.	ROWELL, W. E.	WILCOX, G. N.
HALSTEAD, R.	GLADE, H. F.	MACFIE, R. A. JR.	ATHERTON, J. B.
JONES, P. C.	THURSTON, L. A.	HORNER, W. Y.	HORNER, J. M.
CASTLE, W. R.			

COMMITTEES OF THE PLANTERS' LABOR AND SUPPLY CO.

APPOINTED OCTOBER 13, 1885.

W. H. Bailey,	E. M. Walsh,	LABOR. J. K. Smith,	R. R. Hind,	S. L. Austin.
G. H. Dole,	C. Koelling,	CULTIVATION. A. Lidgate,	W. H. Rickard,	G. N. Wilcox.
James Renton,	C. F. Hart,	MACHINERY. T. H. Davies,	W. Y. Horner,	J. Ross.
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J. H. Paty	Z. S. Spalding,	LIVE STOCK. A. S. Wilcox,	A Dreier,	B. F. Dillingham.
H. M. Whitney,	E. G. Hitchcock,	FORESTRY. C. R. Bishop,	J. Alexander,	W. H. Purvis.
H. P. Baldwin,	E. C. Bond,	FERTILIZERS AND SEED CANE. E. H. Bailey,	R. Halstead,	A. Fayo.
A. H. Smith,	E. G. Hitchcock,	VARIETIES OF CANE. W. H. Purvis,	G. C. Williams,	G. F. Holmes.
B. F. Dillingham,	W. F. Allen,	STATISTICS. C. S. Kinnersley,	H. W. Mist,	C. M. Cooke.
E. Lycan,	Jonathan Austin,	FRUIT CULTURE. C. Koelling,	W. P. A. Brewer,	E. H. Bailey

EDITORIAL AND GENERAL.

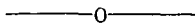
POLITICS AND THE PLANTERS.

There are those in the community who cry out whenever an article appears in this journal on political or kindred topics, that it is invading foreign ground, and should confine itself to the discussion of how to grow cane. It is not at first sight, and perhaps not at all, evident where these censors acquired the right to say what shall and what shall not be discussed herein. As the planters may not be able to continue growing cane unless they do take some interest in the politics of the country, a word on that subject will not be amiss.

Within two months from this issue the election for Representatives will have been held and the character of the next Legislature determined. The organ of the Government, or perhaps more properly of Mr. Gibson, says that "the Government are certain of a large working majority in the next Legislature." It is proper to inquire how and why there is such a certainty. Is it because the present method of conducting the affairs of the country commends itself to the community at large and the tax-payers in particular? Or is it because that with all the machinery of government at their command and every part compelled to do its utmost, the Ministry feel sure of the result? It will not take long for the reader to answer these questions. A very short residence in almost any part of the country will impart knowledge of the extreme efforts being made in every district to enforce the return of the Government candidate. And who are these candidates? Without going over the list, reflection will show that they are men who, as men, do not stand high; they are not regarded in any of the communities where they are known as being worthy of credit in word or purse. They are either in the direct pay of the Government or dependent thereon, or are members of the Executive. They are men in many cases whose official positions demand their constant presence in the districts where they reside. They cannot leave and remain for weeks or months in Honolulu without great inconvenience to the community, and in some cases without denial of right to citizens or residents. But last and most important of all, they are men who will do the will and bidding of the Cabinet; or possibly, as in the past, of the King as opposed to his Cabinet. In short, the election of such men as these—as Kamahele, Nahinu, Kaulanano, Kaulukou and others, means only a subservient and servile House. It means the enactment of such laws as suit the dominant individual and without reference to the public needs. It means the rash and wicked appropriation of the public funds for useless and foolish purposes and the neglect of the public needs.

As the *Advertiser* truly says, "it is about time property owners took this point into consideration and made their views and wishes known to the

country." "Heavy tax payers are entitled to consideration, but they do not seem to make their influence felt." It is true that heavy tax payers do not make their influence felt, but there are so many and cogent reasons why they cannot that the sentence from the *Advertiser* sounds like a taunt. Possibly it was so intended. As voters the heavy tax payers are a very small minority, and the recognized organ of the ministry, the *Elele*, industriously and continually arrays the Hawaiian and poorer classes against the property owner, whereby their influence is rendered even less than it might be. It is indeed time that the property owners of the country aroused themselves, to protect property rights, for their own salvation and for the well-being of the nation. The planters care very little who governs the country provided public affairs are administered for the equal good of all. Much is said of attacks on Mr. Gibson. In some senses they are unnecessary, for his record speaks for itself. So far as the planters are concerned Mr. Gibson can govern till doomsday, provided the government is good. But what interests all tax-payers, and all others who have interests of any kind, is to have good and economical government. In some senses the election must be a declaration by the thoughtful and conservative portion of the community of their judgment of the Administration. If, in the opinion of such people, the record of the present Administration has been for economy and the general welfare and opposed to useless and foolish display; if the public funds have been carefully and wisely disbursed and in accordance with the laws of the land; if the foreign and internal policy has been such as to earn approbation from without as well as from within, then let such cast their votes and their influence for the Government candidates. But if on reflection such people pass judgment—and it is the duty of the citizen to try and pass judgment on the Administration—against the methods and results of government, then they should vote for a change, and are in duty bound to exert all their influence for the defeat and retirement of the offending administration. It is not necessary to review the several acts or omissions of this Administration. Its history is too recent and is too well known to require comment. Its disgraceful actions in the present campaign are comment enough on the past. The Cabinet well knows that if the electors gave an open and unprejudiced vote the result would be overwhelming condemnation. This article simply calls on all who have property interests for action.



The Louisiana *Sugar Bowl and Farm Journal*, edited by Mr. J. Y. Gilmore, has just entered upon the 16th year of its publication. Originally devoted to the sugar industry, it has extended its sphere and now embraces in its scope all crops which can be profitably cultivated in Louisiana. The *Sugar Bowl* is a live paper, and is one of the most valued of our exchanges. We can heartily recommend it to all planters as a source of valuable information concerning the sugar business. Its address is 6 Camp St., New Orleans, La. Terms, \$3 per year, in advance.

THE SUGAR INDUSTRY IN MEXICO.

The *Sugar Beet* furnishes the following information on the above subject. Mexico has great possibilities as a sugar centre. The disturbed political condition of the country and the lack of capital are all that keep back the industry :

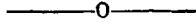
At one time, however (1803), when Humboldt spent several years in Mexico, making there numerous observations, the total exportation of sugar, as asserted by him, was 14,000,000 pounds. This had fallen to 500,000 pounds in 1881. The total production of sugar and molasses of all kinds produced in the Republic of Mexico is 154,200,000 pounds, thus showing that the sugar production in that country is, even under existing circumstances, well worthy of consideration. As nearly one-half of the entire population are Aztecs or a poorer class, the demand is for a special sugar, the quality of which would not be appreciated in other countries. Its color would be difficult to define. It has considerable sweetening property and is cheap, being sold to the inhabitants at a very low figure, and, although crude and direct from the moulds, it is preferred thus by many of the many of the most wealthy class. The sugar cane actually grows wild in several parts of Mexico. It may be planted any month of the year in the warmer zone, thus having the advantage of permitting crushing to continue at all seasons night and day; the crop may, consequently, be sown at various times, and as soon as one portion is harvested the other is ready to be worked. There are but few varieties of cane planted in the country; the one most in favor has been brought from Havana. Many planters consider that the future of sugar cane cultivation in Mexico promises better than coffee growing, and efforts will possibly be made to abandon a crop having a bad reputation, for a plant the scientific growing of which in that special clime is yet in its infancy.

One of the most interesting plantations is located at Jalapilla, about two miles from Orizava. The said plantation belongs to Senor Bringos, and for seven or eight miles around the mill, sugar cane is growing. In consideration of the fact that many Mexican farmers grow tobacco, etc., the land cannot be entirely utilized for sugar cane during the whole year, but as soon as the various crops are harvested the planting of the cane on the same soil commences, and when the sugar cane matures the mill works night and day. The factory is located on a stream from which the motive power is obtained; the turbine wheel works two three-roll horizontal crushers of an old type, these having given satisfactory results for the past thirty years.

The various operations are most simple; the carbonization, concentration, etc., are all done in open pans, heated with copper coil at the bottom. The juice being very pure, no other than bag filtration is necessary. The sirup, when of the desired density, is ladled into earthen moulds of about fifty pounds capacity, and these have each a small hole in the bottom, whence the molasses percolates, when the crystallization of the sugar is complete. If one grade of sugar only is made, of a quality suited to the Mexican demand, the resulting molasses is taken at once to the rum distillery; the product, after being fermented, is distilled with excellent results. Besides the principle one, three grades of sugar are made, and the so-called claying process is adopted. The moulds are filled with sirup and subsequently covered with a solution of clay and water; the resulting molasses forms a basis for second grade sugar, etc.

The success of this sugar mill has been so great that preparations are

being made at present to double its capacity, and a large portion of the machinery therefor is now erected in a separate building. The heads of the cane stalks are cut off and fed to cattle. The fuel used is the refuse bagasse. At times they are obliged to resort to cornstalks, which have been dried in the sun. Labor is very cheap in Mexico, viz, about forty cents per diem, and in this item alone renders the sugar production there most profitable.



OZIER WILLOW CULTURE.

The following from the Louisiana *Sugar Bowl*, suggests another industry which might be introduced here. The prices named certainly leave a large margin for profit.

A new industry, which is admirably adapted to the low lands of Louisiana and promises remunerative returns, has been inaugurated on Saxonholm plantation, St. Bernard parish, by Mr. B. S. Story. It is the culture of the ozier willow, the plant which furnishes the material for basket-making, and hitherto almost exclusively imported from Switzerland. Since eight to ten million dollars worth of willows are annually imported for this purpose, Mr. I. C. Plant, President of the First National Bank, of Macon, Ga., a few years ago conceived the idea of saving this vast amount of money to our country, and imported a lot of cuttings from Switzerland which he planted on his farm. He now has about 500,000 plants on his place, and is doing a good work for the country by selling cuttings to all who desire them. He is likewise preparing a portion of his crop for market, as experience has shown that from one to two tons of willows, worth \$200 per ton at present, can be grown the second year and it will double its product each year for some time. The bark is removed by a stripper of his own invention, costing but \$10, at a cost of \$6 to \$8 per ton, and the bark and leaves, when dry, sell readily for 25c per pound for medicinal purposes. Thus it will be seen that for those who first engage in this industry there will be large returns, and we presume the production of the ozier willow in our country would cause it to be more generally employed for furniture, carriage bodies and for many ornamental purposes.

The ozier willow has no branches, and can be split from one end to the other with ease. If planted near the common willow, it *will* have branches. Cuttings will do well put out any time from the middle of November to the end of March. They should be put in rows five feet apart and a foot distant in the row. They should never be cut from July to September, inclusive, as, if done, a worm attacks the plant and kills it. The surest way to get rid of the common willow is to cut in August, allowing the trees to fall on each other. Worms then destroy them effectually. The willows can be stripped at any time, by wetting and using Mr. Plant's inexpensive machine.

Mr. Story last April put out 5,000 cuttings, but as it was late in the season and there was delay in their transportation, the bulk of them dried up and would not grow. However, he will plant all his cuttings this winter, and there is no doubt that he will next season have a good stand, since the ozier grows as well as the common willow and of course need be planted but once.

BEEET-ROOT SUGAR IN WASHINGTON TERRITORY.

A late Seattle paper states that a joint stock company* has been formed and articles of incorporation filed under the name of the Valley Sugar Company, for the purpose of introducing the beet sugar industry into Washington Territory. Mr. E. Meeker has been appointed manager of the Company, and instructed to canvass among the farmers and contract for 25,000 tons of beets per annum for five years, the price fixed upon being \$4.50 per ton. Already 8,000 tons per annum have been promised. Measures have already been taken to secure a site for a factory opposite Alvord's place, White River, so that freight can be taken to and from the factory either by the river route or by rail. The size of the works contemplated is sufficient to turn out 50,000 pounds of sugar per day. Mr. Meeker says:

"I recently visited Germany for the purpose of investigating the beet sugar industry there, and to ascertain by comparison if it would be practicable to inaugurate the industry on Puget Sound. I found that sugar was there being produced from beets as cheaply as it is in any of the cane sugar producing regions in the world. From years of study and research, and a large outlay of money in traveling and investigating the subject, I am convinced that we can manufacture sugar here as cheaply as they do in Germany, and consequently can compete with any sugar producing region on the continent. In California the manufacture of sugar from beets is being made a success. The Puget Sound country is admirably adapted to the production of sugar beets. Mr. Alvord has for five years raised sugar beets, with an average yield of 20 tons per acre. I raised 65 tons last year on two acres of land on my White River farm. The average in Germany is from 11 to 14 tons per acre. All the valley land on the Sound is adapted to the raising of sugar beets. To all farmers desiring to raise beets for the factory we will furnish seed at cost. Twelve pounds of seed will plant an acre of land. Skilled labor will be furnished from Alvarado, California, to build and operate our factory for two or three years."

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THE LOUISIANA DIFFUSION EXPERIMENT.

As was announced in the last MONTHLY, the diffusion experiment with sugar cane to be conducted by the Agricultural Department of the United States Government, has been postponed until next year, owing to certain mechanical difficulties arising from the construction of the battery in use. A preliminary experiment was tried, however, with sorghum, at the Franklin Sugar Works at Ottawa, Kansas, with very encouraging results. The yield of sugar from the cane was more than 99 per cent., only twelve one-hundredths of one per cent. being left in the waste waters and exhausted chips. The following is a summary of Prof. Wiley's report as prepared by himself:

The general results of the experiments at Ottawa, Kansas, in sorghum sugar manufacture may be summarized as follows:

(1.) By the process of Diffusion more than 99 per cent. of the sugar in cane was extracted, and the yield was fully double that obtained in the ordinary way.

(2.) The difficulties to be overcome in the application of diffusion are wholly mechanical. With the apparatus on hand the following changes are necessary in order to be able to work 120 tons of cane per day:

(A)—The diffusion cells must be made just twice as large as they are now.

(B)—The opening through which the chips are discharged must be made as nearly as possible of the area of a horizontal cross section of the cell.

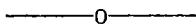
(C)—The apparatus for delivering the chips to the cells must be remodeled so as to dispense with the labor of one man.

(3.) The process of carbonization for the purification of the juice is the only method which will give a pure, limpid juice, with a minimum of waste with a maximum of purity.

(4.) By a proper combination of diffusion and carbonization our experiment here demonstrated that fully 95 per cent. of the sugar in the cane can be placed on the market.

(5.) It is highly important that the department complete the experiment so successfully inaugurated by making the changes in the diffusion battery mentioned above, and by erecting in connection with it a complete carbonization apparatus.

A suitable plant is now being constructed for experimenting on sugar cane, of the capacity and nature indicated by the above trial to be necessary.



THE YARYAN SUGAR APPARATUS.

(From the *Sugar Bowl*.)

NEW IBERIA, May 20th, 1885.

J. Y. Gilmore, Secretary Sugar Planters' Association, New Orleans:

DEAR SIR.—In answer to your inquiries in relation to the working of Yaryan's Evaporating Apparatus, during the last year's operations upon the Morbihan plantation, I have little more to state than what is contained in a printed circular addressed by me to the sugar industry, a copy of which you will find herein enclosed. I sincerely regret that so few persons availed themselves of the cordial invitation extended to them, through me, by the inventor of the apparatus, whilst in practical operation. As stated in the circular, the Yaryan Apparatus was only used as an adjunct to the machinery already in position and in use in the sugar house. It was used in lieu of three eight feet open steam evaporators, doing the work as rapidly as was required, and reducing the defecated juice from six open steam clarifiers, 6 ft. 2x6 ft. 4, 30 inches deep, into sirup, of not less than 23 density, for granulating in the vacuum pan. This work was accomplished *without the live steam, entirely with exhaust*, as stated in the circular. Owing to changes required, on two or three occasions, in the machinery, it became necessary to resort to the use of the open evaporators, when two additional boilers, 44 in. diameter, 26 ft. long, with four flues in each, were required. Whilst using Yaryan's Apparatus, only four boilers of same make were required to run the whole sugar house.

The economy of fuel, under the circumstances, was plainly established as being equal to 33½ per cent. Besides the economy in fuel, the saving, by inversion, from the high temperature in evaporators, contrasted with the temperature in vacuo as practiced in the Yaryan Apparatus, must be considerable, to say nothing of the coloring which a high temperature

must impart. Owing to the use of iron pipes (feed and discharge,) the sirups in their rapid transit through them were slightly colored by salt of iron. This defect in the experimental machine Mr. Yaryan proposes to remedy.

Not having used the granulating chambers which form a part of the Yaryan Apparatus, I can only speak of it as an evaporator. As a double or triple effect it can have no superior *in cost, rapidity and simplicity of work and economy in fuel.* After evaporating 250,000 gallons of defecated juice the copper pipes showed *no indication of coating, but were, on the contrary, brighter than when first put in use.* That the apparatus will do all that is claimed for it—i. e., each coil will evaporate 200 gallons of cane juice to sirup of 258 Baume, per hour—I feel confident can be accomplished.

The price of the apparatus, as quoted February 15th, 1885, I find was—

One coil, capacity 150 gals. per hour (water),	\$1500
Two “ “ 300 “ “ “ “	2500
Three “ “ 450 “ “ “ “	3300
Four “ “ 600 “ “ “ “	4000
Five “ “ 750 “ “ “ “	4500
Six “ “ 900 “ “ “ “	5000

Each additional coil..... 500

The apparatus arranged as double effect of the same capacity as above, 50 per cent. additional.

The above prices included delivery at New Orleans, and the erecting machinery in sugar houses by skilled mechanics, furnished by the inventor. Freight from New Orleans to the plantation, framework to support apparatus and foundations for pumps, at the cost of the purchaser.

But for the depression which has pervaded the entire sugar industry of Louisiana, I feel confident that the Yaryan Apparatus would have attracted universal attention, and received, on account of its undoubted merits, the patronage of the sugar industry to an extent even greater than has been extended to it by such manufacturers, in the West, as are using it in the concentration of fruit juices, glue, glucose, milk, wort, extracts of meat, bark, dyewoods and the like. For one, were I to continue in the manufacture of sugar, I would not be without the Yaryan evaporators, as double or triple effect. The only objection urged by those who witnessed its operations, whilst in practical use, was: How could the cane juice be thoroughly defecated? Of what use are defecators if cane juice cannot be thoroughly defecated, and if the work is to be done over in the evaporators? The high temperature and rapid ebullition in the latter precludes, without loss of time, the continued cleaning of juice. As used in the Morbihan sugar house, the Yaryan evaporator required that careful clarification without which no clean-grain sugar can be obtained. An intermediate mechanical filter, which Mr. Yaryan proposed to introduce, would do away with all danger of imperfect clarification. An intermediate charging tank, arranged as a clarifier, might overcome the only objection urged by such as believe that perfect clarification cannot be obtained, in the first instance, in the defecators. These, with the change of iron into copper pipes, would no doubt prove valuable adjuncts to the machinery, and tend to the perfection of the same. That the inventor will, if encouraged by the sugar industry, make such changes as will overcome all objections, I am confident.

Respectfully yours,

A. DUPERIER.

DOUBLE CRUSHING.

The following article is published in the *Sugar Cane*, and is there stated to be written by J. W. A. Van Soest, although the locality in which his experiments were conducted is not stated. The results obtained by different setting of the mills is worthy of investigation.

"When the megass is treated with water or steam on its way from the first to the second mill, it is usual to extract as much juice as possible while the cane is passing through the first mill. This means an extraction of juice equal to, say, 68 to 70 per cent. from the first mill. After such a severe crushing it is evident there is no "vehicle" left to take up the remaining portions of the soluble sugar, and the necessity for wetting or damping, by means of either steam or water, becomes at once apparent.

"During the last four seasons I have followed a different method of working. I prefer to pass the cane through the first mill with the rollers set up rather easier than usual, and to permit the megass to pass on to the second mill with sufficient moisture left in it to make it clearly advantageous to press a second time.

"When I subject the cane to a single pressure in two independent mills, working in the ordinary way, I obtain juice equivalent to 70 to 71 per cent., but the yield is found to be from 136,000 to 144,000 liters only in the day of twenty-four hours. On the other hand, when the cane is passed lightly through the first mill, and then the megass thoroughly pressed in the second mill, the amount of juice is raised to 192,000 liters, and the percentage extracted is increased to from 75 to 78 per cent.

"When double crushing in the manner just described there is not only a better extraction of juice from the cane, but, in addition, the amount of cane is dealt with in a shorter space of time. The greater part of the juice is expressed in the first mill, while the second mill ensures the extraction of as much as possible of the juice remaining in the partly crushed megass. With single crushing I have never been lucky enough to obtain 75 to 78 per cent., but could only ensure 70 to 71 per cent. by very careful attention to the regular feeding of the mill, to the maintaining of a steady pressure of steam, and at the same time running the mill more slowly than usual.

"The loss of time just indicated is most important, and when running slowly, and crushing heavily, the danger of breakdown is much increased.

"I have been informed that several sugar planters have followed my method of working with more or less success, but most of them secured practically the same results as myself.

"I have never attempted to damp the partly crushed megass with either water or steam, as it has always been my conviction that no satisfactory result would arise from so doing. It has always been my impression that the disadvantages would greatly outweigh any slight advantages which might result. It would certainly be an advantage if some one would make careful experiments to show what improvement results from the addition of either steam or water.

"Careful tests are the best evidence on all these points. Now is the time when careful experiments should be made and the results made public."

As the writers says, careful tests are the best evidence. The experiments made by Dr. G. Martin on this point have been published in the *Monthly*, but the subject seems to be of sufficient importance to bear reiteration, and Dr. Martin's figures are republished. They are as follows:

Analysis of 100 lbs. of trash from five-roller mill at Waiakea, hot water being ejected in a spray upon the trash as it leaves the first rollers, diluting the juice from the second mill to half the density of the first :

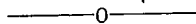
Fibre and mineral.....	42.16 lbs.
Water	56.76 lbs.
Sugar left in trash.....	1.08 lbs.
	100.00

Analysis of trash from five roller mill at Spreckelsville, without application of hot water :

Fibre and mineral	39.12 lbs.
Water.	55.00 lbs.
Sugar left in trash.....	5.88 lbs.
	100.00

This shows 4.8 per cent. more sugar left in trash from double crushing at Spreckelsville without hot water than there was at Waiakea with double crushing and hot water.

The recent trials at Kohala, published in the MONTHLY, have still more strongly demonstrated the advantage of maceration over dry grinding, although as Mr. Castle has shown, the question of fuel has to be taken into consideration.



ENGLAND'S POSITION CONCERNING SUGAR BOUNTIES.

The export bounty, or subsidy system, inaugurated by Germany and followed by France and other European sugar producing countries, and latterly by the United States, has for several years been creating great distress in England, by depriving thousands of workmen in the sugar refineries and kindred industries of work. The extent to which the bounty fed sugar is competing against the English free trade refined sugar has been prominently brought to notice by the importations from the United States, which are as follows:

1882, without bounties.....	2,000 tons.
1883, partly with bounties.....	6,200 "
1884, wholly with bounties.....	52,000 "
1885, for six months only.....	73,000 "

The well known free trade policy of England has left her refiners an easy victim to the subsidized foreign refiners, and has resulted in a widespread and increasing demand that the government impose countervailing specific duties on all bounty aided sugars, all other sugars, British or foreign to be admitted free.

This course has been advocated by mass meetings, by addresses to Parliament, by resolutions of associations, and by delegations to the Ministers. It is claimed by those who advocate the countervailing duty system that this is not a departure from free trade; but in aid of it, in that it is levied only upon that sugar which has received a bounty, and the duty is to be fixed at the same amount as the bounty which has been received. The system therefore will deprive the subsidized sugars of the advantage which they now possess over free trade sugars, and once more give English refiners a chance for fair competition. This reasoning has been fast

gaining adherents, but the late government could not be induced to do more than expostulate with the bounty paying governments against the propriety of their conduct. The present administration has however taken the matter up in earnest, and it is not improbable that the unfamiliar spectacle of England passing an import duty law for the purpose of protecting a home industry will be seen. An immense delegation of representatives from industries interested in sugar production and manufacture, waited upon Lord Saulsbury, on the 7th of September, urging the subject upon his attention. His reply was energetic and to the point. It was as follows, which we take from the *Sugar Cane*:

Gentlemen, I do not need the presence of so important and influential a deputation as this to convince me that this is one of the gravest questions with which we have to deal in our time. I know well all the suffering which is being endured on account of the present condition of trade. I have no sympathy with those who tell us that you make a mistake and that your trade is not depressed, and who are ready to prove to you by figures that you are getting on very well. My impression is that those who wear the shoe knows where it pinches. I do not doubt—I cannot doubt—that a severe blow is inflicted on our British industry by the creation of a large amount of purely artificial competition. (Cheers.) It is very sad to see a great industry withering from such a cause. But when you ask me what remedy I should apply, I would offer some plea on behalf of the office I represent. Year after year now for many years the Foreign Office has been appealed to to put a stop by negotiation to this evil, as though there were some magic in negotiation, and that by much despatch-writing you could do what you like. The matter does not lie with the Foreign Office. It lies all in the question whether you are or are not absolutely precluded by principle from adopting any kind of countervailing duty. The matter is there as in a nutshell; and that is not a matter for the Foreign Office, it is not a matter for the Ministry, it is now a matter for the Parliament which is verging to its close and which can undertake no more business, it is a matter for the constituencies of the country. (Loud cheers.) Mr. Peters, I think, told us that the public was on his side. Well, the widest possible public will have the freest possible means of expressing its opinion, and if the public is on his side there is little doubt what the result will be. But do not imagine that the Foreign Office can help him unless the public make up its mind on this great question. I remember reading in one of the papers in connection with this question, I think about a year ago, that the late President of the Board of Trade directed a reply to be sent to a Gentleman in this room to the effect that he was willing to have a conference to negotiate on this question on one condition only, that every idea of countervailing duty beforehand was abandoned. (Laughter.) Now, with great deference to so great a name, that seems to me the very last position which we can adopt. (Cheers.) If it is the will of the people of this country that the principles which are involved in the idea of reciprocity, and countervailing duties, and so forth, are absolutely inadmissible, that they are wrong in principle, and that no shred of them must ever be admitted, if that is the will of the people of this country, be it so; but, then, any evil that the bounties do, will continue, and you must not expect that any negotiations or any power the Foreign Office can exercise will put a stop to the evil. Asking us to go into negotiations when we are absolutely bound by the accepted doctrines of the day to propose no countervailing duty is imposing upon us a harder task than Pharaoh's taskmaster's ever imposed. You are asking us to make bricks without straw, to go into the market and buy without money, to go to war and

fight without weapons. What is the use of our going to foreign Powers? Do you imagine that supplication, or preaching, or exhortation, or lectures, or political economy will affect their policy? Would it affect any of yourselves? What would you be affected by if somebody came to bargain with you? By something that would appeal to your interest one way or another, and foreign Powers are very much like individuals. If it is the pleasure of the people of this country to give to the Foreign Office the power of saying this—"Unless you are able to find some means of alleviating this which we conceive to be an injury, it is in our power, and we shall exercise that power, of raising a countervailing duty." If a negotiator were able to go into the negotiations with that message I have no doubt the negotiations would assume a satisfactory aspect. (Cheers.) But if you send him into negotiations announcing to all the world beside that he can do neither harm nor good, that he is tied up in his own theories, that he is absolutely powerless, that he has nothing in his hands but lectures of exhortation and supplications, you might well spare yourself the trouble, and the somewhat humiliating attitude you will have to assume. And now I hope that this matter will really be grappled with. The British public, if they have a fault, is that of imagining that they can enjoy simultaneously the advantages of two totally opposite systems. People seem to imagine that they can enjoy whatever the advantages are of absolutely denouncing the countervailing duties, and also the advantages of exercising that influence on the minds of foreign countries which a fear of countervailing duties would exercise. It is not so. You must make up your minds what course you would follow. It is not with us, it is not with any individual statesman, it is not with any particular party, but it is for the electors of this country to determine what line we shall take on this great question. It is with them to decide the issue which you have presented to me to-day. I do not wish to pronounce dogmatically on a matter which the Royal Commission that is shortly to be appointed will no doubt examine to the bottom. My own view is, and always has been, that the power of modifying your fiscal system in order to defeat any oppressive action on the part of foreign countries is a power which ought very rarely to be exercised, but which you ought to possess, and if you are known to possess it will be very seldom necessary for you to exercise it. (Cheers.) I am very far from advocating a general practice of retaliatory tariffs, and still further from advocating anything approaching to Protection, but I believe that freedom from self-imposed trammels of particular theories is necessary if you mean to deal with the world as it is, and with the statesmen of this present time of foreign countries who are animated by principles very different in these matters from yours; and it is only by a free and bold action in this respect that you will obtain the equality between industries which is your natural and legitimate desire. I earnestly hope that the people of this country will think over these matters, and I hope that in some way or other foreign Powers may be induced to abandon this system of bounties, which is not in the long run good for themselves, and which is so deeply injurious to us. I can assure you that with whatever weapons you are pleased to put into their hands the Foreign Office will earnestly struggle to attain such an end. (Cheers.)

Mr. John Howie, Glasgow, in thanking Lord Saulsbury for his reception of the deputation, said that the French Government had stated their willingness to enter into negotiations for the abolition of foreign bounties on condition that the British Government would impose a countervailing duty against any country that refused to refine in bond. He mentioned that in support of the position the noble Marquis had taken on this question. The deputation then withdrew.

NOTES FROM WINDWARD.

Several mills along the coast have begun on the new crops including Waiakea, Hakalau, Kaiwilahilahi, Laupahoehoe, Ookala &c, while one or two in Hamakua are still battling with the old one.

Waiakea is much pleased with the working of the step ladder grate bars and furnaces burning green trash from the double mill. Although the trash is as fine as planing mill shavings, nothing drops through the grates and the deposit there is only ash. They are not using any water in the maceration mill as the juice is of low density.

They propose shortly to experiment in the burning of crude petroleum in their locomotives, the object being to secure immunity from sparks in the fields as well as economy of fuel. The experiment will no doubt be of interest to others similarly situated.

The Japs. still continue to give them good satisfaction and are, they say, the best men they have on the place, for the money.

The Pacific Navigation Brig *Hazard* will remain in Hilo up to the end of this month, and will take such sugar as may come in at the eleventh hour from Waiakea and Laupahoehoe.

The manager of Onomea, Mr. Goodale, formerly of Wailuku, Maui, is on the ground and actively endeavoring to straighten up the affairs and fields of that place, the latter of which are said to be in bad condition, the special efficiency of the patent Austin cultivator notwithstanding. Meanwhile the recent management stands aside awaiting that turn in the tide of affairs which will reinstate them. Of this however there does not appear to be any near prospect.

Mr. J. N. Wright, of Ookala, strongly advocates the use of a heavy roller to flatten heavy Hilo grass before plowing. By using this he is able effectively to plow under the rankest Hilo grass that grows, which is saying a good deal. He then runs another heavy roller over the plowed land for the purpose of packing the sod down, so that the grass quickly rots. Probably his method is a good one and worthy of trial by all those similarly situated.

Hamakua Mill is undergoing a thorough overhauling, and an increase of efficiency. Among other things a maceration mill and engine, an auxiliary vacuum pan for second sugars, a third pan for the double effect converting it into a triple effect, a reconstruction of furnaces and of machines and mixers. A lot of work is being done in a short time under the efficient charge of Mr. Jno. Gilfillan, that veteran of erecting machinists. When in operation again about the end of this month, that mill will yield to few in efficiency and completeness.

It is rumored that a change of management is contemplated for Paauhau Mill, Hamakua, as well as the addition of some new machinery. This mill for some reason has never done the work that it should have, and any change that will ensure greater efficiency will no doubt be acceptable to those interested.

The Pacific Sugar Mill, Kukuihaele, Hamakua, has also recently undergone a change of management through the resignation of T. S. Kay. Mr. Mangleson, recently in the employ of the Co. as sugar boiler succeeds him.

The Japanese Commissioners have recently made a trip through this portion of the country; as near as we can learn they do not seem to have given any great satisfaction anywhere. The general complaint is that all their examinations and negotiations were of an *ex parte* nature. Very long and animated conversations were carried on between the Commissioners and each one of the laborers and much was recorded, very scant and fragmentary portions of which were translated to the employer, and those were secured only by persistent effort on the part of the latter. Apparently in very many cases, judging from the tones and gestures of the laborers, complaints and charges were being made against the employer, which it was only fair that he should hear and refute if untrue. We believe that in every case courtesy was shown to the Commission, such as called for courtesy in return, which was certainly notoriously lacking in some cases at least. We have no Japanese and thus can speak with freedom of what we saw in the treatment of others. We are confident that the Commissioner has left a bad impression. L.

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REPORT OF COMMITTEE ON RAMIE MACHINE.

To the Planter's Labor and Supply Co.

GENTLEMEN :—Your Committee, who were instructed to examine and report on the working of the machine invented by Mr. E. Lycan for cleaning ramie fibre, beg leave to say, that they attended a trial of the machine, which, though brief, was sufficient to show that the inventor has accomplished valuable results.

The machine may be described as a combination of rolls—plain and fluted, for crushing the ramie stalks, with beaters for separating the woody part from the fibre. In its present state it may be classed as a “decorticator;” that is, a machine for removing the bark from the stalk; and no pretense is made of bringing the fibre to the perfection of the hand cleaned ramie prepared for fine work. The inventor moreover expects to add to this machine, so that by one continuous operation the bark shall not only be separated from the stalk but shall also be subjected to a hot water bath and still further dressing, in order to remove the gum and bring the fibre as nearly as possible into a condition fit for combing.

Two things are important in the separation of the bark from the stalk. The fibre must not be cut or broken, and must not be twisted or crossed. These are specially important in the preparation of fibre for high grades of manufacture.

Mr. Lycan's machine seems to accomplish these things successfully. The fibre came out quite free from any appearance of having been cut or broken in the operation, and with proper attention there is no difficulty in keeping the ribbon straight and parallel so that there is no danger of tangling.

A trial was made of green ramie stalks from which all leaves and tops had been removed, and also of bark which had been put through the machine previously and then dried. The stalks were fed to a pair of

smooth rolls, then taken by a pair of fluted rolls and carried on by an apron under a set of beaters to another pair of fluted rolls whence they passed under the final set of beaters. The bark from the green stalk emerged with considerable woody matter adhering, but after drying this seems to separate easily.

The dried bark came out quite free from wood and appeared fully equal to the best of the sample received from the United States, which had been through the corresponding process in machines patented there.

The inventor expects to extend the machine, and it is probable by so doing he will succeed in doing away with the necessity for passing the bark through a second time.

The committee was unable to make a test of the capacity of the machine but were informed by Mr. Lycan that a careful test was made, running continuously for one hour; the stalks being weighed before the operation and finally the dried fibre produced, and allowing considerable margin the machine is capable of producing at least 1000 pounds of dried fibre in 10 hours. The weight of the dried fibre was 9 per cent. of that of the green stalks.

Parties in New York offer 5 cts. per lbs. for all the crude bark delivered there and the samples they send are quite inferior to the best work of the machine, so it may be hoped that Hawaiian Ramie may command a better price than that.

The Hawaiian Ramie Co. will furnish machines similar to this for \$600 and are also ready to clean the fibre on shares. They will do it for one half and hope to be able to do it for even less proportions when their arrangements are more complete. The power required to run the machine is not large and parties raising ramie on the other islands should have a machine close at hand.

Mr. Lycan's perseverance and ingenuity are to be highly commended, and it is to be hoped that he will continue his efforts till he perfects a process which will prepare the fibre for the finest work.

W. E. ROWELL,
H. P. BALDWIN, } *Committee.*
J. B. ATHERTON.

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STATE AND PROSPECTS OF THE SUGAR MARKET.

At our last writing, the Manilla basis stood at 5.51 on Nov. 2d. On the 17th it declined to 5.44 for 91 per cent., at which figure it stood at last advices, Nov. 21st.

The New York market has remained about the same with an upward tendency standing at 6 @ 6 1-16 for 96 per cent. on Nov. 21st as against 6 cents on Oct. 31st. Holders were firm and higher prices expected.

The English market has risen from 14s. 3d. for beets, 88 per cent. at which it stood Nov. 2nd to 15s. 3d. at which it stood Nov. 20th.

Stocks were everywhere decreasing, causing a strong and advancing market.

Licht's latest estimate of the beet crop is 2,075,000 tons, or 465,000 tons less than last season, and 300,000 tons less than 1883-4.

The prospects are exceedingly encouraging, and the next mail will undoubtedly bring news of a rise in Manilla basis.

COMMUNICATIONS.

METHODS OF CULTIVATION.

PART I.

Science is the progressive factor in the advancement of industry, and the development of inventive genius is the fruit of scientific research. All industry is founded upon the exercise of manual labor, and is progressive in as far as such labor is displaced by practical appliances. Thus the advancement of industry is dependent upon the progress of invention.

For the past fifty years all industries have been subjected to the fiercest competition, which has resulted in the production of vast improvements. Of these probably the cane sugar industry has been the least progressive, because the consumption of sugar has increased with the production. Prices were thus maintained far above cost and the necessity of economic appliances not felt.

This happy state of affairs, however, has at last come to an end. The beet, though far less productive in saccharine matter than cane, has been bolstered by science and the bounty system into a formidable competitive rival. Vast stocks were accumulated in the markets and prices fell to ruinous rates. The slumbering cane-sugar industry awoke, and for the first time realized that it was losing twenty per cent. of sugar in manufacturing, and that the fields cost too much.

A wave of failure swept the sugar belt; vast estates in the most favored localities were abandoned, and we were saved from disaster only by aid of our favorable treaty relations with the United States.

Thus have the past two years been fraught with anxiety, and all classes of trade experienced a crisis; but owing to the large number of sugar estates abandoned in other countries, and the failure of the beet crop, the markets are gradually draining and prices adjusting themselves. This gives a pause, a breathing spell in which to recuperate and glance at the situation. But we cannot hope that this favorable position will last above two or three years at best. Beet crops will revive, abandoned estates be taken up, and prices drop as before.

Sugar-cane contains more crystallizable saccharine matter than any other plant, and the sugar-cane industry can be made to defy all competition and supply the markets of the world even in the face of bounties. To do this the loss in manufacturing must be reclaimed and the cost of growing reduced.

Few if any improvements have proceeded from any internal force or genius. All the improvements we have are the fruit of competition among manufacturers of machinery, and have all been in the interest of the manufacturing department.

The field department has had absolutely no improvements invented in its favor applicable to its own particular style of agriculture. It is as crude to-day as it was fifty years ago, except in as far as it has applied to its

uses implements invented for other agricultural enterprises where operations are similar, as in corn. Some may except from this sweeping assertion the Coleman Cane Planter, but I think I shall be able to show farther on that this implement is impracticable in its present form.

The large losses in manufacture are having great attention both in the United States and Germany; and here, Judge Hart with laudable enterprise is experimenting with diffusion, while the Iron Works have instituted maceration. But the field is receiving little attention and no discussion.

It is the object of this paper to point out where improvement may be made in this department. To do this it will first recite methods as they are, leading up to the discussion of methods as they should be.

Virgin cane lands are found either in bush or grass. They may each be divided into two parts: light brush and heavy bush, heavy matted grass and light meadow or grazing land. In heavy bush clearing is very expensive, it being necessary to cut the trees, grub the stumps and roots and remove them from the land. Light brush is cleared in much the same manner, and the work is much lighter, as the brush is lighter than the bush. Heavy grasses are usually mowed with the common wheat mower, and the grass either burned or removed from the land. As there are many places in grass lands where the mower cannot be used to advantage, much manual labor is necessary in cutting as well as in gathering. This operation of clearing land may cost all the way from \$5 to \$50 per acre, except in the case of light meadow or grazing lands, where the plow may be introduced without difficulty. But these lands are in the minority, by far the greater majority being heavy grass or grass, timber, and brush combined.

After clearing and all natural vegetation is removed, the land is round plowed, harrowed, furrowed and planted.

Furrowing is usually but indifferently done, little trouble being taken either to make the rows straight or of even distance apart. This criticism does not, however, apply to irrigation districts where it is necessary to lay rows out by the level.

Planting is done by hand, and it is thought necessary by most planters to place the seed with the eyes on either side and press it firmly into the soil; others believe in cockbill plant, namely, pressing one end deeply into the ground while the other sticks out at an angle; and some even plant across the row, as is the case in Kohala. Some believe in close planting, others in wide; some cover deeply, others lightly. This diversity of opinion is due mainly to different conditions in different districts, yet it cannot be that conditions are as widely different as opinions.

In cultivation the cane is cleaned and hilled when young by hand labor, the spaces between rows being broken and weeded with the cultivating plow and horse hoe. As the cane joints and the leaf falls away it is stripped; this is done from two to four times, as the cane requires. At

maturity the cane is cut and bundled for transportation to the mill entirely by manual labor. These operations cost the enormous sum of from \$80 to \$120 per acre. Ratoons, or volunteer crops, follow the harvesting of plant, and are cultivated in almost identically the same manner.

The foregoing routine of present methods is familiar to all, and we now proceed to the consideration of methods as they should be.

Nature, in pursuance of a consistent unity of forces, produces upon her soils a spontaneous vegetation which increases or decreases in luxuriance as the natural moisture or rainfall is more or less. This spontaneous growth flourishes for a season, dies down, revives and dies again. Thus her soils constantly accumulate fertility until the enterprising hand of man clears her forests and subdues her creative forces to a special growth necessary to his happiness, and which he applies to his uses. Released from such subjugation nature, still in pursuance of the same consistent law, again produces spontaneous vegetation to reconstruct and replace those ingredients exhausted by such depredations. This vegetation is totally different from that first found; and it differs because it exactly represents the ingredients exhausted and which it is attempting to return to the soil. If left to itself this soil would in time gradually change its vegetation, until it would be capable of producing the same luxuriant growth first found upon it. We however, in our greed totally disregard this wise hint from the mother of all industry, and remove this regenerating spontaneous growth, planting again and again, until the soil from sheer exhaustion refuses production. In the first instance, namely, the clearing of brush land, it is necessary to remove all that will not burn. But for the clearing of grass there is no excuse. It is argued that we have no economic means of burying it; then let us use common ingenuity and invent means. A plow and plow attachment should be invented that would turn under and bury grass from one to four feet long to a depth of nine to twelve inches. That such a plow and attachment can be constructed that could be practically worked with but little more power than is now used on a sixteen-inch sulky plow I have not the slightest doubt. I do not propose that the depth above mentioned shall be made with a single cut, for this would be loss in power. But let two plows work as a gang, one following in the wake of the other, the leading plow to turn but six inches deep, while the follower is adjustable to work from three inches to six inches in depth upon a lower level. It may be thought at first sight that in such a plow there is no economy over a single plow cutting the required depth; but it will be seen that there is.

A plow is a wedge, and its draught is equal to the resistance plus the friction in turning the sod. Haswell says, "When one body is movable the length of a wedge is to its back as the resistance to the power," and that "friction does not increase with the increase of surfaces, but in general is increased in ratio of the weight." Therefore, first, a plow to cut twelve inches deep instead of six inches, would require a moldboard twice the height; but to make a plow twice the length would be impracticable, so the draught is increased four-fold, because the back of the wedge would be doubled, and the resistance or weight of earth doubled, and the length of a wedge is to its back as the resistance to the power. Second, as in the first instance, a plow of equal length cutting twelve inches deep

requires four times the power of one cutting six inches, it is better to cut but six inches with a leading plow on the first level, and the balance with a following plow on a second level; because, although the back of the wedge or mold-board of the second plow is double that of the first, still the resistance or weight of earth is the same, so the power is only double, thereby saving 25 per cent. in power or draught over the single plow. Third—as two plows following at different levels have double the surface of a single plow cutting at the lower level, and but one-half the weight of earth, the friction is reduced one-half, because “friction is not increased by the increase of surfaces, and is increased by ratio of weight.” Thus theoretically the following gang proves a great saving in power; yet practically the saving is greater, for the following plow need not be made to cut as wide a sod as the leader to do nearly the same execution. This saving in power will be sufficient to operate a grass burying contrivance attached to the plow that may detached at will. In this manner it is proposed that all grass clearing be done away with, and the soil fertilized as well.

The question now naturally arises, what is the fertilizing power of this spontaneous vegetation? That is, in land exhausted by much planting but which is in a fair crop of grass. This question suggests a counter question or problem which is broader, namely, how can the fertility of soils be maintained? As the solution of the latter answers the former, it will be considered in Part III. under the head of “Application of Artificial Fertilizers.”

FRANKLIN H. AUSTIN.

(To be continued.)

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MACERATION.

BY ROBERT CATTON.

EDITOR PLANTERS' MONTHLY.—The Report on Sugar Manufacture in your October issue begins with the time honored reference to the slow progress of the cane-sugar industry, but the committee did not look very far for a reason, surely. We are all more or less influenced by circumstances, but not to such an extent that a change of nature must follow a change of residence from the temperate to the torrid zone. I believe a thrifty, energetic, and inventive man will be so anywhere, but that the direction in which he applies those qualities may vary with his surroundings. In the tropics, they will be directed towards acquiring money enough to enable him to live comfortably at home, and thus it has come about that, in the cane business, men's brains have been directed first towards making money and second, sugar. All over the cane-growing world, the chief end of man, of the white man at least, seems to be the acquisition of sufficient sugar property to enable the owner to live some thousands of miles away, the care of his property being relegated to others. In contradistinction to this, take the case of our great competitor the beet—the thrifty Teuton, with an inventive turn of mind, born and brought up among the beet factories, finds exercise for his faculties and fair remuneration for his labor *at home*; he is in no great hurry to get rich, but, his efforts being appreciated, he is ambitious to excel in making sugar, and does excel with visible results.

But I have a better opinion of this country than the Manufacture Committee, the climate of which has probably more to do than anything else with the desire to leave "the fields when the sugar cane grows," is, with us, more nearly perfect, probably, than in any other part of the world, while the other conditions of existence will compare favourably with those in any other part of the cane-world; and, as a matter of fact, I believe we are at least as far advanced as any in sugar making, though still some distance from perfection. In this direction much is being done by the efforts now being made to extract more juice from the cane, which brings me to the subject of my paper.

I do not know that, in the crushing of cane, we can make any exception to the universal rule for computing the economy of work done, viz., the consideration of the power applied and the time taken, so that in a given time, other things being equal, one ton of cane will be as well crushed by 20 horse-power as two tons by 40 horse-power, and it may not be out of place to remark here that it is the *engine* that does the crushing; the power is developed in the cylinder and applied through gearing and shafting to the canes. A large mill is not necessary to do *good* crushing; in the "Sugar cane" for September, there is a report which states that a mill *driven by four bullocks* extracted juice equal to 73 *per cent.* of the weight of the cane, but it took an hour to put 500 lbs. of cane through it. A large mill will with power in proportion behind it, do more work than a small one—it will crush the same weight of cane to the same dryness in less time, or a greater weight of cane to the same dryness in the same time, or the same weight of cane to greater dryness in the same time. There are other variations dependent on the ratio of increase of size and power which need not be noticed. Leaving theory for a little, it will be found that the practice has been to order a mill capable of running so many gallons of juice per hour, without any specification as to how dry it was to turn out the megass, and it is to the leaving out of this latter condition, aided no doubt by a fine quality of cane, that the big days work of comparatively small mills are due, the aim having been not so much to crush well as to crush plenty—money in preference to sugar.

Thanks to "our friend the enemy," the change in the relative values of sugar and U. S. gold coin has led us to try and crush the same weight of cane to *greater dryness* in the same time, while the bountiful promise for next crop is that there will be more cane to crush. How to increase at the same time the efficiency and the capacity of the grinding plant? Much can be done by substituting hard wood for the ordinary Nor-west timbers under the mill, and by more careful feeding with the cane cut short, presuming the mill to be a good one and the capacity of the machinery equal to what is required of it. I may mention that in some cases, when very hard crushing is desired, the cover bolts are not carried down through the timbers, but cottered right against the bed plate; this is in direct antagonism to the practice of employing hydraulic pressure to regu-

late the crushing, a practice which has always seemed to me to be theoretically wrong, as rigidity not elasticity is what is required in a sugar mill, and all the regulating should be done on the cane carrier. I know how hard this is to do, especially with a flume, still it can be done.

To resume, it may be found that when a high percentage of extraction has been attained, like that recorded at p. 77, Vol. IV of the MONTHLY, 76.6 per cent. the supply of juice is insufficient for the day's work required, and it will be suggested, open up the mill, put two more rollers behind the first three and crush twice, the result of which will be more juice and about the same extraction, say 45 per cent. of moisture left in the megass, said moisture being juice of the same density as that expressed from the cane. I have seen no better average extraction claimed than that, and probably no better can be obtained by any practicable system of recrushing without maceration. Forty-five per cent. of moisture in the megass from good ripe cane, containing say 87 per cent. of juice at 10 °B. means 76.4 per cent. of the weight of the cane extracted, and 10.6 per cent. or nearly one-eighth of the juice lost, and if we are dealing with 100 lbs. of cane in this illustration, 10.6 lbs. of the undiluted juice means 1.91 lbs. of possible sugar, nearly the whole of which can be recovered by thoroughly macerating the megass before the final crushing; for if we add water enough to reduce the density to 2° B. 10.6 lbs. of this diluted juice will contain only .35 lbs. of possible sugar, representing (1.91—.35) a saving of 1.56 lb. of segar per 100 lbs. of cane. This may be termed the maximum THEORETICAL results.

I have however been favored with a copy of the crushing statistics, for the months of March and April of this year, from four plantations in the East Indies, where it is proposed to apply maceration and double crushing; as also of the figures showing the advantage anticipated, which I believe will be of general interest. It will be observed, in this case, that the *actual*, average, single extraction is only a fraction over 69 per cent., and that no better crushing is claimed for the second mill, before it has been tried.

“ Average crushing (single) during the months of March and April, 1885, on four estates in Penang.

Juice extracted	69.03 per cent. 10° B.	} 88.81 per cent.
Juice left in megass.....	19.78 per cent. 10° B.	
Woody fibre or megass.....	11.19.....	} 30.97 per cent.
	<u>100</u>	

Taking solids in juice at 10° B. as 18.05 per cent., and canes to contain 88.81 per cent. of juice as above, then total solids in juice=16.03 per cent. of the weight of the canes, and solids in juice obtained (18.05 per cent. of 69.03)=12.46 per cent. of the weight of canes. Therefore solids lost in juice left in megass=16.03—12.46=3.57 per cent of weight of canes or 28.65 per cent. of the solids in juice actually obtained. ©

If the megass leaving the single mill were thoroughly saturated with

sufficient water to reduce the density of the juice it contained to 2 °B., and the megass passed through a second mill of equal efficiency to the first, the loss of solids in the juice contained in the megass would be reduced to .71 lbs., a gain of 2.87 lbs. or 23.05 per cent. of the solids in juice obtained from the first mill.

The above results of second crushing and maceration are calculated from the following figures.

Megass from first mill contains 63.86 per cent of moisture being juice at 10° B.=19.78 lbs., juice containing 18.05 per cent. of solids=3.57 lbs. and 16.21 lbs water. To dilute this solution to a density of 2° B., containing 3.59 per cent. of solids, the weight will have to be increased to 100.44 lbs. by the addition of 80.66 lbs of water.

After the second crushing, the amount of megass will be the same as after the first crushing, or 30.97 lbs. containing 63.86 per cent. of juice, having a density of 2° *instead of* 10° B., and the 19.78 lbs. of juice contained in the megass will only carry away 3.59 per cent. of solids=.71 lbs.

The additional weight of water to be evaporated in consequence of the dilution of the juice, will be the added water—80.66 lbs.—less the weight 2.87 lbs. of sugar gained, 80.66—2.87=77.79 lbs.

Assuming evaporation to be effected in a triple effect, and that under such conditions, 20 lbs. of water may be evaporated per pound of coal, it would require 3.88 lbs. of coal to obtain 2.87 lbs. of sugar.”

In case this evaporative economy be doubted, I may mention that the mean of a series of tests, made for the British Government, shows that one pound of coal evaporated 7 lbs. of water, at 60° Far., to steam, in an ordinary Cornish boiler. In evaporating juice in a triple effect, we have the following advantages—a temperature to start with, of say, 160° instead of 60°, a reduction of pressure in proportion to the vacuum maintained, and only one-third of the total evaporation to effect by steam, the remaining two-thirds being done by the vapor arising from the juice itself.

In Australia, the headquarters of maceration, the second mill with its engine and gearing is made an exact duplicate of the first one, which affords this great practical advantage that any lengthened stoppage from accident is very unlikely to occur, for even if both mills broke down, there would be the possibility of making up one whole mill out of the two, and going on with single crushing till the damage was made good. The trash-turner bug bear does not seem to trouble them down there.

I believe the conditions here are exceptionally favorable to carrying out the maceration process to the full extent, seeing that on plantations where there are triple or even double effects, there is now more trash fuel than can be used, while the evaporating power of our boilers is always being improved,

It would be of the utmost value in this connection, to know just how much spare trash has resulted from grinding of a given quantity of cane: perhaps some of your readers can assist in the solution of the question.

A question has been raised as to the relative merits of the double and triple effect, but this was elucidated in the MONTHLY so long ago as September, 1882, and a recent communication to the *Gazette*, without allowing anything for saving in condensing-water quite an item, in some places credits the triple with an economic gain of 35 per cent. over the double. There is also the question of first cost to be considered. Roughly their relative merits may be stated thus:

	Economy.	First cost.
Double effect.....	2	4
Triple effect.....	3	5

I can endorse what the Manufacture Report says about round bottomed clarifiers having worked them. They are immensely superior to the ordinary clarifier, in cleanliness, and can be made with a minimum of trouble, like the proverbial "new pin" every time they are emptied. They are made of copper, with wrought or cut jackets, coils would prevent their being so easily cleaned. They cost more to make than the ordinary clarifier of equal capacity, and are worth more, but, they use more steam.

In the matter of cleaning, would it not be worth while to try passing all the juice through filter-presses ?

ROBT. CATTON.

Honolulu, Nov. 7th, 1886.

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MACERATION AND THE TWO-ROLL MILL.

BY S. N. CASTLE.

The summary of the work done at Kohala since the introduction of the new machinery, as heretofore related, demonstrates its value as an auxiliary, *as a whole*, and the separation of its parts into *dry* and *wet* grinding will enable every planter to judge for themselves whether and when *maceration* will pay. The two together will pay when the trash is sufficient to do the work of the mill, but when ful has to be bought, the *increased* amount of sugar obtained by maceration may bring enough to pay for the coal to evaporate the water used in the maceration.

The difficulty of judging whether or not to macerate the trash has arisen from the uncertainty of how much of the increased yield of sugar is due to maceration.

"Sugar Growing and Refining," by Lock, Wigner and Harland, p. 148, says: "It seems to be an undecided point whether the saturation or the extra crushing should be credited with the increased yield of juice, probably both assist."

The experiment at Kohala has been conducted in a manner (grinding both wet and dry) to demonstrate as far as possible this point. It will be clear that the sugar obtained by maceration must be enough more than would be obtained by dry grinding to pay all additional expenses or the maceration will be a loss instead of a gain. If there are no additional ex-

penses for labor or otherwise attending the process, then these will be for fuel alone, and if the trash furnishes this, then maceration will pay, unless the trash is worth more to return to the land than the cost of fuel would be for evaporation.

Cane was crushed yielding (by measurement) 147,050 imperial gallons of a density to give 262,395 pounds of sugar. The trash was then macerated with hot water and run through a 2-roll mill, yielding 64,700 gallons of the diuted juice, of a density to yield 61,704 pounds of sugar, being 23 52 per cent. of the original yield, but 34,072 gallons of juice of the original density would have given this amount of sugar, consequently there must have been added 30,628 gallons of water to bring the quantity up to 64,700 gallons and the density down so low as to require so large a quantity of juice to yield the 61,704 pounds of sugar.

Again, 101,575 gallons of juice, equal to 182,421 pounds sugar, were extracted from other cane of similar quality, and the trash run through the 2-roller mill *without wetting or maceration*, yielding 17,375 gallons of juice of a density to give 30,304 pounds of sugar, equal to 16.61 per cent. of the original product. This shows a difference of nearly 7 per cent. in maceration.

The two roll mill and maceration gave an increase of.....61,704 lbs.
The two-roll mill without maceration would have given an increase..43,584 lbs.

The difference in favor of maceration is18,120 lbs.
This at 5 cts. net would be.....\$906.

The theoretical evaporating power of one pound of coal is six pounds of water, but I notice that the author before me for safety in his estimates gives credit for only four pounds of water for one pound of coal. The 306,280 pounds of water added in the maceration at Kohala would require to evaporate it 765,570 pounds of coal, which at \$20 per ton would amount to \$765.70, which deducted from the \$906 proceeds of the 18,120 pounds of sugar, would leave the gain to be credited to maceration \$140.30.

When the trash is sufficient, then it is all gain. The value of trash for fuel cannot be determined except by use, it is so variable in quality, cane containing from 9 to 17 per cent. of woody fibre, its character depending upon soil, temperature, moisture, age, etc., as well as locality and altitude. The juice will be more thoroughly extracted from soft than from hard canes by the first mill, and the last will be better fuel. Wetting will diminish the value of either for fuel if not dried.

The intelligent manager can tell *when* and *where* to use water if he will observe, as it is presumed he will do. The character of the cane may make it profitable to-day and a loss to-morrow on the same plantation. A change from hard to soft cane in Kohala diminished the amount of juice from the second mill, with or without maceration, and diminished the advantage of wet over dry grinding, and it will or may be a loss to-day to follow the practice of yesterday, in which there was a gain. Maceration is good, but to be used with discrimination.