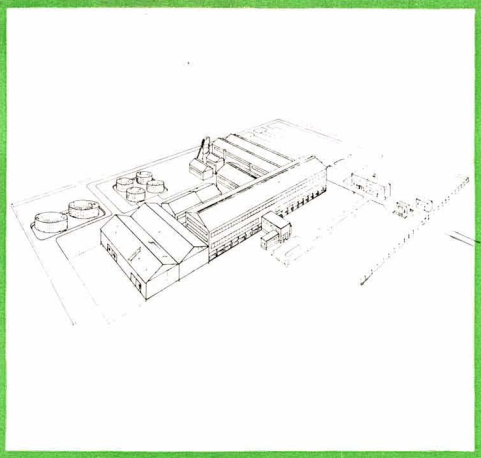
THE International Sugar Journal

OCTOBER 1969



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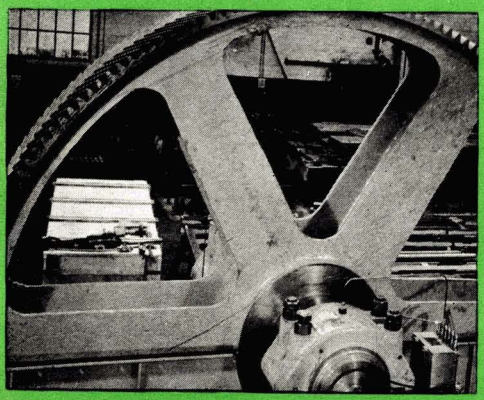

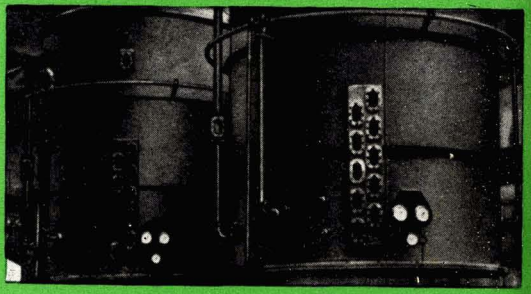

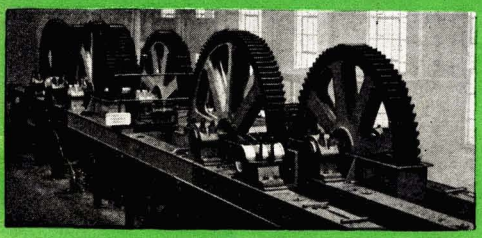

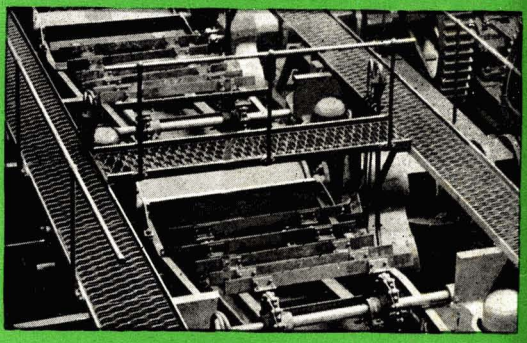

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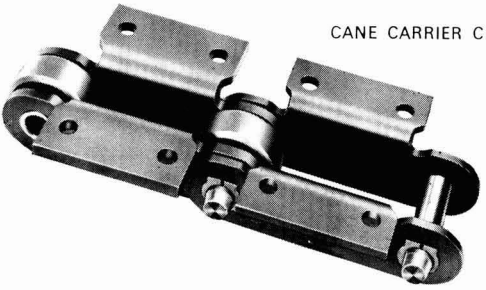

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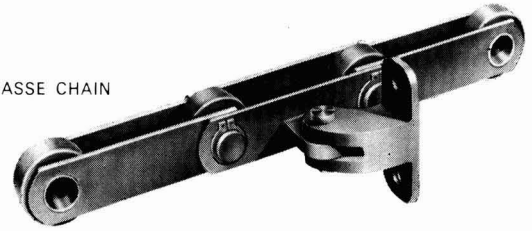

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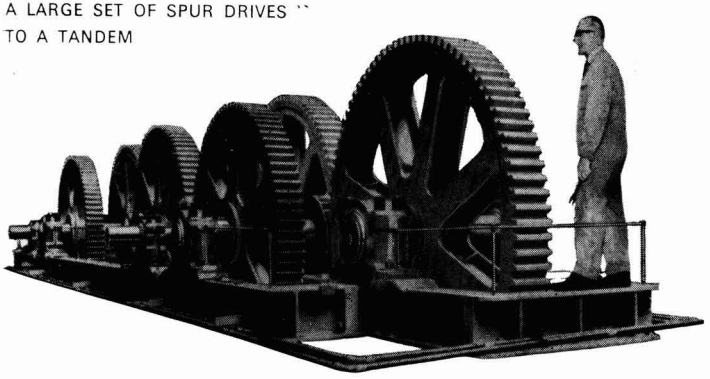

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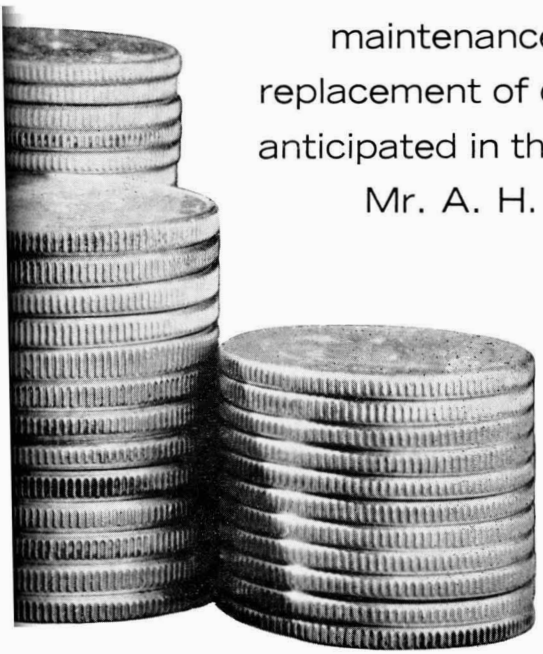

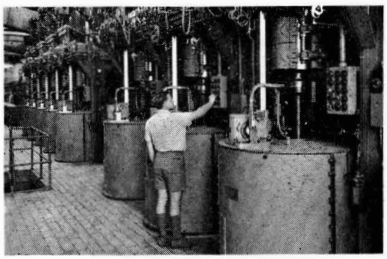

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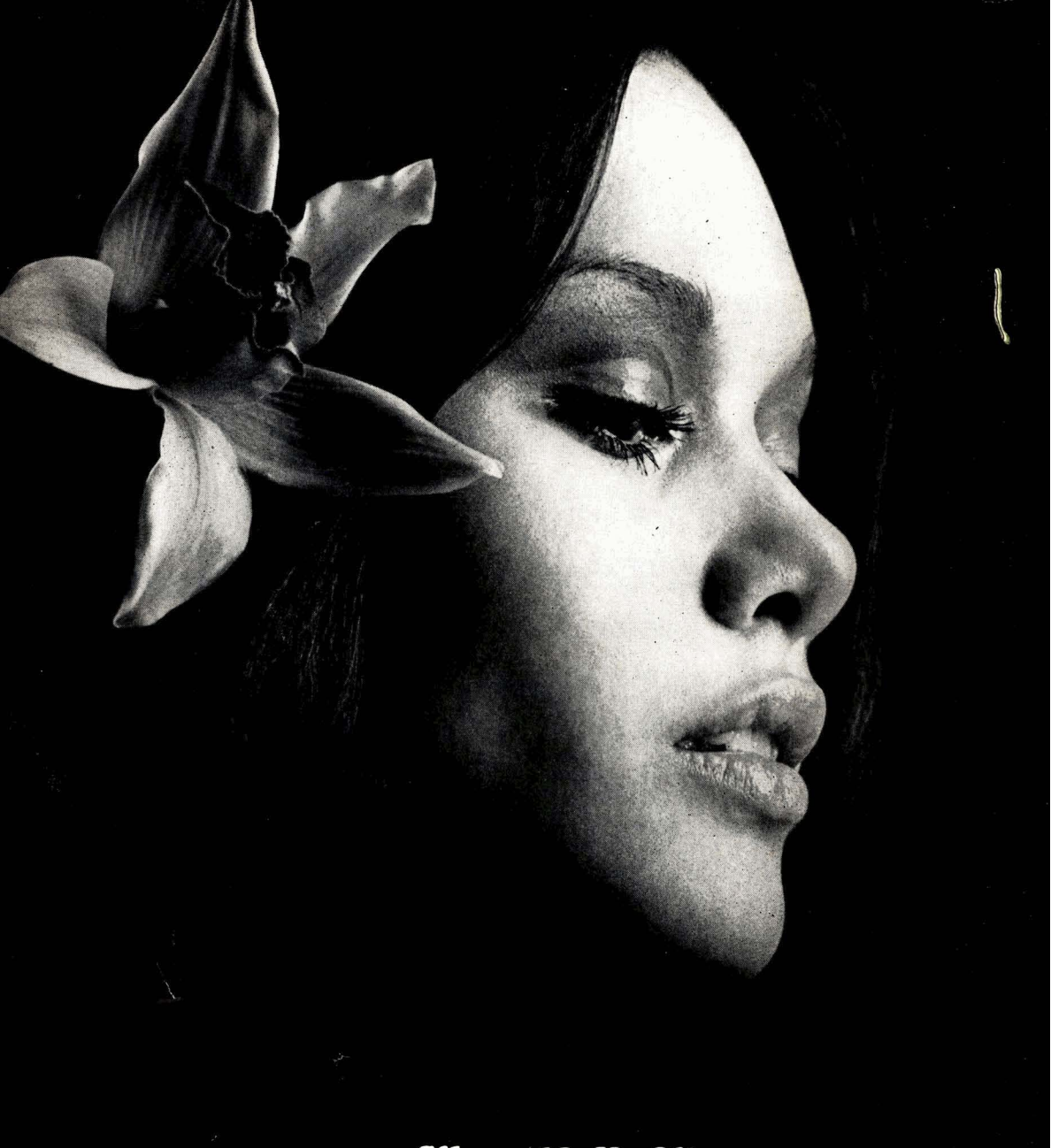

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'Medicinal Plants' Vol. 4, Bentley & Trimen, London, 1880

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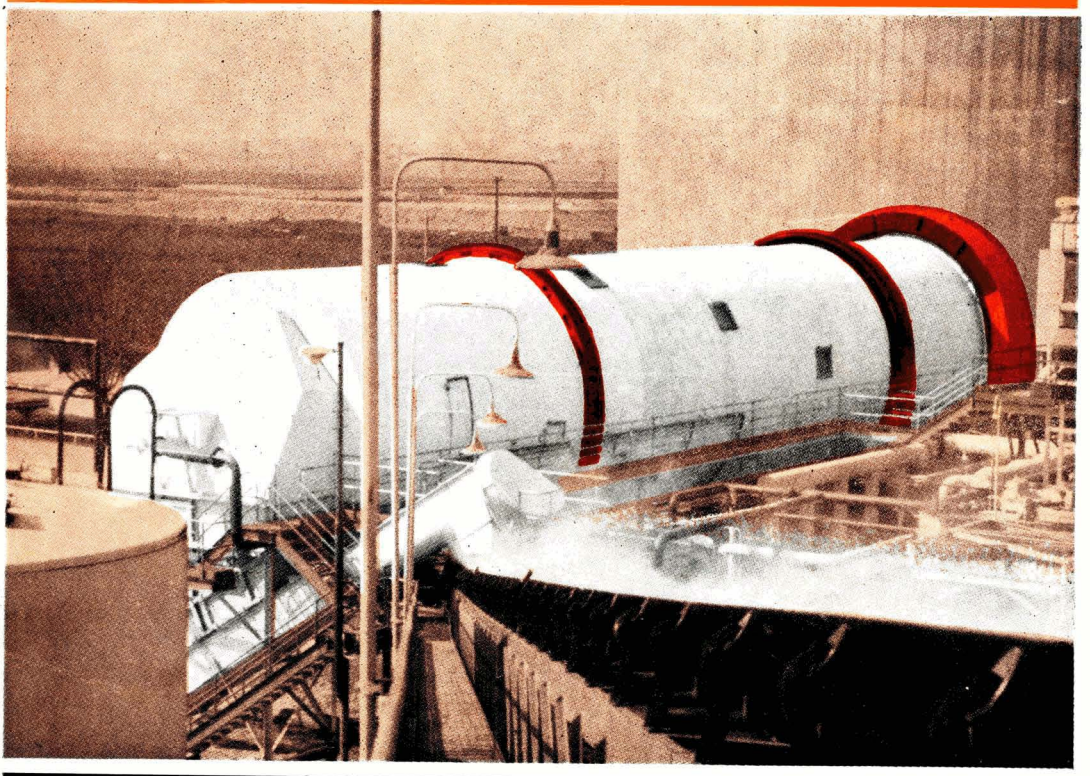
*Holly Sugar Factory, Tracy, California, 1968-9
**Union Sugar Factory, Betteravia, California



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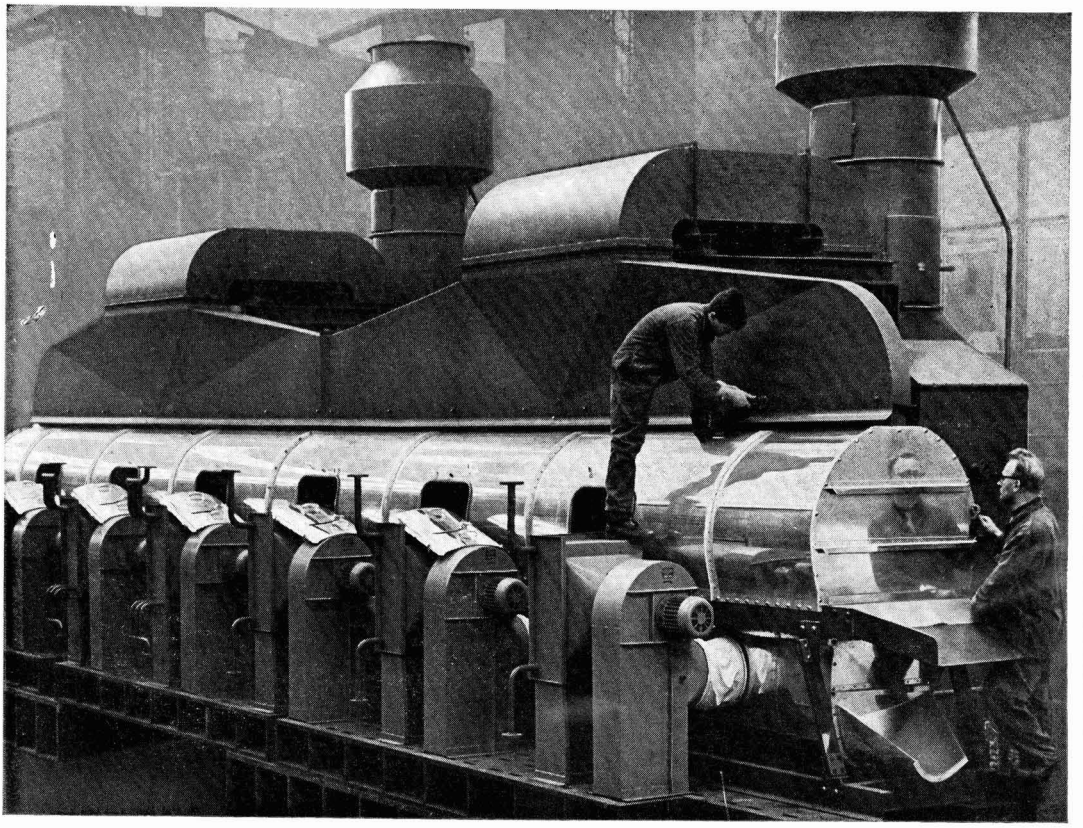

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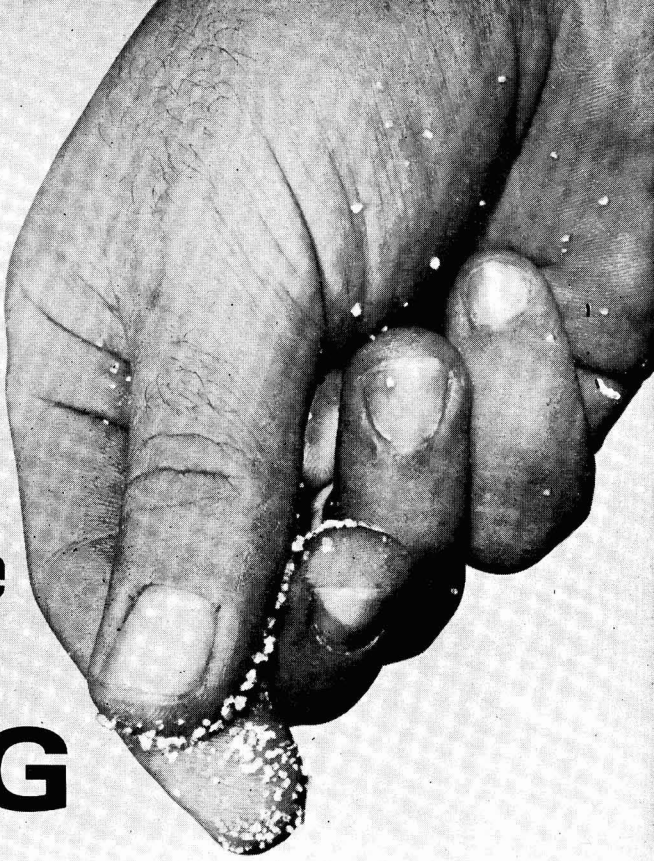

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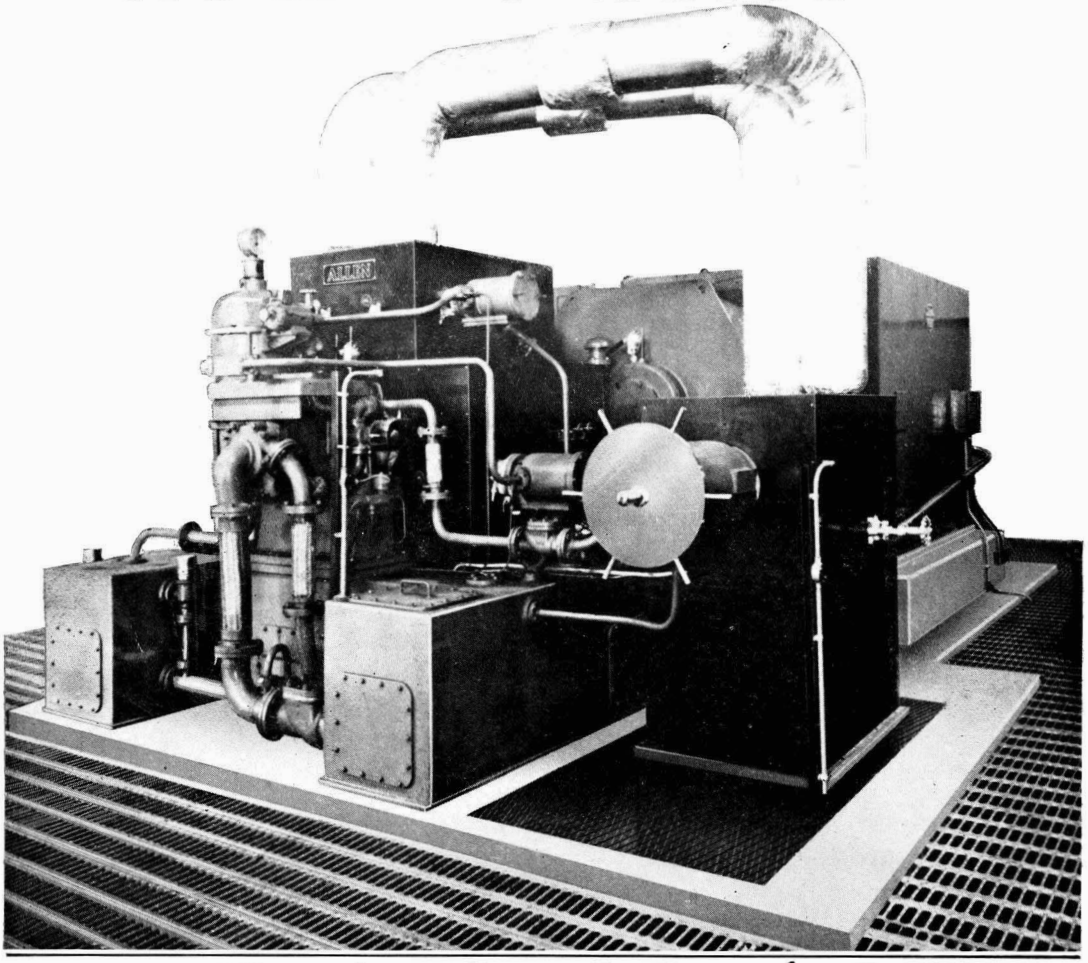

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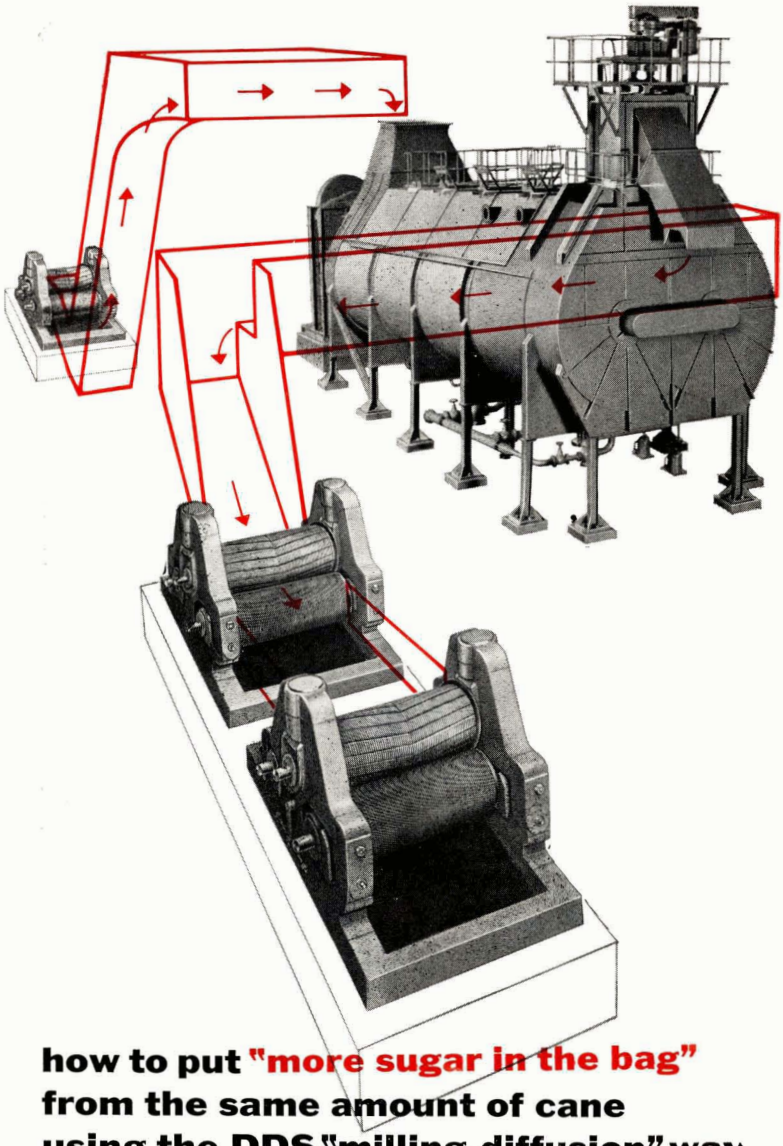

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SOMMAIRES : ZUSAMMENFASSUNGEN : SUMARIOS

Culture de la canne à sucre au Queensland. *p.* 291–293

On présente un sommaire du rapport annuel pour l'année 1968 du Bureau of Sugar Experiment Stations au Queensland, traitant d'aspects variés comprenant les problèmes de la récolte mécanique, les engrais, les mauvais herbes et leur contrôle, et les maladies et insectes nuisibles de la canne.

* * *

La mécanique de broyeurs à marteaux oscillants rotatifs. 2-ème partie. W. R. CRAWFORD. *p.* 293–296

Dans la deuxième partie de son article, l'auteur développe quelques équations pour calcul de la couple du broyeur, le travail total accompli par le rotor et la puissance transférée d'un rotor à la canne. Quelques moyens par lesquels on peut améliorer la performance d'un broyeur sont discutés sous les rubriques de paramètres individuels.

* * *

Le maniement de matériaux dans l'industrie du sucre. H. G. BAYLER. *p.* 297–300

L'article traite du maniement de la canne à sucre et du sucre brut et raffiné, tant en vrac que dans les sacs. Quelques matériels de types employés sont illustrés.

* * *

Nystose—Oligosaccharide X. W. W. BINKLEY et W. F. ALTENBURG avec M. KOMOTO et H. TSUCHIDA. *p.* 300

On rapporte les résultats d'essais, sous la forme de points de fusion mixtes et données de diffraction de rayons X, qui montrent que les trihydrates de nystose et d'oligosaccharide X sont identiques.

Zuckerrohranbau in Queensland. *S.* 291–293

Eine Zusammenfassung des Jahresberichts (1968) des Bureau of Sugar Experiment Stations in Queensland wird gegeben; sie handelt von verschiedenen Themen, wie z.B. Problemen des mechanischen Rohrerntens, Düngmittel, das Unkraut und die Unkraut bekämpfung, und Rohr-Schädlinge und -Krankheiten.

* * *

Die Mechanik von Schreddern mit rotierenden Schwinghammern. Teil 2. W. R. CRAWFORD. *S.* 293–296

Im zweiten Teil seines Aufsatzes, entwickelt der Verfasser einige Gleichungen für die Berechnung des Schredder-Kräftepaars, der ganzen vom Rotor ausgeführten Arbeit, und der von einem Schredder-Rotor auf das Rohr übergetragenen Kraft. Es wird an Hand der einzelnen Parameter diskutiert, wie man die Leistung von Schreddern verbessern kann.

* * *

Die Handhabung von Materialien in der Zuckerindustrie. H. G. BAYLER. *S.* 297–300

Der Artikel betrifft die Handhabung von Zuckerrohr, Roh- und raffiniertem Zucker, gesackt und ungesackt. Einige für diese Arbeit angewandte Einrichtungen werden illustriert.

* * *

Nystose—Oligosaccharid X. W. W. BINKLEY und W. F. ALTENBURG mit M. KOMOTO und H. TSUCHIDA. *S.* 300

Man gibt einige Versuchsergebnisse, in der Form von Mischschmelzpunkten und Röntgendiffraktionsdaten, die zeigen, dass die Trihydraten von Nystose und Oligosaccharid X identisch sind.

Agricultura de la caña de azúcar en Queensland. *Pág.* 291–293

Se presenta un sumario de la Memoria Anual de 1968 del Bureau of Sugar Experiment Stations en Queensland, que trata de varios aspectos que incluyen las problemas de la cosecha mecánica, abonos, malas hierbas y su control, y plagas y enfermidades de la caña.

* * *

La mecánica de desfibradores de martillos giratorios. Parte II. W. R. CRAWFORD. *Pág.* 293–297

En la segunda parte de su artículo, el autor desarrolla algunas ecuaciones para calcular el par del desfibrador, el trabajo total hecho por el rotor, y la fuerza transferido del rotor a la caña. Discute métodos por que el cumplimiento de un desfibrador puede mejorarse, sobre los títulos de parametros individuales.

* * *

El manejo de materiales en la industria azucarera. H. G. BAYLER. *Pág.* 297–300

El artículo describe el manejo de caña, y de azúcar crudo y refinado, tanto a granel como en sacos. Varios tipos de equipo usados se ilustran.

* * *

Nystose—Oligosacarido X. W. W. BINKLEY y W. F. ALTENBURG con M. KOMOTO y H. TSUCHIDA. *Pág.* 300

Detalles se presentan de las resultas de ensayos, en la forma de puntos de fusión mixtos y de dados de difracción de rayos X, que demuestran que los treshidratos de nystose y oligosacarido X son identicos.

THE

INTERNATIONAL SUGAR JOURNAL

VOL. LXXI OCTOBER 1969 No. 850

Notes & Comments

World raw sugar prices.

The decline in world raw sugar prices reported in our last issue continued through August and by the beginning of September the London Terminal Daily price had reached £27 10s, its lowest level since November 1968. The principal reason for the fall is the reluctance of buyers to hold stocks because of the high cost of financing them, coupled with ready availability from East European countries. By the 27th August, the ISA prevailing price[1] had fallen below the Agreement's floor level of 3·25 cents/lb, when a number of provisions of the Agreement came into force; these included: (a) total prohibition of imports by Members from non-Members, (b) total ban on any re-distribution of shortfalls and (c) increase of the power of the Council to reduce quotas in effect.

The Executive Committee of the International Sugar Council met and appointed a Working Group under the chairmanship of Mr. G. SAUZIER, Chairman of the Committee, to study the circumstances underlying the market situation and to report promptly to the Committee with recommendations as to action which should be taken. The Committee resumed its sessions on the 9th September to consider the report of the Working Group and reached the rollowing conclusions:

"(1) A drop in the price of sugar from July to September is an inherent feature of the price fluctuations in the free market.

"(2) The present situation is partly caused by uncertainties regarding the level of supplies in 1969 and to an imbalance between the supplies of raw and white sugar respectively.

"(3) However, it is now known that total shortfalls for 1969 under quotas in effect will be of the order of 700,000 tons as compared with previously declared shortfalls totalling 292,000 tons; in present circumstances, they cannot be re-distributed and must, therefore, be considered as removed from the market.

"(4) A further cut of 5% of basic export tonnages under Article 49(2)(e), at this late stage, would remove from the market in 1969 not more than about 25,000 tons of sugar, in view of the fact that

(a) many exporting Members have already surrendered quantities in excess of the amount of such quota reduction, and

(b) most other exporting Members have already exported or sold the whole of their present quotas in effect.

"(5) The aggregate of Members' quotas in effect after deduction of the expected shortfalls will amount to 81% of total basic export tonnages. Furthermore, there is very little uncommitted sugar still available within quotas in effect for marketing in the balance of 1969; this fact, coupled with the prohibition on imports from non-Members and with the ban on any re-distribution of shortfalls, should have a positive effect on the market.

"(6) The few Members who still have sugar available for export in 1969 may consider that they would be well advised to exercise restraint in offering sugar for sale; there is already an indication from one such Member that it intends to pursue such a policy.

"In conclusion, the Executive Committee believes that most of the factors which have been responsible for the recent decline in prices are unlikely to have a lasting influence on the market.

"The Executive Committee is due to meet again shortly after the 30th September, by which date shortfalls will have been officially notified, when it will consider the situation further in the light of developments. Moreover, the Council is due to meet within the next two months to consider, amongst other things, the determination of initial export quotas for 1970, including possible recourse to Article 49(2)(e) should the market situation justify this.

"The Executive Committee believes that the attainment of the price objectives of the Agreement would be further promoted if all Members who export sugar, particularly those who export white sugar, were to pursue marketing policies consistent with those objectives. The Executive Committee agreed on a course of action intended to achieve this end."

[1] See *I.S.J.*, 1969, **71**, 95.

Initial reactions to the Committee's statement were disappointed and it was felt that only the minimum possible actions had been taken; later reappraisal led to some recovery of confidence, however, with the result that the Daily Price has risen to its current level of £29.00 per ton.

* * *

World sugar balance.

F. O. Licht K.G. recently issued their third estimate of the world sugar balance for 1968/69[1]. Although the period chosen, i.e. September/August, interrupts crops in a number of important countries, this would apply to any chosen crop year and the end of August is considered the most suitable time to consider stocks since they reach their most important level at that time, before the start of the European beet sugar campaign.

The latest estimates are summarized as follows:

	1968/69	1967/68	1966/67
	(metric tons, raw value)		
Initial stocks	18,737,127	18,659,261	18,561,040
Production	68,800,859	67,595,438	65,800,724
Imports	22,105,652	21,775,928	21,447,923
	109,643,638	108,030,627	105,809,687
Exports	22,253,180	21,582,875	21,483,535
Consumption	70,040,007	67,710,625	65,666,891
Final stocks	17,350,451	18,737,127	18,659,261
Production increase..	1,205,421 (1·78%)	1,794,714 (2·73%)	3,528,515 (4·00%)
Consumption increase	2,329,382 (3·44%)	2,043,734 (3·11%)	2,629,795 (4·17%)
Final stocks % consumption	24·77%	27·67%	28·42%

Sugar imports and exports in the table do not match exactly but are close enough; the differences arise from the sugar cargoes in transit and to different valuations of sugar qualities.

As C. Czarnikow Ltd.[2] points out: "It used always to be held that if stocks dropped below three months' requirements (i.e. 25% of consumption) the market was in a dangerous situation. The current high cost of finance has encouraged many sugar users, particularly in developed countries, to devise procedures which enable them to keep their stocks of sugar at a minimum. It is therefore feasible for world stocks to be maintained at a lower level than was formerly the case. Nevertheless, it must be recognized that consumption is expanding rapidly year by year and any major crop failure could bring about a very tight statistical situation".

At present there are adequate supplies available so that the disinclination to hold stocks is a basic cause of the weakness of the market; in the event of a crop failure or other cause for reduction of supplies it is likely that a consequent strengthening of the market would be given added impetus by a wish to restore stocks to their formerly normal level.

In referring to the future, F. O. Licht consider that if 1969/70 sugar production should remain within reasonable limits the statistical situation for the year would be very sound, and such a tendency is not threatened by European producers. Cuba, however, has publicized its target of 10 million tons—about double the normal crop—and is evidently intent on raising production this year as near as possible to that level. Most observers do not think that the target will be reached, in spite of counting part of 1969 production in the 1970 crop[3], but Licht points out that, although such a figure will be required at some time in the future, it would be a disaster in 1969/70

* * *

EEC sugar and the French devaluation.

A very difficult problem arose for the EEC Council of Ministers following the devaluation of the French franc on the 8th August. The common agricultural policy has rested on two propositions: that there should be one market and one set of prices throughout the community, and that consumers and not taxpayers should provide the payment for the crops. It had been considered that a change in parities between the countries of the EEC was unthinkable since it would involve either a re-negotiation of the price levels which had been established after considerable bargaining, or a need for isolation of the country concerned from the rest of the Common Market.

In the event, the second course has been followed, with subsidies for agricultural products entering France, levies on exports from France, and lowering of the intervention price in France by 11·11% (the full amount of the devaluation) until the end of the 1969/70 crop year, and by 5·6% in 1970/71. These measures can only be temporary if the Community is to be restored to its original purpose and form, since, after 1971, if prices are not re-negotiated and French farmers are again receiving the original prices in terms of the EEC Units of Account they will be shielded from the effects of devaluation, in contrast to their compatriots, and will be more competitive than other EEC farmers and so will have added incentives to increase the already serious problem of surpluses, especially of dairy products and wheat, and to produce more unwanted sugar.

* * *

US sugar supply quota, 1969.

On the 11th August the US Dept. of Agriculture prorated 128,703 tons of deficits in sugar quotas to Western Hemisphere countries able to supply additional sugar. This action reflects proration of deficits of 142,886 and 817 tons, respectively, in the quotas previously established for Peru and Panama and also a reduction of 15,000 tons in the previously determined deficit in the quota for Puerto Rico which, when considered together, results in 128,703 tons for prorations to other countries. No proration was made to the Philippines, Haiti or Nicaragua as information available to the Department indicated that these countries are unable to supply additional quota sugar. The prorations and former and revised quotas are tabulated elsewhere in this issue.

[1] *International Sugar Rpt.*, 1969, **101**, (22), 1–3.
[2] *Sugar Review*, 1969, (931), 140.
[3] *I.S.J.*, 1969, **71**, 288.

Sugar cane agriculture in Queensland

68th Report, Bureau of Sugar Experiment Stations, Brisbane, Queensland

THIS report covers the calendar year 1968 and gives a good idea of the important rôle played by the main station at Brisbane and the four regional or substations in other parts of Queensland, these being at Meringa, Burdekin, Mackay and Bundaberg. It is pointed out that the position in regard to world sugar prices has led to more serious consideration of exploiting any possible means of reducing costs of production. Cane growers are prone to rely, quite understandably, on improved cane varieties to reduce costs. A more vigorous, sweeter cane can, by producing more sugar per acre, reduce the grower's costs per ton of sugar on a given area of land. But new cane varieties which increase the yield of cane and sugar per acre cannot influence favourably the overall cane price. On the other hand a sweeter cane variety which produces the same amount of sugar per acre as its predecessor, but at lower cane tonnage, will raise the cane price and thereby improve the net profit per ton of cane. This aspect of cane growing economics has been highlighted by analysis of variety trials conducted on growers' own properties in recent years.

The selection of higher sugar content varieties has, for this reason, received special attention by cane breeders in the Bureau. There has been less emphasis in recent years on varieties with the capacity for higher cane yields, but more bias is placed on those which have the potential for higher sugar content, whether for early or late harvesting. It is considered that, at present, there are too many cases of over-reliance on a single variety which is suitable for profitable farming during only half or two-thirds of the harvest, but which becomes unprofitable for the remainder of the period.

Problems associated with mechanical harvesting

Reports from most mill areas indicated increased incidence of ratoon stunting disease. This has been a feature of the increased use of mechanical harvesting. This increased prevalence of the disease may be due, in part, to complacency among some growers and failure to take the recognized precautions. Most of the increase is considered to be due to contract and other non-farmer operators of mechanical harvesters not sterilizing the cutter blades as they move from field to field and farm to farm, in spite of much publicity on this issue. However, headway is being made on this problem, especially when the farmer realizes that he is the only direct loser through contamination of his clean blocks. A few farmers have gone to the extent of buying their own base-plates and cutting edges and insisting on their attachment before the machine commences to operate on their farms. Another dangerous source of contamination is the practice of cutting planting material with a whole-stalk harvester. This is being closely watched.

During the year nearly 59% of the total crop (9,204,000 tons) was cut by machines and 97·5% of the crop loaded mechanically. In the aggregate 814 chopper-type harvesters and 509 whole-stalk harvesters were employed.

Another of the problems associated with mechanical harvesting is the rapid deterioration of chopper-harvested cane, a matter continually under review. No significant progress was made during the year on the technical side to prevent the destruction of sugar by micro-organisms but considerable advances were made in reducing the delay between harvesting and crushing. The speed-up of transport units and the minimization of mill stocks over weekends have proved to be the most practical way of attacking the problem.

Yet another major issue with mechanically-harvested cane is the increase in extraneous matter (tops, trash and earthy matter) that becomes mixed with the cane and so reaches the mill. The present practice in some areas of applying monetary deductions for extraneous material on the basis of visual assessment does not appeal as a scientific solution to the problem. For over 50 years sugar cane has been purchased on the basis of its recoverable sugar content, and legislation requires a high degree of accuracy in the methods of sampling and analysis employed. It seems rather anomalous, therefore, that appreciable deductions from cane value—because of non-cane content—can be made as the result of rapid visual assessment. It may not be possible, within a range of reasonable cost, to determine extraneous matter as accurately as sugar content of cane, but it is logical to expect that an attempt be made to measure this foreign material more precisely than at present, and that the evaluation be made by skilled, neutral personnel. At some mills considerable progress has been achieved in the direction of measuring non-cane constituents of deliveries and in basing the monetary deductions on the measurements made. At others the practices in vogue leave much room for improvement.

Nitrogen and sulphur nutrition

Results are given of trials carried out on the economics of nitrogen nutrition. From these it becomes apparent that if a farmer is to take full advantage of nitrogen fertilizers it will be desirable for him to decide, at the time of making the nitrogen applications, the approximate date of harvest of the block of cane and adjust his rate of application accordingly. The data from the experiments indicate that, within the period of harvest covered by the trials, for every week harvest is delayed the cane can profitably utilize an extra six pounds of nitrogen per acre.

A report is given of a further series of trials in which the standard source of nitrogen, ammonium sulphate, was compared with ammonium sulphate/nitrate and ammonium sulphate with a nitrification inhibitor. In only one trial was there any indication of a difference in the availability of nitrogen to the plants. This trial was in the Bundaberg area and it was apparent that, while there was a slight increase in

yield where nitrate was present in the fertilizer, a distinct depression in growth was encountered in those plots where the inhibitor was applied.

Six sulphur field trials were carried out during the year, two in ratoon cane and four in plant crops. Five of these were ratooned for further study and two new trials were set out in the Mackay area. Significant responses to the presence of sulphate in the fertilizer were obtained in one of the plant cane trials in the "wet belt" in the northern part of Queensland. The amount of sulphur removed in millable cane varied from 12·4 lb S per acre in the control (no S) plots of a ratoon trial to 29·5 lb S per acre from the plots of a plant cane trial, where the application of 101 lb S per acre as sulphate had been made.

Results of monthly estimations of sulphur in rain water at five stations are given. These varied considerably with time and place, averaging 0·28 p.p.m. with values ranging from 0·01 p.p.m. to 1·18 p.p.m.

Leguminous cover crops

It is pointed out that the Queensland cane grower has been, for many years, a large user of short fallow leguminous cover crops, such as cow peas and velvet beans. The Bureau has been active for some time in producing improved and disease-resistant varieties of these cover crops, well suited to Queensland conditions. Unfortunately in recent years there has been a chronic shortage of seed of these leguminous cover crops with resulting difficulty in getting supplies and high prices for the cane grower. The Bureau has consistently recommended legume fallows for (a) nitrogen supply to the succeeding plant cane crops, (b) erosion and weed control during the wet season, fallow period, and (c) soil amelioration. The effect of high seed cost has been to encourage a trend towards bare fallowing and a substitution of nitrogenous fertilizer in preference to legume nitrogen.

The short-supply-high-demand situation is responsible for the high cost of legume seed and is not likely to be corrected unless legume seed producers stabilize their industry by growing seed under irrigation. The effects of dry spells at critical periods will then be minimized, and the cane growers will be able to purchase seed supplies of the varieties on which so much time and effort have been expended, and of which the original seed stocks were given free to the commercial seed producers.

Weeds and weed control

A large number of trials with chemical weedkillers, both pre-emergence and post-emergence, are reported. The extent to which herbicides are used with sugar cane in Queensland varies a great deal from one district to another. The overall picture is that, for routine weed control, chemicals are gaining favour in the wetter areas whilst mechanical means are usually considered to be sufficient elsewhere. The reason for this distribution seems to be connected with the difficulty of using mechanical cultivation methods at critical times when required in the wetter areas.

Accounts are given of special investigations directed against some of the more troublesome or persistent weeds of sugar cane in Queensland. Reference is made to the increasing incidence of the giant sensitive plant, *Mimosa pudica*, in some areas, confirming fears that the 1967 flood would distribute seed of this weed. While patrols and farmers' surveillance will undoubtedly control the pest, it is thought that further downstream infestations may yet be discovered. In other districts control measures against this weed were also continued. Almost 3000 acres were sprayed aerially in the Tully area for its control, and isolated patches were attended to wherever recorded in any district.

Instances of successful control of Johnson grass by utilizing the dry ploughing technique are given. This technique, followed by seedling eradication on two badly infected farms has now given apparent eradication of the pest. In another case where a vital cultivation for seedling control was missed, the infestation is now as bad as ever. Successful eradication from roadsides and tramlines are also quoted.

Pests and diseases

Much attention has been given to the soldier fly pest (*Altermetoponia rubriceps*) and its control. Although of long standing in the southern and central districts, an unpleasant development has been the discovery of its larvae under poor ratoons on several farms on red volcanic soil in the far northern district of Innisfail. The question of successful control has not yet been completely overcome. The majority of plantings made on known infested soils are now giving successful ratoons if the recommended pre-planting insecticidal treatment is correctly applied. But there are some unsatisfactory results which may or may not be due to the insecticide failing to protect the crop against the larvae of the insect. The broadcast and ploughed-in insecticide is capable of killing most of the small larvae which develop in the autumn and early winter months—when plant cane is germinating or just beginning its growth—but it is apparently not sufficiently toxic to large larvae which can still cause damage. The timing of the application of the insecticide appears to be fairly critical. Recent measurements of the degradation rate of "Dieldrin" and BHC in the soil confirm the better persistence of the former.

Results are reported of trials with soil insecticides for the control of "ground pearls" (*Margarodidae*). While some success was obtained with ethylene dibromide the treatment is too costly for large scale use. Further investigations are envisaged. Investigations on the large moth borer (*Bathytricha truncata*) and several minor pests are reported.

With regard to sugar cane diseases the effects on disease incidence of the heavy floods in northern Queensland in March 1967 are discussed. Ratoon crops from the flooded cane showed widespread bacterial mottle with appreciable losses in some fields. Abnormal amounts of leaf scald were also present. In the central district around Mackay dry

periods at the end of 1967 could have led to a build-up of the aphid population and been partly responsible for the large amount of mosaic disease that developed there. An eradication campaign was initiated. By June 1968 12,000 stools had been rogued from 15 different farms.

Wet season waterlogging, followed by dry weather in March, was apparently a major factor in the widespread development of red rot from Innisfail north, although it is possible that a new strain of the causal fungus played a part. This is now under investigation. Red rot has hitherto never been serious in North Queensland.

North of Townsville yellow spot disease built up during the autumn after a slow start. There were some heavy localized infections in the varieties Cyclops, Q 83 and Q 89, and, to a lesser extent, in Q 84. These varieties have been regarded as satisfactorily resistant in the past but, as with red rot, it is possible that a new strain may be developing, as has happened before. The varieties Q 68 and Q 77 were heavily infected.

Experimental work on some other well known cane diseases such as leaf scald, striate mosaic and chlorotic streak is recorded. What are considered to be the first photographs of particles of the Fiji Disease virus are referred to. These were taken with the assistance of the Electron Microscope Unit of the University of Queensland.

F.N.H.

Mechanics of swing-hammer shredders

By W. R. CRAWFORD, D.Sc., Ph.D., M.Sc., Whit. Sen. Sch.

Paper presented to the 36th Conference of the Queensland Society of Sugar Cane Technologists, 1969

PART II

The Work Done

To estimate the total work done we must now make an assumption of the way in which M varies between initial contact and the instant of entering the breaker sector. It will be seen in a moment that for discussion purposes almost any assumption will do, but since we have already determined the end values of M on what seem reasonably based assumptions, let us try to continue in an orderly fashion.

In engineering analysis where a function—say a deflection curve—is unknown, it is quite common to assume, as a first approximation, a trigonometrical function which fits the end conditions. We will adopt this practice and assume that, from the instant the hammer commences to swing back, until it reaches the start of the breaker, the angle θ changes with the swept angle φ in accordance with the equation:

$$\theta = \frac{\theta_2}{2}\left[1 - \cos\left(\frac{\pi}{\psi} \cdot \varphi\right)\right]$$

This fits the end conditions because:

$$\text{when } \varphi = 0,\ \theta = 0 \text{ and } \frac{d\theta}{dt} = 0,$$

$$\text{and when } \varphi = \psi,\ \theta = \theta_2 \text{ and } \frac{d\theta}{dt} = 0$$

From this relationship it is possible to work out a corresponding relationship for M. This is tedious and unwarranted, and for present purposes it is quite sufficient to say that M is proportional to θ, so that:

$$M = M_1 + \left(\frac{M_2 - M_1}{2}\right)\left[1 - \cos\left(\frac{\pi}{\psi} \cdot \varphi\right)\right] \text{ lb ft}$$

This assumed variation of M over the whole shredding operation, is illustrated by Fig. 5(a).

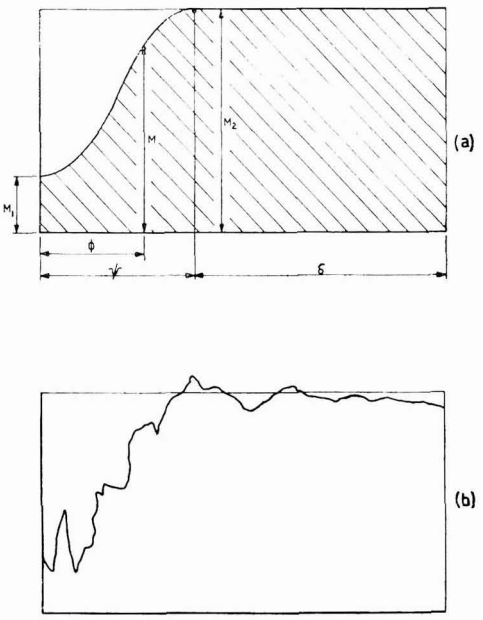


Fig. 5. Hammer moments

It must be emphasized again that these assumptions have no empirical basis, and we cannot preclude the possibility of random variations as suggested by Fig. 5(b). However, allowing for a little wistful hoping, we have arrived at an orderly visualisation of what could be the behaviour in an ideal shredder.

It is not necessary to indulge in any more calculus to find the value of the work done, because it is

evidently the shaded area of Fig. 5(a), given by:

$$u = (\frac{M_1 + M_2}{2})(\psi - \theta_2) + M_2\delta \text{ ft lb}$$

If we now substitute the values of M_1 and M_2 in the above equation we get, after rejecting small quantities:—

$$u = \tfrac{1}{2}\frac{W}{g}\Omega_2 R\,[h(\psi+2\delta)\theta_2 + 2\mu\tau(1+\frac{h}{R})(\psi+\delta)] \text{ ft lb}$$

This is the work done by one hammer during one revolution of the shredder. It is seen that its value depends not only on the swing-back angle, but on the much larger angles swept during shredding.

The Power Equation

With a knowledge of the power input we may now write down a general relationship between the parameters involved, as follows:

Let H = power input (corrected for bearing losses) hp
N = shredder speed r.p.m.
n = number of hammers

The work done per revolution, per hammer, is $\frac{33000H}{Nn}$ ft lb, and if we equate this to u and rearrange, with the substitution $\Omega = \frac{\pi N}{30}$, we get:

$$H = \frac{W R N^3 n}{1{\cdot}937 \times 10^8}[h(\psi+2\delta)\theta_2 + 2\mu\tau(1+\frac{h}{R})(\psi+\delta)] \text{ hp}$$

Although the writer has felt it necessary to retain the friction term up to this stage, discussions hereafter will not suffer if we neglect pivot friction.

To illustrate the big difference in angle of swing-back calculated from the above expression (neglecting the friction term), and as calculated by SHANN and CULLEN, Fig. 6 has been prepared from the data for the 9 lb Racecourse hammers. The total swept angle $(\psi + \delta)$ has been taken as 144° and over the breaker sector $\delta = 90°$.

For 200 hp input the present analysis gives θ_2 about 1·5°.

IMPROVING SHREDDER PERFORMANCE

The objectives of cane preparation have already been stated and we know that we can define a degree of preparation by measuring the percentage of ruptured cells and carrying out a sieve analysis to check the length of shreds.

If we do this for an existing shredder and find the results disappointing, how should we set about improving matters?

The answer seems to be that provided the machine is mechanically sound and the hammers and breaker sector in good condition we should increase the power input to the cane.

We have seen that, ignoring pivot friction, the power transferred from a shredder rotor to the cane is given by:

$$H = \frac{W R N^3 n h(\psi + 2\delta)}{1{\cdot}937 \times 10^8} \cdot \theta_2 \quad \text{hp}$$

In previous discussions on methods of increasing power input it has been said that constancy of swing-back angle θ_2 must be a criterion for the power absorbed by the cane. In the writer's opinion this is not so and, in any discussion of the influence of the parameters on the right hand side of the power equation, we should regard the power H as a linear function of θ_2, so that it may be graphically represented by a series of straight lines through the origin. The slope of these lines is: $\frac{W R N^3 n h(\psi + 2\delta)}{1{\cdot}937 \times 10^8}$, and by manipulating this slope we can change the value of

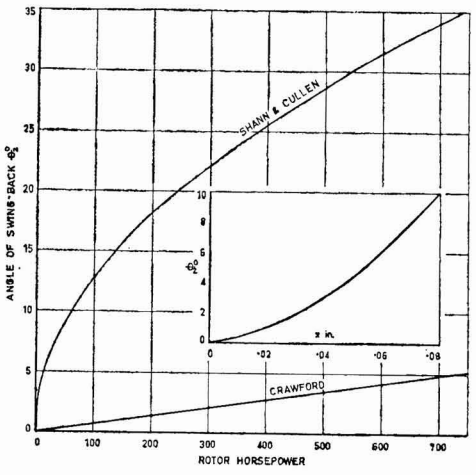


Fig. 6. Swing-back angle *versus* hp

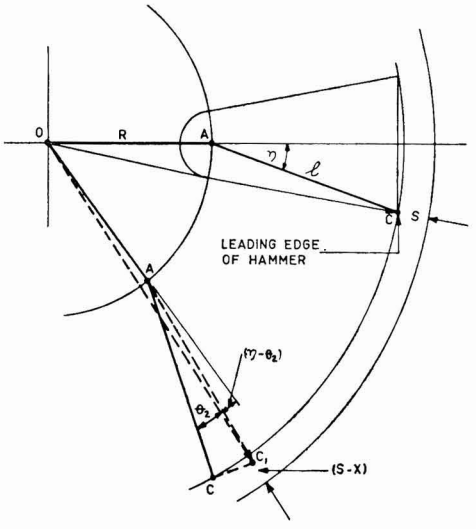
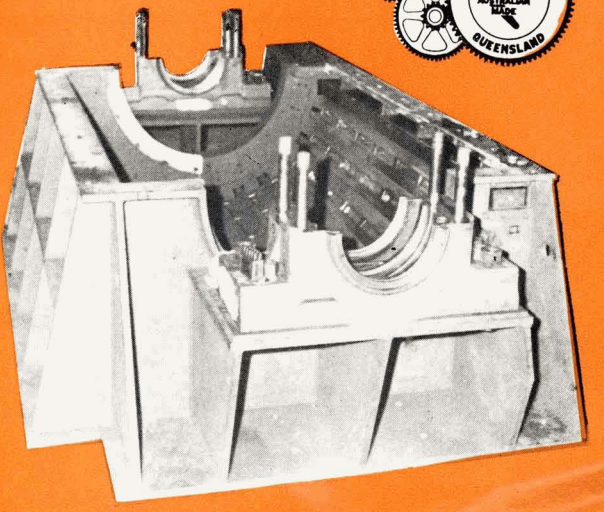


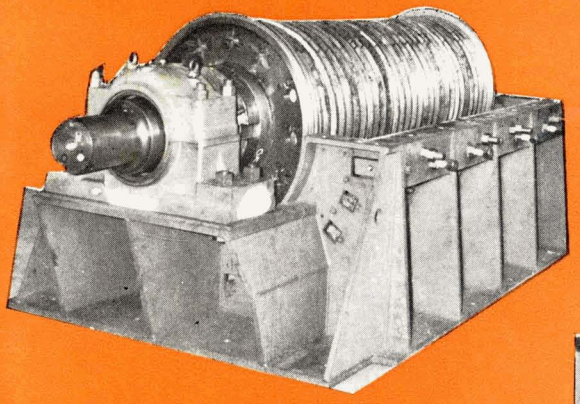
Fig. 7. Change in settings

CANE PREPARATION BY SHREDDING

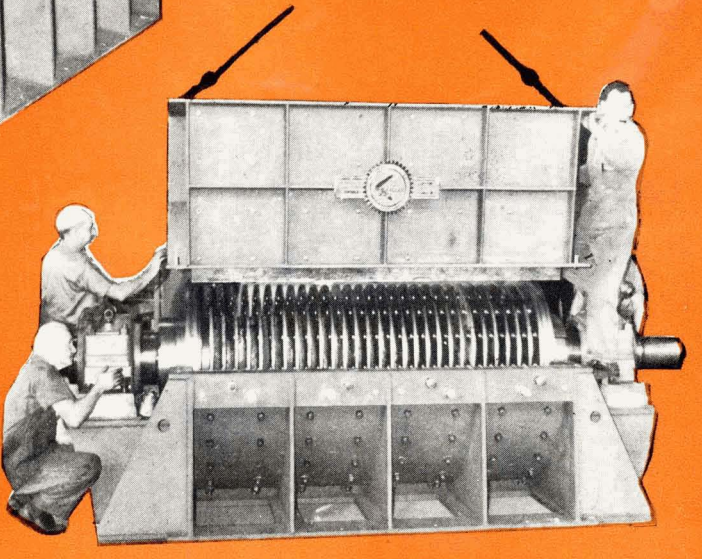
HIGH EXTRACTION AT HIGH RATES IN MILLS OR DIFFUSERS REQUIRES THE ULTIMATE IN CANE PREPARATION. PRELIMINARY KNIFE PREPARATION FOLLOWED BY SHREDDING PROVIDES THE SOLUTION.

TECHNICAL KNOW-HOW AND THE UNSURPASSED SKILL OF THEIR TRADESMEN GIVE **WALKERS LTD.** AN INTERNATIONAL LEAD AS DESIGNERS AND MANUFACTURERS OF SWING-HAMMER SHREDDERS.





STAGES IN THE SHOP ASSEMBLY OF AN 84" HEAVY DUTY CANE SHREDDER



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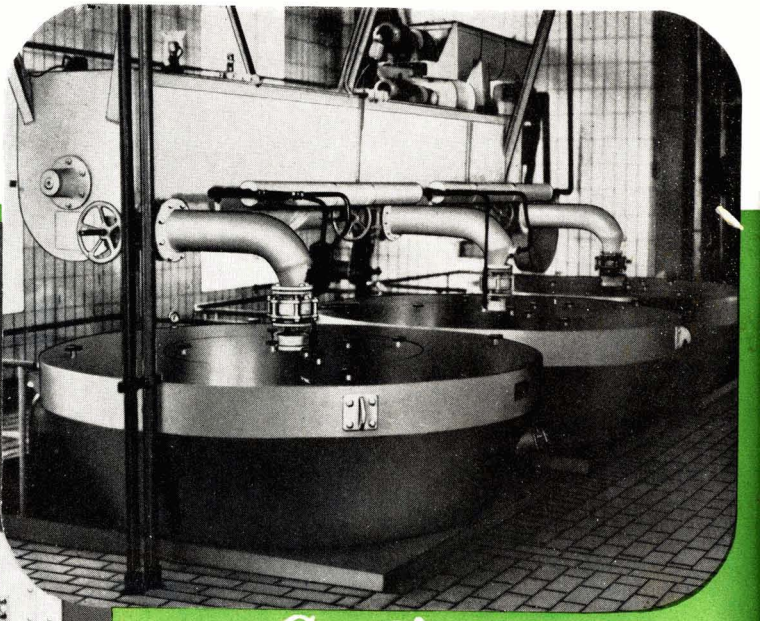

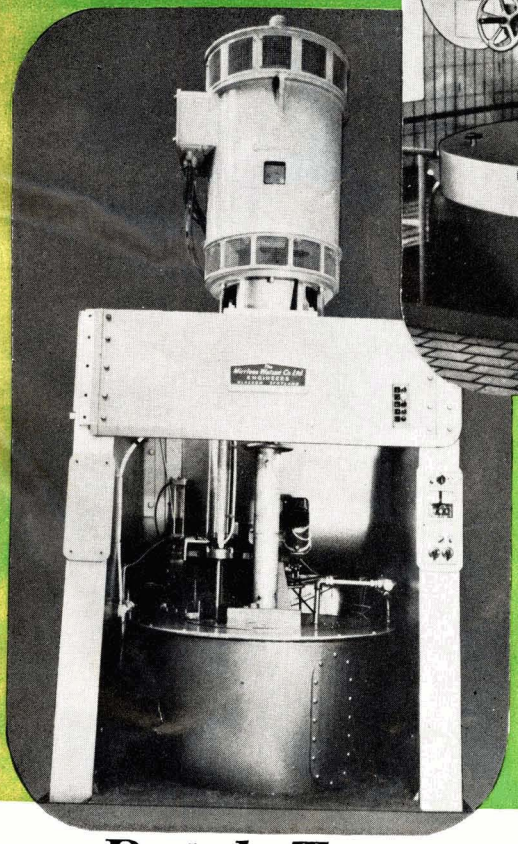

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H for *any* selected value of θ_2. The several parameters are considered below.

Changing the Angle of Swing-back

Referring to Fig. 7, let us define the setting of a shredder as the radial distance S from the leading edge, C, of the hammer, when the latter is in its radial position, to the tops of the breaker bars or washboard.

For a given shredder, at a specified throughput, the swing-back angle must be a function of the setting. It will also depend on the cane density over the breaker sector.

If S has been chosen too large the shredder settles to work with a small value of θ_2 and consequently the power input is small.

If S be gradually reduced the angle θ_2 will increase, so increasing the power input.

In view of the very small swing-back angles revealed by the present analysis, this method of increasing power input is a very practical one; in fact it is in common use, and the writer is merely showing *why* the power input increases.

For most hammers the radius from the pivot to the leading edge C makes a leading angle, η, with the radius through the centre of gravity, as in Fig. 7. Consequently as the hammer swings back through an angle θ_2 the leading edge moves to the position C_1 and the setting is reduced by an amount:

$$x = (OC_1 - OC)$$

The value of x is fairly small in practice, but its presence indicates a measure of inherent auto-control of settings. The insert to Fig. 6 shows the value of x for the Racecourse rectangular hammers.

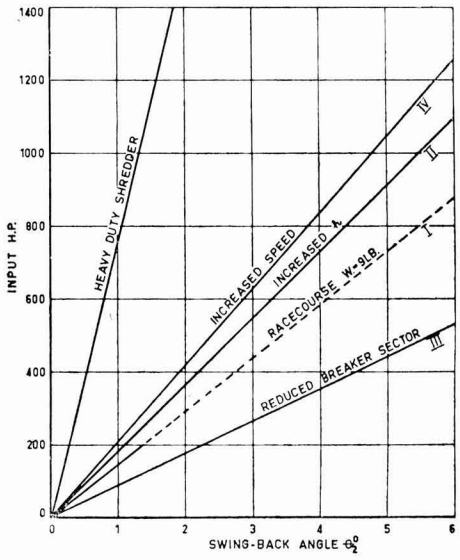

Fig. 8. Power characteristics

This method of increasing power input can only be done by trial, and calls for a simple means of adjusting the setting. Line I of Fig. 8 shows the power input to the Racecourse shredder with 9 lb hammers. The method is probably limited in existing shredders by cane throughput.

Weight of Hammers

In earlier discussions it has been said that the heavier the hammer, the more power will be given to shredding the cane, for a specified angle of swing-back. This is true for individual hammers, but we should not be thinking of these, but of the rotor as a whole; in fact we should be looking at the product—weight of hammer $\times$ number of hammers, i.e. Wn in the power equation.

In certain Searby shredders in which the hammers are folded over to give more pivot bearing area, it is possible, with a given array of hammers, to double the total hammer weight by doubling the thickness of each. In such shredders the weight limit for rectangular hammers seems to be about 12·5 lb. If a T head is added this may be increased to about 18 lb. Beyond this little can be done by way of weight increase.

To take a simple example, suppose we remove every second disc and double the thickness of the upper part of the hammer. This gives a hammer weight of about 30 lb but, unfortunately there are now only half the number of hammers, so that the product Wn is less than before. There would probably be less than half the number of hammers since it seems likely that the discs would require thickening.

In either case the power input potential would decrease.

Apart from the possibilities of power increase through weight alone, heavy hammers have the following advantages:

1. Individual hammers have greater angular momentum and can thus more effectively crush the stones which arrive with the cane in ever increasing numbers.

2. For the same reason they can deal more effectively with lateral variations in cane feed rate.

3. They may have longer life because wear on the sides will be reduced.

Position of the Centre of Gravity

This involves changing the parameter h in the power equation. Where overall radial dimensions are fixed, as in an existing shredder, this method is of limited value because of the small practical range through which h can be varied by changing the profile of the hammer. It would probably be difficult to achieve more than a 25% increase in h which corresponds to a 25% increase in power for the same angle of swing-back. The power characteristic for a 9 lb hammer, so modified, is given by Line II in Fig. 8.

It is doubtful whether the extra cost of specially shaped hammers is justified.

The swept angles ψ and δ

Since the power input at any swing-back angle varies directly as the sum $(\psi + 2\delta)$, it is evident that for maximum power input this should be kept as large as possible.

The inlet angle ψ is controlled largely by the method used to introduce the cane to the shredder, and may vary between quite wide limits.

A maximum value for δ of about 90° over the breaker section seems to be dictated by the need to provide easy egress of the shredded cane.

If δ is reduced to 45°, without changing ψ, the corresponding power characteristic is Line III of Fig. 8.

Speed of Rotation of the Shredder

The power equation indicates clearly that increasing rotational speed is a most significant method of increasing power input, because power is proportional to the cube of the speed.

However some care must be exercised here, because the throughput is a function (it may be a linear one) of the rotational speed. Hence at constant throughput a speed increase will require a corresponding reduction in the setting, for any selected angle of swing-back.

The power characteristic for a 13% speed increase with the Racecourse shredder is the Line IV of Fig. 8.

It is not thought that higher speeds would pose any difficult design problems, but care should be exercised in any proposal to increase materially the speed of an existing shredder.

Changing Hammer Length and Pivot Radius

If we increase the hammer weight from W to W_1 by increasing its length, then h changes to h_1, and for a given swing-back angle the power input changes in the ratio $\frac{W_1 h_1}{Wh}$. If we change the pivot radius from R to R_1, the power changes in the ratio $\frac{R_1}{R}$. If we change both R and h then the power change ratio is $\frac{W_1 R_1 h_1}{W R h}$.

These are the methods which have been adopted in shredders of modern design.

As an example consider the shredder with the heavy hammers discussed in the section on oscillations. This shredder has 87 hammers each of 39 lb weight. Its power characteristic for a speed of 950 r.p.m. is also given in Fig. 8. This shredder and that at Racecourse are both 84 in wide.

It is seen that, for a selected angle of swing-back, the power input to the cane may be increased enormously.

This manipulation of pivot radius and hammer length would appear to be an effective method of inducing existing shredders to absorb more power. The pivot radius R may be reduced to permit the use of longer and heavier hammers within the existing casing.

CONCLUSION

No apology is made for the fact that this is a theoretical paper. It is believed that it takes the study of swing-hammer shredders a stage further.

It contains (to the author's mind) proof that under steady working conditions, the normal angle of swing-back is only a few degrees. Consequently the chief advantages of a swing hammer are, firstly, that it provides a safety measure when sizeable foreign bodies enter the shredder, and secondly, that by increasing the angle of swing-back the power input to the shredder may be increased.

The fact that indications of larger swing-back angles have been observed is not surprising, because of lack of uniformity of feed supply, and perhaps the presence of anvil bars. Such larger angles would be of a transient nature.

The relative merits of changing the several parameters to improve shredder performance have been discussed, and it is pointed out, again, that to obtain the best results a simple and quick method of adjusting the gap is desirable.

Much has been left unsaid because papers of this type tend to snowball.

Acknowledgment

Thanks are due to the directors and management of Walkers Ltd. for permission to publish this paper.

APPENDIX

If pivot friction be neglected, but second order small quantities be retained, the expression for the work done by a hammer may be written:

$$u = \tfrac{1}{2}\frac{W}{g}\Omega^2 R h(\psi + 2\delta)\theta_2 - \tfrac{1}{2}\frac{W}{g}\Omega^2 R h \theta_2^2 \quad \ldots.(1)$$

The change in kinetic energy of a hammer due to its rotation through the angle θ_2, relative to its pivot, is:

$$\frac{W}{g}\Omega^2 R h(1 - \cos\theta)$$

$$= \frac{2W}{g}\Omega^2 R h \sin^2\frac{\theta_2}{2}$$

For small values of θ_2 this may be written:

$$\frac{2W}{g}\Omega^2 R h\frac{\theta_2^2}{4} = \tfrac{1}{2}\frac{W}{g}\Omega^2 R h\theta_2^2 \quad \ldots\ldots\ldots\ldots(2)$$

This is identical with the second term of equation (1) and if the latter is rewritten as:

$$u = \tfrac{1}{2}\frac{W}{g}\Omega^2 R h\theta_2[(\psi + 2\delta) - \theta_2]$$

it becomes obvious that the second term is negligible in comparison with the first. In addition it is negative with respect to the first term, indicating that it plays no part in the work done by the rotor on the cane, and that the energy represented is eventually restored to the system.

Materials handling in the sugar industry

By H. G. BAYLER
(Federation of Associations of Materials Handling Manufacturers*)

MILLIONS of tons of sugar cane are moved each year in a relatively short crop season, and this is only the first stage in a whole series of high-speed handling operations through which sugar in its final blended, graded form reaches the food manufacturing plants and market places of the world.

On average, from every nine tons of cane comes one ton of raw sugar; not the easiest of products to handle, particularly where high humidity leads to stickiness, placing special demands on bulk handling skills as the trend away from bagging of raw sugar continues.

Fig. 1. Mobile crane loading cane sugar on to road transport in Natal

In the sugar-producing areas of the world, increased use of road transport for carrying cane from field to mill has brought greater speed and flexibility but has also raised new demands for high-speed, high-capacity, mobile means of loading the vehicles so as to keep them productively on the move.

At the same time, traditional mule- or oxen-drawn field carts, tractor-drawn carts, tramway and railway rolling stock must still be fitted into the handling picture.

Fixed-base cranes and scotch derricks have been joined by mobile cranes with the necessary high ground clearance and in many cases with four-wheel drive which enables them to negotiate rough terrain in travelling from one loading point to the next as cutting of the cane progresses.

The high line speeds of modern cranes and simultaneous slewing, derricking and hoisting enable one crane easily to handle 500 tons of cane a day, in bundles usually weighing 3 to 3½ tons but sometimes loading 6 or 7 tons per lift. Where necessary, the mobile cranes can load vehicles from the fields above or below road level and jib head floodlights augmenting the normal headlights enable loading activity to continue right through the night.

The round-the-clock flow of cane from the fields avoids the need for undue stockpiling at the mill, which may well be operating 23 hours a day, six days a week throughout this period of peak activity.

While field transport—carts and trailers—is relatively slow-moving, it has been proved that its work output can be doubled by the provision of modern lifting methods for transferring the cart or trailer loads to stockpiles or direct to high-speed road transport. Weighing of the cane can be carried out simultaneously, by means of a device fitted to the lifting hook.

In the same way, simple movement of cane to the roadside by hand (in hilly country or small fields where field transport is not warranted) can be streamlined where the porters are taught to make up bundles of the required size over chain slings, for crane loading in 3 ton or even bigger lifts.

Cranes are also the main form of handling in receiving the cane at the mill—diesel, electric or steam-driven tower cranes, tower jib cranes, overhead travelling cranes or monorail-type hoists, equipped either with cane grapples or with spreader bars.

A fixed tower crane of 5 tons capacity and 60 ft radius will, on average, handle 80 tons of cane per hour, the storage capacity around such a crane being 800–1000 tons.

Rail cars arriving at the mill may be discharged by means of a wagon tippler/weigher, tarpaulins first

* Through its member associations—the Association of Crane Makers, British Industrial Truck Association, Lifting Equipment Manufacturers' Association and the Mechanical Handling Engineers' Association—F.A.M.H.M. represents some 130 leading equipment manufacturers. The Federation is based at Glen House, Stag Place, London S.W.1, England.

being removed by means of hoists equipped with self-grip hooks. Discharge may be into an intake hopper or directly on to the cane carrier—a metal slat conveyor which ensures a constant feed of cane to the crushing mill.

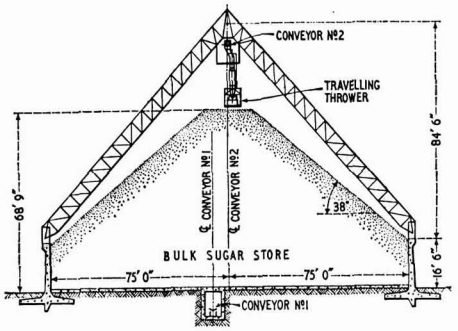

Fig. 2. Cross section through a bulk sugar store in Barbados, showing how the travelling thrower can heap sugar to a height of nearly 70 ft, giving a total storage capacity in this case of about 80,000 tons. Reclaiming of sugar is by gravity, via louvred hoppers and tunnel conveyor.

In the stores in which the resulting raw sugar is held, an electric overhead travelling grab crane can play a dual rôle in spreading the sugar and in reclaiming it for transfer via a hopper to road transport, for bulk movement to the ocean terminal.

Such a terminal will have a raw sugar storage capacity of between 25,000 and 200,000 tons. Earlier practice was to transship the sugar to the terminal in bags and either ship it in this form or slit the bags and bleed the sugar into the ships' holds. Even when working into four or five hatches simultaneously, the average loading rate was only about 100 tons per hour. Now, using modern bulk handling methods, five or six times this loading-out speed can be achieved.

Intake speeds are similarly impressive—more than 200 tons per hour with two grab-type unloaders working from barges or coasters; up to 300 tons per hour with a rail wagon tippler working to an eight-minute cycle; and speeds approaching this in dealing with road-borne arrivals, too, where containers are lifted straight off the vehicle decks and tipped so as to discharge the raw sugar into the receiving hoppers.

Conveyors then carry the sugar into the storage shed or silo, where even distribution is achieved by means of a steel band conveyor and mobile ploughs or by a travelling thrower which can be rotated through 360° so as to give a throw of up to 100 ft in any direction. Sugar can be piled to a height of around 70 ft in this way.

Sugar for shipment is reclaimed through louvred openings in the floor of the store, troughed belt conveyors carrying it via a weigher tower to the loading-out gantries which employ a retractable boom conveyor and possibly a rotating thrower to ensure even distribution of the sugar in the holds, reducing the need for cargo trimming to a minimum.

In the reclaiming operation, what cannot be removed from the store purely by gravity is assisted mechanically by tractor shovels fitted with large-capacity buckets, working from the sides of the store to the central discharge points.

Troughed conveyors up to 5 ft wide and some operating at speeds of over 350 ft per minute incorporate special features to avoid undue build-up of sugar, because of its stickiness, at feed and discharge points in particular. These include rubber-faced belt scrapers, motorized cleaning brushes, self-cleaning return pulleys and spraying of belts with atomized water.

Advances in methods of control have enabled entire terminal conveyor systems to be operated

Fig. 3. The jetty section of the bulk sugar handling system at Tate & Lyle Refineries Ltd., London, showing grab cranes of the electro-hydraulic, level-luffing, pantographic type feeding 80-ton capacity retractable hoppers which, with the cranes, travel the full length of the jetty and feed sugar into the conveyor system which delivers it via a junction house and weigh house to the storage sheds.

from a single point, a mimic control panel showing at a glance which conveyors are operating at any time and interlocks preventing the feeding of sugar to any point unless the appropriate take-away system is functioning correctly.

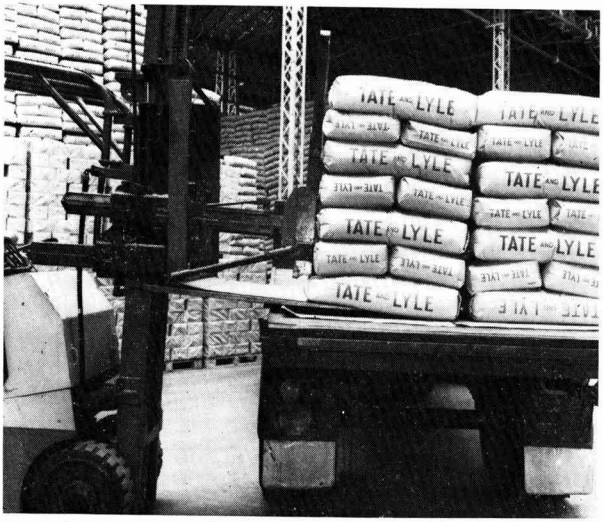

Fig. 4. Palletless loading of bagged sugar using a fork-lift truck fitted with a special carrying plate and push-pull attachment. With this system stacking heights of up to 16½ ft have been attained, with space savings of up to 15%.

Having tended to force the pace of the swing toward bulk handling of sugar, the major refineries have if anything introduced still greater improvements in handling methods than are found at any earlier stage.

Unloading from ship to barge and thence to store has been replaced by direct ship-to-store transfer in one or two notable cases. Grab cranes can be employed on bulk carriers or ships of 'tween deck construction, with trimming carried out by highly manoeuvrable four-wheel-steer tractor shovels which are lifted aboard at the appropriate stage in the discharging operation.

The quayside cranes discharge to hoppers which feed conveyors leading via a junction house and weigh house to the storage shed, where distribution is typically by means of a steel band conveyor and ploughs. "Combing" of the sugar in the junction house removes tramp materials.

Reclaiming of raw sugar for conveyorized movement to melt is often carried out by tractor shovel, one such machine being capable of handling 100–150 tons per hour.

From the dryers, refined sugar is conveyed to bins and then fed by grade to a blending conveyor, through variable speed rotary valves adjusted to give a blended product of consistent quality. Cooling is also carried out at this stage.

The blended sugar is then sieved and separated into different grades according to size of crystal, for storage in bins awaiting transfer to bagging-off stations, tanker loading bays or the packaging department.

Drying, cooling, screening and all inter-process conveying stages can be controlled from a central panel, with totally enclosed elevators and conveyors employed throughout.

In the handling of packaged sugar, the transporting/stacking/vehicle loading versatility of the fork-lift truck comes into its own—not only in handling palletized loads but in palletless handling, too.

This involves the use of a load carrying plate and push-pull mechanism with gripper blade in place of the normal forks, enabling thin, flexible boards to be used in place of flat-top pallets in stacking of packaged sugar to heights of over 16 ft, with saving in vertical space of up to 15%.

Battery-electric lift trucks, with their quiet, fume-free operation, are best suited to warehouse handling or packaged and bagged sugar, but lift truck handling extends also to loading bays outside the storage area itself, enabling vehicles to be turned around in 20–30 minutes and quite possibly doubling the number of delivery journeys made each week.

Cranes, hoists, conveyors, elevators and industrial trucks are therefore all playing their part in stepping up the tempo of handling in one of the world's key industries, coping smoothly with ever-increasing tonnages and trimming wastage at all stages from cane field and mill to food factory and market place.

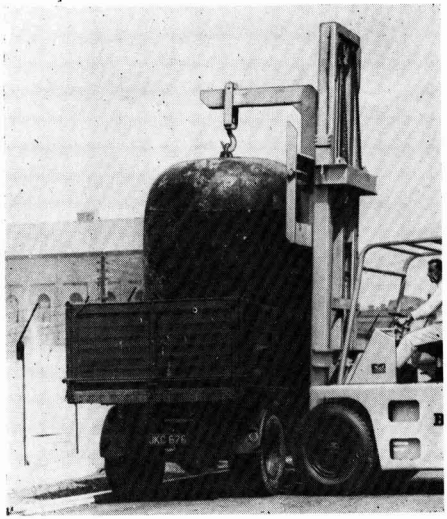

Fig. 5. A 10-ton capacity lift truck with a special crane attachment handling a collapsible rubber container

Nystose: Oligosaccharide X

By W. W. BINKLEY and W. F. ALTENBURG[1] with M. KOMOTO and H. TSUCHIDA[2]

A CRYSTALLINE fructosyl-l-kestose, named "nystose", has been obtained by the action of a transfructosylase on sucrose[3]. Chemical studies strongly suggested that nystose was *O*-α-D-glucopyranosyl-(1↔2)-*O*-β-D-fructofuranosyl-(1←2)-*O*-β-D-fructofuranosyl-(1←2) β-D-fructofuranoside. Recently[4], nuclear magnetic resonance studies of the peracetates of sucrose, l-kestose and nystose proved that the terminal D-fructofuranosyl residue of nystose was linked through the primary alcohol group of the terminal D-fructofuranosyl residue in l-kestose. Among the physical constants recorded for nystose were the melting point, 131–132°C, and specific rotation, $[\alpha]_D^{20}$ +10·6° (*c* 3·9 water)[3]. Soon after the publication of these data, a crystalline fructosyl-l-kestose trihydrate with a probable structure identical to that established for nystose was reported possessing a melting point of 129–131°C and a specific rotation of $[\alpha]_D^{22}$ + 8·9° (*c* 3·83 water)[5]. This tetrasaccharide was designated "Oligosaccharide X"[6]. We have nucleated an aqueous methanolic solution of nystose with crystalline oligosaccharide X trihydrate and crystal growth was observed. The implications of these findings are reported herein.

Discussion & Summary

Mixed melting points and X-ray diffraction data have shown that nystose and oligosaccharide X trihydrates are identical.

Table I

X-ray powder diffraction data for nystose and oligosaccharide X trihydrates

Interplanar spacings expressed in Angstroms

Nystose	*Oligosaccharide X*
11·73s	11·68s
8·91m	8·91m
6·68m	6·67m
6·21s	6·22s
5·89s	5·88s
5·41m	5·41m
5·12s	5·14s
4·83vs	4·80vs
4·77w	4·78w
4·58m	4·58m
4·42m	4·44m
4·09m	4·13m
3·87m	3·89m
3·66m	3·66m
3·38m	3·38m
3·18w	3·19w
3·08m	3·06m
2·56s	2·56s
2·41m	2·41m
2·38w	2·39w
2·21m	2·22m
2·04m	2·03m
1·93w	1·93w

vs = very strong, s = strong, m = medium, w = weak

Experimental

Nucleation of Aqueous Methanolic Nystose with Oligosaccharide X Trihydrate—Formation of Nystose Trihydrate. An amount of 428 mg of recrystallized nystose was dissolved in 0·43 ml of water. Methanol (0·43 ml) was added and the resulting solution was nucleated with oligosaccharide X trihydrate. Extensive crystal growth began within a few minutes and was allowed to continue at 20–25°C for 2 days in an atmosphere saturated with methanol; yield was 412 mg of elongated needles, often clustered as rosettes. These crystals melted at 129–131°C (mixed m.p. with oligosaccharide X trihydrate unaltered), $[\alpha]_D^{20}$ + 9·8° (*c* 3·06 water). X-Ray powder diffraction data are shown in Table I. Elemental analyses are given in Table II.

Table II

Elemental analysis of nystose and oligosaccharide X trihydrates

	Calculated for $C_{21}H_{42}O_{21},3H_2O$	Nystose Found	Oligosaccharide X Found[5]
Carbon	40·00	40·33	40·44
Hydrogen	6·66	6·58	6·88
	Calculated for $C_{21}H_{42}O_{21}$	Nystose Found*	
Carbon	43·24	43·28	
Hydrogen	6·35	6·32	

* After heating 2·5 hours at 110–115°C.

Acknowledgment

Thanks are due Mr. W. WINTER, State University College of Forestry at Syracuse University for his assistance with the X-ray diffractograms.

Brevities

New Philippines sugar factory.[7]—The North Iloilo Sugar Corporation is to erect a new sugar mill in San Dionisio, Iloilo, on the island of Panay. It will be the sixth in the province of Iloilo and will start operations in 1971.

* * *

New sugar factory projects in India[8].—The State Government of Jammu and Kashmir proposes to set up a beet sugar plant, while the Government of Nagaland is erecting a 1000 tons/day cane sugar factory at Dimapur to have its first trial run in the 1971/72 season. The feasibility of erecting a sugar factory in Goa is also under consideration, while a khandsari plant is being contemplated by the Manipur State Government.

* * *

Bagasse board plant for Peru[9].—A new bagasse board plant, formed under the name Bagapan del Perú, is to be constructed in the area of Trujillo. Designed for three-layer, 6 ft × 10 ft boards, it will manufacture 50 cubic metres of bagasse board per day for building and furniture use.

[1] New York Sugar Trade Laboratory, 37 Warren Street, New York, N.Y., 10007 USA.
[2] Department of Agricultural Chemistry, Kobe University, Rokko, Kobe, Japan.
[3] BINKLEY & ALTENBURG: *I.S.J.*, 1965, **67**, 110.
[4] BINKLEY *et al.*: *Carbohyd. Res.*, 1969, **10**, 245.
[5] TSUCHIDA *et al.*: *Agric. Biol. Chem.*, 1966, **30**, 429.
[6] KOMOTO & TSUCHIDA: *Pro. Research Soc. Japan Sugar Refineries' Tech.*, 1968, **20**, 29.
[7] *Sugarland* (Philippines), 1969, **6**, (2), 34.
[8] *N.S.I. News* (Kanpur), 1969, **4**, (4), 7–8.
[9] *Sugar y Azúcar*, 1969, **64**, (6), 33.

Sugar cane agriculture

The development of Tatushan cane plantation. ANON. *Taiwan Sugar*, 1968, **15,** (3), 21–25.—An account is given of the development of this plantation which began in 1956. Infertile or leached soil in eroded areas had to be built up and much soil conservation work carried out. Land preparation, planting, fertilizing, irrigation and weed control are discussed.

* * *

Plastic piping in agriculture. L. S. EDWARDS. *Producers' Rev.*, 1968, **58,** (7), 33–39.—Attention is drawn to the rapid increase in the use of plastic piping in agriculture in the last 20 years, especially in irrigation and drainage. The relative merits of polyethylene and rigid PVC (polyvinylchloride) piping are discussed. Under Australian conditions the latter has the advantage of not being damaged by termites and of being less liable to rodent damage (rats). If buried 2 feet or more it is safe, as rats do not burrow more than 18 inches deep.

* * *

Some thoughts on the economy of mechanical harvesting. J. A. ROW. *Producers' Rev.*, 1968, **58,** (7), 7–9. In a field day address at Mackay in Queensland cane growers were urged to examine carefully the advantages and disadvantages of owning their own mechanical harvesters or employing contractors. Individual or group ownership of harvesters did offer a chance of appreciable savings.

* * *

The Tully area cane deterioration investigation. R. P. VICKERS. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 19–29.—This investigation was carried out to ascertain the relative rates of deterioration of chopped cane and whole cane subject to delays between cutting and crushing of up to 30 hours in the Tully area. It was found that even under the cooler weather conditions chopped cane deteriorated significantly within 17 hours of harvesting. Whole cane did not usually deteriorate appreciably with delays of about 30 hours. The rate of deterioration of chopped cane was significantly greater during the first 4 to 17 hours than during subsequent periods of 17 to 28 hours.

* * *

Loss of benzenehexachloride (BHC) insecticides from soil. K. C. LEVERINGTON. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 39–42.—Reference is made to the fact that the crude dust has proved much more effective than the purified products and emulsions for controlling certain soil pests of sugar cane in Queensland, such as the soldier fly and Childers cane beetle. This paper reports the results at present available of part of an extensive investigation designed in an attempt to elucidate the problem of the varying effectiveness of BHC products.

* * *

A novel method of marking plots in field experiments. A. C. ARVIER. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 43–44.—See *I.S.J.*, 1968, **70,** 360–361.

* * *

A filter system for hot water treatment tanks. R. H. ROBINSON. *Proc. 35th Conf. Queensland Sugar Cane Tech.*, 1968, 51–52.—In the hot water treatment of sugar cane planting material (for control of ratoon stunting disease) the choking of the circulating pumps by foreign material can be a serious difficulty or nuisance. In this paper a filter is described which effectively overcomes the difficulty. It is simple to make and install and of cheap construction.

* * *

Soldier fly—past, present and future. R. B. MOLLER. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 53–55.—The history of the pest in Queensland, first recorded in the middle 1920's, is discussed, as is the modern recommended remedial treatment. The need for more basic knowledge regarding the pest and its life history is emphasized. The length of time insecticides remain active in the soil is an important factor and is under investigation.

* * *

Cane quality at Babinda. O. W. STURGESS. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 111–120.—Reference is made to the low quality of cane crops, measured in terms of commercial cane sugar (c.c.s.), over a long period in the Babinda area. Probable causes for this are discussed, notably delay in handling the crop after harvest and the presence of excessive extraneous matter in the cane when delivered to the factory. Other points raised are the need for improved farm management practice and better balanced planting of varieties.

* * *

Some methods used to aid harvesting of flood damaged sugar cane. C. M. MCALEESE. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 121–123. An account is given of the various methods employed in harvesting cane in northern Queensland after the extensive floods in 1967. These include the use of

dessicants, such as "Diquat", "Paraquat", sodium chlorate and arsenical preparations prior to burning. Many and varied blowers were used on mechanical harvesters to remove extraneous matter. Rotary slashers were sometimes used to remove erect-growing side shoots on recumbent cane.

* * *

Investigations into chemical control of arrowing. A. C. ARVIER. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 125–130.—An account is given of experiments in controlling flowering in the variety N:Co 310 at two different locations in Queensland by spraying with "Diquat" ("Reglone") at different concentrations at different times. Successful control of flowering was achieved but the effect on sugar yield did not appear significant. Further trials are planned.

* * *

The sulphur nutrition of sugar cane. J. M. SEDL. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 131–135.—It is pointed out that with the increasing use of non-sulphur-containing fertilizers in Queensland, such as urea and aqua ammonia in place of ammonium sulphate and phosphate in forms other than superphosphate, the likelihood of sulphur deficiency developing in cane lands has increased. Preliminary trials are described to test the effects of different rates of application of sulphur, applied as gypsum. In some cases increased yields were recorded but it was felt that more prolonged experiments were needed.

* * *

Milling trash. ANON. *Sugarland* (Philippines), 1968, **5,** (4), 6.—The evils of trashy cane, to the factory, are emphasized and the need for cane producers to be constantly on the alert to reduce trash in their cane is stressed. An instance is quoted where trash in a delivery of cane was found to be 22%!

* * *

"Reglone" for flower control in sugar cane. ANON. *Sugarland* (Philippines), 1968, **5,** (4), 51.—The success achieved in the Philippines with "Reglone" (I.C.I. bipyridilium compound) in controlling flowering or tasselling of sugar cane (associated with serious loss of sugar content) is described. It is considered superior to substances used earlier, such as maleic hydrazide, "Monuron" and "Diuron". In some cases an aerial application of only 0·7 litres per hectare of "Reglone" has resulted in 100% flowering control and has given considerable increases in total sugar yield, increases of up to 15% having been recorded.

* * *

Sugar cane production by Indian growers in Natal. B. A. STEAD. *S. African Sugar J.*, 1968, **52,** 708–712. The history of the association of the Indian community with the sugar industry in Natal is outlined, as is their present status in regard to the industry. The yields obtained by Indian growers are lower than those obtained by European growers. Reasons are given. Indian growers supply 6·3% of the industry's cane from 8·3% of the total acreage planted.

* * *

Rat poison and insecticides. S. G. LOJO. *Sugarland* (Philippines), 1968, **5,** (5), 23.—A method of using fluoroacetate (or "Compound 1080") and corn or maize as a rat bait in cane is described. The special precautions needed because of the highly poisonous nature of the chemical are outlined.

* * *

Comparative efficacy and economics of various measures adopted for the eradication of white grub beetle (*Holotrichia serrata*) damaging sugar cane in Uttar Pradesh. S. S. KHANNA, K. M. GUPTA and K. M. RAI. *Indian Sugar*, 1968, **18,** 247–250.—Results of trials with various insecticides are given. At planting time "Telodrin" was the most effective insecticide against grubs or larvae. No insecticide was effective against mature grubs in a standing crop. Repeated ploughings proved effective.

* * *

Preliminary observations on *Heteronychus robustus*, a beetle pest of sugar cane in Uttar Pradesh. H. SINGH and S. M. A. RIZFI. *Indian Sugar*, 1968, **18,** 251–252. This pest has recently caused damage to cane in localized areas. Observations of the life history and control of the pest are given.

* * *

Studies on the germination of sugar cane—optimum requirement of soil moisture for sprouting and rapid growth of sprouts. U. S. SINGH. *Indian Sugar*, 1968, **18,** 253–258.—In Uttar Pradesh soil moisture is all-important in the successful germination of setts, as planting normally takes place during relatively dry and warm weather. Results of experiments with various levels of soil moisture over a 5-year period are reported. A soil moisture level of 8% was found to be the optimum and better than the higher levels of 10% and 15%.

* * *

Pesticide industry in Taiwan. S. S. CHIEN. *Taiwan Sugar*, 1968, **15,** (4), 23–28.—The increase in the use of pesticides in Taiwan has been phenomenal. Pesticide manufacture did not exist in Taiwan prior to 1948. Now 8 factories are concerned with BHC manufacture, 6 with "Malathion", 4 with "Neoasozin", one with PCP and one with 2,4-D. Details are given of various factories and processes employed.

* * *

The best seed cane comes from hot water treated cane. ANON. *Producers' Rev.*, 1968, **58,** (8), 17.—What applies equally is "the best cane comes from hot water treated seed". Perhaps this is meant. It is urged that only hot water treated seed cane or setts be used in planting. Cane that has been subject to flooding should not be used, as it is more likely to be disease infected. Seed cane should generally be about 12 months old, first ratoon being preferable to

plant cane, and the stalks straight (bent cane packs badly and is troublesome in the tank). Solid cane of normal thickness with sound eyes should be chosen.

* * *

Bacterial blight of sugar cane in India. S. K. SINHA, A. N. MUKHOPADHYAY and S. C. SAXENA. *Plant Disease Reporter*, 1968, **52,** 715.—The symptoms of a severe leaf spot disease of sugar beet in India are described. It is considered to be due to bacterial agency, i.e. *Pseudomonas aptata*, the same organism that has been the cause of bacterial blight of sugar beet in India.

* * *

The soils of the sugar producing areas of the south eastern lowveld of Rhodesia. A. A. DU TOIT. *Rhodesia Agric. J.*, 1968, **65,** 182–186.—A description is given of the main soil categories, five in number. The soils of the areas where cane is grown at present are nearly all derived from gneisses of various ages and origins, popularly known as "papagneiss soils". In the extreme south-east some development has taken place on soils derived from basalt and sandstone, but these areas are still small. The present sugar area covers some 50,000 acres and might be regarded as a "pilot scheme" for possible future development in the lowveld. The soils studied are typical of a wide area.

* * *

Assessment of crop losses caused by nematodes in the United States. J. M. GOOD. *F.A.O. Plant Protection Bull.*, 1968, **16,** 37–40.—An estimate of the losses of 30 different crops caused by nematodes in the United States is given in a table. Percentage losses ranged from 3% (wheat) to 25% (cucumbers). In the case of sugar cane it was 10% and with sugar beet 4%.

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Development of new sugar cane varieties for Florida. R. N. FALGOUT, N. I. JAMES and E. R. RICE. *Sugar Bull.*, 1968, **46,** (23), 7, 10–12.—The purpose of this paper is to provide an up-to-date record of breeding practices now employed at the US Sugarcane Field Station at Canal Point. About 10,000 seedlings are raised annually and, after germination in a greenhouse, pass through 4 different stages of selection. These are described.

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Controlling soil insects. ANON. *Victorias Milling Co. Expt. Sta. Bull.*, 1968, **15,** (1 & 2), 2–3.—The value of crude BHC (benzene hexachloride) in controlling troublesome sugar cane pests in the Philippines, such as grubs and termites, is discussed. The recommended rate for 26% BHC is given as 4 kg in 100 gal water per ha and for 12% BHC 9 gk/ha.

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Fertilizer recommendation for Victorias district farms. ANON. *Victorias Milling Co. Expt. Sta. Bull.*, 1968, **15,** (1 & 2), 8–9.—Three N-P-K formulations are given for different soil conditions as a guide in the absence of soil analysis, the third formulation being given for mountain-side farms recently developed and generally high in organic matter, very low in phosphate and low in potassium.

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Achieving good germination. ANON. *Victorias Milling Co. Expt. Sta. Bull.*, 1968, **15,** (1 & 2), 10–13.—Uniform, good germination and early vigorous growth are essential for good crops. The requirements of good germination are discussed, viz. good quality seed pieces or setts, good soil tilth, correct planting and adequate soil moisture. The value of mercurial treatment as a protection against rot-producing organisms and hot water treatment, where ratoon stunting disease may be present, is stressed.

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Taiwan's sugar railways turn to chemical weed control. S. Y. PENG. *Sugar y Azúcar*, 1968, **63,** (10), 22–24, 30.—The importance of the sugar railway system (more than 3000 km) in Taiwan in transporting cane and passengers is pointed out. Keeping the railway lines, stations, shunting yards, etc. free of weeds has always been a problem and expensive in hand labour. The great value of chemical herbicides, now employed throughout, and the savings involved are explained. Spraying must be done at the right time in relation to the monsoon. The formulations employed are given.

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Weeding and cultivation. C. G. AURELIO. *Sugarland* (Philippines), 1968, **5,** (6), 9, 11, 39.—The methods of chemical weed control at present employed in the Philippines are described. A plea is made for greater use of the animal-drawn spike-toothed harrow for controlling weeds when still young (less than one inch high) and growing on light or crumbly soils. As it floats on the soil instead of cutting deeply, is does not inflict much damage on cane roots.

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A comparative study of seven varieties of sugar cane in the central Tacarigua zone of Venezuela. O. LOZADA. *Bol. Estac. Exp. de Occidente* (Yaritagua, Venezuela), 1967, (82), 9 pp.—The climate and soil conditions of the area are described, cane being grown under unirrigated conditions. The predominant variety at present cultivated is B 4362. The other varieties studied were: PR 980, PR 1013, Co 419, CJ 118-53-19, B 49119 and Mex. 53142. In different areas different varieties gave best results.

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What's new in chopper harvesters from Bundaberg. L. G. VALLANCE. *Australian Sugar J.*, 1968, **60,** 275–281.—A flood of new chopper harvesters and mechanical harvesting devices is coming from manufacturers in Bundaberg, to a greater extent than ever before. These are discussed. They include: the Crichton S.P. machine, Parry three-point linkage machine, Parry-Scott single row machine, Parry-Scott double row machine, Toft new CH200, the new thrower fitted to

the Massey-Ferguson machine and the extremely successful Mizzi trash and dirt extractor now in full production.

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Two promising new cane varieties. ANON. *Australian Sugar J.*, 1968, **60**, 295–296.—Two new cane varieties known as Q 87 and Q 88, now being extensively propagated and likely to be on the 1969 lists of approved varieties for Queensland, are described. It is thought that Q 87 may replace Q 58 because of the latter's brittleness in mechanical harvesting and N:Co 310 in dry areas where arrowing limits late growth. Q 88 is highly resistant to leaf scald and red rot and may replace, in part, a number of varieties.

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Correlation of rind hardness and fibre in sugar cane. L. G. DAVIDSON. *Sugarland* (Philippines), 1968, **5**, (7), 14, 16, 34, 35, 46.—Methods and apparatus used in estimating rind hardness are described. Data from 74 comparisons involving 44 varieties indicated a high degree of correlation between rind hardness at the centre of the 4th to 6th internode, counting from the butt, and the fibre. The use of rind hardness to estimate fibre may be useful in eliminating varieties with undesirable fibre content in early stages of selection.

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What makes a good ratoon crop? R. ARANETA. *Sugarland* (Philippines), 1968, **5**, (7), 19, 32.—It is pointed out that the quality of a ratoon crop is very dependent upon the quality or nature of the plant crop from which it is derived, especially the root system. The need for rapid preparation of the field after harvesting the plant crop is stressed. Pros and cons of burning the trash (the common practice in the Philippines) and of trash mulching are discussed, the heavy labour requirement of the latter being a serious current drawback.

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Half a million pesos set for 10-year rat control program. ANON. *Sugarland* (Philippines), 1968, **5**, (7), 20–21. Reference is made to an agreement between the Philippine Government and the US Agency for International Development to finance together a 10-year rodent control research project. The seriousness of the rat menace in the Philippines, not only with sugar cane but with other crops such as rice, is discussed. The use of radio-active isotopes and mini-transmitters attached to released rats in studying rat habits and biology is envisaged.

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Economics of the Argentine sugar industry. V. HEMSY. *Misc. Publ.* (Tucumán National Univ., Faculty of Agric.), 1968, (23), 27 pp.—Results are given of a study of labour conditions in the Argentine sugar industry in terms of man-hours per ton of cane or sugar produced. These are compared with similar figures for the United States sugar cane industry. It is considered that reorganization of the Argentine industry is needed.

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Studies in relation to the control campaign against a bacterial disease of sugar cane in Mauritius. C. RICAUD. *Rev. Agric. Sucr.* (Mauritius), 1968, **47**, 108–119.—This refers to the new strain of gumming disease (a bacterial disease) that has developed in Mauritius. The fact that it is definitely a new strain has been confirmed by laboratory investigations. The programme of varietal replacement that has been implemented is discussed as well as studies to improve knowledge of the evolution of the disease, in particular the effect of systemic infection in a tolerant variety. A better understanding of the effect of climatic factors on the development of the disease has been obtained. The importance of infection by knives at harvest has been established.

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Organic *versus* inorganic manuring in sugar cane cultivation. A. P. GUPTA, S. P. SHUKLA and D. M. CHATURVEDI. *Proc. 1st Conv. S. Indian Sugar Cane and Sugar Tech. Assoc.*, 1968, (2), 1–5.—Field experiments are described in which various organic manures were compared with inorganic fertilizer (ammonium sulphate). The conclusion reached was that a combination of both gave the best results.

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C 6304, a promising new mid-season variety. C. EKAMBARAM. *Proc. 1st Conv. S. Indian Sugar Cane and Sugar Tech. Assoc.*, 1968, (2), 15–18.—The characteristics and special features of this cane are described, including its resistance or tolerance to smut or pineapple disease. It promises to replace Co 449, the present mid-season variety, and also Co 419 which is largely grown under wet land conditions.

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Seed cane production. S. K. SASTRY and K. KRISHNAMURTHY. *Proc. 1st Conv. S. Indian Sugar Cane and Sugar Tech. Assoc.*, 1968, (2), 19–28.—Results of trials on seed cane and its treatment carried out at the Rudrur Regional Agricultural Research Station are given. Young cane was superior to old for seed pieces. Application of N-P-K fertilizers at planting resulted in rapid and increasing germination. Hot water treatment was considered advisable under prevailing conditions.

* * *

Limitations caused by disease in the use of new varieties. K. V. SRINIVASAN. *Proc. 1st Conv. S. Indian Sugar Cane and Sugar Tech. Assoc.*, 1968, (2), 29–33. Numerous instances are given of how well-known and popular varieties have had to be relinquished because of increased incidence of certain diseases to which they prove very susceptible. Examples are given in other cane-growing countries besides India. In India the troubles encountered with certain varieties and diseases such as red rot, smut, wilt and grassy shoot are outlined.

Sugar beet agriculture

Induction of flowering in sugar beet cuttings by intermittent exposure to light at midnight. P. CURTH. *Züchter*, 1967, **37**, 119–120; through *Plant Breeding Abs.*, 1968, **38**, 617.—Experiments over 2 years showed that 2 hours light in the middle of the night hastened the onset of flowering in cuttings. An even greater induction was given by alternating periods of light and darkness lasting about a minute, giving in all less than one hour of light. This may be of value in speeding up breeding in varieties resistant to bolting.

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The relationships of soil potassium categories with crop response: sugar beet. M. HERLIKY, P. MCENROE and P. A. GALLAGHER. *Min. Agric. Fisheries and Food Tech. Bull.*, 1967, (14), 78–85; through *Biol. Abs.*, 1968, **49**, 5254.—Results are reported from individual and selective multiple regression analyses. The study included the comparative evaluation of the following conventional extractants: Morgan, Truog, Egner Richm, Bray and Kurtz, and Purdue.

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Yield and quality responses of irrigated sugar beet to manure, nitrogen and phosphorus fertilizers on three soil sypes in Israel. Y. GUTSTEIN and B. KARADAVID. *Israel J. Agric. Res.*, 1967, **17**, 199–212; through *Soils and Fertilizers*, 1968, **31**, 359.—The interrelated effects of cow manure and mineral N and P on yield and quality of sugar beet in field trials is discussed. Application of N had a positive effect on yield and a low negative effect on the quality of beet juice. Nitrogen requirement was higher for beet yield than for sucrose yield.

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Physiological characteristics of the growth of sugar beet crops on different soils. D. J. WATSON. *J. Int. Inst. Sugar Beet Res.*, 1967, **2**, 225–231; through *Soils and Fertilizers*, 1968, **31**, 360.—Leaf area index of crops sown in late March or early April increased to a maximum in early August and then changed little. Crops sown on comparable dates in three years with similar spacing on widely different soils (silt, fen peat, clay loam, sand and limestone) had large differences in leaf area index but smaller differences in net assimilation rate.

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The use of "Menazon" seed dressing to decrease spread of virus yellows in sugar beet root crops. G. D. HEATHCOTE. *Ann. Appl. Biol.*, 1968, **62**, 113–118. The organophosphorus insecticide "Menazon" applied to sugar beet seed decreased the proportion of seedlings infected with aphids during May and early June and the number of aphids per plant during June and early July to one third of that in the control plots. It also checked the spread of virus yellows. In 8 field trials during 1965–67 "Menazon" seed dressing increased sugar yield by about 8 cwt per acre. Spraying with "Demetron-methyl" when a "spray warning" was issued in the area gave a similar increase, but had no further effect on plots sown with "Menazon"-treated seeds. It is recommended that "Menazon"-dressed sugar beet seed be used in regions where yellows is usually prevalent, or where there is reason to expect a large aphid infestation.

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Modern sugar beet cultivation. A. DONA DALLE ROSE. *Ind. Sacc. Ital.*, 1968, **61**, 149–154.—Some modern methods of mechanization in the cultivation of sugar beet and recent work by a well known Scandinavian geneticist (BOSEMARK) are discussed.

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Comparison of different methods of beet harvesting. G. BARALDI. *Ind. Sacc. Ital*, 1968, **61**, 155–177 —A detailed analysis is given of the results obtained from close observation of beet harvesting by different methods or the use of different types of sugar beet harvester. Topping irregularities, losses through overtopping, broken roots and roots not harvested were all taken into account.

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Problems of sowing sugar beet to a final stand. O. NEEB and C. WINNER. *Zucker*, 1968, **21**, 445–450, 463–468.—Trials on loess soils in West Germany over a period of six years on sowing sugar beet to a final stand have proved the method to be practical or satisfactory and not to impair yield and sugar beet quality, provided certain conditions apply regarding sowing and spacing. Details are given.

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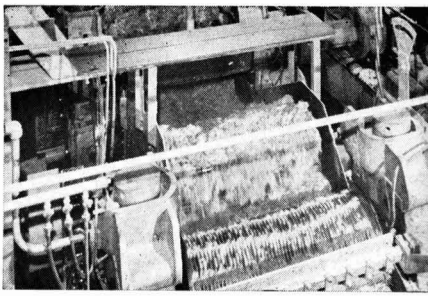
Selection and testing of sugar beet for curly top resistance in the greenhouse. J. S. MCFARLANE and C. W. BENNETT. *Phytopathology*, 1968, **58**, 1311–1315.—A new greenhouse method of selecting for curly top resistance is described. Viruliferous beet leafhoppers are caged on seedlings for one week and the plants are graded for severity of symptoms six weeks after inoculation. Plants with the mildest symptoms are selected and selfed seeds produced. At least eight plants of each selfed progeny are tested. Advantages and disadvantages of the method are discussed.

Cane sugar manufacture



The effect of side feeder carriers on the power required for cane preparation. T. C. MULVENA and J. H. NICKLIN. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 273–280.—Investigations similar to those conducted in 1967[1] on the power requirements for cane preparation by knives and shredder were carried out at Millaquin and Bingera sugar mills. Full details are given of the findings, which showed that the use of side feeder carriers reduced the knife power consumption as indicated earlier[2].

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Influences of operating conditions on the stresses in a sugar mill roller shaft. R. N. CULLEN. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 281–287.—See CULLEN & ALLEN: *I.S.J.*, 1969, **71**, 197–201.

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Investigation of internal stresses in mill roller shaft forgings. K. D. HORTON. *Proc. 35th Conf. Queensland Soc. Sugar Cane Tech.*, 1968, 289–294.—Experiments have shown that after heat treatment of a mill roller shaft forging a varying amount of compressive stress exists at the surface which would, it is suggested, benefit shaft performance to some extent. Water quenching produces a more uniform compressive stress distribution about the longitudinal axis. The formation and measurement of residual stress are discussed.

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Guadeloupe—sugar cane island of the EEC. H. HIRSCHMÜLLER and H. J. DELAVIER. *Zeitsch. Zuckerind.*, 1968, **93**, 483–486.—The sugar industry of Guadeloupe, covering both cane agriculture and factory processing, is surveyed.

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The lime kiln at Ankaratra sugar factory (Malagasy Republic). G. VERNOIS. *Zeitsch. Zuckerind.*, 1968, **93**, 486–487.—Details are given of a French-built lime kiln which is bagasse- and oil-fired (these fuels can be used separately or together) and produces only 8 tons of lime per day. It is simple to operate and maintain, so that it is suitable where untrained personnel are employed, as in developing countries.

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Application of (an) ion exchange process in carbonatation sugar factories of India. S. MUKHERJEE and S. K. SRIVASTAVA. *Sharkara*, 1967, **9**, 126–141.—Ion exchange demineralization experiments described earlier[3] were extended to juices from carbonatation factories, "Duolite A-7" and "Duolite C-25" being used separately and in mixed bed form, using 3 litres of "C-25" and 4·5 litres of "A-7". Full details are given of the results for both unsulphited and sulphited juice. With mixed bed treatment, the ash removal from juice of 80–88 purity was of the order of 84–89%; with sequential treatment it was 85–90% for juice of 84 purity. Unsulphited juice was more suitable for treatment, and the sequential system was better for this juice than the mixed bed cycle, unlike treatment of juices from sulphitation factories. The economics are discussed.

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Estimation of the output of white sugar centrifugals. K. PAUSE. *Bol. Azuc. Mex.*, 1968, (226), 7–11. Separation of liquid from crystals in the centrifugal is related to both centrifugal force and to the time of its application, giving rise to the concept of "seconds of effect". If the amount of liquid to be separated per hour in a centrifugal is to be increased, it is necessary to raise the centrifugal force part of this "seconds of effect" by raising the speed of revolution, when the quantity of covering water is reduced. In this way the output of the centrifugal in terms of white sugar is increased.

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The innovation of TSC sugar machinery. T. L. PING. *Taiwan Sugar*, 1968, **15**, (4), 14–19, 29.—Details are given of cane sugar factory equipment manufactured by the Taiwan Machinery Manufacturing Corp. from their own designs or under licence.

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Partial third carbonatation of thin juice—a means (which) can be used for reducing sulphur consumption in a carbonatation factory. B. B. PAUL and I. S. SAXENA. *Indian Sugar*, 1968, **18**, 241–242.—See *I.S.J.*, 1968, **70**, 372.

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Reduced clarification house extraction and filtration efficiency. K. N. AGARAWAL. *Indian Sugar*, 1968, **18**, 243–246.—A formula is presented for calculation of the reduced clarification house extraction, which is defined as the available sugar extraction in clear juice % available sugar in 85 purity mixed juice at a final molasses purity of 33. For a more accurate calculation of clarification house efficiency the author

[1] NICKLIN: *I.S.J.*, 1968, **70**, 53.
[2] THE SOUTH QUEENSLAND INSTITUTE OF SUGAR MILL ENGINEERS: *I.S.J.*, 1968, **70**, 51.
[3] MUKHERJEE *et al.*: *I.S.J.*, 1967, **69**, 244.

suggests two factors not previously considered, i.e. purity rise factor, defined as precipitated non-sugars removed in filter cake % non-sugars in mixed juice, and the filtration efficiency, defined as undiluted clear juice lost in filter cake % filter cake. Worked examples are given.

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Studies on the determination of (the) regeneration point during the use of ion exchange resins for decalcification of clarified cane juice. S. C. GUPTA, N. A. RAMAIAH and S. K. SRIVASTAVA. *Sharkara*, 1968, **10**, 6–13.—Deliming of clarified juice was carried out with three different cation exchange resins. Of the methods tested for determining the point at which to regenerate the resins, conductivity was insufficiently sensitive to change in the CaO content at 100–200 mg CaO/litre, measurements of e.m.f. are difficult, and the use of EDTA with Eriochrome Black T as indicator necessitates costly equipment for measurement and control. A simple method using a chelating agent and suitable indicator is described; it has been found satisfactory, takes only 1–2 min, and does not require any complicated apparatus.

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Estimation of steam consumption in pans. S. K. GHOSH. *Sharkara*, 1968, **10**, 14–18.—Values are tabulated for 11 different quantities (lb/hr) involved in pan boiling in 11 Indian sugar factories. The quantities include steam % cane, which varied from 19·7 to 32·5. Qualitative factors for massecuite and syrup are also tabulated for the same 11 factories as well as the ratio of average massecuite Brix to an "assumed" syrup Brix. This ratio is used as a guide to steam consumption % cane. The two methods of estimating steam consumption are discussed.

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An absolute criterion of mill work? A. L. WEBRE. *Sugar y Azúcar*, 1968, **63**, (10), 19–21, 32.—The author considers available criteria for evaluating cane mill performance to be unsuitable because they are affected by cane quality or "richness". An absolute criterion is proposed based on the use of counter-current washing formulae to be found in textbooks, since the author draws an analogy between counter-current washing and cane milling. The formulae were used to obtain a theoretical milling loss at various imbibition:fibre ratios and assuming various cane analyses. Values plotted for calculated milling loss *vs.* the pol:water ratio in cane lay along a straight line for each I/F value, while considerable scatter occurred when the pol:fibre ratio was used instead of the imbibition:fibre ratio. The ratio of the calculated milling loss to the true milling loss can then be used as an absolute criterion of cane mill (or diffuser) performance. Graphs and a table are presented.

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Report on Silver ring diffuser system. B. S. SILVER. *Sugar J.*, 1968, **31**, (4), 22–26.—The performances of Silver ring cane diffusers at Pioneer (Hawaii), at the Hokubu Seito factory in Okinawa, at Ingenio Eldorado (Mexico), and at Central Cumanacoa (Venezuela) are discussed and data tabulated for these factories during 1967. The results obtained at Pioneer during the last two years when cane mills were used are compared with the first two years when the Silver diffuser was used.

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Louisiana sugar factory wastes and water pollution. R. A. LAFLEUR. *Sugar J.*, 1968, **31**, (4), 29–30. Tabulated data indicate that Bayou Teche river in Louisiana during the 1967 cane grinding season had a dissolved oxygen content no greater than 1·8 p.p.m., and large numbers of fish were killed, followed by septic conditions with characteristic noxious odours. The river receives as much sugar factory waste water as other rivers in Louisiana, and possibly more. Details are given of the effluent BOD from 12 sugar factories discharging into the Bayou Teche, and an order issued by the Louisiana Stream Control Commission on water pollution is reproduced.

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Sugar cane diffusers. L. V. VALERA, A. GORREZ and L. VILLALBA. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 21–29.—The performance of the Fairymead Burnett cane diffuser[1] is discussed and compared with the results obtained at the same factory using conventional cane milling. The performances of BMA, Silver and De Smet diffusers at four sugar factories are then compared with results obtained in cane milling at these factories. The question of diffuser costs is discussed and the possibility of the Philippine Sugar Institute developing its own distinct cane diffuser is considered.

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Operation of the Silver ring diffuser. F. PRICE. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 30–39. See SILVER: this page.

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The theory of boiler feed water heating and aeration. B. S. OCAMPO. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 89–98.—The advantages of heating feed water are listed and discussed in turn, and comments are made on five methods used for heating. Deaeration of feed water is also discussed, with remarks made by an "eminent authority" on mechanical deaeration. The venting of incondensable gases in a deaerating heater is also dealt with.

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Automatic controls of the evaporator station at First Farmers. V. A. CUSTODIO. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 99–103.—See *I.S.J.*, 1968, **70**, 371.

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Sugar mill turbinization. F. G. SALONGA. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 104–108.—See *I.S.J.*, 1968, **70**, 341.

[1] *I.S.J.*, 1969, **71**, 62.

Where not to put a sugar central. T. O. SORIANO. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 127–128.—A list of 17 types of location where a sugar factory should not be erected is given as a guide to "those individuals who are given the responsibility to put up new sugar factories" (in the Philippines).

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Some notes on boiling house management. J. G. MEYER. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 161–165.—The author, a representative of Stork-Werkspoor Sugar N.V., of Holland, criticizes the Philippines practice of back-boiling *A*-molasses in a 2-boiling system. He advocates replacement of the system with a 3-boiling scheme or, if the production of *B*-sugar is considered too much of a drawback, a double-magma system in which *C*-sugar is used as magma for *B*-massecuite and *B*-sugar as seed magma for *A*-massecuite. Reference is made to the Steffen process and to back-boiling in a beet sugar factory.

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Sugar juice sanitation. J. A. CASEY. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 166–174.—See *I.S.J.*, 1968, **70**, 341.

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The use of Pan Aid Concentrate at Pasudeco. D. I. BALAGSO. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 175–177.—Results obtained at Pampanga Sugar Development Co. with use of "Pan Aid Concentrate"[1] are compared with those obtained without its use. These show the advantage of the surface-active additive in increasing *A*- and *B*-massecuite Brix, reducing final molasses apparent purity and reducing boiling and purging times for low-grade massecuites.

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Automatic combustion control of steam generating station at First Farmers. S. A. SUAREZ. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 178–185.—Details are given of the Bailey automatic combustion control system used for the three Riley boilers at the sugar factory of First Farmers Milling Co. Inc., in the Philippines. Steam pressure, steam flow and CO_2 charts are reproduced.

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Horizontal (centri)fugals at Fairymead. ANON. *Australian Sugar J.*, 1968, **60**, 456.—Information is given on the Buckau Wolf horizontal continuous centrifugal, two of which have been installed at Fairymead for low-grade work. The machine, which has a basket 1100 mm in diameter and operates at 1600–2200 r.p.m., is started by press-button, which opens the steam valves to the basket, front sugar chamber and molasses compartment. The indicator light changes from red to green once operating speed is attained, and when the temperature reaches 50°C the steam valves are closed and massecuite feed starts. Massecuite quantity, observed through a sight glass, is regulated by a manually-operated feed valve. The sugar chamber is provided with lighting so that sugar quality can be observed. In 2 months' operation the machines have performed very satisfactorily, producing good quality sugar at high throughput, rates of up to 5 tons of massecuite per hr being obtained in test runs.

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BMA cane diffusion—Egyptian system. P. FREUND. *Sugar J.*, 1968, **31**, (6), 23–26.—The performances of BMA cane diffusers in various countries are discussed, particularly the results obtained at Ingenio Montelimar in Nicaragua, where diffuser extraction increased from 95·33% in 1966 to 96·18% in 1968 compared with a mill extraction of 91·80% in 1965, which was lower than in 1963. This difference is attributed to the absence of cane quality effect on BMA diffuser performance, since the quality of the cane has fallen during the 3 years during which the diffuser has been in operation. Reference is also made to the BMA diffuser at Dalton in South Africa.

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Factors contributing to increased manufacturing losses and increased undetermined losses and steps to control them. T. C. JHINGAN, W. C. BAKSHI and A. K. MEHAY. *Indian Sugar*, 1968, **18**, 373–375.—Sugar losses in final molasses and filter-press mud and how to reduce them are discussed, with particular attention paid to the graining technique used for *C*-massecuite. Other sources of known sugar losses are considered as well as unknown losses and analytical errors.

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Present stage of development of diffusion in cane sugar factories. L. LINCOLN, P. SCOTT and R. LAGESSE. *Rev. Agric. Sucr.* (Mauritius), 1968, **47**, 231–240. The development of cane diffusion is discussed in the light of the symposium held at the 13th ISSCT Congress in 1968 and from visits paid by the authors to factories in Australia, the Philippines and Taiwan. References are also made to the work of various authors, covering cane preparation, effect of temperature and liming, bed thickness and percolation, and diffusion *vs.* milling.

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Aluminium tubes in juice heaters, evaporators and vacuum pans. R. B. KHAVE. *Indian Sugar*, 1968, **18**, 525–532.—The mechanical, physical and corrosion-resistant properties of aluminium tubes in juice heaters, evaporators and vacuum pans are described and the costs compared with those of brass tubes, showing the savings in foreign exchange possible with the use of aluminium tubes, which are manufactured in India.

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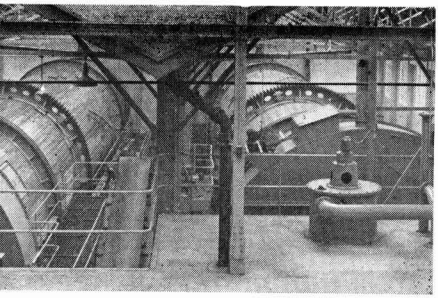
The sugar economy of Cuba 10 years after the revolution. H. HIRSCHMÜLLER and H. J. DELAVIER. *Zeitsch. Zuckerind.*, 1969, **94**, 74–81.—A survey is presented of cane agriculture, sugar factory performance and of the sugar economy in Cuba, together with a map showing the locations of the sugar factories and refinery.

[1] *I.S.J.*, 1966, **68**, 318.



Beet sugar manufacture

Aspects and problems in the flow of water in thermic centrals. T. SONGA. *Ind. Sacc. Ital.*, 1968, **61**, 278–287.—Formation of scale, corrosion and carryover phenomena in power plants are discussed with a mention of water conditioning measures to counteract these, and tables of steam and water purity standards laid down by the VGB (German Large Boiler Industry Association) are presented.

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Automation of the juice purification and filtration station in sugar factories. F. PŘIDAL. *Listy Cukr.*, 1968, **84**, 204–214.—Desiderata of an automatic control scheme for the carbonatation station are listed and schemes for regulation of various parameters are described in turn. A flow scheme for automatic control of a conventional carbonatation station with hot pre- and main liming is described, as well as a typical scheme using cold pre- and main liming.

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Sugar beet storage in the 1967/68 campaign. M. MILOSZ. *Gaz. Cukr.*, 1968, **76**, 270–274.—In an evaluation of beet storage, details are tabulated of cossette pol for 1965/66–1967/68 at sugar factory groups in Poland. Together with these data are given the campaign length and details of beet storage. From the results certain conclusions are drawn and these are listed.

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Arrangement of warehouses for bulk storage of white sugar. V. L. MAR'YANCHIK, A. G. BORODYNYA and R. M. KOLOMIETS. *Sakhar. Prom.*, 1968, **42**, (10), 16–19.—As regards the situation in the Soviet sugar industry, it is considered essential to maintain a regular year-round supply of white and raw sugar from the factories to the consumer or refiner; but it is thought inadvisable to erect silos and warehouses elsewhere than at the sugar factories, only sugar reception bays and short-term stores (to maintain a current reserve) being needed at the customer's end.

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Use of disc filters at Zaplaskii factory. P. I. ISHCHENKO. *Sakhar. Prom.*, 1968, **42**, (10), 19–21.—At Zaplaskii sugar factory the performance of three Soviet-built disc filters, used for syrup from the 3rd effect of a quadruple-effect evaporator after it had been sulphited, was so good after their introduction in 1967 that in 1968 they were used to replace mechanical filters installed only the previous year for 2nd carbonatation and sulphitation juice.

Boiling 3rd product massecuite on a footing of 2nd massecuite. A. V. LYUBCHAK and V. V. REVENKO. *Sakhar. Prom.*, 1968, **42**, (10), 21–22.—At Chupakhovskii sugar factory 3rd product massecuite is boiled on a footing of 2nd product massecuite of 92–92·5°Bx and built up with 2nd product wash syrup. The 3rd massecuite is boiled to 92·5–93·0°Bx. Advantages include lower molasses purity and yield.

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Improved scheme for raw juice purification at factories in the Khar'kov beet sugar trust. V. V. RAKHMANYUK. *Sakhar. Prom.*, 1968, **42**, (10), 23–26.—The scheme introduced in 1967 at Savinskii sugar factory includes pre-liming with recycled 1st carbonatation juice to pH 10·8–11·2, cold main liming followed by 10–15 minutes' destruction of reducing and nitrogenous matter in another "defecation tank" after heating to 85–90°C, and 1st carbonatation in two vessels to a final pH of 11, after which the juice is heated to 101–102°C and subjected to 2nd carbonatation (simultaneous defeco-saturation). In the first of the two 1st carbonatation vessels the juice enters at the bottom and flows upwards in the same direction as the gas flow, while in the second vessel it enters at the top and flows down against the CO_2. Advantages of the scheme are discussed.

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Automatic control of the technological process in a pre-liming tank. V. V. ZLAMAN. *Sakhar. Prom.*, 1968, **42**, (10), 27–31.—Details are given of a scheme with two variants for automatic control of the pH in pre-liming to which unfiltered 1st carbonatation is recycled.

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Calculation of sugar yield as a function of syrup and molasses purities. T. P. KHVALKOVSKII. *Sakhar. Prom.*, 1968, **42**, (10), 32–33.—Formulae are given for calculating sugar yield as a function of syrup and molasses purities.

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Regulating limestone calculation and consumption. V. A. DANIL'TSEV. *Sakhar. Prom.*, 1968, **42**, (10), 34–36.—Reasons for increased limestone consumption over the 10-year period 1958–68 in Soviet sugar factories are discussed. The true consumption is lower than indicated by the data as a result of defects in the calculation system used, and recommendations are given to remedy this and reduce the limestone usage.

Experience in boiling-out of vacuum pans. A. P. SOFRONYUK. *Sakhar. Prom.*, 1968, **42**, (10), 37. Boiling-out with sodium carbonate was shown by laboratory tests to loosen pan scale much faster than using sodium triphosphate solution. The scheme for boiling-out at the author's sugar factory is described.

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New forms of covers for long-storage (beet) piles. I. YA. SLOBODYANIK, B. YA. KONSTANTINOVSKII, M. Z. KHELEMSKII, B. I. KRASNOKUTSKII and A. KH. STARUSHENKO. *Sakhar. Prom.*, 1968, **42**, (10), 50–53. Details are given of tests with protective layers of such materials as plastic-bonded felt and panels formed by a light material such as felt, corrugated paper and polyurethane sandwiched between two outer layers to give an air-insulated cover. The binding of reed pressboard panels with plastic cord was also tested.

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Application of wetting agents to improve sugar house work. J. EHRENBERG. *Zucker*, 1968, **21**, 624–627. Of three wetting agents tested at the author's sugar factory, "Intrasol FA 12/18/10" proved the most effective in reducing mother liquor purity, easing the boiling process through reduced massecuite viscosity, giving greater control of crystal size, and in facilitating the work of the centrifugals with consequent higher yields from the machines. The optimum dosage was 1 kg per 40 tons of 1st massecuite and 1 kg per 30 tons of low-grade massecuite.

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Control of sucrose crystallization in sugar factories. II. A new calculation and graphical method of determining massecuite crystal content. S. ŠUŠIĆ and G. KUKIĆ. *Zeitsch. Zuckerind.*, 1968, **93**, 593–596. The method described uses massecuite analytical data and is based on the relationships between, on the one hand, the amount of sucrose crystallized and the mother liquor composition in the massecuite and, on the other, the mother liquor water content after completion of crystallization, the final crystallization temperature, the sucrose solubility, the non-sucrose matter content and composition, and the supersaturation coefficient. From the data graphs are drawn for the relationship between Brix, purity and supersaturation of the mother liquor and massecuite Brix at the end of crystallization.

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Syrup storage. ANON. *Sucr. Franç.*, 1968, 289–295, 359–366.—Storage of thick juice at the Carlton (California, USA) beet sugar factory of Holly Sugar Corp.[1], at Furnes sugar factory in Belgium[2], and at Bucy-le-Long in France is described in detail with the aid of tabulated analytical data and photographs. Conclusions are drawn concerning technical and financial aspects of thick juice storage.

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Great Western opens new beet sugar plant. P. B. SMITH. *Sugar J.*, 1968, **31**, (5), 23–25.—Details are given of the Frank A. Kemp beet sugar factory in western Kansas, USA, built for the Great Western Sugar Co. and incorporating a DDS-Silver diffuser with a rated capacity of 3400 tons of beet per day.

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Primary elements in automatic circuits in the sugar industry. S. GAWRYCH. *Gaz. Cukr.*, 1968, **76**, 281–285.—The control of products in transit between processes or in process is described under a number of categories, and the parameters to be controlled and the type of control element applicable are considered for the various processes in a beet sugar factory.

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Sugar house work with the use of magma. K. WAGNEROWSKI and C. DABROWSKI. *Gaz. Cukr.*, 1968, **76**, 286–289.—At Szczecin the conventional 3-boiling scheme as used in Poland is employed, i.e. boiling 1st massecuite from normal syrup, remelted 2nd sugar and washed 3rd sugar, while the 2nd massecuite is boiled entirely from 1st massecuite run-off. In a scheme which has been tested 2nd sugar is remelted in thin juice for 1st massecuite boiling, and the 2nd massecuite boiled on 1st massecuite run-off on a footing of 3rd sugar made into a magma with 1st massecuite run-off. The two schemes are compared.

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The water economy in the Czechoslovakian sugar industry with regard to the new water legislation. H. CHILKOWICZ, S. GÓRSKA and J. ZAREBA. *Gaz. Cukr.*, 1968, **76**, 293–297.—New legislation in Czechoslovakia lays down a scale of payment for industrial and drinking water consumption and for effluent discharge on the basis of BOD_5 and the amount of suspended solids in the waste water. The water utilization schemes at three Czechoslovak sugar factories are described in the light of the new legislation.

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Oscillating feeder for beets in a flume. S. WACNIK and N. GLATTER. *Gaz. Cukr.*, 1968, **76**, 297–299. The feeder, which has been patented, comprises an arcuate section of grids, the lower end of which travels to any position from near the bottom almost to the top of the flume with simultaneous oscillating movements brought about by a piston travelling between the arc and the axis from which the arc is suspended. The synchronizing of the two movements is made possible by a rack-and-pinion arrangement at the arc end of the piston travel. The feeder's electric drive is geared to the beet level in the flume.

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Removal of non-sugars during electro-ion exchange purification of molasses. R. TS. MISHCHUK, L. D. BOBROVNIK and K. D. ZHURA. *Izv. Vuzov, Pishch. Tekhnol.*, 1968, (4), 79–82.—In electrolytic demineralization of molasses solution, it was found that the ash components were removed 2½ times faster than

[1] MORRIS: *I.S.J.*, 1961, **63**, 371–373.
[2] LAMBRECHTS *et al.*: *Sucr. Belge*, 1967, **87**, 139–147; *I.S.J.*, 1968, **70**, 308.

were the nitrogenous substances. At 65–70% demineralization (found to be the optimum, after which the current usage rose steeply) 77% of the glutamine complex in the original molasses was removed, while only 28% of the total N was separated, most of the betaine remaining in the solution. Because of this, the final demineralized molasses could be a good source material for betaine recovery.

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Calculation of the time constant for sugar crystallization in vacuum pans and crystallizers. V. G. TREGUB and V. D. POPOV. *Izv. Vuzov, Pishch. Tekhnol.*, 1968, (4), 83–87.—Equations are obtained for calculation of the sugar crystallization time constant θ. While the equations for massecuite cooling in crystallizers give values in satisfactory agreement with earlier calculated and experimental values[1], the value of θ for the pans and crystallizers is found by a trial-and-error method, starting with a value of θ which is half of the expected crystallization time.

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Application of the theory of Silin to the De Smet diffuser. P. DEVILLERS. *Sucr. Franç.*, 1968, (12), 407–413.—The formula derived by SILIN[2] for evaluating diffuser performance has been applied to De Smet diffusers in a number of French beet sugar factories over a 3-year period. Values of the diffuser constant A obtained with the aid of a nomogram based on the formula differ widely between factories, indicating the effects of a number of factors not considered in the calculation, e.g. cossette slicing uniformity, regularity of the diffusion process, pH of the diffusion juice, feed water quality, overloading of the diffuser, beet "diffusibility" as well as the marked influence of the campaign period. There was, however, no distinct difference from one year to the next. Diffuser throughput had little effect on A except at very high overloading.

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Great Western's new beet sugar factory. ANON. *Sugar y Azúcar*, 1968, **63,** (11), 46.—See *I.S.J.*, 1969, **71,** 310.

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Beet and cane sugar in Iran. H. J. DELAVIER and H. HIRSCHMÜLLER. *Zeitsch. Zuckerind.*, 1968, **93,** 661–665.—A survey is presented of the Persian sugar industry, which includes 28 beet and 1 cane sugar factory producing a total of 450,000 tons of sugar annually, covering more than two-thirds of the national consumption. Most of the sugar is produced in loaf form.

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Variable-speed drives. B. RADKE. *Zucker*, 1968, **21,** 681–689.—A survey is presented covering variable-speed drives, variable couplings and electric motors. The applications of semi-conductors to D.C. motor speed control are discussed.

Suitable construction of an auxiliary bearing for automatic sugar centrifugals. H. HULLEN. *Zucker*, 1968, **21,** 689–690.—Further information is given on the auxiliary bearing designed by the author and previously discussed[3].

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Evaluation of dryer-coolers for white sugar. D. S. SHEVTSOV, B. F. MILYUTENKO, A. F. ZABORSIN and S. F. ZYAKHOR. *Sakhar. Prom.*, 1968, **42,** (11), 11–19. A number of dryer-coolers are compared, including BMA, Buckau-Wolf, Fives Lille-Cail, UCMAS, Duncan Stewart and Soviet designs. They are evaluated for a number of factors. As regards crystal breakage, the best results were obtained with a Soviet fluidized bed dryer, but its power consumption was far greater than that of the other dryers. The next best results for crystal breakage were obtained with the Fives Lille-Cail vertical multi-stage model. In all cases the crystal lustre was reduced by drying. All the dryers satisfied the requirements for sugar moisture content (0·02–0·04%), but only one Soviet dryer and the Duncan Stewart type met the temperature requirements of 22–25°C. Full details are given of the tests.

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Examination of various raw juice purification schemes. S. L. SHOIKHET, A. K. KARTASHOV, V. A. NAGORNAYA, G. P. PUSTOKHOD and V. Z. SEMENENKO. *Sakhar. Prom.*, 1968, **42,** (11), 22–27.—Comparison of a number of carbonatation schemes showed that none gave optimum values in all factors where the beet was of varying quality, although certain of the schemes are recommended for giving high-quality products and for settling and filtration where low beet quality causes difficulties. Full details are tabulated.

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Industrial tests of a thyristor-controlled electric drive for a diffuser. N. F. SHURBOVANYI, V. G. DRYNOV and V. E. KRUTIKOVA. *Sakhar. Prom.*, 1968, **42,** (11), 28–32.—Three types of electric drive control were compared: generator-motor, magnetic regulator-rectifier-motor, and thyristor converter-motor. In tests on a rotary diffuser and a beet slicer, the last two proved technically and economically better than the first.

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Effect of pH in decolorization of sugar solution with a strongly basic anion exchanger. K. ČÍŽ and M. KRUPKOVÁ. *Listy Cukr.*, 1968, **84,** 252–255.—Tests with a number of anion exchange resins have shown that in the pH range studied (6–10) sugar solution pH did not have any noticeable effect on sorption of colouring matter from the solutions. Results are given in the form of graphs.

[1] TREGUB & POPOV: *I.S.J.*, 1969, **71,** 23.
[2] *ibid*, 1958, **60,** 144.
[3] *ibid*, 1969, **71,** 22.

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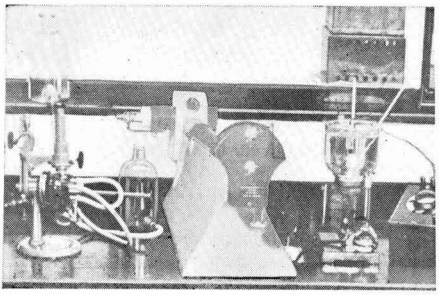

Traces of lead compounds in white sugar. M. GAWRYCH. *Gaz. Cukr.*, 1968, **76,** 184–187.—The lead content in Polish refined and white sugar samples was determined by extracting with dithizone in chloroform, followed by colorimetric analysis, with and without preliminary ashing with conc. nitric and sulphuric acids and hydrogen peroxide. The methods gave the same results, and showed a lead content in the range 0–0·6 p.p.m. compared with a maximum permissible level of 2 p.p.m.

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Chemical analysis of limestone. M. FRIML, J. BUREŠ and B. TICHÁ. *Listy Cukr.*, 1968, **84,** 175–182. Various colorimetric and titrimetric methods were used to analyse limestone, and results are tabulated showing the SiO_2, Al_2O_3, Fe_2O_3, $MgCO_3$, SO_3 and CaO contents in five samples (each being the mean of 10 determinations).

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Determination of the higher fatty acids in molasses by a saponification method. O. I. BELOVA and Z. B. AMYEVA. *Sakhar. Prom.*, 1968, **42,** (9), 28.—Determination of the content of higher fatty acids in beet molasses by saponification after preliminary treatment involving alcoholic KOH and ether, showed that the content depended on the time during the campaign at which the beet was processed, and ranged from 0·853 to 1·539 g/100 g molasses (3·1971–4·7765 g/100 g non-sugars).

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Computer method for calculating percentage apparent purity of sugar beet thin juice. G. A. MILLIKEN and R. J. HECKER. *J. Amer. Soc. Sugar Beet Tech.*, 1968, **14,** 674–681.—The method described involved programming a computer to obtain an equation for the refractometric dry solids from refractometer readings. From the RDS values a second equation was obtained for calculating the factor by which a saccharimeter reading is multiplied to give the apparent purity. The computer was then programmed to use both equations to obtain the factor and multiply the saccharimeter reading by it to give the apparent purity. The equations obtained are presented. An electronic computer with a high-speed memory can compute 40 apparent purities for beet thin juice in 1 sec. The accuracy is at least equal to that of the "purity wheel" (a circular slide rule).

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Beet molasses true purity predicted from thin juice chloride content. J. B. STARK. *J. Amer. Soc. Sugar Beet Tech.*, 1968, **14,** 704–708.—Molasses samples in covered 8-oz jars were heated to about 80°C in a hot water bath to dissolve all the sugar and the contents then stirred thoroughly with a rod, and 15–20 g samples poured into tared beakers for accurate weighing. The samples were then dissolved in hot water and transferred to 500-ml flasks, cooled and made up to volume. Aliquots were removed for solids, chloride, reducing and total sugar determination. Chloride was determined with an Aminco-Cotlove automatic titrator. Details are given of the methods used to determine the other contents. An equation was derived for calculating molasses true purity: purity = 0·75 (%Cl) + 60·34, where Cl is expressed as g/100 g non-sucrose solids. Good agreement was found between predicted and true purities based on the chloride content in thin and thick juice and molasses, although the slightly lower chloride content in thin juice than in molasses give slightly lower predicted purities than the observed values. Thick juice contains about the same quantitative impurities as molasses, so only slight differences were found between these two products.

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Automation of the operations in the treatment of samples at a beet reception centre. P. NOETINGER. *Ind. Alim. Agric.*, 1968, **85,** 963–967.—Details are given of an automatic system for handling and recording beet samples at a tare house. The system was developed by Compagnie Generale d'Automatisme.

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The influence of different organic and inorganic salts on the sucrose crystallization rate determined gravimetrically. S. ZAGRODZKI and J. MARCZYNSKI. *Ind. Alim. Agric.*, 1968, **85,** 995–997.—Details are given of tests in which KCl, NaCl, Na_2CO_3 and K_2CO_3 were all found, separately, to cause a reduction in the sucrose crystallization rate at constant concentrations of the salts. Potassium carbonate had a more marked effect than did the other salts tested. On the other hand, small additions of organic salts caused an increase of about 5% in the crystallization rate.

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Refractometric tests on the determination of the influence of different organic and inorganic compounds on the crystallization rate of sucrose. S. ZAGRODZKI and Z. NIEDZIELSKI. *Ind. Alim. Agric.*, 1968, **85,** 999–1002.—Tests were conducted on sucrose crystallization in the presence of 0·5, 1·0 and 1·5% $CaCl_2$, Na_2CO_3, KCl, starch and dextran, respectively. With $CaCl_2$ and Na_2CO_3, the 1·5% dose of the im-

purity had the greatest effect on the crystallization rate, while 0·5% KCl caused the greatest retardatation and 1·5% KCl the least retardation. The final amounts of sucrose crystallized varied according to the nature of the impurity.

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The quality of crystal sugars in relation to the EEC standards. J. HENRY. *Sucr. Belge*, 1968, **87**, 821–824. Of 17 Belgian white sugars from the 1967/68 campaign examined, all conformed to the EEC standard specifications on pol, moisture content and reducing sugar content. While all conformed to the standard for Category 2 sugar, only 4 were good enough to be included under the top Category 1. To satisfy the requirements for this class, stirring during boiling and filtration of standard liquor are considered necessary.

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A method for determination of the ammonia- and amide-nitrogen in thin juices. F. PERSCHAK. *Zucker*, 1968, **21**, 597–599.—Causes of evaporator tube corrosion on the juice side are discussed and a method for determining ammonia- and amide-N described, in which the nitrogen is liberated as ammonia by conversion with NaOH, driven off by steam distillation, quantitatively collected and determined by volumetric analysis. The difference between the N content found in thin juice and that in thick juice (based on pol) will give a relatively rapid and accurate guide to the corrosive properties of the thin juice during evaporation. The method takes a maximum of 15 min to carry out.

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The use of borax for determining sucrose in non-pure sugar products. E. D. HEMEDES and A. R. OLIVEROS. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 114–116.—Comparison of the borax method with the official Walker method for determination of sucrose in syrup and juice showed that the latter method gave higher values, although the differences (for juice of about 14 pol and syrup of about 51 pol) are considered negligible, so that the borax method is thought to be suitable for routine analysis. The procedures used are described.

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Comparative measurements of colour and clarity of sugar solutions. E. B. PUYAOAN. *Proc. 15th Conv. Philippines Sugar Tech.*, 1967, 117–126.—See *I.S.J.*, 1968, **70**, 378.

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Automated chromatography of sugars on cation exchange resins. P. JONSSON and O. SAMUELSON. *Anal. Chem.*, 1967, **39**, 1156–1158; through *Anal. Abs.*, 1968, **15**, 6711.—The use of a sulphonated styrene-divinylbenzene resin (Li^+, Na^+ or K^+ form) for the automated separation of sugars was studied. The peak-elution volumes of 16 monosaccharides were determined in 92·4% ethanol at 75° and 100°C, and the distribution coefficient were calculated. The results showed that cation exchangers in these forms cannot replace anion exchange resins in all determinations of monosaccharides. The main advantages of the cation exchangers are in the analysis of solutions containing deoxy-sugars and kestoses.

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Transport characteristics of porous cellulose acetate membranes for the reverse osmosis separation of sucrose in aqueous solutions. S. KIMURA and S. SOURIRAJAN. *Ind. Eng. Chem., Proc. Design Dev.*, 1968, **7**, 548–554. Reverse osmosis separation data for the system sucrose-water using a number of Loeb-Sourirajan type porous cellulose acetate membranes are analysed to determine the relationship between the solute transport parameter and sucrose boundary concentration, feed concentration, flow rate and operating pressure. The predictability of membrane performance for sucrose separation by reverse osmosis and the effect of membrane compaction on solute separation are illustrated and discussed.

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Microbiology of sugars. II. Micro-organisms of "black sugar"—taxonomic position. S. JOLY. *Brasil Açuc.*, 1968, **72**, 282–287.—Ten samples of "black sugar" in four stages of deterioration were examined and the yeast and fungus strains present were identified and tabulated. They included 49 fungi belonging to 9 species and 13 yeasts belonging to 4 species. The most common micro-organisms were *Penicillium humili* and *Saccharomyces acidifaciens*.

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Diffusion, viscosity and rate of growth of sucrose crystals. I. N. KAGANOV and V. I. TUZHILIN. *Sakhar. Prom.*, 1968, **42**, (10), 11–12.—While a curve of sucrose crystal growth rate K *vs.* temperature was parallel with one of sucrose molecule diffusion coefficient D^N *vs.* temperature for saturated solutions, its form was vastly different from that of saturated sugar solution viscosity *vs.* temperature, which had a maximum at 70°C after which there was a slight fall in viscosity. A linear relationship between K and D^N was plotted, for which an equation was derived: $K = -1{\cdot}08 + 1{\cdot}10 \times 10^6 D^N$.

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Polarimetric determination of sucrose in the presence of invert sugar by means of borax addition. F. SCHNEIDER, A. EMMERICH and E. LAUDIEN. *Zucker*, 1968, **21**, 627–633.—In tests to determine the effect of borax on the optical rotation of dextrose, levulose and sucrose separately and together in pure solution, it was not possible to confirm the findings of LÓPEZ HERNANDEZ[1] that the rotation of both hexoses is completely eliminated by formation of borate complexes. Moreover, in the presence of borax the total rotation of the sugar mixture was not the sum total of the individual rotations, since levulose reacted more favourably with the borax than did dextrose, and both monosaccharides reacted more favourably than did sucrose. The optical rotation of the invert sugar components (equivalent amounts of

[1] *I.S.J.*, 1963, **65**, 46–48, 72–73, 107–109.

dextrose and levulose) is compensated if the borax and invert sugar concentrations are in a given proportion to each other. Hence, in practice an accurate measurement with pure solutions is only possible if the invert sugar content is known. The method is not considered applicable with technical solutions which require clarification.

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Polysaccharide-forming micro-organisms in sugar manufacture. F. SCHNEIDER, H. P. HOFFMANN-WALBECK and M. A. F. ABDOU. *Zucker*, 1968, **21**, 652–657.—Of numerous cocci obtained at various North German sugar factories from frosted beet, flume and wash waters and beet juices, eleven strains were isolated which produced a stringy mucilage in bouillon containing sucrose. These were studied in detail. Chromatography showed that four produced dextran and laevan from sucrose, while the others produced only dextran; no other differences were found between the two groups. All belonged to the *Leuconostoc mesenteroides* species, the properties of which are discussed with 28 references to the literature.

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Application of the modified anthrone method in the quantitative analysis of sugars by means of paper chromatography. V. JIRÁČEK, A. JINDRA and V. NAVRÁTIL. *Rostlinná Vyroba*, 1967, **13**, 1003–1012; through *S.I.A.*, 1968, **30**, Abs. 68–1164.—The sugars in a mixture were separated by paper chromatography, and determined spectrophotometrically after reaction with anthrone. The heat evolved when conc. H_2SO_4 added to the sugar solution was sufficient for reaction with an ethyl acetate solution of anthrone to take place. The colour reached a maximum in 30 min, and was stable for about a further 30 min. Results obtained with known amounts of sucrose, glucose, fructose, galactose, maltose and raffinose are tabulated. The average error was $\pm$ 3–8%. The use of the method to determine the sugars in some plant tissues is described.

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Cryoconcentration of sucrose solutions. Z. NIEDZIELSKI, S. ZAGRODZKI and A. KULAGOWSKA. *Roczniki Technol. Chem. Zywnosci*, 1967, **14**, 69–81; through *S.I.A.*, 1968, **30**, Abs. 68–1192.—Methods of concentrating sucrose solutions by freezing were studied. Two methods are described, in both of which 15% solutions were concentrated in two stages. In the first, the solution was not stirred; in the second, freezing was carried out in a rotary crystallizer, and the solution was seeded with 0·75 mm ice crystals. The latter method gave well formed crystals which were easily removed by centrifuging. In the first method, the sucrose content of the solution from the second stage was 55%, and the sucrose recovery in this solution was 68·2%. The run-off and the ice crystals contained 24·6% and 2% of the original sucrose, respectively, and unknown losses were 5·2%. The corresponding values for the second method were 60%, 74%, 13·5%, 0·7% and 11·8%. Circulation of the solution and seeding are therefore recommended.

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Relationships between basic characteristics of sugar beet technological quality. L. SCHMIDT. *Listy Cukr.*, 1968, **84**, 218–222.—An inverse linear relationship has been established, by correlation calculations, between beet yield and sugar content, whereby a rise in yield of 2·2 (2·47) tons/ha results in a fall in sugar content of 1%. (The lower yield increment is based on beet reports and the higher value on actual campaign results.) The yield per 1% sugar content varied from 2·0 to 2·4 tons/ha according to variety. An inverse relationship was also found between sugar content and conductimetric ash, again depending on beet variety.

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Refractive index of aqueous solutions of D-glucose. A. SMELÍK, D. IVANČENKO and J. MATEJOVÁ. *Listy Cukr.*, 1968, **84**, 223–230.—The refractive indices of D-glucose were determined for concentrations above 85% in aqueous solution, and quadratic functions were derived for refractive index as a function of concentration up to 98% concentration.

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Determination of the water content in white sugars by means of sodium hydride. M. FRIML and R. ČEJKOVÁ. *Listy Cukr.*, 1968, **84**, 230–235.—The analytical method described is based on measurement of the volume of hydrogen liberated by NaH reaction with water. The method has the advantage over the carbide method of a faster reaction, and since the amount of gas liberated is double that in the conventional method, the new technique is claimed to be substantially more accurate. The differences between the moisture contents as determined by drying and by NaH ranged from —0·027% to +0·070% for moisture contents in the range 0·024–1·048%. The method is suitable as a factory technique.

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Measurement of the colour of solutions and calibration of photocolorimeters. M. KADLECOVÁ and V. VALTER. *Listy Cukr.*, 1968, **84**, 236–240.—Variations were found between the calibration curves for various sugar solutions and juices in the case of an LP photocolorimeter equipped with five different filters. Since the measurements could differ sufficiently widely from the colour perception of the human eye as to cause wide divergences between curves, it is recommended to replace photocolorimeters with spectrophotometers.

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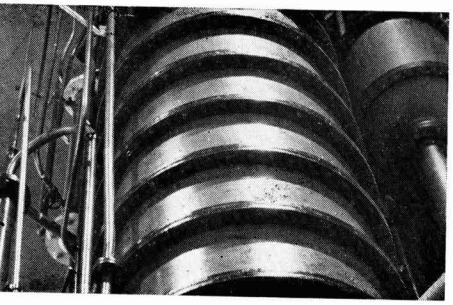
Exhaustibility formula—critical assessment and further work done. S. C. SHARMA and S. S. SHARMA. *Indian Sugar*, 1968, **18**, 307–317.—A number of formulae for evaluating molasses exhaustibility are presented and discussed. Values of expected true purities obtained with six of them for molasses samples from six Indian sugar factories are compared, showing differences between all values for each sample.



By-products

Sugar industry diversification programme in Hawaii. G. Y. EWART. *Paper presented to the 13th Congr. ISSCT*, 1968.—Diversification crops and undertakings in the Hawaiian sugar industry are described.

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Obtaining a mutant of *Saccharomyces cerevisiae* resistant to 15% ethanol. C. V. BARROSO and J. A. ROSEMBERG. *Brasil Açuc.*, 1968, **71**, 162–167.—By a diffusion gradient process it was possible to obtain a mutant of *S. cerevisiae* EQ-39 which was capable of existence in the presence of 15% ethanol and which produced in fermentation 12% of ethanol in cane molasses musts containing 30% of total reducing sugars.

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Fattening trials with male buffalo calves to determine the level of protein and proportion of wheat straw and molasses. S. M. ATHAR, N. A. KHAN, A. Q. QAZI and B. H. SCHNEIDER. *Agric. Pakistan*, 1966, **17**, 41–50; through *S.I.A.*, 1968, **30**, Abs. 68–32.—Six groups of 3 young male buffaloes were fed for 70 days on different rations containing 25-45% of wheat straw, 35 or 40% of undecorticated cottonseed cake and 15–40% of cane molasses in varying proportions. There were no significant differences in the weight gains of different groups, or in the weight of feed consumed/100 lb of weight gained.

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Dried pulp, basic ration for intensive meat production. F. BUYSSE and C. BOUCQUE. *Rev. Agric.*, 1967, **20**, 1029–1044; through *S.I.A.*, 1968, **30**, Abs. 68–46. Young bulls weighing about 140 kg were fed to a weight of about 475 kg on rations containing 60–70% of non-molasses dried beet pulp, or dried pulp containing 10% of molasses or vinasse. Daily weight gains were 1284 g, 1223 g and 1264 g respectively. The weights of concentrates (containing 30% of digestible protein), dried pulp and hay consumed per kg gain in weight were, respectively, 2·00, 3·61 and 0·08 kg for the dried pulp ration, 1·81, 4·12 and 0·07 kg for the molassed pulp ration and 1·76, 3·94 and 0·09 kg for the vinassed pulp ration. Replacement of 10–20% of the dried pulp by an equal weight of a 1:1 mixture of linseed husks and molasses caused no significant change. Yield at slaughter and carcass quality were improved.

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Utilization of biogas in (the) sugar industry. S. C. GUPTA, J. P. SHUKLA and K. A. PRABHU. *Indian Sugar*, 1967, **17**, 675–676.—See GUPTA & SHUKLA: *I.S.J.*, 1969, **71**, 250.

Bulk storage of bagasse. D. R. BERNHARDT. *Sugar J.*, 1968, **30**, (10), 36–37.—An account is given of the development of a bulk storage system for bagasse at Valentine Pulp & Paper Co. Green bagasse is brought by conveyor belts from the sugar factory to the storage site and piled by means of pivoting elevator conveyors to a height of 60 ft, giving a pile containing 30–35,000 tons. Advantages of the system include reduced capital and operating costs, higher recovery yields and improved bagasse quality. The last is evidenced by reduced fibre degradation, greater uniformity, lower chemical demand for pulping, and improved final product quality.

* * *

Chemical pulp from bagasse: present and future. E. RAMOS. *Sugar y Azúcar*, 1968, **63**, (3), 87–90. Prospects for bagasse utilization for pulp manufacture are considered good because of the rapidly increasing demand and increasing difficulties in meeting this with wood pulp. Properties of bagasse chemical pulp are surveyed as are industrial pulping methods and economic aspects of bagasse pulp manufacture.

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Rapid gains in the use of bagasse for pulp and paper. J. E. ATCHISON. *Sugar y Azúcar*, 1968, **63**, (4), 20–21, 23–24.—Present use and future possibilities for bagasse pulp are discussed as are the availability of bagasse and the need for integration of pulp mill and sugar factory operation and ownership. Bagasse purchase, collection, storage and preservation are discussed as are the advantages of depithing and proper preparation before pulping. The introduction of the rapid continuous pressure pulping technique is mentioned and the costs of bagasse as a raw material discussed.

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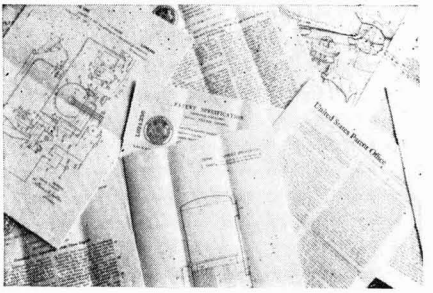
Preliminary tests on the manufacture of semi-chemical pulp from bagasse. J. JANČI. *Sborník Vyskum. Prác Odboru Celulózy Papiera*, 1966, **11**, 107–132; through *S.I.A.*, 1968, **30**, Abs. 68–156.—The neutral sulphite and cold soda processes were compared for producing pulp for corrugated cardboard manufacture. With the neutral sulphite process, optimum yields were 75–80% at theoretical Na_2SO_3 consumptions of 7–11% on bagasse; ring crush test values (force required to crush a cylinder of the cardboard longitudinally) were 2·4–2·7 kg/cm. Strength values were about the same as with pulp from heavy hardwood. With the cold soda process, optimum yields were 85–90% at theoretical NaOH consumptions of 7–9%; ring crush test values were2·0–2·4 kg/cm.

Patents



UNITED STATES

Cane harvester gathering system. J. J. MUNSON, of Houma, La., USA. **3,415,044.** 17th September 1965; 10th December 1968.

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Polysaccharide (having anti-cancer activity) and its preparation. S. SAKAI, J. SUGAYAMA, G. SAITO, T. KAMASUKA, S. TAKADA and T. TAKANO, *assrs.* KAKEN KAGAKU K.K., of Tokyo, Japan. **3,418,311.** 25th January 1966; 24th December 1968.—A stock comprising cane molasses or raw sugar or a hot (60°–100°C) water extract from the leaves and stems of plants of the family *Graminae* is acidified to pH 3–4 with a mineral acid, acetic acid or trichloroacetic acid, and the precipitate discarded. The solution is saturated with ammonium sulphate and the salted-out precipitate collected, dissolved in water and deionized by passing through a column of strongly acidic cation exchange resin (then through a column of decolorizing resin) and a column of strongly basic anion exchange resin, collecting the effluent and isolating the polysaccharide (by precipitation with a water-miscible organic solvent, e.g. ethanol, methanol or acetone). During the treatment a step may be included involving dialysis against water and retaining the non-dialysate. A further step, including treatment with aqueous lead acetate, discharging the precipitate, adding an acid to form an insoluble lead salt and discarding the new precipitate, may also be included. The polysaccharide so obtained hydrolyses to equimolecular amounts of xylose, arabinose and galactose, together with a trace of uronic acid.

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Beet harvester. A. G. BAROWS, E. W. PARRISH and R. C. MINER *assrs.* INTERNATIONAL HARVESTER CO., of Chicago, Ill., USA. **3,419,084.** 22nd October 1965; 31st December 1968.

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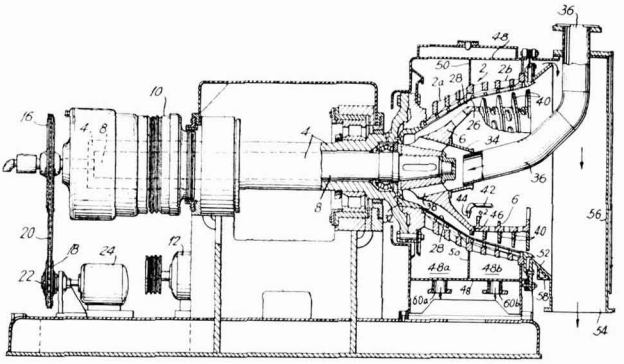
Continuous centrifugal. T. NIWA and S. OISHI, *assrs.* HITACHI SHIPBUILDING AND ENGINEERING CO. LTD., of Osaka, Japan. **3,419,148.** 23rd October 1967; 31st December 1968.

The centrifugal basket 2 is rigidly secured to one end of the hollow shaft 4 while a conveyor screw 6 is rigidly secured to the end of shaft 8 which passes through shaft 4. Both shafts are driven by V-pulley and a differential drive mechanism is built into the mechanism 10 so that the basket and screw rotate at slightly different speeds of rotation, the difference being adjustable even during operation. The basket includes two sections of different angle 2a, 2b fitted



with a wire mesh screen 28 onto which massecuite, supplied through pipe 36 and dispersing cone 34, is distributed by the acceleration pot formed by element 32.

The massecuite passes along the passage formed between the screen 28 and screw 6 forming a thin layer of crystals which moves to the junction plane of the two cones while the molasses passes through the basket and collects in chamber 48a formed by the housing 48 and the baffle 50, from which it is removed through pipe 60a. When the crystals reach the cone section 2b they cannot continue to move by themselves and their passage is assisted by the scroll blade 40. They are treated with wash solution, supplied through pipe 42 within the screw 6, which passes through channels 46 onto the crystal layer. The wash liquor collects in chamber 48b and is discharged through pipe 60b, while the crystals pass over the rim of the cone onto the rubber lined plate 52 and so to chamber 56 which they leave through port 54.

Copies of Specifications of United Kingdom Patents can be obtained on application to The Patent Office, Sale Branch, Block C, Station Square House, St. Mary Cray, Orpington, Kent (price 4s 6d each). United States patent specifications are obtainable from: The Commissioner of Patents, Washington, D.C., 20231 U.S.A. (price 50 cents each).

Chemical control of beet weeds. J. DESMORAS and P. JACQUET, *assrs.* RHONE-POULENC S.A., of Paris, France. **3,419,381.** 16th April 1965; 31st December 1968.—The weeds are controlled by application of a 3-alkoxy (C_1-C_4)-4-nitro-6-alkyl (C_1-C_4)-pyridazine-1-oxide, homogeneously dispersed in a compatible inert diluent.

* * *

Animal feed containing molasses. M. D. APPLEMAN, of Los Angeles, Calif., USA., *assr.* J. J. SCHROEDER. **3,420,672.** 12th February 1965; 7th January 1969. The animal feed comprises (2–60% of) edible fatty material (animal or vegetable fats or oils, acidulated fats or oils or fatty acids), molasses and between 0·001 and 0·6% of partially gelatinized starch or dextrin as an emulsifier. Additionally bentonite, kaolin or gelatinized starch may be added to give a solid emulsified feed.

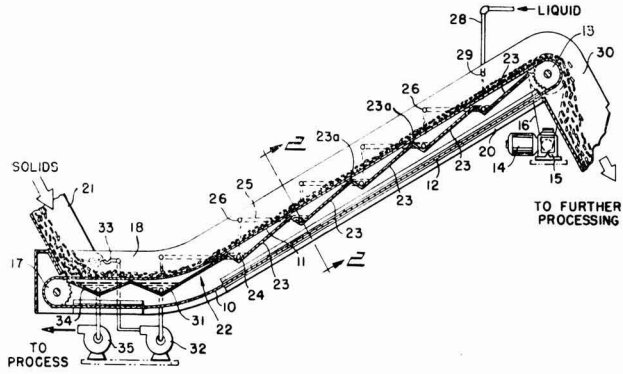
* * *

Polishing composition. A. A. KARRIP, of Hazelwood, Mo., USA. **3,420,681.** 13th January 1966; 7th January 1969.—The polishing composition consists essentially of a homogeneous powdery mixture of (10μ particles of) 75–98% (90%) dextran, dextrin or starch and 2–25% (10%) of an abrasive substance which may be diatomaceous earth, alumina, bentonite, metal hydrated silicate or montmorillonite.

* * *

Inclined cane diffuser. F. C. SCHAFFER, of Baton Rouge, La., USA. **3,420,708.** 27th September 1965; 7th January 1969.

The diffuser comprises a continuous perforated conveyor 10 with an upwardly moving upper portion 11 and a downwardly moving return section 12. The conveyor may be in the form of a wire mesh



screen, overlapping perforated plates, a perforated belt or other means. It runs over a pair of sprocket wheels 13 driven by motor 14 through gearbox 15 and belt 16, while a pair of idler sprockets 17 are located at the lower end. The prepared cane feed is supplied through chute 21 and is carried upwards by the conveyor to be discharged into chute 30 for further processing or use as fuel after dewatering.

Between the walls 18 on both sides of the conveyor are a series of plates 22 which are joined together to form reservoirs 23. Water supplied through pipe 28 and horizontal distributor pipe 29 passes through the cane and collects in the first of these reservoirs. It drains through ports on either side and flows by gravity to the distribution pipe 26 above the second reservoir. In this way it passes from reservoir to reservoir, becoming increasingly rich in the sucrose which it extracts from the cane during its percolation. At the lower end of the conveyor it reaches reservoir 31 and from this it has to be pumped to the distribution pipe 33 over the fresh prepared cane. Juice collecting in reservoir 34 is sent to process by pump 35.

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Sugar liquor decolorization. H. E. BARRETT and B. N. DICKINSON, *assrs.* DIAMOND SHAMROCK CORP. **3,420,709.** 29th April 1965; 7th January 1969.—The liquor is contacted (for 15–60 min at 50–80°C) with a mixture of at least two of the following adsorbents, having particles of less than 120μ in size: active carbon (as the major adsorbent), cross-linked insoluble synthetic adsorbent resins, containing polar groups consisting of amine, quaternary ammonium, sulphonium, sulphonic acid, carboxylic acid, hydroxyl or nitro (as minor adsorbent), and an inorganic adsorbent which may be kaolin, calcium phosphate gel, magnesium silicate, amine-modified clays or processed silica rock. The liquor and adsorbents are agitated until approximately 80% of adsorption equilibrium is reached, when the liquid is filtered.

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Cane planter. S. E. LONGMAN, of Franklin, La., USA. **3,422,973.** 11th October 1966; 21st January 1969.

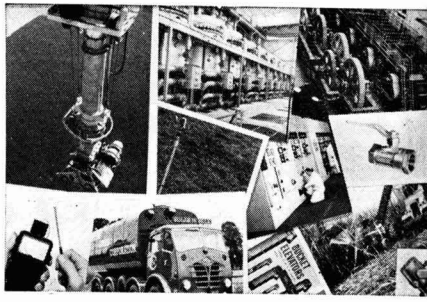
* * *

Beet cleaner. T. T. ITAMI, of Ontario, Ore., USA, *assr.* PARMA WATER LIFTER CO. **3,423,914.** 1st September 1965; 28th January 1969.

* * *

Sugar cane processing. R. B. MILLER, of Edmonton, Alta., Canada. (A) **3,424,611.** 22nd July 1964; 28th January 1969; (B) **3,424,612.** 1st July 1965; 28th January 1969.—The first of these patents covers the processing of cane stalks individually so that they are washed, cuticle wax removed and recovered, the epidermis removed and collected, the stalk split longitudinally and the two halves separated and rotated and flattened, so exposing the pith. The latter is carefully separated from the rind and pressed to yield the cane juice, while rind is wetted and squeezed to recover the remaining juice. The second patent covers the equipment for use in this treatment of the cane stalks.

Trade notices



Statements published under this heading are based on information supplied by the firm or individual concerned. Literature can generally be obtained on request from the address given.

Road tanker pumps. The Albany Engineering Co. Ltd. Lydney, Glos., England.

Albany have developed a new bulk loading pump for handling the wide range of liquids of varying viscosities transported in bulk tankers. Known as the S.B.L., the pump is extremely compact and light, of simple design with internal bearings, and can be easily stripped for cleaning and maintenance. It is available in a number of materials and is suitable for drive from a p.t.o. shaft. S.B.L. pumps are in use for molasses and liquid sugar pumping. All pumps for edible sugars can be fitted with timing gears, which prevent the rotors touching and contaminating the sugar with metal particles. Most Albany gear pumps can be supplied with steam- or hot water-jackets. Albany Engineering have been manufacturing pumps for cold molasses for more than 60 years and so have wide experience in this field. A loose-leaf folder available from the company includes details of a wide range of pumps, including gear, centrifugal and rotary gear pumps for a number of applications.

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PUBLICATIONS RECEIVED

SAUNDERS VALVES IN THE SUGAR INDUSTRY. Saunders Valve Co. Ltd., Cwmbran, Mon., England.

A well-produced booklet illustrates the various uses that Saunders valves are being put to in the sugar industry. Saunders diaphragm valves are shown in a number of applications in beet sugar factories in the UK, France and Sweden, in a Cuban cane sugar factory, as components of a filter constructed by A. & W. Smith & Co. Ltd. and in a Tate & Lyle liquid sugar plant as well as a glucose refinery. The properties of Saunders diaphragm valves are described, for both large and small pipeline diameters, and details are also given of Saunders butterfly and "Sabal" ball plug valves. "Safran" centrifugal and diaphragm pumps are also featured. The SCE centrifugal pump has the pump and motor mounted on a single shaft and is highly reliable under arduous and continuous running conditions in sizes ranging from ¾/1½ in to 5/6 in. A hand-operated diaphragm pump handles all types of liquids and transfers them at up to 5 g.p.m. Both pumps are reliable and require the minimum of maintenance.

* * *

"NEUMOLEV" CONTENTS GAUGES. K.D.G. Instruments Ltd., Manor Royal, Crawley, Sussex, England.

"Neumolev" contents gauges are described in a recently published pamphlet. These work on the principle of maintaining air pressure at a point of balance when fluid in a tube immersed in a fluid is expelled, provided the air pressure exceeds hydrostatic pressure exerted by the fluid and a suitable pressure and flow regulator is introduced in the air supply line. The DP.30 series of 1:1 force balance transmitters have been developed for situations, such as in the food industry, where a standpipe is undesirable because of hygiene requirements. They are highly accurate and can be mounted flush in the side or base of the tank.

* * *

Malaysian sugar factory order.—Fletcher and Stewart Ltd. have won an order worth £1·4 million for the supply of a complete sugar factory to Malaysia. The factory will have an annual production capacity of 50,000 tons of sugar and is to be the first of a number of sugar factories to be built in Malaysia to enable the country to become almost self-supporting in sugar.

* * *

Argentina tractor company acquisition.—Massey-Ferguson Ltd., of Toronto, Canada, has acquired a controlling interest in Rheinstahl Hanomag Cura S.A., of Rosario, Argentina. Massey-Ferguson will continue to produce 4 basic Hanomag tractor models and has been granted licence rights for the manufacture of additional Hanomag models in Argentina. Massey-Ferguson also intends gradually to introduce its own new line of tractors in Argentina. The firm already has manufacturing plants in Brazil and Mexico and has a major position in the farm machinery and diesel engine markets of every Latin American country.

* * *

DDS cane diffusers.—Five DDS cane diffusers are now in operation: two in India (Belapur and Phaltan factories), and one each in Tanzania (Arusha Chini), Réunion (Stella Matutina) and Brazil (Usina São Francisco). In addition, orders have been placed for a further 7 DDS diffusers: two for the Philippines at Carebi and Cavite sugar factories (that at Cavite is being built under licence by Kawasaki Dockyard Co. Ltd., of Tokyo, Japan), two for Brazil (Usina Outeiro and Usina São José), and one each for Kenya (Ramisi) India (Kopargaon) and Colombia (Pichichi).

* * *

Pipework for the Philippines.—Fosters Power Piping Ltd., a subsidiary of Foster Brothers Ltd., of Wednesbury, Staffs., England, is supplying 400 tons of fabricated mild steel pipework and supports for a new sugar factory being erected by Tate & Lyle Enterprises in the Philippines. Part of the order is already on its way and later the firm will be sending out an engineer to supervise the installation of the pipework.

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Cane diffuser orders.—Extraction De Smet S.A., the Belgian diffuser manufacturers, announce the sale of three cane diffusers, bringing the total sold by them to 20. Two of the diffusers have been sold to Fletcher and Stewart Ltd. for installation in the new sugar factories to be erected in the Philippines[1] and in Malaysia (see above). The diffuser for the Davao Sugar Central Co. in the Philippines will process 1st mill bagasse from 4000 tons of cane per day, while that for Gula Perak Berhad will process 2000 tons of cane per day after knifing and shredding. The third diffuser has been sold to the Charsadda Sugar Co., of Peshawar, Pakistan, and is designed to process 2800 tons of cane per day or 1500 tons of beet.

* * *

Centrifugal order from Mexico.—Eleven automatic centrifugals have recently been despatched to Obreros del Mante cane raw sugar factory in Mexico by Thomas Broadbent & Sons Ltd., of Huddersfield, Yorks., England. The machines will be installed and operational in time for the next season.

[1] *I.S.J.*, 1969, **71**, 286.

US sugar supply quota 1969

	Previous quotas	*Shortfalls/ prorations*	*Revised quotas*
	—— (*short tons, raw value*) ——		
Domestic beet	3,215,667	—	3,215,667
Mainland cane	1,169,333	—	1,169,333
Hawaii	1,190,673	—	1,190,673
Puerto Rico	340,000	15,000	355,000
Philippines	1,126,020	—	1,126,020
Argentina	75,157	3,652	78,809
Australia	192,937	—	192,937
Bahamas	10,000	—	10,000
Bolivia	7,272	353	7,625
Brazil	610,949	29,689	640,638
British Honduras	15,800	768	16,568
British West Indies	216,914	10,541	227,455
Colombia	64,650	3,142	67,792
Costa Rica	71,925	3,495	75,420
Dominican Republic	660,949	32,119	693,068
Ecuador	88,896	4,320	93,216
Fiji	42,339	—	42,339
French West Indies	68,234	3,316	71,550
Guatemala	60,611	2,946	63,557
Haiti	33,316	—	33,316
Honduras	7,272	353	7,625
India	77,175	—	77,175
Ireland	5,351	—	5,351
Malagasy	9,111	—	9,111
Mauritius	17,686	—	17,686
Mexico	624,687	30,357	655,044
Nicaragua	71,925	—	71,925
Panama	45,257	−817	44,440
Peru	442,886	−142,886	300,000
Salvador	44,449	2,160	46,609
South Africa	56,808	—	56,808
Swaziland	6,967	—	6,967
Taiwan	80,390	—	80,390
Thailand	17,686	—	17,686
Venezuela	30,708	1,492	32,200
	10,800,000	—	10,800,000

Süddeutsche Zucker AG. rationalization[1].—Süddeutsche Zucker AG., the largest sugar company in West Germany, plans to rationalize its operations in the Bad Württemberg area. A total of 150 million Deutschmarks is to be invested by the 1971/72 campaign, and a new 5000 tons/day factory is to be built to replace the existing 3000 tons/day plant at Waghäusel. The Offenau factory near Heilbronn is to be increased to a capacity of 6000 tons of beet per day. The company envisages the construction of large modern production units and will close the sugar factories at Stuttgart, Heilbronn and Züttlingen. By 1975, Süddeutsche Zucker AG. will produce 476,000 tons of sugar, 35% of West German production.

* * *

Uganda sugar situation[2].—Output of sugar in Uganda amounted to 150,007 tons in 1968, exceeding the previous year's level by nearly 11%. The crop did not expand in value by the same proportion, however, the total value at £U 5,600,000 being only 4·5% higher than the year earlier. The rising trend in production will bring about a significant change in the export pattern for sugar; with Kenya and Tanzania seeking self-sufficiency in this commodity, the rising surplus will have to be sold outside East Africa. Uganda was allocated a basic quota of 39,000 tons under the new International Sugar Agreement, however, in addition to an extra quota of 10,000 tons for export within East Africa. In addition to this, Uganda has access to the UK market covered by the Commonwealth Sugar Agreement.

Brevities

Peruvian sugar estate expropriations[3].—The Peruvian Government announced at the end of June that the eight most important sugar plantations in the country were to be completely expropriated within two months. The Agriculture Minister, General JORGE BARANDIARAN, also said that by 1970 the whole country would come under the new agrarian reform law announced by President JUAN VELASCO ALVARADO. The reform law plans to hand over large tracts of private and foreign-owned land to Indian peasants to be farmed as cooperatives under central government guidance. Later it was stated that the administrations of the sugar companies concerned had already been taken over by 40 State Comptrollers. The plantations, which are in the Departments of Lambayeque and La Libertad, are Pomalca, Tumán, Pucalá, Cayaltí, Casa Grande, Laredo, Cartavio and Paramonga. They will be turned into cooperatives during the next four to six years.

* * *

UK sugar surcharge.—In view of the fall in the world price of raw sugar on the London Market, the UK Sugar Board surcharge was increased to 2¾d per lb (25s 8d per cwt) from the 26th August and to 3d per lb (28s 0d per cwt) from the 29th August. To remind readers, the surcharge is a levy made under the Sugar Act, 1956, to cover any losses incurred by the Sugar Board arising from (a) the purchase of Commonwealth sugar at fixed prices and its sale by the Board at world prices in accordance with the Act and (b) the financing of the British Sugar Corporation in the purchase of sugar beet at guaranteed prices. As the world price falls, the Sugar Board receives less for the sugar it sells and the surcharge has to be raised correspondingly to compensate for this; conversely, as the world price rises the surcharge can be reduced. The net result is a substantially steady price for sugar.

* * *

Verenigde HVA-Maatschappijen N.V. 1968 report.—In Ethiopia, the unfavourable climatic conditions resulted in an anticipated fall in 1967/68 production at the Wonji and Shoa sugar factories where 67,753 metric tons of sugar were produced as against 76,869 tons in 1966/67. Progress was made in establishing the Metahara estate, with completion of the irrigation system and planting of some 1600 hectares of cane. The factory building was finished and installation of machinery is under way for operation of the factory in the 1969/70 million season. In Tanzania, abnormal weather caused heavy flowering and early ripening of the cane so that production of sugar was lower than anticipated at Kilombero sugar estate, amounting to 27,976 tons as against 30,750 tons in 1967. Investigations are under way on the soil, methods of irrigation and cultivation of new varieties to raise production. The company's lactic acid plants in Holland and Brazil and the chemical factory of N.V. Centrale Suiker Mij. were merged to form a new company N.V. Chemie Combinatie Amsterdam C.C.A. which will rationalize production facilities and permit cooperation in the field of sucro-chemistry.

* * *

Tongaat Sugar Co. Ltd. 1968/69 report.—The record season enjoyed by the sugar industry of South Africa in 1967/68 was followed, unfortunately, by two periods of severe drought which seriously depressed cane and sugar production in 1968/69. The quality of the cane as a result of the adverse weather conditions was unsatisfactory and yielded not only poor sucrose but very low purity juices. The effect on milling results was that efficiencies obtained by the factory could be equated to some of the lowest in the past thirty years. Cane crushed amounted to 1,423,235 tons as against 1,946,041 tons in 1967/68, and sugar produced was 152,184 tons, compared with 204,181 tons.

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[1] *Sucr. Belge*, 1969, **88**, 347.
[2] *Uganda Ann. Econ. Rev.* (Standard Bank Group), July 1969, 6.
[3] *Public Ledger*, 1st July 1969.

Brevities

Colonial Sugar Refining Co. Ltd., 1969 report.—The Company's mills in Australia made 563,000 tons of raw sugar in the 1968 season. This was a record production, 42,000 tons more than the previous record in the 1966 season. In Fiji the mills made 394,000 tons, also a record and 83,000 tons more than the previous best in 1965. Refined sugar sales in Australia were 621,000 tons, an increase of 3·5% above the previous year, while The New Zealand Sugar Co. Ltd. sold 140,000 tons of sugar, 1·4% less than in 1967. In efforts to minimize the delay between cutting and milling cane, in order to avoid the deterioration which results in the cane, trials were made of night-time operation of the harvesters; this proved safe for the men and machines and the required rate of work was maintained. Mechanical harvesters are also being developed for use in New South Wales where the cane is heavier than in Queensland and is often sprawled, tangled and trash-bound. Although there was an unpromising start to the Fiji crop early in 1968 growing conditions improved to produce the record crop and the season finished later than usual. In fact, it was only the heavy expenditure on factory expansion and modernization that permitted all the available cane to be accepted.

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International Sugar Organization.—A list has been published recently of Members of the International Sugar Organization established under the International Sugar Agreement, 1968, which entered definitively into force on the 17th June. Exporting members totalled 33, including Antigua, Argentina, Australia, Barbados, Bolivia, Brazil, British Honduras, China (Taiwan), Colombia, Cuba, Czechoslovakia, Denmark, Dominican Republic, Fiji, Guatemala, Guyana, Honduras, Hungary, India, Indonesia, Jamaica, Malagasy Republic, Mauritius, Mexico, Nicaragua, Peru, Philippines, Poland, South Africa, St. Kitts-Nevis-Anguilla, Swaziland, Trinidad and Tobago, and Uganda. The 11 importing members include Canada, Finland, Ghana, Japan, Kenya, Malawi, New Zealand, Portugal, Sweden, the UK and USSR.

* * *

Sugar and heart disease.—A special report issued by the International Sugar Research Foundation Inc. refers to work recently reported in the *British Medical Journal*[1]. Allegations of a causal relationship between the intake of sugar and onset of heart disease[2] are soundly refuted by the results of a research project conducted by Drs. R. W. HOWELL and D. G. WILSON which showed *no* real difference in the sugar intake between a group of 1158 men believed to be free of ischemic heart disease and 170 men with confirmed or possible heart disease. The results also showed that there is no significant correlation between sugar intake and serum cholesterol, white blood cell count, haemoglobin, E.S.R., B-lipoprotein or uric acid. Furthermore, no correlation whatsoever was found between total sugar intake and weight gain after the age of 25 years. Reprints of the paper are available on request from the Foundation, at 7316 Wisconsin Ave., Bethesda, Md., 20014 USA.

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Sierra Leone sugar imports[3].—In 1968, imports of sugar into Sierra Leone amounted to 25,370 long tons, tel quel, as compared with 22,925 tons in 1957. The supplies included 1475 tons from Belgium, 1445 tons from China, 2430 tons from Czechoslovakia, 1591 tons from France, 1890 tons from Poland, 4460 tons from the UK, 8123 tons from the USSR, 1674 tons from West Germany and 2282 tons from other countries.

* * *

Finland-USSR sugar trade agreement[4].—A contract has been signed between Suomen Sokeri Oy. of Helsinki and the Soviet export organization Prodintorg of Moscow, under which the latter will supply 149,000 metric tons of raw sugar per year for the period 1971–1975 inclusive.

Switzerland sugar imports[5]

	1968	1967	1966
	(*metric tons, tel quel*)		
Belgium/Luxembourg ..	18,037	13,024	198
Brazil	641	—	—
Cuba	16,084	59,934	35,439
Czechoslovakia	32,357	33,134	40,808
Denmark	38,943	14,686	990
Finland	464	11,487	—
France	71,891	30,693	77,963
Germany, West	18,611	4,788	26
Hungary	1,875	6,350	5,960
Italy	12,241	—	—
Peru	1,346	1,645	796
Poland	—	1,026	—
UK	47,944	58,309	58,113
Other Countries	65	18	40
	260,499	235,094	220,333

* * *

Brazil sugar exports[6]

	1968	1967
	(*metric tons, tel quel*)	
Chile	132,819	80,615
Finland	—	10,723
France	54,570	43,220
Iraq	22,651	10,564
Japan	—	13,049
Lebanon	—	10,441
Malaysia	—	21,428
Morocco	107,849	52,214
Netherlands	1,502	—
Syria	8,536	—
Tunisia	57,329	51,113
UK	12,292	18,445
USA	620,286	590,773
Uruguay	46,619	47,236
Vietnam, South	—	29,761
Zambia	20,041	21,165
	1,084,494	1,000,747

Brevities

Hawaii bagasse board plants[7].—Two companies have announced plans to build installations for manufacturing building materials from Hawaiian bagasse. Durite Corp. is to locate a $4 million plant on the Hamakua coast of the island of Hawaii which will have a capacity of 15,000,000 sq. ft. of bagasse fibre building board per year. Hawaiian Board Products Corp. is building a panel board plant on the island of Oahu and is negotiating with Castle & Cooke for bagasse. Proposed products range from low-density insulation-type board to medium-density particle boards and high-density products such as hardboard.

* * *

Sudan sugar imports[8].—Total sugar imports of 180,000 metric tons, refined value, included 20,000 tons from Poland and 160,000 tons from the USSR. In 1967 imports were only 70,758 tons and included 39,805 tons from Mainland China, 20,833 tons from Poland and 10,120 tons from Egypt.

[1] 1969, 145–148.
[2] *I.S.J.*, 1964, **66,** 277.
[3] C. Czarnikow Ltd., *Sugar Review*, 1969, (930), 136.
[4] F. O. Licht, *International Sugar Rpt.*, 1969, **101,** (21), 6.
[5] C. Czarnikow Ltd., *Sugar Review*, 1969, (906), 34.
[6] *ibid.* 1969, (914), 68.
[7] *Sugar y Azúcar*, 1969, **64,** (7), 53.
[8] *Lamborn*, 1969, **47,** 115.

Let's talk

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Centrifugals – Fully and semi-automatic and associated equipment are now being manufactured by Manloves and will incorporate the latest Watson Laidlaw designs with our technical expertise and engineering skill.

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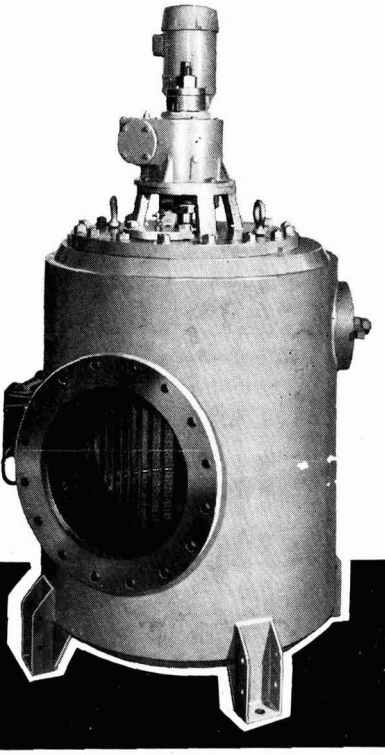
BRACKETT/ZURN 'STRAIN-O-MATIC'



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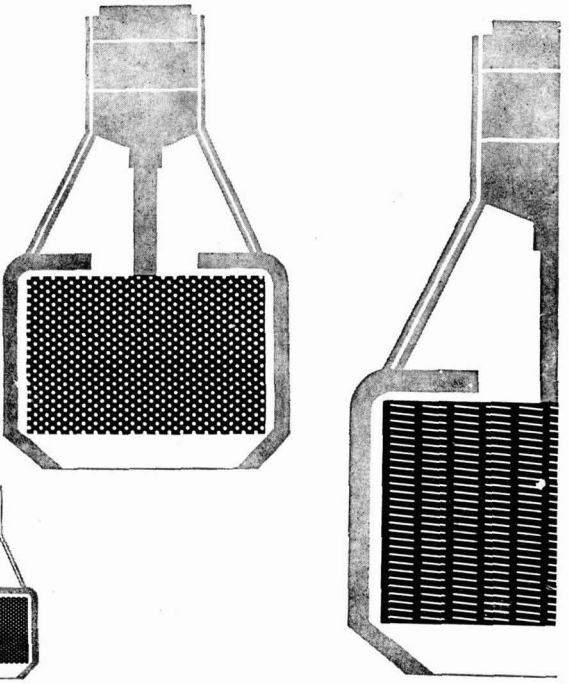

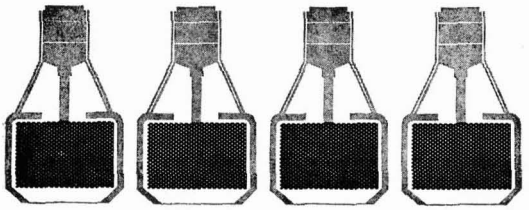

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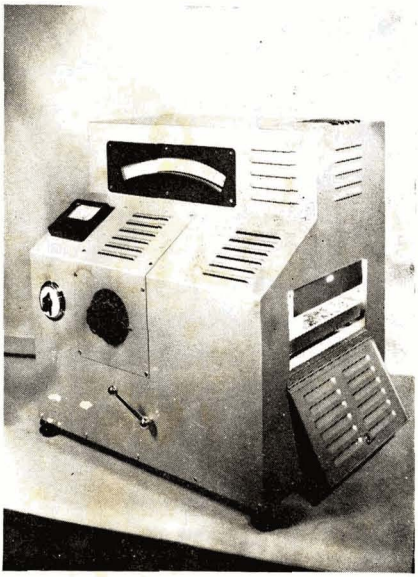
DRYING EQUIPMENT



MOISTURE BALANCE—TYPE D

The moisture balance type D illustrated is essentially the same as the type CB excepting that it can take samples from 100 to 1000 grm depending on the density of the product. In the case of bagasse the weight of sample possible is 100 grm contained in a dish 250 mm long × 200 mm wide × 22 mm deep.

The scale range is graduated 0/100% moisture and the maximum temperature of determination is 200°C controllable by a resistance knob.

The accuracy of the scale for 100 grm is ±0.5% or 0.05% on 1000 grm samples of material. The power required for operation is 1 kW. A timer 0/60 minutes is fitted as standard.

Additional extras which can be fitted if required are:

1. Pyrometer. 2. Voltage stabiliser.

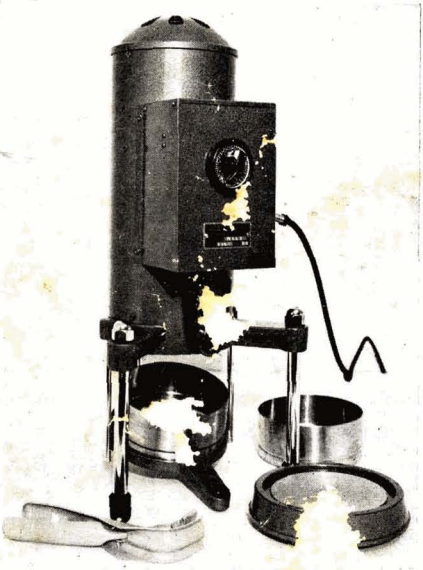
Please state single phase voltage and frequency when ordering.

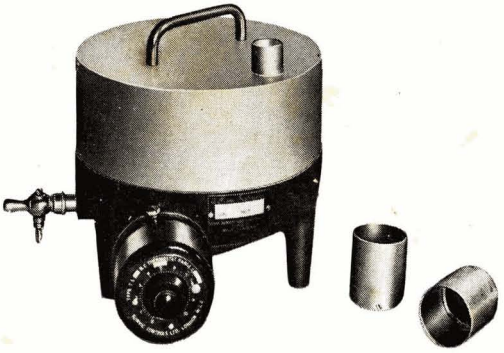
MOISTURE TELLER

Work carried out in South Africa using this type of dryer gave excellent results in drying bagasse. Experiments revealed that 100 g of bagasse could be dried in 20 minutes at a temperature of 266°F, which agreed very closely with laboratory oven determinations at 225°F for 20 hours. Such rapidity of determination is a great benefit to the engineer.

The equipment consists essentially of a fan which draws in air, passes it over heating elements and then through the bagasse. A time switch and thermostat are provided so that any temperature between 90° and 150°C can be maintained with a time of operation between 0 and 60 minutes.

Please state single phase voltage and frequency when ordering.





LABORATORY SUGAR DRYER

For the rapid estimation of moisture in sugars, a comparatively large volume of heated air should be passed over and through the sample. Care should be taken in these estimations, however, as it is essential to know the conditions of temperature and time of drying during which period no decomposition takes place. Once these conditions have been established for a particular type of sugar estimations become routine thereafter and results can be obtained in about 10 to 15 min.

This oven is fitted with a thermostat type TS.2, which gives temperature control of ±0.25°C over a range of ±60° from a central adjusted temperature.

Four sample containers are provided to fit into recesses in the body of the oven, and two additional containers are provided as spares.

This type of oven must be used in conjunction with a vacuum pump or the factory vacuum line, if available, for drawing the air over the heating element, through the sample and into the vacuum line or pump trap. A time device can also be supplied as an extra with a re-set push-button so that, simply by pushing the button for making contact, a whole series of rapid determinations can be made under the predetermined conditions of time, temperature and air volume, the whole process being automatic once the cycle is set in operation.

The Sugar Manufacturers' Supply Co. Ltd.

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Telephone: HOP 5422 *Cables:* "Sumasuco, London S.E.1"

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