

Agricultural Research Institute, Pusa

Notes on Sugar Machinery and Manufacture
in Northern India, 1914

BY

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AGENTS FOR THE SALE OF BOOKS

PUBLISHED BY THE

Superintendent Government Printing, India, Calcutta

IN THE UNITED KINGDOM.

Constable & Co., 10, Orange Street, Leicester Square, London, W.C.

Kegan Paul, Trench, Trübner & Co., 68—74, Carter Lane, E.C.

Bernard Quaritch, 11, Grafton Street, New Bond Street, London, W.

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Deighton Bell & Co., Ltd., Cambridge.

Oliver and Boyd, Tweeddale Court, Edinburgh.

E. Ponsonby, Ltd., 116, Grafton Street, Dublin.

ON THE CONTINENT.

Ernest Leroux, 28, Rue Bonaparte, Paris.

1 Martinus Nijhoff, The Hague, Holland.

IN INDIA AND CEYLON.

Thacker, Spink & Co., Calcutta and Simla.

Newman & Co., Calcutta.

R. Cambay & Co., Calcutta.

S. K. Lahiri & Co., Calcutta.

B. Banerjee & Co., Calcutta.

The Calcutta School Book and Useful Literature Society, 309, Bow Bazar Street, Calcutta, and 226, Nawabpur, Dacca.

Butterworth & Co. (India), Limited, Calcutta.

Rai M. C. Sircar Bahadur & Sons, 75-1-1, Harrison Road, Calcutta.

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Notes on Sugar Machinery and Manufacture in Northern India, 1914.

Preliminary.

It is felt that the incompleteness of these notes requires some explanation.

Within a day of departure for Vancouver *via* the West India Islands, Colon and Panama, the writer was unexpectedly approached by the Harvey Engineering Company with a proposal to visit certain of the Sugar Districts of India.

The visit was to be made in place of Mr. James Harvey, the Managing Director of the Company, who was prevented by circumstances from leaving England, and its object as understood was to make calls upon the Agents of the Company and upon its clients, to ascertain the requirements of the latter in regard to sugar machinery, and to **advise the Government of India in connection with sugar matters generally** where such advice was desired.

Copies of recent letters which had passed between Mr. James Harvey and Mr. Bernard Coventry then in England on leave, in which the latter regretted his inability to see the writer before leaving, were found among the papers supplied by the Company, and the trip was entered on with but a vague notion of the importance of Mr. Coventry's position and in absolute ignorance of the conditions obtaining among the sugar factories subsequently visited.

The Harvey Engineering Company laid down no precise itinerary, but furnished the addresses of its Agents and of a number of its clients whom it was considered desirable to visit.

Before leaving London a call was made upon Mr. Francis Drake of the India Office, from whom it was ascertained that the Government of India had been apprised of the intended visit.

London was left on the 23rd January, 1914. On the 6th February on reaching Bombay and calling at the Secretariat it became evident that the Government of India had very much interested itself in the intended visit

of Mr. James Harvey, and that this interest had been extended to his substitute.

The Chief Secretary to the Government of Bombay, Revenue Department, had received from the Hon'ble Sir E. D. MacLagan, Secretary to the Government of India, Department of Revenue and Agriculture, a communication (No. 100-C., dated Delhi, 27th January 1914), referring to the subject. A copy of this with an original letter from Mr. F. Noyce, I.C.S., Under-Secretary to the Government of India, Department of Revenue and Agriculture, addressed to the writer and accompanied by a free-pass over the State-worked Indian Railways was received. This letter was also accompanied by a memorandum from the Hon'ble Mr. J. Mackenna, Officiating Agricultural Adviser to the Government of India, who had carefully considered and mapped out an extended tour with valuable advice as to how it was to be carried through. It was suggested that this tour should finish up at Poona under the direction of Mr. G. Keatinge, I.C.S., Director of Agriculture for the Bombay Presidency.

At the Secretariat I learned that Mr. Keatinge was momentarily expected in Bombay and, as I had made that gentleman's acquaintance in 1909, I deferred my departure from Bombay until I had seen him and ascertained that sugar conditions in the Bombay Presidency had not greatly changed in the past six years.

Mr. Keatinge was then on the way to Gujarat and it was arranged that I should visit Poona some time in March.

On February 11th I left Bombay, reaching Cawnpore on 12th, and on 13th called on The Harvey Engineering Co.'s Agents. These gentlemen were also understood to be agents—or part owners—of the Sugar Factories at Barak, Mahrourah, and Ryam.

The last-named was understood to be in process of erection.

Messrs. Harvey's Agents did not favour me with an invitation to visit either of these factories, but suggested a visit to Pilibhit—a factory with which they were in no way connected.

Mr. Mackenna had given the names and addresses of six of the Provincial Directors of Agriculture as gentlemen likely to facilitate enquiries during this tour. Among these were the Hon'ble Mr. H. R. C. Hailey, Director of Land Records and Agriculture for the United Provinces. Mr. Mackenna had suggested that a visit to Pusa should be deferred until after the return from leave of Mr. Coventry, Agricultural Adviser to the Government of India. Mr. Coventry was not due at Pusa until the 22nd of February. In order to obtain an authorisation to visit

the factory at Pilibhit therefore, it became necessary to find or to get into communication with Mr. Hailey.

Enquiries at Lucknow on the 14th February resulted in the information that he had gone to Pilibhit with the Lieutenant-Governor, was moving round, and likely to be at Aligarh on the 20th. On the 18th February a visit was paid to the Rosa Factory, and I left Bareilly *en route* for Aligarh on the 19th—20th but Mr. Hailey could not be found there.

As valuable time was slipping an unauthorised visit to Pilibhit was then decided on and made on the 22nd, when the native staff of the factory received me with the utmost courtesy and readily gave all the information asked for.

In returning from Pilibhit to Bareilly I had the good fortune to find in the train Mr. Hulme, of whom I had heard, but of whose precise position I had not been made fully acquainted. From that time until we parted on the 24th Mr. Hulme was unremitting in his kind attentions.

Late on the 23rd of February Mr. Hailey arrived at Aligarh and next day accompanied by him and Mr. Hulme I was privileged to visit the Experimental Farm at Nawabgunj.

Pusa was reached on the 26th of February where I had a most kind reception from Mr. Coventry who proposed accompanying me among the Bihar Factories, but as he was not then prepared to start out I paid a visit to Calcutta where on the 2nd March Mr. Noël Paton, Director-General of Commercial Intelligence, was interviewed.

Some few years ago when favoured by this gentleman with some correspondence on the subject of central sugar areas, I had laid stress on the risk attaching to placing orders for complete sugar factories unreservedly in the hands of Contracting Engineers. Mr. Noël Paton had not forgotten this, but at the time of my visit I was not aware how completely these remarks had already been justified in India itself.

On the 3rd of March I returned to Pusa and on the 4th Mr. Coventry took me under his protection and accompanied me for the next seven days through the Bihar Districts among the sugar factories.

During the course of that time the factories visited were :—

Bhicanpore, Barah, Seeraha, Pursa, Pertabpore and Bubnowlie.

It had been proposed to visit one other factory but the permission to visit it was accompanied by certain conditions and restrictions which, speaking for myself, I considered unnecessary. We did not, therefore, visit that factory.

On the 14th March I returned to Calcutta whence, on the 18th, I moved on to Delhi for the purpose of seeing Sir Robert Carlyle whose

acquaintance I had been fortunate enough to make in journeying between Calcutta and Waini in 1908.

Delhi was reached on the 20th and, after an exceedingly agreeable and interesting interview with Sir Robert Carlyle, was left on 21st for Madras *via* Manmad and Dhond.

From Madras, Poona was reached on the 26th March and after another interview with Mr. Keatinge I arrived at Bombay on the 29th. This completed the round, and it will be seen that the time spent in the sugar factories was too short to permit of more than a mere cursory examination.

That time was however long enough to produce the impressions which are here recorded as referring to the factories collectively.

Buildings.

Construction and Suitability.

The buildings seem to be solidly constructed but are in most cases insufficiently lighted. To this there is one notable exception, an exception also in the matter of space which, in most, is deficient.

Deficient space means insufficient lighting, and insufficient lighting makes cleanliness the first essential in a sugar factory—impossible.

The Approaches and Exits seemed, in most cases, ill-arranged resulting in confusion of carts and animals, a confusion in no way lessened by the scales in use. In one factory the canes were weighed on one scale and the cart, after searching round for a convenient spot on which to discharge its load was tared on another. Accumulations of cane in the yard prevented free manœuvring of carts and rendered impossible the grinding of cane in the order of its arrival, causing difficulty in cane carrier feeding and deterioration in cane seriously affecting the clarification of the juice and the quality and extraction of sugar.

Where central factories have encouraged small growers they have had great difficulty in controlling their deliveries. When growing canes for a factory of any considerable size the delivery is generally to some field scale where the load of the cart is picked up by a derrick and swung into the trucks of the factory. This is done while both cart and animals stand on the scale. After raising the load, cart and animals are tared and are free to move off. This system cannot, of course, be used in small factories

having no railways. The result of the want of control of the small grower may be seen in Figures No. 1 and No. 2,

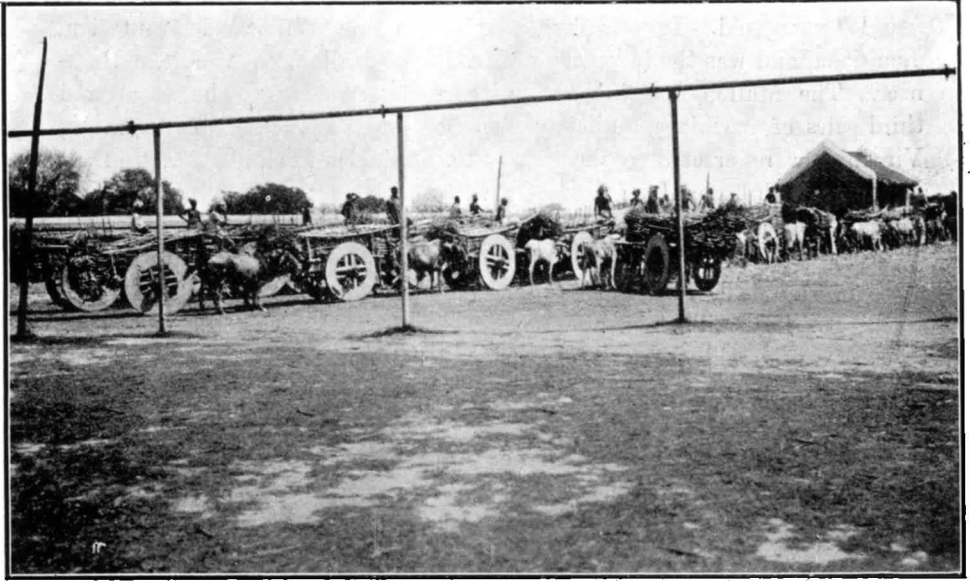


Fig. 1.—Block of cane carts and holding up of men and animals at an Indian Sugar Factory in March, 1914.



Fig. 2.—Showing in the background an accumulation of canes and in the foreground a hold up of men and animals.

Cane Carrier Feeding.

In all the factories visited this was done by hand and it appeared to absorb a great deal of labour. Mechanical feeding is a contrivance not yet 17 years old. It was first adopted on the Willswood Plantation, Louisiana, and was the invention of Mr. James Mallon, an American Engineer. The Mallon machine was a pronounced success. The second and third pairs of machines, built by the Bodley Wagon Co. of Staunton, Virginia, were erected at the Usine Ste. Madelaine, Trinidad, where they dispensed with 64 hands, dealt easily with the 1,700 to 1,800 tons of cane ground daily and could have disposed of five times the quantity.

Apart from the liberation of this large amount of labour for productive work in the field, other great advantages resulted from the use of these machines. The mills took the machine-fed canes more readily, and got through considerably more work with improved crushing.

The appearance of the Bodley Mallon rakes conferring as they did enormous advantages from an economic point of view and easing the work of supervision in the factory to an extent which can be appreciated only by those conversant with the working of cane sugar factories with tropical labour, was quickly followed by a number of other contrivances more or less widely advertised and different in efficiency, but all great labour-savers and infinitely preferable to feeding by hand.

Plate I (see at the end of the Bulletin) shows two pairs of Bodley Mallon machines at work in 1899 in a factory dealing with 1,700 to 1,800 tons of cane per day.

Plate II (see at the end of the Bulletin) gives another view of one pair of these machines in full work in the same factory in that year.

The Gregg Cane unloader is a modification of the Bodley Mallon and has been well spoken of.

The Wicks works somewhat differently but is an effective machine. Plate III (see at the end of the Bulletin), Figure 1 gives a view of one at work in a Mexican sugar factory and feeding 800 tons of cane per day, but capable of doing much more.

This machine requires the attention of three hands. One attaches and releases the rope pulling the trucks up to the machine, one attends to the truck doors and one drives the engine. The two boys seen in the centre of the picture are not employed about the machine. The loaded trucks being pulled up to within reach of the claw push the empties to a point where they can be coupled up to the locomotive. The yard of the Trinidad Factory is graded 1 in 125—see Plate I—from the cane siding limit to the machines, and a touch of the hand brings the trucks within reach of the rakes. When emptied they move away slowly by gravity and

are collected by locomotives at the other end of the factory. This, however, is the case with the two outside lines only. The lines inside the cane carrier terminate in turntables on which the empties are turned out to be picked up and removed by the yard locomotive. Plate 1 shows all the hands employed to attend the emptying of 4 trucks simultaneously—except two bringing the loaded trucks down to the rakes and letting down the doors. The doors are put up by the train attendants at the other end of the factory.

In one Mexican factory the loads of the field trucks after passing over the scale are transferred by an overhead travelling crane to trucks of twice or three times the capacity. The latter are then drawn alongside the cane carrier to be emptied by hand while the small truck returns free to the field. The only advantage in this arrangement lies in permitting the work to be done with a smaller number of field trucks than what in the ordinary course would be necessary.

Plate III, Figure 2 shows the transfer crane, the empty small trucks passing out to the field, and the large trucks being emptied by hand under the cane carrier shed.

Figure 3 below shows transferred cane in the larger truck. Canes in this part of Mexico are cut into lengths of two feet to the benefit of the mill extraction.

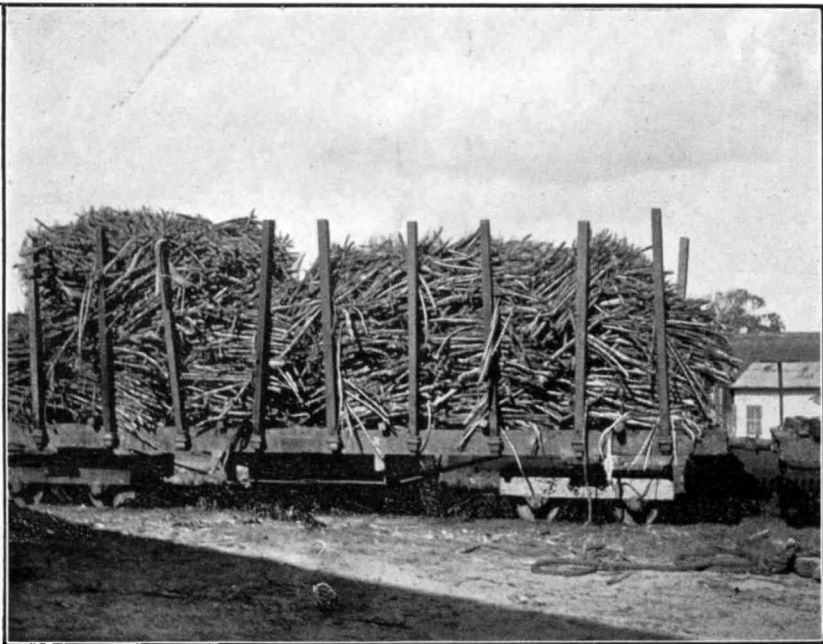


Fig. 3.—Showing transferred cane in the larger truck.

The Link Belt Engineering Co. of New York have devised an overhead crane and sling for transferring bodily the contents of the small field truck to a hopper at the end of the Cane Carrier.

An idea of how this works may be gathered from Plate IV (see at the end of the Bulletin), Figures 1 and 2 giving different views of it. This machine is worked electrically as is the whole of the machinery in this factory except the mills, power being obtained from a stream behind the works.

The dumping of quantities of cane, weighing generally from one to two tons, in a heap on the cane carrier is highly objectionable.

A different plan for hopper feeding is in use in a French Factory in Tropical Mexico. The cane trucks are led on to a platform which is tipped by hydraulic power to an angle sufficient to throw off only a part of the load. As this is drawn away by the cane carrier the platform is further inclined, and the truck gradually relieved of its load.



Fig. 4.—Bascule in a French Factory tipping a truck of cane into the carrier (wooden truck).

In a sugar factory in the Island of Antigua, West Indies, a tipping platform has been arranged to facilitate the feeding of the cane carrier. Over this the trucks are drawn and the canes disposed of by hand. Figure 6 shows this arrangement at work.

The factories visited in India have no railways of their own,



Fig. 5.—Truck relieved of its load. (Iron truck.)



Fig. 6.—Trucks being discharged into cane carrier from Railway Sidings crossing it.

Neither of the appliances mentioned can therefore be expected in any way to benefit them. All are inapplicable. But the American Hoist and Derrick Co. have a machine which, if it does not entirely eliminate labour at the cane carrier, will very greatly reduce it and can be depended on to keep the cane yard well regulated and to eliminate absolutely the blocks and delays to the men and animals engaged in the transport service.

Plate V (see at the end of the Bulletin), Figure 1 shows this machine swinging a truck load of canes, weighing from $1\frac{1}{2}$ to 2 tons on to a sloping platform at the end of the cane carrier whence it is dragged by hand as it is required by the moving carrier.

Plate V, Figure 2 gives another view of the Derrick swinging a load into place where it can be reached by the four men occupied in feeding the cane carrier.

Here may be seen the head man and all the hands employed in the cane yard of this factory where 400 to 500 tons were disposed of daily. Beyond the line of trucks from which the Derrick is working may be seen a quantity of stored cane, to be used in the intervals between trains from the field, and at night when trains are not running.

Without modification the Indian cart would admirably lend itself to working in with such a machine and the mere saving of labour would be the very least of the advantages which would accrue from its adoption.

Questions as to juice extraction by mills did not result in much information which could be considered of value. In some of the factories, owing to the tangle of canes in the yard, the crushing cannot be taken daily—a serious drawback, as here no pains should be spared to obtain the maximum extraction.

In each case, however, the mills seemed to have fallen into careful hands. As far as could be judged by the eye all were doing good work. And this, in more than one case, despite the drawback of intermediate carriers scraping the bagasse from the first mill and presenting it in uneven quantity to the second.

In one case the crushing figures from the start of the crop of 1914 to the 28th February, week by week, were furnished by the Administration. The average fibre content of the cane during this period was given at 14·6 per cent. and the average crushing for the ten weeks works out at 62·69 per cent. On paper this does not look particularly good crushing. It is not while members of the staff are hovering round the cane carriers and watching the feeding of the mills in the full light of day that bad crushing is done.

Much might be said on this subject. Before leaving India, by the courtesy of Mr. Keatinge, Director of Agriculture for the Bombay Presidency, I became possessed of a copy of Bulletin No. 52 of 1912, Department of Agriculture, Bombay.

In that publication the author, Mr. G. N. Sahasrabudde, L.Ag., at page 12, gives a table constructed by my friend Dr. Watts of the Imperial Department of Agriculture for the West Indies, giving the possible juice extraction from 100 of cane with fibre contents ranging from 8 to 16 per cent. by mills varying from the poorest type of bullock mill to the 9 roller modern mill preceded by a Krajewski crusher.

These figures are no doubt very useful as approximations, but those referring to two three-roller mills strike me as low. In 1882, along with the late Alfred Fryer, well known in sugar circles in connection with the Concretor, I made certain experiments in juice extraction with two single mills, each 34" x 72" running with a peripheral speed of 8.9 feet per minute and set close to take only a thin feed.

The experiments lasted three weeks. During that period of continuous work—the only stoppages being on Sundays—the mills were never for a moment left to themselves. The crushing worked out at an average of 67.8 per cent. Mr. Fryer had throughout the experiment been making constant tests of the bagasse and he recorded it as having contained 45.34 per cent. of fibre, the fibre content of the cane for the period being 14.4 per cent. Too much care cannot possibly be bestowed upon the feeding of the mills. The Engineer may do his part by having them in the perfection of condition, but it rests with the Administration to get the perfection of work from them.

Before the days of "green" bagasse furnaces the appearance of the bagasse turned out overnight indicated the amount of care bestowed on the feeding of the mills. In these days bad work is hidden by burning up the bagasse as made. To insure good work, therefore, **it is imperative that the crushing of the mills be taken once every 24 hours.** The use of storage derricks would make this a very simple and withal a very profitable operation.

Cane Juice.

As to the quality of the cane juice, in most of the factories visited, there was much complaint.

The Boiling House Records of one Factory for the current crop showed the following figures : -

Week ended	Brix.	Sucrose.	Purity.
1913, December, 20	16.38	13.20	80.6
" " 27	16.73	13.49	80.6
1914, January, 3	16.83	13.65	81.1
" " 10	16.78	13.60	81.0
" " 17	16.80	13.63	81.1
" " 24	16.88	13.84	82.0
" " 31	17.04	13.91	81.6
" February, 7	17.00	13.87	81.5
" " 21	17.32	14.12	81.5
" " 28	17.56	14.55	82.8
Average of ten weeks	16.93	13.78	81.3
" for December	16.55	13.35	80.6
" " January	16.87	13.72	81.3
" " February	17.29	14.18	81.9

After I had left India another Bihar factory forwarded an extract from its records for the four years 1909-10 to 1912-13 and for 1913-14 down to part or the whole of the month of March 1914.

From this statement the following figures have been compiled :—

	DECEMBER.		JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.	
	Brix.	Sucrose.	Brix.	Sucrose.	Brix.	Sucrose.	Brix.	Sucrose.	Brix.	Sucrose.	Brix.	Sucrose.
1909-10 .	16.78	13.36	15.82	14.45	16.10	14.58	18.39	14.11	18.00	15.40
1910-11 .	15.19	12.97	16.20	13.28	17.32	14.25	16.97	14.61	17.00	14.17
1911-12 .	15.53	13.40	16.15	14.05	16.15	15.10	17.10	15.00	17.60	15.00
1912-13 .	17.17	14.67	17.35	15.39	17.75	16.05	18.17	15.57	19.15	16.22	19.40	16.20
1913-14 .	16.80	14.50	17.45	14.80	17.42	15.42	18.30	15.90	?	?	?	?
Sucrose Average	13.78		14.40		15.08		15.04		15.33		16.20	

SUGAR MACHINERY AND MANUFACTURE IN NORTHERN INDIA

"	"	"	"	1911-12	.	.	.	14.51	"
"	"	"	"	1912-13	.	.	.	15.01	"
				to end of March (?) 1913-14	.	.	.	15.15	"

Canes grown without irrigation fluctuate in saccharine content with the vicissitudes of season and the above cannot be considered particularly poor juice.

From only one of the Estates visited, the one referred to on page 10, were fibre figures obtained. These were given for the current crop as 14.6 per cent.

Fibre figures at best are only an approximation more or less remote. Assuming—we can only assume—that the fibre in the cane supplied to the second factory for the crop of 1912-13 was 14.5 per cent. the sucrose content of those canes would appear to have been 12.82 per cent.

A brief résumé of the figures for 1913 for 133 Java factories is now available, and it shows that the sugar content of the canes was 12.54 per cent. against 12.35 for the previous year. The highest amount of sugar in the cane was 14.81 per cent., the lowest 9.70 per cent. The average fibre is not given, but it may not be unsafe to assume that it was less than in the Bihar cane and that the juice contained less sugar. Its average purity was 80.95 per cent. as against 81.3 per cent. in the Factory mentioned at page 12.

If the juice dealt with in these two factories is to be taken as near the average of Bihar juices that district has great possibilities.

Clarification.

In two factories outside Bihar the appliances for clarification and their arrangement were found not unsatisfactory, but in only one of these did the sulphur box appear to be thoroughly effective.

One factory only of those visited later was using the carbonation process. Of those using sulphur only one was applying it effectively. This must not be taken to mean that its application by means of rough-and-ready furnaces and wooden boxes cannot be made thoroughly effective. Where wooden boxes were used they were found too small. The vent pipe of one was too small to keep the sulphur burning in the furnace. It was therefore useless. One of the shelves of another was at the moment of my visit lying outside the box. Its construction clearly showed the inefficiency of this box. A third was at the moment out of use

on account of a broken jet pipe. All were difficult of access for cleaning internally.

In three of the factories the clarifying arrangements consisted of a range of defecators in imitation of the French system. There is no better defecator than the French when properly arranged in a good light **and carefully attended**. These are insufficiently lighted where light is most required at the outlet pipes and at night in some of the ranges it must be impossible to obtain a careful separation of the clear juice from the mud or scums.

The "Eliminator" may be expected to correct this; as a matter of fact as now generally constructed it does not.

The mud subsidors in each of these three factories were of wrong dimensions. They could not be used as subsidors, consequently more liquid had to be passed through the filters than should have been and the work was imperfect. To correct this, in one case at least, a range of seven subsidors has been erected. It is needless to point to the loss of sugar which must result from the hanging up of so much juice in the factory, and heat, and other losses consequent.

Evaporation.

In all the factories visited the Evaporators if kept properly clean seemed to be sufficient for their work. In some cases continuous work was said to be carried on for a couple of weeks. This is certainly not economical and the practice cannot be defended. In sugar factories generally Sunday is the most important day of the week, and the time should be fully utilized in cleaning evaporating surfaces and otherwise engaging in works of prevention.

Vacuum pans.

In most of the factories the vacuum pans were of capacity sufficient to deal effectively with the material passed on to them if helped out by crystallizers.

Crystallizers.

In only two were the crystallizers sufficient in number to insure the maximum reduction of the sucrose in the molasses. The amount of this reduction was not ascertained but a mere glance at the other installations was enough to show their deficiencies.

Quality of Sugar.

This depends to a great extent upon clarification and owing principally to the construction and arrangement of the appliances, clarification was responsible for any shortcomings in the quality of the product. In one small factory where the clarifiers were well arranged and the crystallizers adequate to the work, two sugars were being made and the quality of each was of its kind excellent.

Much has recently been written in reference to the manufacture of white sugar, and all-white-sugar at one operation, but unless the price of the white is far enough above that of the second to compensate for a greater vacuum pan capacity, for extra centrifugals, and greater demands upon the fuel, to say nothing of a decreased extraction, he will be well advised who, having a fair market for second sugar, continues to make it.

Extraction of Sugar.

With regard to extraction no figures extending over a number of years were obtained, but the condition of the cane yards, the poor crushing, the appliances for treatment of the juices and the shortcomings of the crystallizers taken together are sufficient to account for its being anything but high or satisfactory.

Here the manufacturing figures from Java for the crop of 1913 may again be referred to. The highest percentage of sucrose extracted by the mills from that in the cane was 95.1. This was with 11.11 per cent. of fibre in the canes and 12.7 per cent. maceration. The lowest was 84.7 per cent., with 7.91 per cent. of fibre.

This shows mill work on cane of 84.4 and 78 per cent. respectively.

The working up of the juices appears to have resulted in the following figures :—

White Sugar of	.	.	99.20	poln.	6.93	per cent.
Refining crystals of	.	.	97.18	"	1.34	"
Second boilings of	.	.	97.61	"	0.90	"
Molasses Sugar of	.	.	86.07	"	0.76	"
Black Stroop	.	.		"	0.05	"
			Total		9.98	"

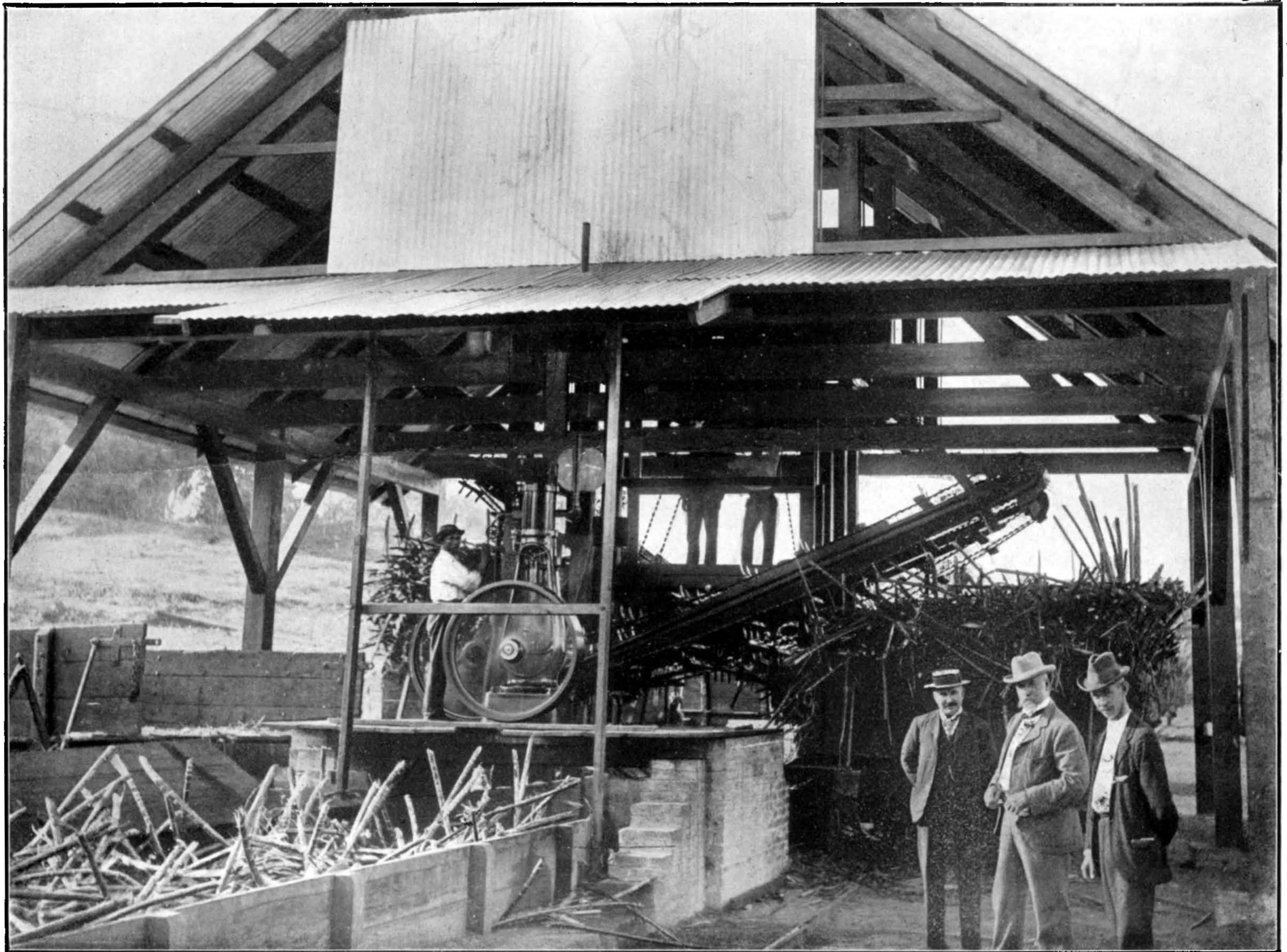
As to the number of crushes to which the cane was subjected to obtain from the mills the results given above, no information has been furnished, but it is probably safe to assume that three was a minimum, and of less frequent occurrence than four or five. No Indian mill as it stands at

present can approach this working but the addition of a third or fourth to the double mills now in use and careful feeding would make the approach a very near one, regard being had, of course, to the excess of cellulose in the Indian cane.

The result of the treatment of the Java juice shows that it must have been skilfully handled throughout—the first stage being good clarification.

With a few modifications and additions the Indian factories seen in the early part of March last need be no long way behind Java in the matter of sugar extraction.

Victoria, Vancouver, B. C., }
July 29th, 1914. }



ANOTHER VIEW OF ONE PAIR OF BODLEY MALLON MACHINES IN FULL WORK.

PLATE III.



FIG. 1.—THE WICKS CANE CARRIER FEEDER AT WORK IN MEXICAN SUGAR FACTORY.

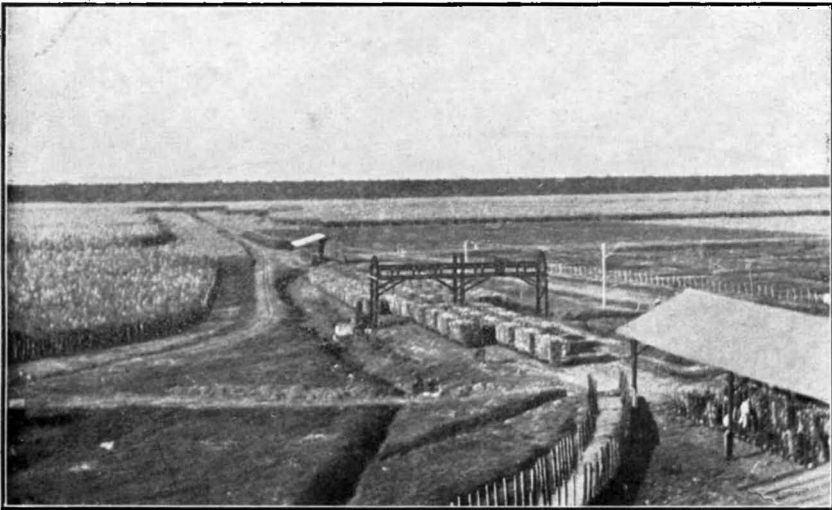


FIG. 2.—THE TRANSFER CRANE, THE EMPTY SMALL TRUCKS PASSING OUT TO THE FIELD AND THE LARGE TRUCKS BEING EMPTIED BY HAND UNDER THE CANE CARRIER SHED.

PLATE IV.

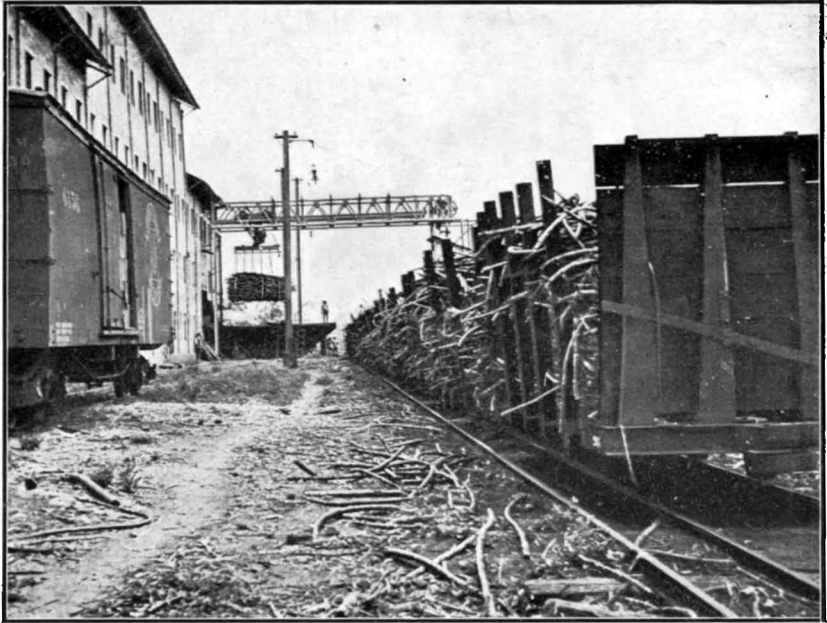


FIG. 1.—OVERHEAD CRANE AND CANE SLING IN MEXICAN SUGAR FACTORY.

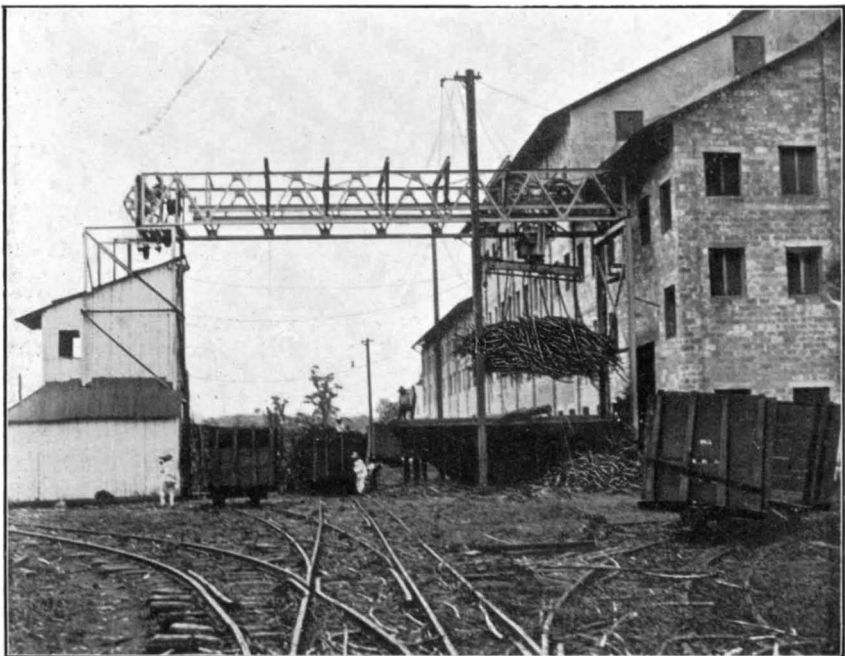


FIG. 2.—TRAVELLING CRANE AND CANE SLING IN MEXICAN SUGAR FACTORY.

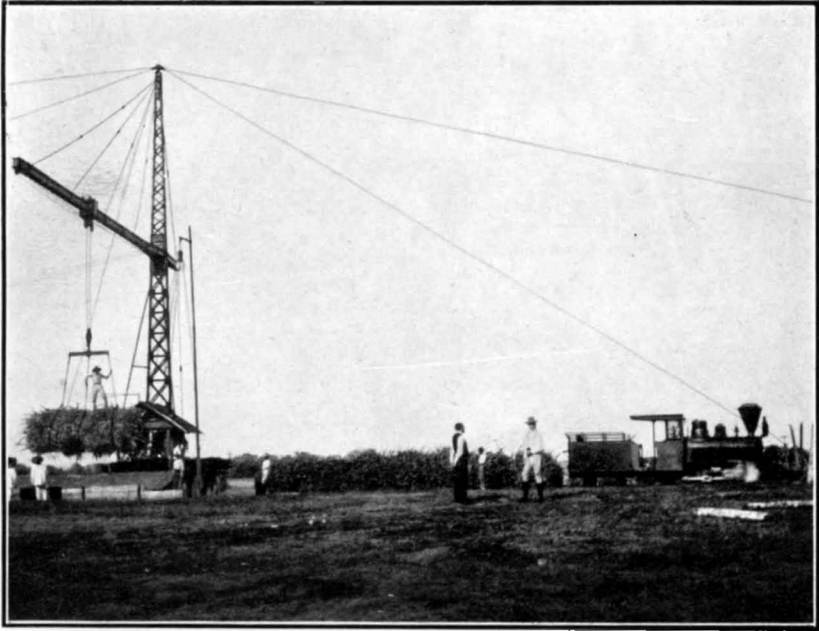


FIG. 1.—AMERICAN HOIST AND DERRICK Co.'s TRANSFER CRANE AT WORK AT MEXICAN SUGAR FACTORY.

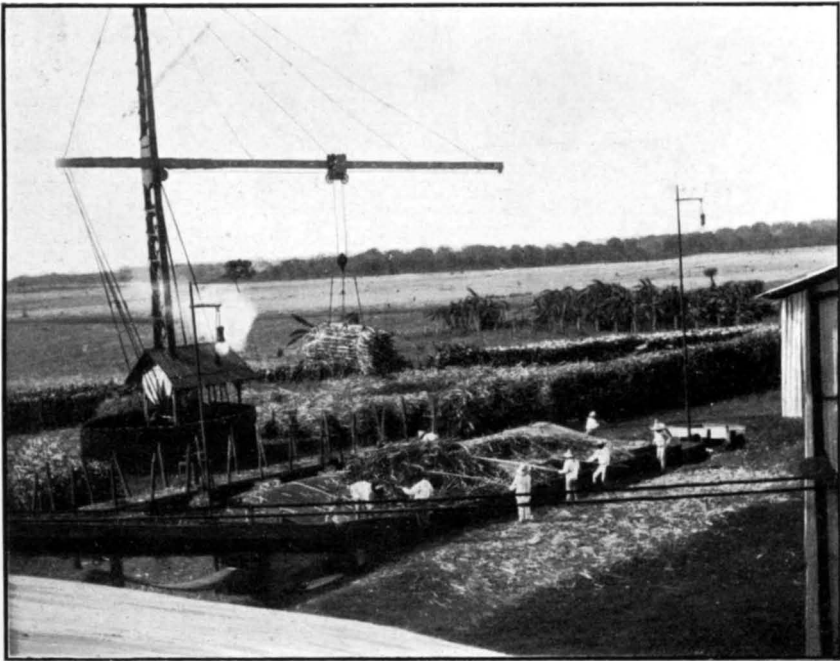


FIG. 2.—ANOTHER VIEW OF THE DERRICK SWINGING A LOAD OF CANES ON TO CANE CARRIER PLATFORM.

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