THE International Sugar Journal

SEPTEMBER 1972

at all stages of sugar manufacture

- 150 years of experience in the construction of sugar machinery
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90 years of precision chain manufacture ensure a product combining high strength with compactness, minimum weight and low cost for long life and trouble free operation.

Precision power transmission chains and wheels are also available for all applications.

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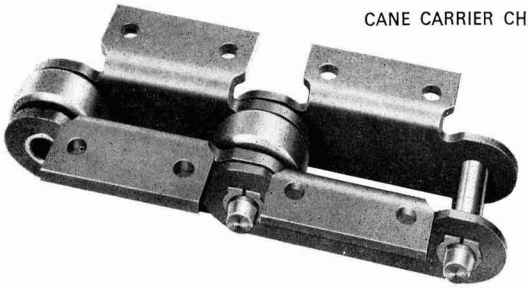
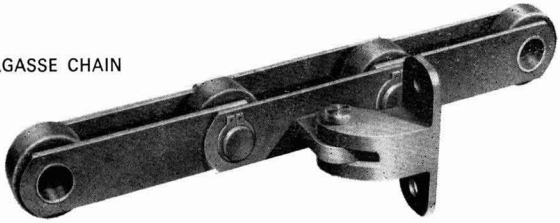
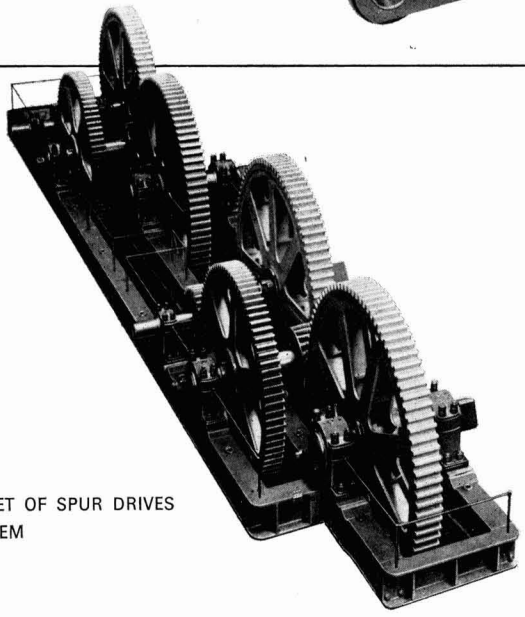


BAGASSE CHAIN





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Spur gears up to 127mm circular pitch, 760mm face and 4700mm diameter can be supplied for heavy tandem drives. Other gear products include worm, spur, helical and bevel gear boxes and individual gears.

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MANCHESTER ENGLAND

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have the basic strength to go on and on and on. The type of strength we're talking about isn't just brute strength. It's strength that comes from a balance of: good design, the best materials and expert craftmanship. You get a healthy return on your centrifugal dollar from features like: reinforced basket rings, square shaft discharger, stellite faced charging gates, water cooled brake drums . . . and, there are many more. Many successful sugar processors profit from this kind of strength. Shouldn't you? Write, now, to Mr. A. H. Stuhlreyer, Director of Sales.

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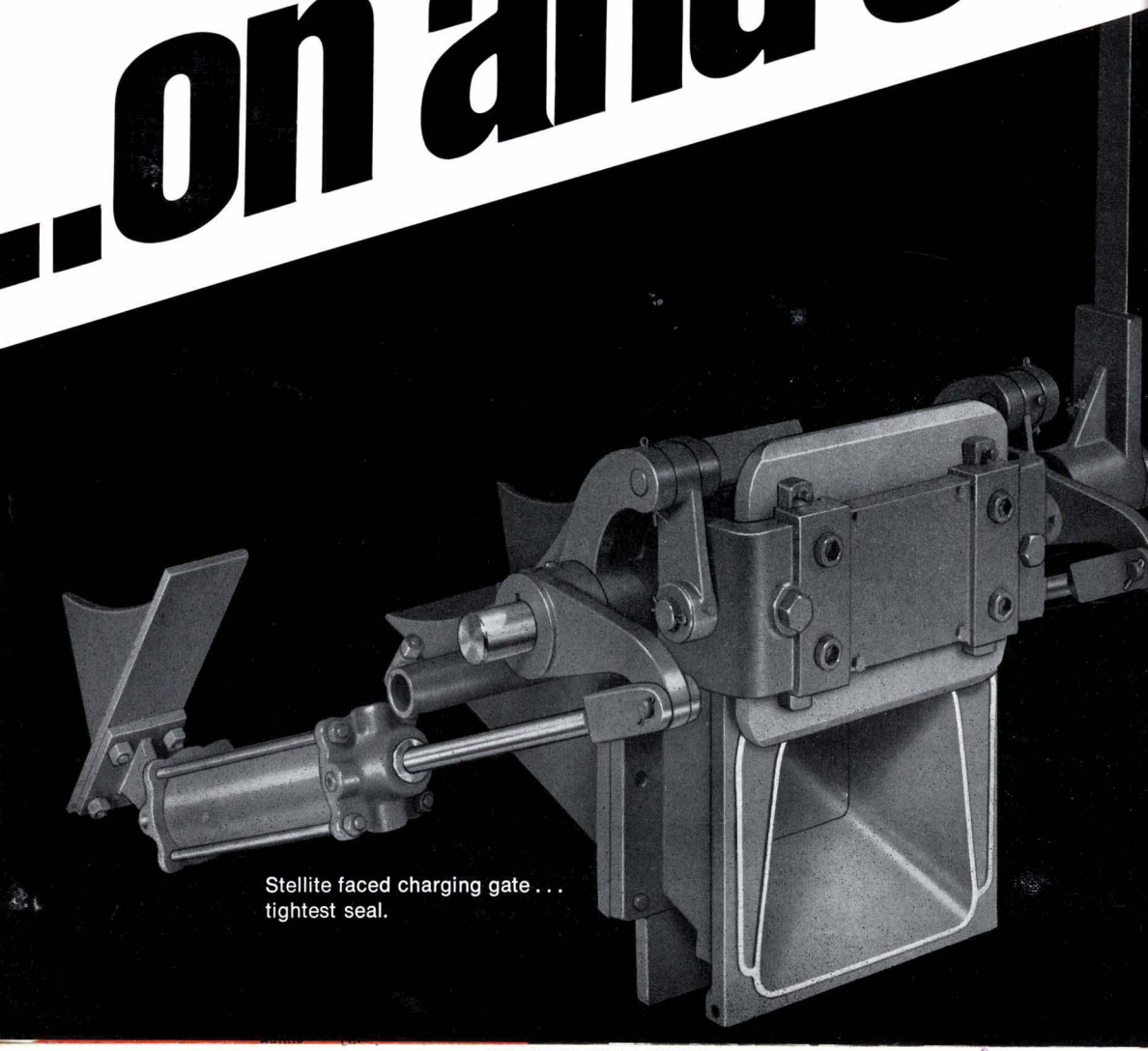
Hamilton, Ohio 45012 U.S.A.

. . on and on.



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Three bearing head . . .
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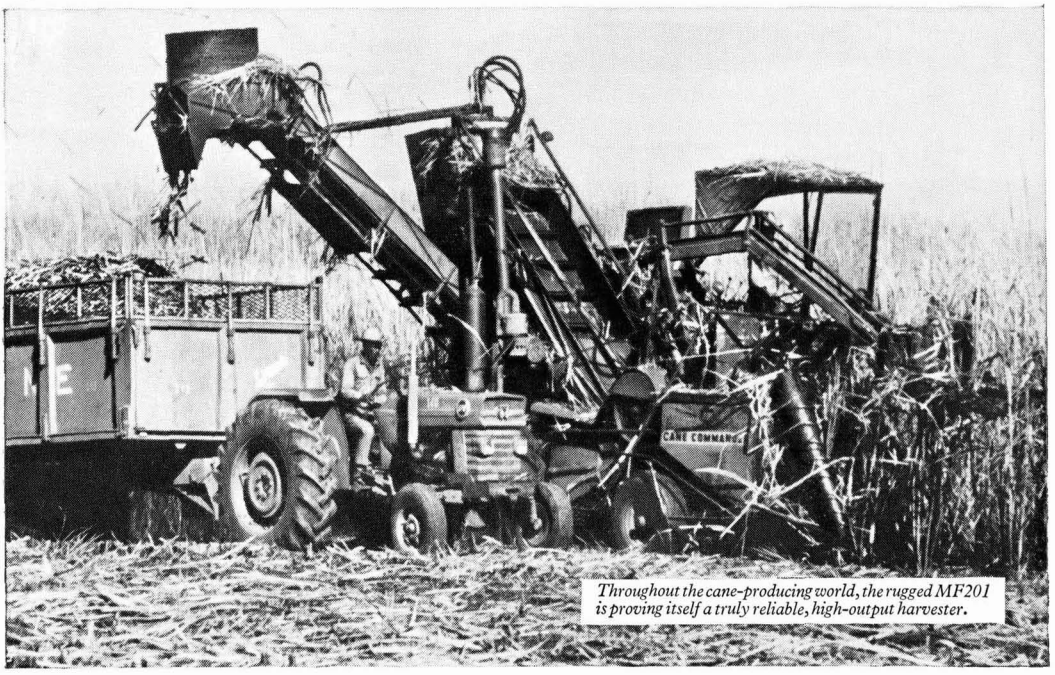


Throughout the cane-producing world, the rugged MF201 is proving itself a truly reliable, high-output harvester.

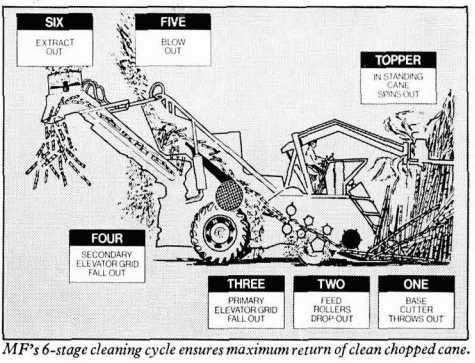
MF 201: the ton-a-minute, dollar-a-ton cane harvester

The facts and figures behind the MF 201 Cane Commander are as impressive as the machine itself. Introduced in 1969, the MF 201 has established a harvesting record unequalled by any other machine.

Over three hundred of the Australian-built MF 201 have been marketed by Massey-Ferguson throughout the world. Performances have been outstanding – 2½ million tons of sugar cane had been harvested by MF 201's by the end of 1970, with outputs of up to 450 tons/day being recorded regularly in some areas. The MF 201 handles any kind of crop, from 9 to 90 tons an acre, with costs as low as U.S. $0.60 per ton.

The MF sugar cane system. The MF 201 is the heart of a comprehensive sugar cane harvesting system, which takes you from tillage to transport. This is made possible by Massey-Ferguson's position as the world's biggest manufacturer of tractors, combines, diggers and loaders, and diesel engines, besides being the world's largest producer and exporter of cane harvesters.

MF coverage in the cane countries
Angola, Antigua, Argentina*, Australia*, Bahamas, Barbados, Bolivia, Brazil*, British Honduras, Burma, Cambodia, Cameroon, Ceylon, Colombia, Republic of Congo, Congolese Republic, Costa Rica, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, French Guiana, Ghana, Grenada, Guadeloupe, Guatemala, Guyana, Guinea, Haiti, Hawaii, Honduras, India*, Indonesia, Ivory Coast, Jamaica, Japan, Kenya, Lebanon, Malagasy, Malawi, Malaysia, Martinique, Mauritius, Mexico*, Mozambique, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Puerto-Rico, Reunion, Rhodesia, Ryukyu Islands, Sierra Leone, Somalia, Spain, St. Lucia, St. Vincent, St. Kitts & Nevis, Sudan, Surinan, Taiwan, Tanzania, Thailand, Trinidad & Tobago, Uganda, Union of S. Africa*, Uruguay, U.S.A.*, Venezuela, Vietnam, Virgin Is., Zambia.
* *MF Operation Units or Associate Companies.*



MF's 6-stage cleaning cycle ensures maximum return of clean chopped cane.

If you would like further information about the MF 201 and MF crop mechanisation, please return this coupon.
To: Special Crop Systems Manager, Massey-Ferguson (Export) Ltd, Coventry, CV4 9GF, England.

Please send me the following:
MF 201 Cane Commander leaflet*
Booklet on Sugar Cane Crop Mechanisation*
MF newspaper "Cane News"*
Tell me how I can see a MF 201 in action*
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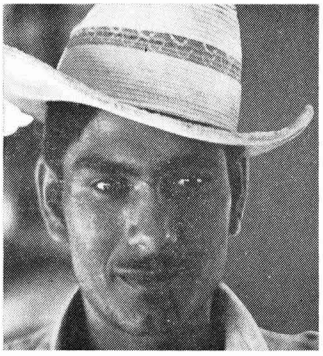
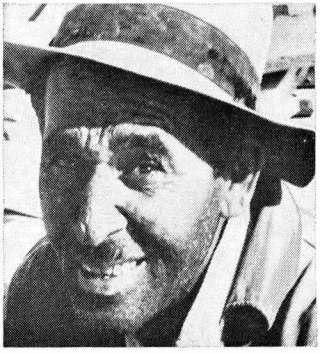
Tot ziens...

Building factories all over the world, we have made friends with Bill, Jan, Houshang, Untung, Chandra and Chucho.
And also with you, Mister Smith, Herr Schmidt, Señor Herrero and Mijnheer Smit. We have learned a lot from you and you will have learned something from us.
We have commissioned factories together to mutual satisfaction, and thinking back to these times of hard work we say au revoir, auf Wiedersehen, hasta luego or, in Dutch, 'tot ziens!'

sugar industry engineers

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They design "Financial Packages" to suit the individual needs of their customers ranging from the comparatively simple provision of extended credit for the purchase of equipment, to comprehensive arrangements which include assistance in the financing of down payments as well as local civil and erection work for complete factory projects.

The fact that they have been entrusted with the building of five sugar factories within the last four years and have now secured a sixth speaks for itself.

When you think of sugar machinery—think of FS.

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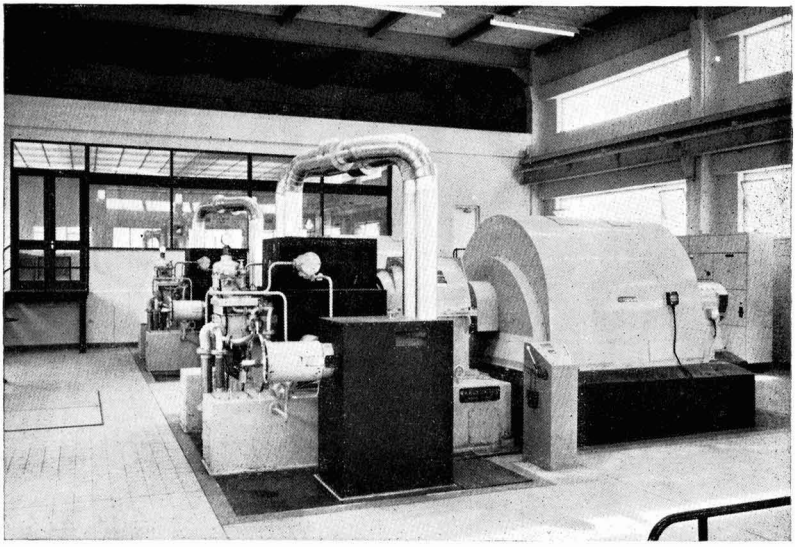
Single-stage turbine powers 10 to 4000 hp and exhaust pressures from 24 in Hg to 300 lb/in²



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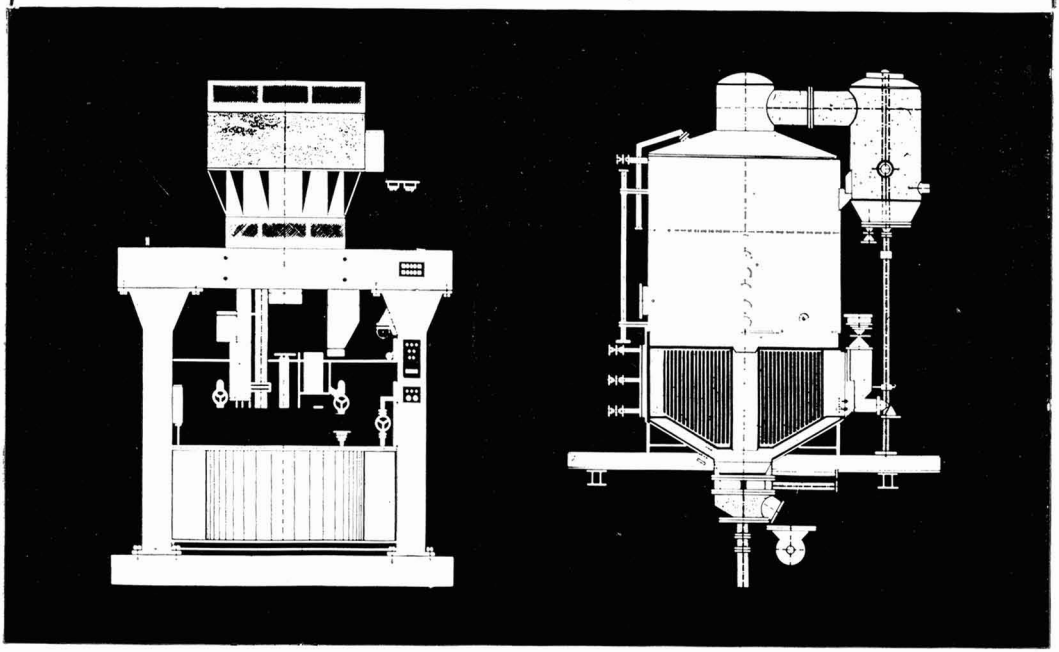

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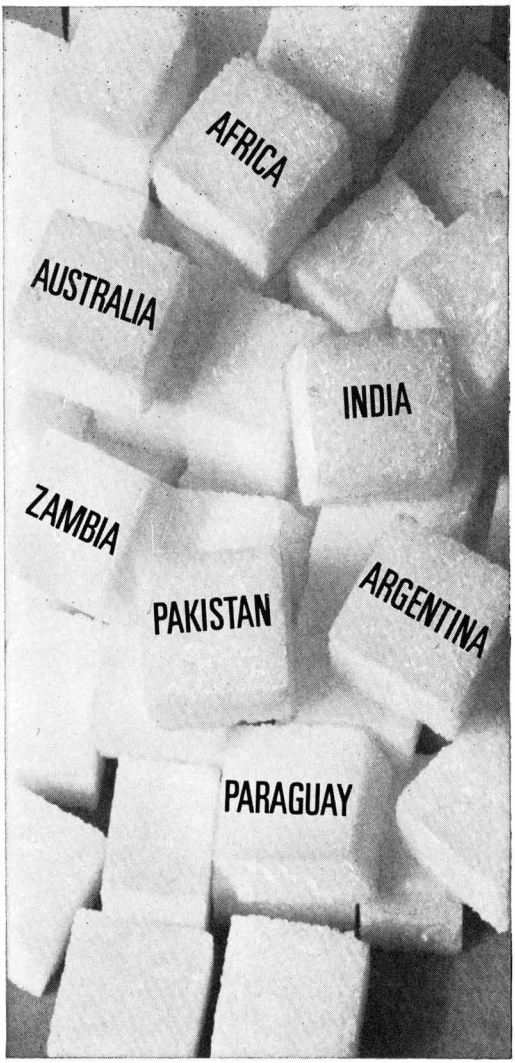
Sweet success for Brotherhood steam turbines

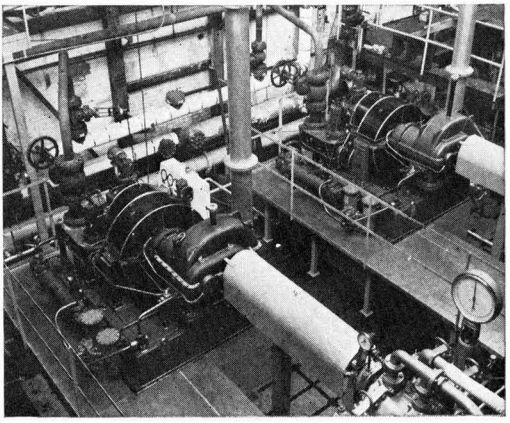


When the big names in sugar mill plant specify Brotherhood turbines, we count it as success. Not that it is unfamiliar, because we have been making turbines for over 60 years, but success is no less sweet.

Throughout the sugar producing world Brotherhood turbines are at work. The illustration shows part of a recent contract for horizontal, multi-stage steam turbines developing 2,500 kW on test prior to despatch to the Caribbean.

Brotherhood build single-stage and multi-stage turbines for mill, cane knife and generator drives, with controlled or uncontrolled pass out to process.

Detailed brochure SMT66 tells you all about Brotherhood turbines. Send for your copy today.



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That's because our fabrics are **designed** to meet their end use —not merely to clothe a filter.

And we'll supply your filter fabrics shaped, cut, eyeletted, hemmed—or as bags, sleeves, belts or blankets—everything to suit your need. Give us a call—we'd like to help.

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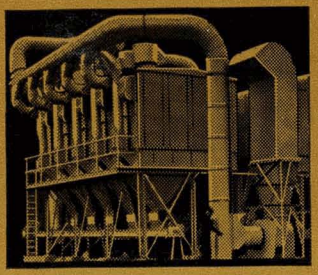

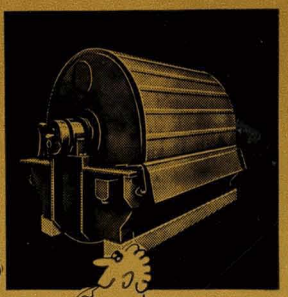

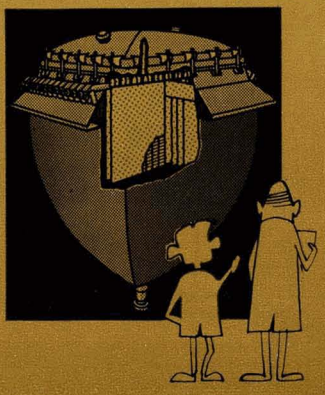

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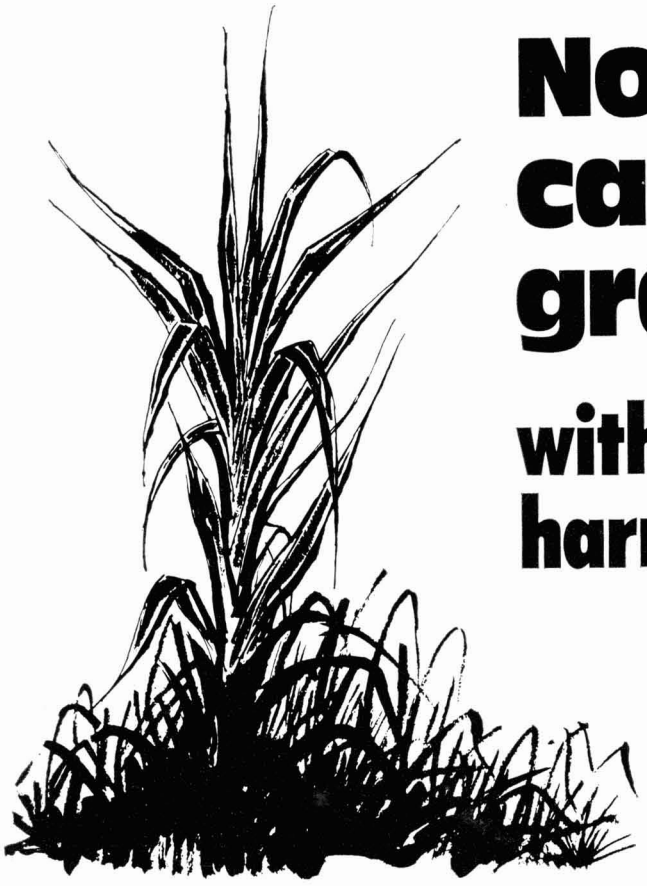
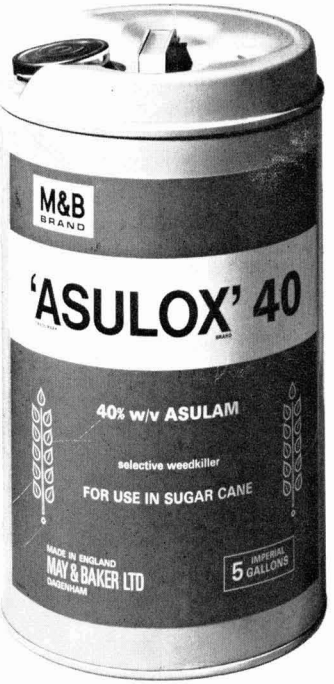


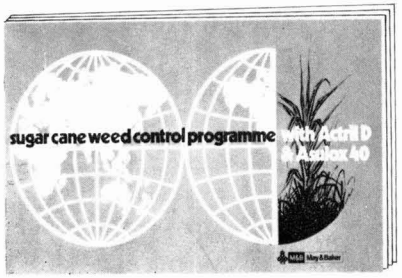
Now you can kill grasses without harming cane!



'ASULOX' 40 IS THE NEW HARD-HITTING KILLER FOR TOUGH GRASSES, SUCH AS *SORGHUM HALEPENSE* (johnsongrass) AND *PANICUM PURPURASCENS*.

. . . and the perfect partner for 'Asulox' 40 to give a complete programme of weed control is 'Actril' D – which gives rapid knockdown of the toughest broadleaved weeds.

SEND FOR FULL DETAILS OF THESE OUTSTANDING WEEDKILLERS NOW!



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Hodag products for the Sugar Industry are designed to increase efficiency, reduce operating difficulties, and maintain a high level of production in sugar processing. Sugar factories and refineries throughout the world rely regularly on Hodag with utmost confidence.

Backed by years of technical expertise in the Sugar Industry, these Hodag products have become standards.

CB-6—An additive for use in the crystallization and processing of sugar to improve quality, increase exhaustion of final molasses, and overcome problems due to sticky, hard to handle massecuites.

VAP-99—An additive to inhibit scale formation and increase evaporator efficiency.

HCA-21—A powdered chelating and dispersing agent for use as scale inhibitor in alcohol stills, evaporators, and heat exchangers.

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SANITROL—A high-potency microbiocide used to reduce inversion losses, odors, and aid in overall mill sanitation.

ANTIFOAM BX-SERIES—A series of special antifoams for use in beet sugar processing. Formulations for direct use and dilution with water or mineral oil.

Write for technical data on any of Hodag's products for sugar processing. Or ask for a Hodag technical representative. He'll be glad to help you in the testing of our products or assist you in finding the best means of application in your process.

Why not send the inquiry coupon below? And let Hodag help you improve your operation and enjoy the benefits of these products.

Please send complete literature and case history data on the Hodag products checked below:

☐ CB-6 ☐ FLOCS 411, FLOCS 433 ☐ FLO-1
☐ VAP-99 ☐ RAPISOL ☐ SANITROL
☐ HCA-21 ☐ PH-2 DESCALER ☐ ANTIFOAM BX-SERIES
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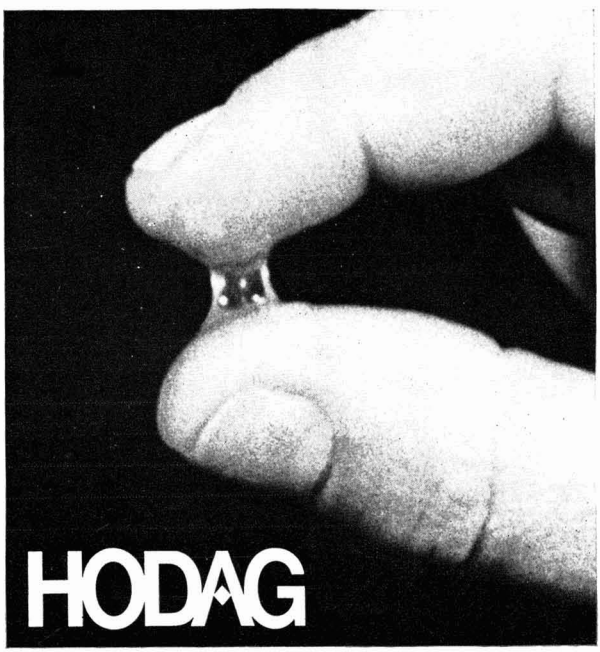

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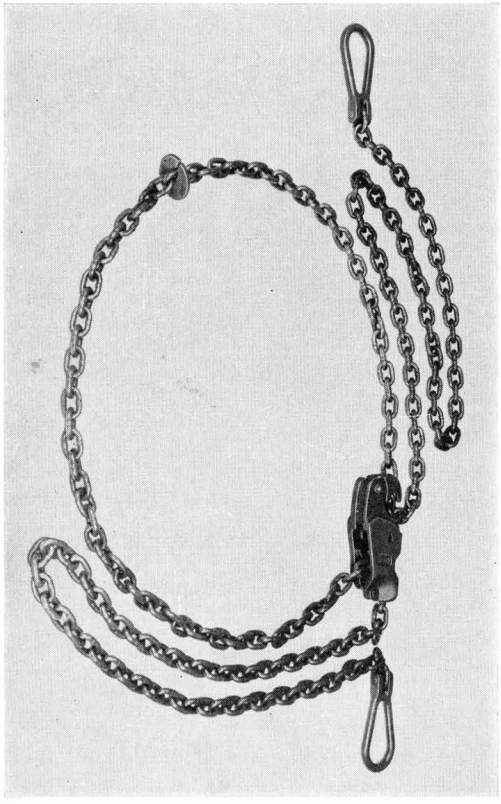
New. Parsons Kuplex® cane slings.

Stronger, lighter, easier to use than the kind you've been stuck with for years.



O.K. Mechanisation's a fine thing if you can afford it. If you can't, there's no need to stand still while costs rise and profits fall. Parsons, Europe's No.1 chain manufacturers, offer you a range of slings specially designed for sugar growers.

Parsons Kuplex 3/8" Approximately 40% lighter than the old 1/2" you've been using.
Parsons Kuplex $\frac{3}{8}$" will revolutionise your cane slinging. They have a 2.5 TONNES working load proof tested to 5.7 TONNES with a safety factor of 4.5 to 1.

Parsons '05' 13/32" sling. Strong contender for top place.
Parsons '05' $\frac{13}{32}$" sling is approximately 33% lighter than the $\frac{1}{2}$" with a 2 TONNES working load proof tested to 4 TONNES and a safety factor of 4 to 1.

Both Parsons Kuplex and '05' slings take a lot of beating over rough ground. And both have super lightweight trip hooks. 3,17kg., which make them the most easily slung slings in the business.

Contact Parsons Chain Co. Ltd., Stourport, Worcestershire, England, *for full details.*

Parsons Kuplex® & Parsons '05' Your new choice in cane slings.

Over half the world of sugar uses Broadbent centrifugals

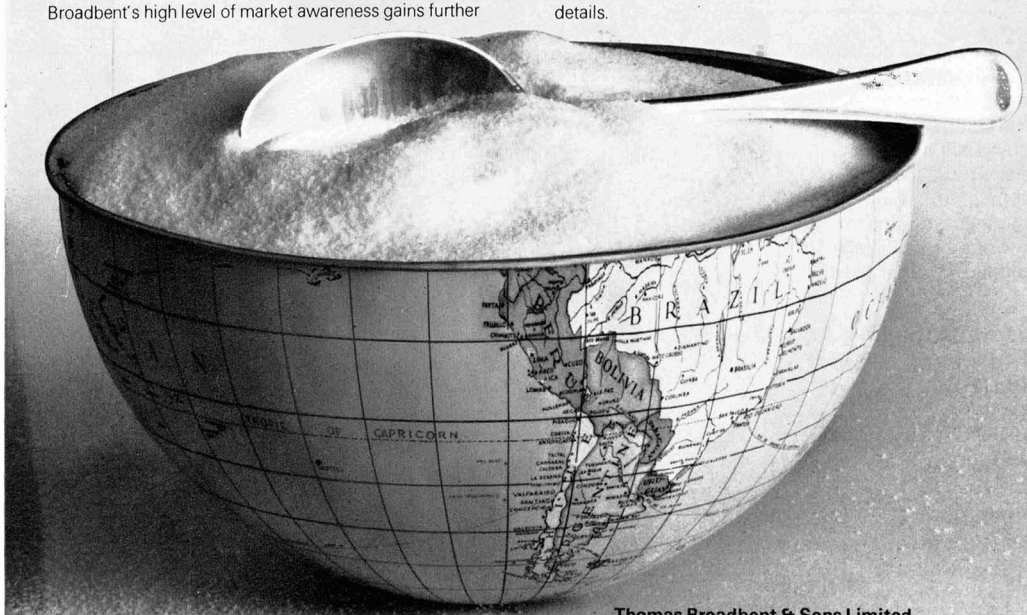
Hundreds of Broadbent sugar centrifugals are operating in forty three of the world's sugar producing countries.

Both batch and continuous machines are equipped to meet the total process requirements of beet and cane sugar factories – no matter how hot or humid the operating conditions. And it's this combination of flexibility and reliability, for maximum yield and minimum maintenance, that makes for good centrifuging on a world-wide scale.

Broadbent's high level of market awareness gains further expression in the Broadbent Design Service, which facilitates the customizing of machine batteries to meet specific site and operational needs.

And Broadbent service doesn't stop at the design and installation stage. A team of 'fly-anywhere' service engineers, backed by a comprehensive spare parts service, minimises the possibility of processing delays.

If that sounds like the sort of sugar centrifugal service you'd like for your plant, then make contact now for full details.



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Now you can find in Brazil certain products that you never thought were manufactured here. Brazil, to you, was a country that produced large quantities of coffee, cotton and sugar. But it never occurred to you that Brazil could build the world's most up-to-date sugar mills. M. Dedini S.A. - M. is proud to present the new list of brazilian export products. After all, it is M. Dedini that manufactures all these items:

Mills ranging in size up to 42"x90 3/4", fitted with press - rollers and variable speed conveyors.
Turbo-reducers for starting mills, knives and alternators.
Turbo-pumps. Sulfitizers. Vertical and horizontal heaters. Vacuum pans. Sugar driers. Bagasse boilers. Refineries. Distilleries for alcohol and rum.
Accessories: High and low pressure valves. Lubrication pumps. Lubricators. Barometric condensers. Steam ejectors. Structures in general.

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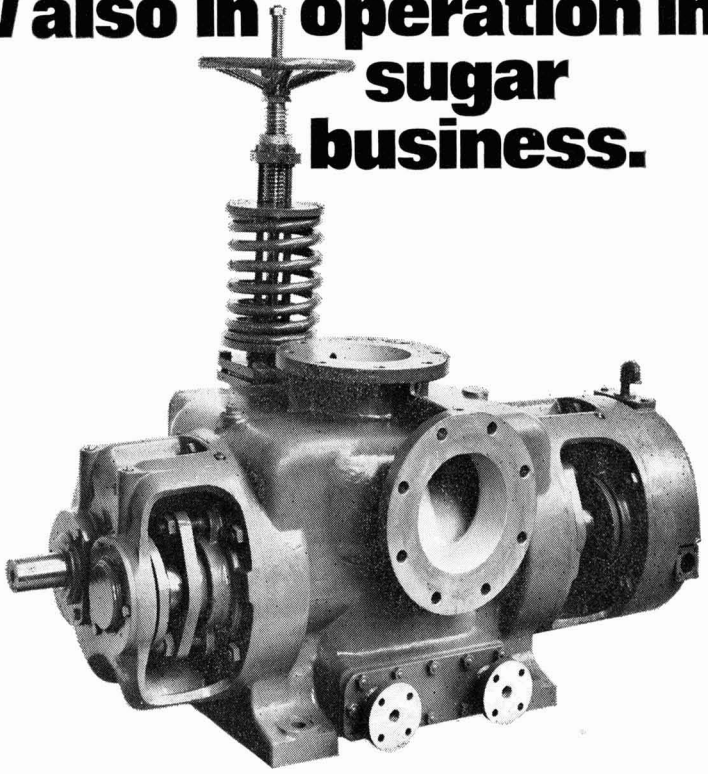
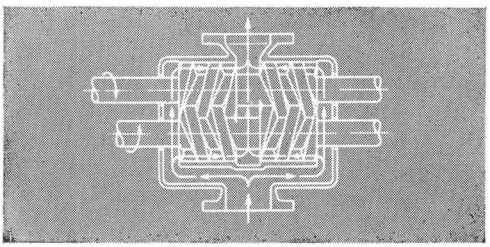
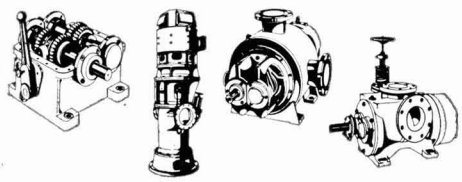
Houttuin screw pumps now also in operation in sugar business.





The two screws that provide the drive for Houttuin positive rotary displacement pumps, intermesh smoothly without metal to metal contact.

Features:
Selfpriming even under the most unfavourable conditions. Can handle all kind of liquids, including heavy juice, run offs, melts, molasses. Extremely suitable for pumping thin liquids to settling stations and filter presses because of the virtually pulseless flow. Versatile and suitable for all temperatures and capacities encountered in the sugar industry. All liquid contact points can be made from materials carefully selected to suit the liquid you want to pump. Wear resistant even on saturated juices (sulphitation, carbonatation, etc.).
Like to know more? Send for our comprehensive catalogue.



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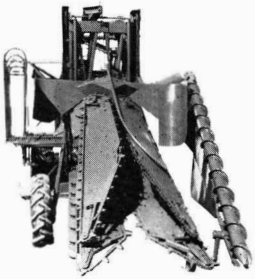

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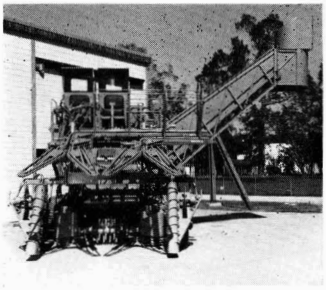

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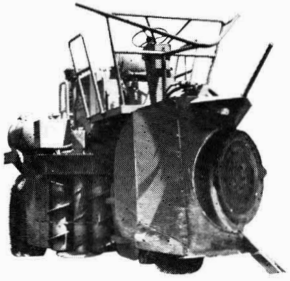

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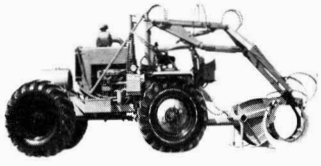

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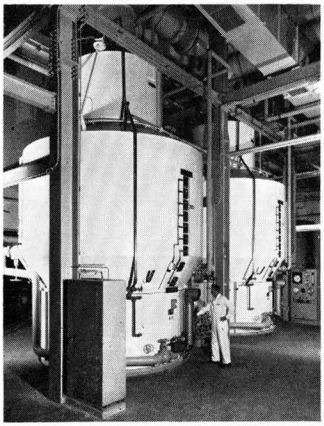

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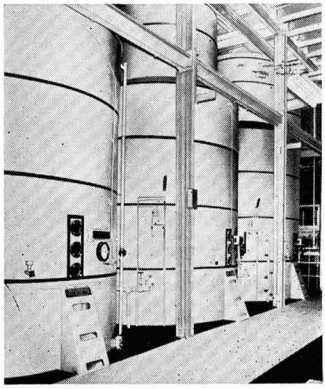

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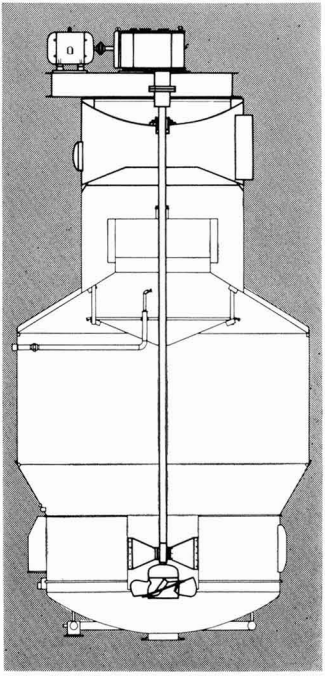

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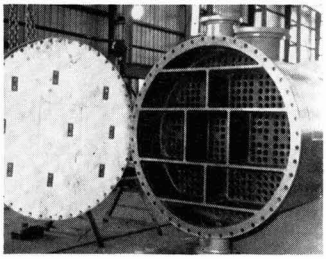

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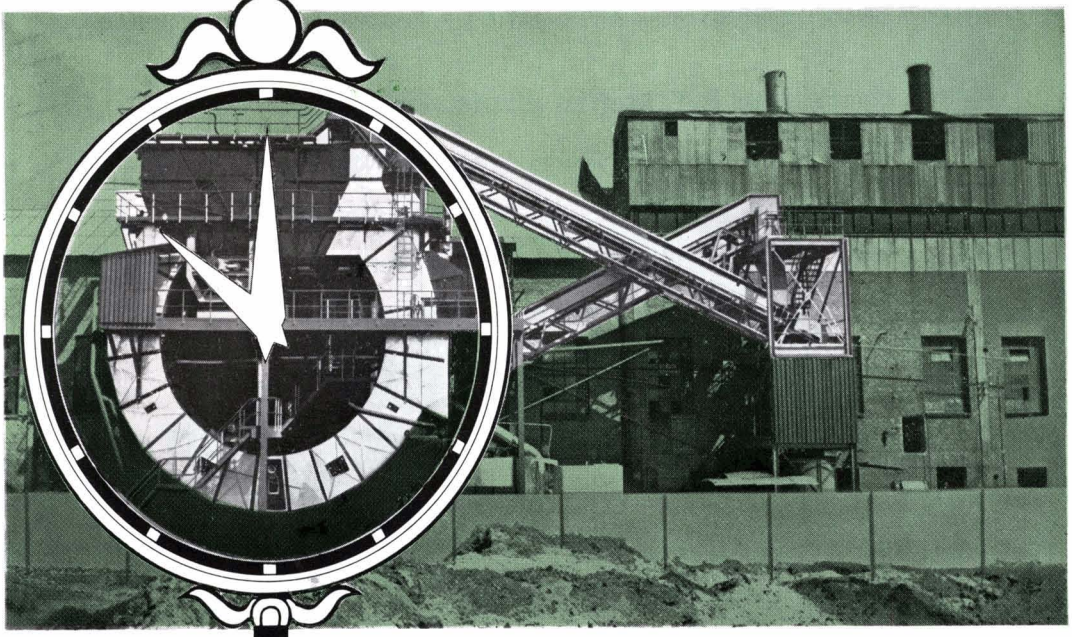

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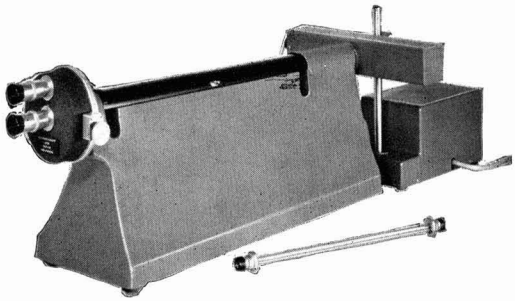

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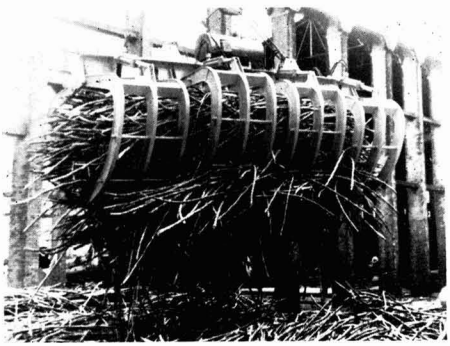

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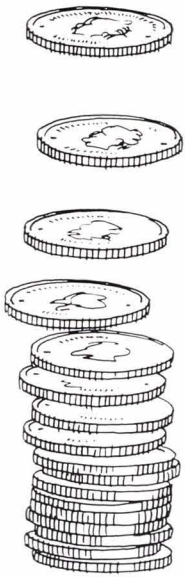

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* * *

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Research and Development Engineer, Walkers Ltd.

K. DOUWES DEKKER,
Consultant and former Director, Sugar Milling Research Institute, South Africa.

M. MATIC,
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International Sugar Journal

September 1972

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ห้องสมุด กรมวิทยาศาสตร์

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Chromatographie sur couche mince à l'aide de "Sephadex G-25" de colorants présents dans les produits de la canne. C. C. Tu et Margaret Degnan. *p.* 259–260

On décrit une méthode simple convenant pour des déterminations de routine. En utilisant la chromatographie sur couche mince de gel de "Sephadex G-25", on a séparé deux types de groupes de colorants, l'un de couleur brune et de poids moléculaire supérieur à 5000 et l'autre de couleur jaune-brun et de poids moléculaire situé entre 150 et 350.

* * *

British Sugar Corporation Ltd. 21e Conférence Technique 1972. *p.* 260–261

On donne un bref compte-rendu de cette conférence technique avec mention des communications présentées.

* * *

Expérience de la diffusion de canne au Queensland. Ie partie. D. H. Foster et D. S. Shann. *p.* 261–265

La Fairymead Sugar Co. Ltd. a installé en 1965 à Bundaberg un diffuseur du type à percolation. On rend compte de l'expérience pratique de l'appareil et des difficultés rencontrées ainsi que des recherches expérimentales effectuées par des techniciens du Sugar Research Institute pour mesurer les débits de liquide, le type de percolation, la performance du diffuseur et l'extraction supplémentaire de sucre obtenue.

* * *

Equipement polonais pour l'industrie sucrière. *p.* 265–268

Au cours de la Foire Internationale de Poznan, un groupe de journalistes techniques d'Europe Occidentale fut convié à visiter un certain nombre d'usines du groupe CHEMAK, une association de 14 entreprises construisant des usines chimiques, comprenant des sucreries complètes de canne et de betterave ainsi que les pièces d'équipement séparées pour celles-ci. On décrit la visite faite, avec quelques illustrations de l'équipement sucrier polonais.

* * *

Réponse de la canne à l'amendement azoté. M. K. Shingarey et J. R. Kakde. *p.* 268–270

On a mesuré l'influence de l'application d'engrais azoté sur les rendements en canne et en sucre de plants de canne au Maharashtra (Inde). On a calculé la dose optimale d'engrais pour les conditions des essais. L'optimum varie suivant que l'on recherche le plus haut rendement en canne, le plus haut rendement en sucre ou le plus grand bénéfice financier.

Dünnschichtchromatographie von Farbstoffen in Rohrprodukten mit Hilfe von "Sephadex G-25". C. C. Tu und Margaret Degnan. *S.* 259–260

Es wird eine einfache Methode beschrieben, die für Routineuntersuchungen geeignet ist. Mit Hilfe der Dünnschichtchromatographie an "Sephadex G-25"-Gel wurden zwei Typen von Farbstoffgruppen getrennt, von denen die eine braun gefärbt ist und ein Molekulargewicht über 5000 hat, während die andere gelbbraun ist (Molekulargewicht zwischen 150 und 350).

* * *

21. Technische Konferenz 1972 der British Sugar Corporation Ltd. *S.* 260–261

Es wird kurz über diese Technische Konferenz berichtet und auf die dort gehaltenen Referate eingegangen.

* * *

Erfahrungen mit der Rohrdiffusion in Queensland. Teil I. D. H. Foster und D. S. Shann. *S.* 261–265

Ein Durchflussdiffuseur wurde 1965 von der Fairymead Sugar Co. Ltd. in Bundaberg installiert. Ueber die praktischen Erfahrungen mit diesem Diffuseur wird berichtet. Dabei werden die aufgetretenen Schwierigkeiten diskutiert und durch die Technologen des Zuckerforschungsinstituts durchgeführte Untersuchungen zur Bestimmung der Strömungsgeschwindigkeiten, des Durchflussschemas, der Leistung des Diffuseurs und der zusätzlich erzielten Saccharoseextraktion beschrieben.

* * *

Polnische Maschinen und Apparate für die Zuckerindustrie. *S.* 265–268

Während der Internationalen Posener Messe hatte eine Gruppe westeuropäischer technischer Journalisten Gelegenheit, eine Anzahl von Anlagen der CHEMAK-Gruppe zu besichtigen, einer Vereinigung von 14 Konzernen, die chemische Anlagen einschliesslich kompletter Rohr- und Rübenzuckerfabriken und einzelne Maschinen und Apparate dafür liefern. Der Besuch wird beschrieben; der Bericht ist mit Abbildungen polnischer Maschinen und Apparate versehen.

* * *

Die Wirkung der Stickstoffdüngung auf Zuckerrohr. M. K. Shingarey und J. R. Kakde. *S.* 268–270

Auf der Basis der als Rohr- und Zuckerertrag bestimmten Wirkung von Stickstoffdünger auf Zuckerrohr in Maharashtra (Indien) wird die unter den Versuchsbedingungen optimale Düngergabe berechnet. Das Optimum ändert sich, je nachdem ob die höchste Rohrausbeute, die höchste Zuckerausbeute oder der höchste Geldertrag erzielt werden soll.

Cromatografía sobre un capa delgada de "Sephadex G-25" de colorantes en productos de caña. C. C. Tu y Margaret Degnan. *Pág.* 259–260

Se describe un método sencillo conveniente para pruebas rutinarias. Empleando cromatografía sobre una capa delgada de "Sephadex G-25" gelatinoso, se separan dos tipos de grupo colorante, uno de color pardo y peso molecular más de 5000 y el otro de color amarillo-pardo y peso molecular entre 150 y 350.

* * *

La 21ª Conferencia Técnica de la British Sugar Corporation Ltd., 1972. *Pág.* 260–261

Una cuenta breva se presenta sobre esta conferencia técnica, con mención de las comunicaciones presentado.

* * *

Experiencias con difusión de caña en Queensland. Parte I. D. H. Foster y D. S. Shann. *Pág.* 261–265

Fairymead Sugar Co. Ltd. instaló en 1965 a Bundaberg un difusor de caña del tipo que emplea percolación, y los autores dan una cuenta de experiencia práctica con él, incluyendo las dificultades encontrado. También recuerdan las investigaciones hecho por tecnólogos del Sugar Research Institute para la medición de velocidades de flujo, del diseño de percolación, del cumplimiento del difusor y de la extracción de sacarosa que se obtuvo.

* * *

Planta polaca para la industria azucarera. *Pág.* 265–268

Mientras la Feria Internacional de Poznan en 1972, un grupo de periodistas técnicas de Europa Occidental se condujieron a algunas plantas del Grupo CHEMAK, un asociación de 14 empresas que fabrican plantas químicas que incluye fábricas completas para azúcar de remolacha y de caña, tanto como equipos individuales para éstas. Se describe la visita con ilustraciones de planta polaca para fábricas de azúcar.

* * *

Respuesta de caña a fertilización con nitrógeno. M. K. Shingarey y J. R. Kakde. *Pág.* 268–270

Sobre el base de las respuestas medidas de caña de planta en Maharashtra, India, en términos de rendimiento de caña y de azúcar, al aplicación de abonos nitrógenosos, se calcula la dosis optimal de abono en las condiciones de los ensayos. El optimum varia en cuanto a sea el más alto rendimiento de caña o azúcar, o sea la más alta ganancia en dinero acabarse.

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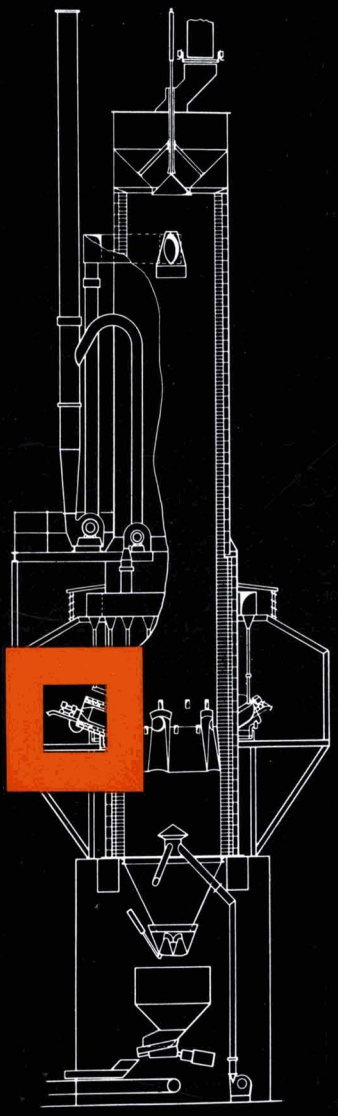

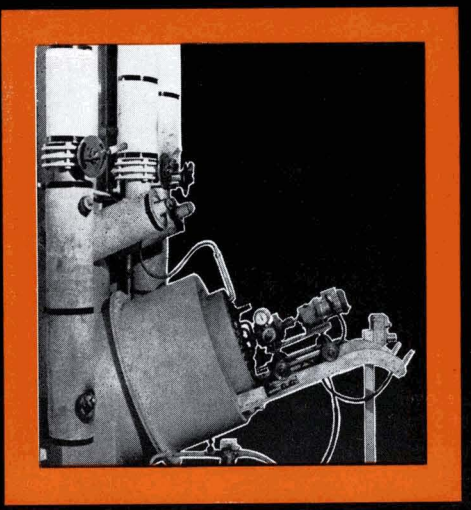

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VOL. LXXIV SEPTEMBER 1972 No. 885

Notes & Comments

World raw sugar price

During July the price of sugar on the London Terminal Market sank to its lowest levels of the year, following a series of sales of Brazilian sugar. The Export Director of the Instituto do Açúcar e do Alcool announced that from the 14th July, the Institute would be open to bids for an unlimited quantity of raw sugar for the world market. Bids were to be accepted at a fixed price for less than 20,000 metric tons but for larger amounts the price of half would be fixed at the time of the bid and half would be at a price to be fixed later. Considerable sales were made and on the 31st July the Institute announced that it had sold a large tonnage and was withdrawing from the market until October.

It had been officially stated earlier that all available sugar from the 1971/72 crop had been sold so that it appears that the new sales, believed to amount to 300,000 tons, must come from the 1972/73 crop. The export target from this crop was set at 1,476,000 tons, with the possibility of expanding this by a further 190,000 tons. Since exports to the USA would be some 600,000 tons, this would leave 876,000–1,066,000 tons available for the world market.

With the ready availability of this Brazilian sugar, the world market price fell to £52 per ton, causing the ISA prevailing price to drop to the level of 5·25 cents/lb. It thus became necessary for the ISO Executive Committee to meet on the 2nd August to review the market situation; the upward tendency of the London price and ISA price following the Brazilian announcement persuaded the Committee that no action was needed, however.

* * *

US Sugar Quota, 1972

On the 31st July, the US Department of Agriculture announced a further deficit of 100,000 tons against the domestic beet area's share of the Sugar Quota for 1972. The shortfall was reallocated among western hemisphere countries and details are tabulated elsewhere in this issue.

Small amounts have been allocated to the Bahamas and Bolivia to cover the quantities supplied before renunciation of their quotas by these countries in June, while no increase has been made in the quota of the Philippines (normally one-third of reallocations), where severe flooding has affected cane lands.

* * *

World sugar balance, 1971/72

Their third estimate of world sugar movements for September 1971/August 1972 and the two previous campaign years has been published by F. O. Licht K.G.[1]; the figures are recorded below:

	1971/72	1970/71	1969/70
	(*metric tons, raw value*)		
Initial stocks	18,800,543	21,120,085	19,289,669
Production	72,431,150	72,590,953	74,346,292
Imports	24,866,250	23,685,705	23,628,020
	116,097,943	117,396,743	117,263,981
Exports	24,820,100	23,908,164	23,853,758
Consumption	76,203,202	74,688,036	72,290,138
Final stocks	15,074,641	18,800,543	21,120,085

Three important points may be noted from the estimates: first, that as a result of high prices and, in some cases, rationing, which result from a tight statistical position, consumption has been restricted to a growth of only 2·0% against the more usual 3½–4%; this argues a static or even declining per caput consumption in many countries. Second, stocks at the end of this month are set at just over 15 million tons or less than 20% of 1971/72 consumption. This is extraordinarily low and indicates the urgent need for major expansion of production to ensure adequate supplies in 1972/73 and subsequently.

Thirdly, the large size of the required expansion is indicated by the fact that if consumption were to remain static in 1972/73, production would have to increase by 3·8 million tons to maintain the same absolute level of stocks; if consumption were to increase by a further 2·0% to about 77·7 million tons, production would have to rise by 5·3 million tons to prevent a further erosion of stocks. Failing such a rise, sugar prices must increase to the point where they are sufficient of a disincentive to consumption as to reduce offtake to balance the available supplies.

[1] *International Sugar Rpt.*, 1972, **104**, (18), 1.

UK sugar beet production economics

A report on the economics of sugar beet production in the UK has been published by the Agricultural Economics Unit of Cambridge University (Silver Street, Cambridge, England; price 40p), and is entitled "Sugar Beet: A study of sugar production and the feasibility of expansion". A survey of over 100 growers throughout England was carried out in 1970 by the authors, F. G. STURROCK and M. C. THOMPSON. This showed that the gross and net margin per acre mainly depends on the yields per acre. There was no evidence that farmers who save labour by drilling to a stand and use herbicides suffer any loss of yield.

The report states that economics of producing sugar beet have changed substantially in the last 30 years. Man-hours per acre have fallen by 85% and yields have increased by 50% since 1943.

In the authors' opinions, an expansion of sugar beet would benefit British farming. Apart from vegetables or potatoes, for which the British market is limited, sugar beet is usually the most profitable crop on arable farms. It is considered to be an excellent break crop and the report suggests that some additional acreage would be welcomed by farmers who are encountering disease problems in sustaining or increasing their present production of cereals. Examples are given to show how farmers might fare with a European Economic Community type of contract and how they might adapt their cropping to suit such a system.

A cost benefit study has also been made of the effects of growing an additional acreage of sugar beet. The authors make certain assumptions about the extra acreage that could be grown by existing and new growers and suggest that the return on capital invested in producing and processing extra sugar beet might well be high.

* * *

EEC Commission "cartel" charges against Italian sugar producers[1]

Italy's largest sugar company, Eridania Zuccherifici Nazionali S.p.A., has denied charges by the EEC Commission that it was breaking Community rules on competition by participating in a market-sharing cartel of 22 refiners. The other nine Italian producers supported the denial. The Commission alleged the existence of practices aimed at guaranteeing sugar producers' control of their home markets; trade in sugar between member countries was carried out only by producers, and confectionery and food manufacturers found it impossible to buy from refiners outside their own countries.

During the Commission's investigations, which took more than two years, some of the companies tried not to cooperate, but a £2000 fine on Raffinerie Tirlemontoise S.A. of Belgium persuaded other firms to provide information.

Colonial Sugar Refining Co. Ltd. 1971 report

Raw sugar mills in the C.S.R. Group made 883,000 tons of raw sugar in the 1971 season from a good crop in Queensland and poor ones in New South Wales and Fiji. The forecast for 1972 is 846,000 tons, the drop being almost wholly due to a further fall in Fiji output. Continual bad weather interfered with every phase of production last year and unusually wet weather has continued in 1972.

Sales of sugar products from the five refineries were 648,000 tons, 1·8% lower than in 1970, owing to reduced usage in fruit canning and restricted export markets. Refined sugar sales in New Zealand were the same as in 1970 at 150,000 tons.

* * *

UK ex-refinery price of sugar

On the 8th March 1972 the Minister of Agriculture Fisheries and Food announced in the UK Parliament that the Government had decided to limit the rise in the ex-refinery price of granulated sugar during 1972 to 5% above the range operative for most of 1971. For this purpose he proposed to make special payments not exceeding £25 million to the Sugar Board which would enable it to keep the ex-refinery price within the range £82–£92 per ton for the rest of 1972.

Movements in the world price of sugar since March have been such that the Sugar Board can now operate within a somewhat lower price range, namely £77–£87, without additional support from the Government, and this will accordingly be the target range for the remainder of 1972.

In the light of this decision, the distribution payments on sugar (which had been reduced from £4 to £2 per ton from the 14th July) were increased to £6 per ton from the 21st July. With further falls in the level of world prices of raw sugar on the London Market, the distribution payments were again reduced to £2 per ton with effect from the 1st August.

Dominican republic sugar statistics 1971[2]

		short tons, tel quel
Initial stocks		240,096
Production		1,210,595*
		1,450,691
Exports:		
Canada	11,760	
Finland	14,006	
France	25,097	
Iraq	13,768	
Japan	186,709	
Malaysia	28,976	
New Zealand	56,396	
Singapore	31,716	
South Africa	2,025	
USA	711,723	
		1,082,176
Consumption		145,851
Final stocks		222,664

[1] *The Times*, 28th July 1972.
[2] C. Czarnikow Ltd., *Sugar Review*, 1972, (1068), 59.
* Including 52,069 tons refined sugar.

"Sephadex G-25" thin-layer chromatography of colorants in cane products*

By C. C. TU and MARGARET DEGNAN

(Experiment Station, Hawaiian Sugar Planters' Association, Honolulu, Hawaii, USA)

Introduction

DURING the past half century many papers have been published on colorants in cane or sugar products. The colorants in raw sugar have been variously reported as being caused by: (1) thermal degradation products of reducing sugars, the so-called caramel; (2) reaction products between reducing sugars and amino compounds, the so-called melanoidins; and (3) polyphenolic compounds or complexes of polyphenolic compounds.

The main process in a sugar refinery is decolorization. Despite numerous publications and a lengthy period of research on colorants in cane products, it is still not known which colorants in raw sugar (or which classes as described above) are responsible for the difficulty in sugar refining. This paper describes a simple method for the separation and the determination of colorants in cane products on a "Sephadex G-25" (Pharmacia Fine Chemicals, Sweden) thin-layer plate. The method is based upon our recent work on the separation of colorants in cane juice on a "Sephadex G-25" column from which several types of colorants differing in molecular weight can be distinctly separated. The details of the work will appear elsewhere.

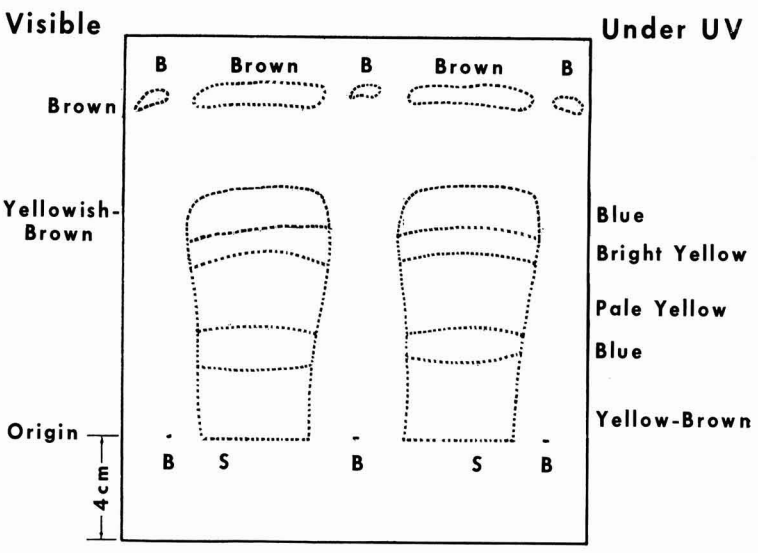

Fig. 1. Spots on "Sephadex G-25" thin layer after development with water. Sample (S) was spotted 4 cm from the edge of plate, with blue dextran (B) as a visible reference.

PROCEDURES

Preparation of Thin-Layer Plates

The glass plates (20 × 20 cm) were first carefully cleaned to free them from oil or grease and then stored in a 10% sodium carbonate solution. Prior to coating they were thoroughly rinsed and dried.

About 30 g of the "Sephadex G-25" Superfine gel powder was allowed to swell in excess 50% aqueous ethanol (v/v) overnight. The supernatant was then decanted and about one part of 50% aqueous ethanol per ten parts of the settled "Sephadex" gel was added back to form a heavy suspension. The slurry was then poured into a thin-layer spreader (Desaga/Brinkman Standard Adjustable Applicator). The gel was spread, 0·25 mm thick, on five clean glass plates.

Development of Thin-Layer Plates

Diluted cane syrup or concentrated cane juice containing 0·2 g of solids per ml was applied onto the prepared plates in 2 μl spots 5 mm apart until 10 spots, or 4 mg sample solid, were used. Spots of 2μl of 1% Blue Dextran with a molecular weight 2,000,000 (Pharmacia Fine Chemicals, Sweden) were used as a reference. The plates were developed horizontally with 50% aqueous ethylene glycol (v/v) in a BN chamber (Desaga/Brinkman) with the surface covered, for 10–30 min. The migration speed was largely dependent upon the dryness of the thin layers (the dryer, the faster). Best separation was obtained when the plates were quite moist but not fluid. The plates were then removed from the chamber and allowed to dry in air at room temperature.

* Published with the approval of the Director as Paper No. 303 in the Journal Series of the Experiment Station, Hawaiian Sugar Planters' Association, Honolulu, Hawaii, USA.

A distinct separation was observed of two classes of colorants differing in molecular weight. The dried plates were then observed under the ultraviolet light (long UV) and the intensified spots under UV were circled.

Measurement of Colour Spots

Each encircled gel spot was removed and transferred into a small centrifuge tube (12 × 100 mm). To each tube was added 4 ml of water. The tubes were shaken, then centrifuged at 18,400 *g* for 20 min. The supernatant was measured at 280 nm on a Beckman DK-2 spectrophotometer.

RESULTS AND DISCUSSION

From the samples studied, two types of colorants, brown and yellowish-brown, were separated as shown in Fig. 1. The brown spot, which migrated as fast as the eluting liquid, contained high molecular-weight substances. The yellowish-brown spot was slow-moving and more diffuse, containing several low-molecular weight colorants together with sucrose.

Based upon the separation of colorants on a "Sephadex G-25" column described above, the molecular weight of the fast-moving brown substance is estimated to be over 5000 and that of the slow-moving, yellowish-brown substances to be in a range of from 150 to 350.

This method is simple and can be used for routine tests, particularly in the determination of the amount of colorants of differing molecular weight in various samples of cane juice, syrup, and commercial sugar with regard to sugar refining characteristics. The applicability of this method is being studied.

British Sugar Corporation Ltd.

21st Technical Conference

VISITORS from twelve countries assembled with British Sugar Corporation staff and other UK sugar personnel at the Grand Hotel in Eastbourne on the 3rd July in order to participate in the Corporation's 21st Technical Conference. This opened the following morning with a welcoming address by the Conference Chairman, Mr. T. RODGERS, Production Director of the Corporation, who then introduced the first speaker.

Mr. J. F. T. OLDFIELD, B.S.C.'s Director of Research, introduced the first paper on determination of sugar losses in beet fluming and washing, detailed information being presented by Mr. J. V. DUTTON of the Research Department. Following questions and discussion of the paper, Mr. J. MATHER, Works Manager at York sugar factory, presented a paper reviewing applications of powder technology in bulk white sugar handling and assembling some of the basic information which has not previously received attention by the industry.

A series of three papers were then presented by Prof. S. ZAGRODZKI and his colleague Dr. H. ZAORSKA of Lódz Polytechnic, Poland, describing a new technique of juice purification by means of pre-carbonatation, deliming of beet juice using ammonia and soda, and a decolorization procedure for thin juices using a four-column system of granular carbon, reactivation being by use of superheated steam.

After lunch a composite paper was presented by a total of ten authors on the Wissington factory re-construction project completed last year[1]. Mr. I. S. HIGGINS, Project Manager, provided the introduction and described the project planning while the technical personnel involved gave descriptions of process plant, combustion control, steam and power generation, and the electrical, instrumentation and computer project work. These were illustrated by a great many slides and were awe-inspiring in the complexity of the details involved in the reconstruction with the introduction of the latest and most sophisticated techniques for white sugar production and handling.

In the evening was held the Conference dinner to which those present were welcomed by Mr. K. C. SINCLAIR, Chief Executive of the Corporation, a reply to whose toast to the guests was made by Mr. HENRI LEMAIRE of Belgium, while the evening concluded with a cabaret.

On the morning of the 5th July were presented three papers on matters more concerned with management than technology but of great interest to the audience. Mr. O. H. PHIPPS presented a paper on budgetary control as applied to operation of each factory of the Corporation with examples of the computer-calculated records, stationery and methods of applying control techniques to observe and correct unusual variances. Mr. W. M. LANYON and Mr. P. TORY described maintenance planning and labour utilization control in the off-season in order to ensure optimum efficiency of employment of the maintenance force, proper planning of spares and servicing, etc., and Dr. A. P. DRAYCOTT of Brooms Barn Experimental Station and Mr. D. C. THOMSON, Trials and Demonstrations Officer of the Corporation, discussed agricultural factors affecting sugar beet yield and quality, an interaction of importance to the factory personnel, especially as it was evident that increased yield by use of excessive nitrogen fertilizer could be uneconomical for the farmer as well as providing a

[1] See also *I.S.J.*, 1972, **74**, 3–6.

raw material more difficult to process because of high organic nitrogen content.

After lunch, in addition to the usual golf match for enthusiasts, visits were arranged to a number of local places of interst, including the Royal Observatory at Hurstmonceux, and Michelham Priory, as well as Brighton Races.

When the Conference resumed, the following morning, Mr. R. TAYLOR, Agricultural Director of the Corporation, gave an account of the 1971/72 crop in Great Britain and summarized changes which have taken place in recent years. He mentioned that the 1973 crop would be the first under conditions applying in the EEC and spoke of negotiations for an agreement with the National Farmers' Union to apply then. Weather conditions had been difficult after a fine start in March, and the crop was not expected to be as large in 1972 as in 1971. Visitors from other European countries then gave similar indications as to conditions applying during the start of their own crops; in many cases the weather had been similar to that of Britain and beet tonnages were expected to be little different to 1971 in spite of somewhat higher crop areas.

Subsequently Mr. OLDFIELD and Mr. M. SHORE described work by the Research Department on procedures to assess and reduce the deterioration of decalcification resins in service, which involved selecting a suitable method for cleaning the resins and discovering the cause of the deterioration. Mr. D. E. ASH, Works Manager of Peterborough sugar factory, then described trials carried out there on an Enviro-Clear clarifier for muddy juice, and on conversion of a coke-fired lime kiln to oil firing.

Mr. R. J. BASS presented an account of trials using electrical resistance heating for massecuite treatment at Cantley in order to reduce its viscosity before centrifugalling, and Mr. D. F. A. HORSLEY described an experimental condensate still for boiler feed-water make-up to ensure the absence of sugar contamination which has become more strictly necessary with the adoption of modern high-pressure boilers in the Corporation. The last paper of the Conference was then presented by Mr. N. R. TWAITE, Works Manager at Kidderminster factory, who discussed experiences in the use of surface-active additives as an aid to pan boiling and centrifugalling, after which Mr. RODGERS closed what had been a highly successful, stimulating and informative Conference.

Experiences with cane diffusion in Queensland

By D. H. FOSTER* and D. S. SHANN†

Paper presented to the 14th Congress I.S.S.C.T., 1971

PART I

Introduction

CONSIDERABLE experience has been accumulated in Queensland on the subject of bagasse diffusion over the past several years, based on both pilot plant research activity and on factory scale experimentation; the object of this paper is to report broadly on the work to date, with particular emphasis on the marriage of theory and practice.

Description of diffuser installation

The initial and only diffuser installation in Queensland is that designed and installed by the Fairymead Sugar Co. at their factory in the Bundaberg area of South Queensland in 1965. This diffuser is 120 ft long and 9 ft wide with a total area of 1080 ft^2. As shown in Fig. 1, it is installed as an integral part of a 5-mill tandem and is situated between the 2nd and 3rd mills. It carries a bed of about 5·75 ft depth at an average fibre density of 5 lb/ft^3, and a fibre rate for 1970 of 35·45 long tons/hr (crushing rate 248·6 tons/hr). The residence time in the diffuser would have been approximately 25 min. It is of particular interest to note that no addition of imbibition water is made to the diffuser. Rather, the diffuser is considered an integral part of the milling train, and the compound imbibition system which is standard for Queensland is retained. As shown in Fig. 1, all imbibition water is added prior to the final mill, and juice from this mill is added to No. 3 mill bagasse. Juice from Nos. 3 and 4 mills is clarified and forms the final liquid addition to the diffuser bed. There are a total of 5 recirculation paths, and the draft from the diffuser is applied as maceration between 1st and 2nd mills. Juice from these mills goes to process. Prior to clarification, press juice is heated in a tubular heater using vapour from the 1st evaporator cell.

The diffuser is situated outside the crushing house, and bagasse is conveyed to and fro on rubber belt conveyors. Both the diffuser and the major belts have infinitely variable speed drives and, as with the crushing mills, speeds are automatically controlled to maintain an even flow of material through process. All units in the milling train are 36 in × 78 in 3-roll mills, Nos. 1, 4 and 5 being equipped with heavy-duty

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† Fairymead Sugar Co. Ltd., Bundaberg, Queensland.

CSR-type pressure feeders, and Nos. 2 and 3 utilizing light-duty Sugar Research pattern 2-roll feeders. Completely effective dewatering of the material from the diffuser is accomplished in No. 3 mill alone, the average moisture of the bagasse leaving this unit being 50–51%.

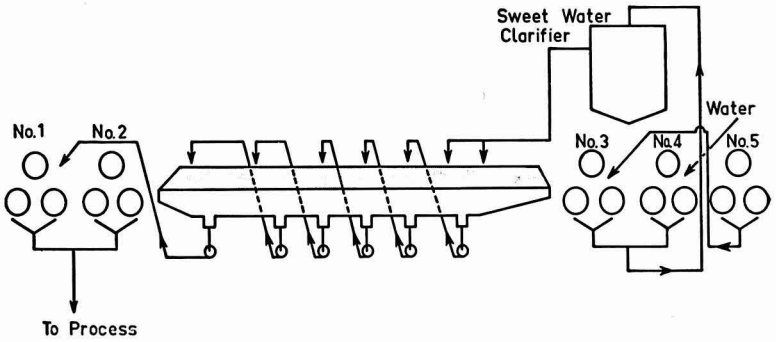

Fig. 1. Schematic layout of diffusion and milling equipment at Fairymead

Early commissioning difficulties

In common with most other diffusion installations, the main difficulty encountered in the initial stages of operation was associated with bed plugging and poor percolation. No means of clarification of press juice were provided in the initial installation, and attempts were made to overcome plugging difficulties which occurred in the area of application of the press juice by disturbing the bed mechanically with the aid of agricultural scarifier tines. This was of very limited benefit, however, as the plugging zone was simply removed to a greater depth in the bed.

Attempts were then made to remove the plugging constituent by fine screening of press juice using "Sweco"-type vibrating screens, and further immediate remedial steps included the installation of hydrocyclones. Concurrent investigational work, however, confirmed by subsequent information from other countries, disclosed that the plugging constituents were of a particle size (< 325 mesh) which obviated any chance of effective removal by mechanical methods, and conventional clarification was adopted by rearrangement of the existing clarification station. During the introduction of the diffusion system considerable emphasis had been noted in reports from overseas that dewatering of bagasse which had been subjected to an extended diffusion period was a process fraught with difficulty in so far as normal milling equipment was concerned, the inference being that not only did the nature of the material cause extreme feeding problems, but also that subtle changes in physical characteristics occurred which impeded free drainage of the expressed fluid from the blanket in its passage through the mill. For these reasons a slightly conservative approach was adopted initially, and the setting of the mill handling the material leaving the diffuser was made rather wider than would be normal for the 3rd mill in a train.

Operating experience soon showed, however, that with the use of an adequate feed hopper and adoption of current normal feeding methods (in this instance a light duty 2-roller feeder) quite normal settings could be carried. The only departure from normal practice was the use of a fairly high mill ratio (about 2·9:1) and 1-inch pitch 30° grooving on feed and top rollers in lieu of 1-inch pitch 35° which has been normal in all other units of this milling train.

Currently, fibre rates of over 36 tons/hr have been handled by the dewatering mill at a peripheral speed of 37 ft/min, yielding bagasse from No. 3 mill of 50% moisture. Normally the material leaving the diffuser has a juice content of 84–85%. With a heavy-duty feeder equipped with underfeed roll, in lieu of the 2-roll feeder, there is no reason to doubt that moistures consistently below 50% could be achieved in this unit. Provided reasonable diffuser operating techniques are followed it is our considered opinion that the dewatering function following a diffuser is a completely normal operation, in so far as conventional milling equipment as used in Queensland is concerned.

Pilot plant experimentation related to practice

The results of various experimental studies of diffusion at pilot plant level have been reported elsewhere[1,2]. The general regression equation relating to 1st mill bagasse is as follows: $E = 3{\cdot}01S + 0{\cdot}10t + 0{\cdot}185T + 91{\cdot}2$, where E is extraction % pol in 1st mill bagasse, S is mean particle thickness in mm, t is temperature (°C), and T is time of diffusion in minutes.

These results showed that preparation has a most important effect. It is pertinent to note further that while all pilot plant studies showed that percolation rates decreased as preparation became finer[2], the net effect of increased fineness was always an increase in extraction level. One would, therefore, be tempted to expect that the same would be true at factory level; but operating experience at Fairymead indicates that this is not necessarily the case. It should be noted, however, that although the full size diffuser could have difficulty in operation on preparation as fine as some used in the pilot plant, it did receive much finer bagasse than any we have seen in other bagasse diffusion units. This will be readily appreciated when it is remembered that the cane was subjected to 1

[1] FOSTER and HILL: *Proc. 33rd Conf. Queensland Soc. Sugar Cane Tech.*, 1966, 111–119.
[2] FOSTER and SHANN: *Proc. 13th Congr. I.S.S.C.T.*, 1968, 142–149.

heavy knife set, 1 shredder and 2 crushing mills before diffusion.

When comparison is made of operating techniques, good reasons can be suggested for the differences between pilot plant and factory operations. The former equipment consisted of carefully packed towers, and the irrigating liquids used were clean and free from muds, etc. In addition, the beds were controlled to a just-flooded condition by means of liquid level sensing electrodes. At factory level, percolation rates may be affected by many factors, such as variations in cane variety, in condition of growth, variation in quantity and type of soil content and variation in quality of press juice clarification. Also, in practice, if percolation is retarded at one point in the diffuser, local flooding will extend to other areas and produce further problems. For this reason and in order to assist in maintaining the surface of the bed in a flooded condition, the areas for each liquid application in the Fairymead unit have been subdivided by the addition of rollers on the bed surface. In addition, an automatic flood control is provided for the press juice so that part of it is bypassed to the 1st receiving tank whenever the level of free juice in the top portion of the blanket exceeds a control setting.

Bed depths

Normal practice is to control the speed of the diffuser so that the bed depth at entrance is 6–7 ft. This results in a compacted bed depth towards the discharge end of the diffuser of 5·5–6·0 ft. On occasions bed depths both greater and less than this have been used, but the ranges indicated appear to give optimum performance. Undoubtedly, percolation tends to be more stable at lower bed depths, but as shown in the previous section the time factor is important, and performance suffers with lower bed depth for this reason. On the other hand, although for a given fibre rate, greater bed depths should allow greater residence time, the use of greater depths impedes percolation rates and tends to make operation more touchy, the practical consequence being a tendency to reduce recirculation rates to a degree where extraction is again adversely affected.

Percolation measurements

As part of the commissioning activities in 1965, dye tests were carried out to ensure that correct relative positions of application and collection of irrigating fluids had been chosen, and some adjustment of collection weirs was made as a result of these investigations. In the ensuing period, pilot plant and other observations showed that the bed offered greatest resistance to flow near the bottom owing to reduction of void volume caused by the weight of the overlying material. Best results, therefore, would be achieved by keeping the bed close to a flooded condition so that all the material is thoroughly wetted and maximum flow rate achieved.

With the co-operation of Fairymead Sugar Co., the Sugar Research Institute decided in 1967 to initiate factory scale trials to measure percolation rates as attained in normal practice. Initially, to do this, narrow troughs were installed at seven points over one irrigation area. These extended over the full width of the bed, and in effect each collected the drainage over an area of 1·77 ft² of bed. The troughs were arranged to drain into small measuring tanks so that flow rates could be determined for each sampling area.

Initial flow measurements disclosed some surprising results. In many cases percolation rates of rather less than 1 gal/ft²/min were found. This was far below the normal percolation capacity of the bed, but was probably due to a combination of several factors, the chief of which was a tendency on the part of the operator to restrict flow to a level which could never cause flooding. In addition, over extended periods control valves could, especially in the partly closed condition, become fouled with bagacillo particles to the extent of seriously reducing pumping rates. In the authors' view this provided confirmation that the provision of flow monitoring equipment is very important for the correct operation of a diffuser. Using the measured percolation rates at sample points as a guide, irrigation rates were augmented and Table I gives an indication of typical percolation rates measured during this period. (See also Fig. 2.)

Table I. Percolation rates in 1966

	Sampling point No.						
	1	2	3	4	5	6	7
Percolation rate (gal/ft²/min)	2·5	2·7	2·5	2·4	3·5	2·9	1·6

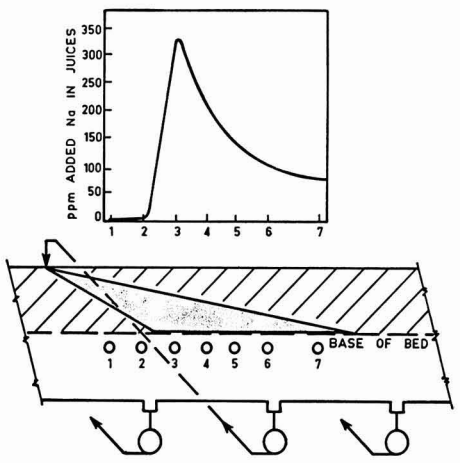

Fig. 2. Percolation pattern as shown by salt tests

Concurrently with flow measurements a further check on percolation drainage distribution was made using salt concentration techniques, as difficulty had been encountered in establishing precision with the dye tests. The results of these tests are shown in Fig. 2, which indicates that the correct position on

Table II. Percolation flow measurements in 1958

	Imbibition water flow (gal/hr)	*Temp. (°F)*	*Sweet water (gal/hr)*	*Draft (gal/hr)*	*Recirculation pump flow* (gal/hr)* 1	2	3	4	*Diffuser speed (ft/min)*
	12000	189	45000	11800	34200	39600	57000	51200	3·8
	12000	178	39000	11500	27600	33000	48000	48000	3·2
	12000	165	45000	11500	18000	31200	36000	54000	3·8
	12000		39000	12000	24000	30000	42000	54000	
Ave.	12000		42000	11700	25950	33450	45750	51800	

*Recirculation paths numbered from discharge end of diffuser

the collection area for this percolation stage would encompass sampling points 3–6. As a matter of interest one weir division was shifted approximately 3 ft as a result of the tests.

As a continuation of these experiments, flow meters were installed on four recirculation paths for the 1968 crushing season, and with the aid of this equipment further upward adjustment of average percolation rates was possible without incurring operational problems. The average results of several of these tests are shown in Table II, and the average percolation rate over the total application area was of the order of 5·9 gal/ft²/min.

Measured over the total available drainage area from the bottom of the bed, drainage rates are of necessity somewhat lower than this, but a reasonable estimate would be in the region of 3·5 gal/ft²/min which is considerably in excess of the figures achieved in the 1967 tests. It should be noted that flow measurement is now a normal operational aid and enables the diffuser to be operated very largely in a flooded rather than a percolating condition.

Diffuser performance

To indicate the effect of developmental work on the Fairymead diffuser, averaged results for test series carried out in 1966 and 1968 are shown in Table III. A summary of the data in Table IV shows both incremental extraction by each unit, and also the progressive total extraction. There is a marked improvement in the 1968 results. This is due to improvements in both diffusion and milling operations, No. 3 mill in particular giving improved performance as a result of grooving and setting modifications. If the 1966 data for No. 3 mill bagasse are adjusted to the 1968 fibre content of 44·7, the incremental extraction from No. 2 to No. 3 mill of 58·4%, making reasonable assumptions for the Brix of the extra juice removed, becomes 66%. This is still significantly lower than the value of 67·9% obtained in 1968, and it is considered that the extra performance can be attributed to the provision of equipment which allowed percolation rates to be monitored, to more effective separation of the various passes, and to effective control of transient flooding conditions, especially in the area of application of press juice. As stated above, average percolation rates into the bed in 1968 were in excess of 5 gal/ft²/min. No exact flow rates are available for 1966, but it is considered they would not have exceeded 3 gal/ft²/min.

Table III. Analytical data for Fairymead milling-diffusion system

		Periods 10–19th Oct 1966 (9 × ½ hr tests)	9–14th Oct 1968 (4 × ½ hr tests)
Sweet water (gal/hr)		34,000	42,000
Imbibition water (gal/hr)		13,600	12,000
,, ,,	(% fibre)	187	160
Cane	Pol	16·02	16·99
	Fibre	14·11	14·09
Mill No. 2	Pol	8·03	8·58
	Brix	9·63	9·74
	Fibre	37·61	40·05
	H_2O	52·85	50·20
Mill No. 3	Pol	4·56	3·07
	Brix	4·79	3·68
	Fibre	40·05	44·67
	H_2O	55·16	51·62
Mill No. 4	Pol	2·77	2·09
	Brix	3·52	2·63
	Fibre	45·09	46·25
	H_2O	51·36	51·13
Mill No. 5	Pol	1·83	1·42
	Brix	2·48	1·89
	Fibre	47·81	50·83
	H_2O	49·70	47·10
	Fineness (mm)	4·49	
Diffuser temperature (°F)		180–190	180–190
Crushing rate (tch)		231	238
Fibre rate (tch)		32·6	33·5
Fibre residence time (min)		30 (approx.)	30 (approx.)

Table IV. Summary of pol extractions in Fairymead milling-diffusion system

	Year 1966		1968	
Mill No.	*Total extraction*	*Incremental extraction**	*Total extraction*	*Incremental extraction**
2	81·33		82·24	
Diffuser		58·38		67·93
3	92·23		94·54	
		32·62		34·35
4	94·76		96·26	
		36·27		38·15
5	96·64		97·69	

* Calculated as in following example:

Extraction by No. 3 mill + diffuser =

$$100 \times \frac{\text{pol \% fibre No. 2 bagasse} - \text{pol \% fibre No. 3 bagasse}}{\text{pol \% fibre No. 2 bagasse}}$$

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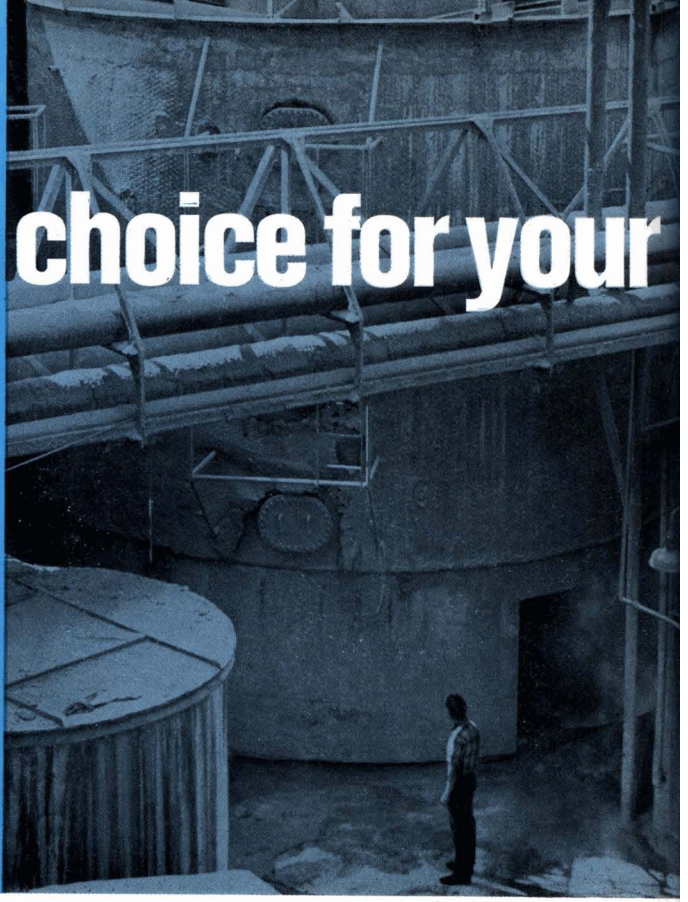

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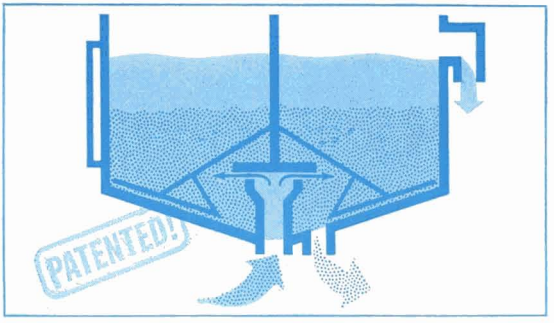

Introducing the feed into a previously formed active sludge drastically reduces the distance the settled products must travel. Incoming feed juice, treated with a few ppm. of synthetic polymer, enters the unit and is deflected horizontally within the previously formed active sludge bed by a baffle plate. The resulting flow pattern is a rolling one, with juice percolating and filtering upward as particles agglomerate and settle. As juice continues to enter the unit, the clarified effluent is taken off the top. The line of demarcation between sludge blanket and clear effluent is quite sharp; thus it can be used for control of sludge withdrawal. A sludge rake aids further compaction.

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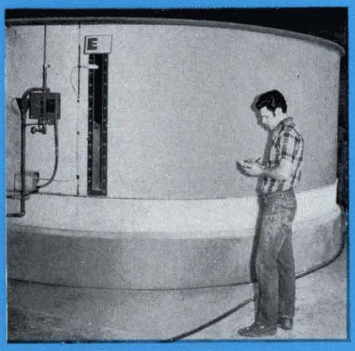

ENVIRO-CLEAR Clarifier

THE PERFORMANCE: faster, smaller, simpler, better!

COMPARATIVE SIZE DATA (NOMINAL VALUES) APPLICATION, 1st CARBONATION		
	ENVIRO-CLEAR SETTLER	CONVENTIONAL SETTLER
Diameter, feet	14	26
Height, ft., liquid straight side	4.5	17.75
Number of trays	1	4
Settling area, sq. ft. (ONE TENTH THE SIZE)	154	2100
Volume, cu. ft. (ONE TENTH THE SIZE)	777	9400
Retention time, minutes (ONE TENTH THE TIME)	7.2	88
Flow rate, U.S. GPM/sq. ft. (ONE TENTH THE TIME)	5.2	0.38

This comparison also can be applied to (1) heated cold Steffen filtrate or (2) beet flume water.

SEPARATION IN MINUTES!

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- avoids undesirable side-reactions
- speeds start-up and shut-down
- immediate response to corrections
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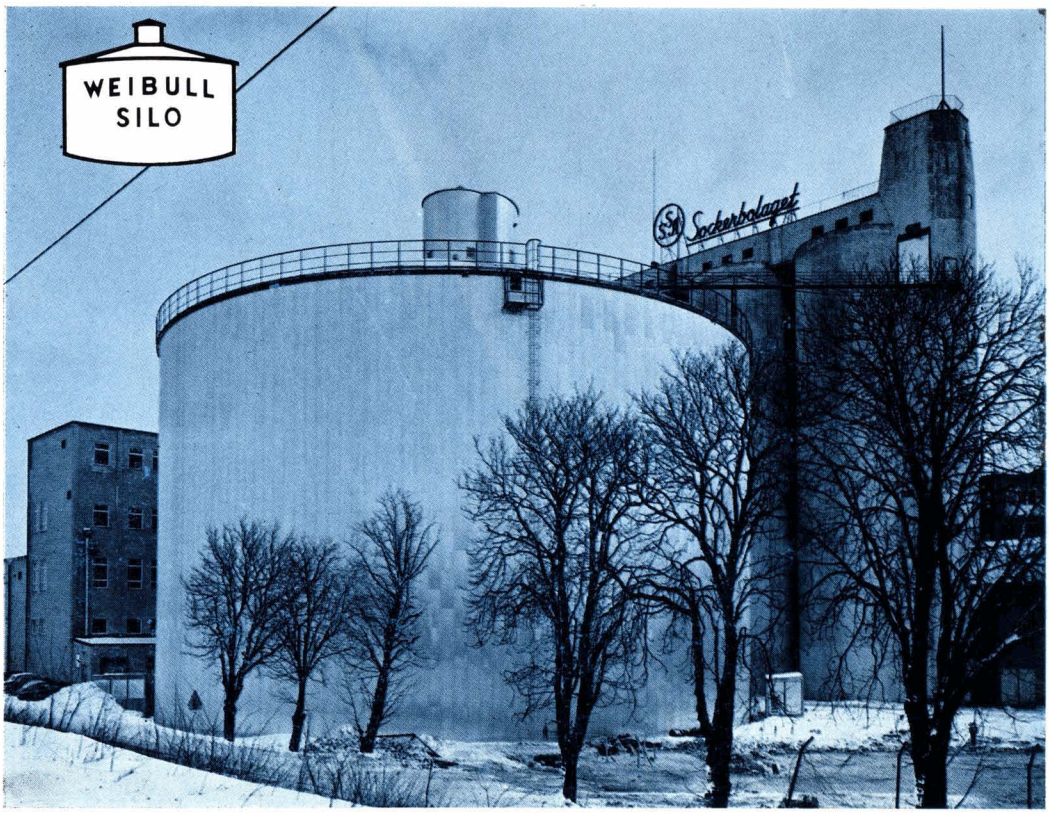
Sugar industry silos for white and raw sugar



Above, a 10,000 ton white sugar silo built in 1933.
It was enlarged in 1961 to take 30,000 tons.

We also design, manufacture and install to meet individual requirements and follow it up with service, besides producing equipment for

- Tare houses and laboratories for sugar analysis.
- Sugar centrifugals (ASEA-WEIBULL).
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have been supplied and installed by us in the following countries:

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One important deduction can be made from the incremental extractions obtained by the diffuser plus No. 3 mill. This concerns the relative gains to be made by adding a diffuser to an existing 5-mill tandem (in this case 78-in mills). Experience in Queensland indicates that an intermediate mill of this size with a light duty feeder in a 6- or 7-mill tandem with imbibition quantity of the order of 200% on fibre and with a relatively short time in an intermediate carrier would contribute 30–33% incremental extraction at the fibre rates shown for the Fairymead experiments. On this basis the comparative data shown in Table V have been calculated and it is considered conservatively that the diffuser at Fairymead as presently operated is equivalent to 1·5 crushing mills. In this calculation 200% imbibition is assumed for milling, but the quantity used on the diffuser at Fairymead was considerably less (see Table II) only because of limitations in evaporator capacity. Better performance would be obtained with additional imbibition.

Table V. Fairymead 1000 ft² diffuser at 33 tons fibre/hr

Extraction by one 78-in mill with light duty feeder	*No. of crushing mills to give performance equal to that of the diffuser*	
	1966	1968
30	1·5	2·2
33	1·2	1·8
35	1·0	1·6

The original choice of size of this diffuser was made principally on the basis of the space available for its installation. The general data available at the time of installation dealing with the performance which might be expected in operation on relatively fine, partially milled bagasse were meagre. An economic assessment of any projected diffuser installation can now be made on a basis similar to that described above, due allowance also being made for savings which would accrue from reduced maintenance and operating costs.

(To be continued)

Polish equipment for the sugar industry

A SPECIAL 6-day session held in Poland from the 17th to the 22nd June 1972 had as its theme the contribution made by Polish equipment manufacturers to the chemical, and particularly sugar, industries.

Participants, representing West European technical publications, gathered in Poznań where the first official function was a breakfast in the Hotel "Wielkopolska" at which the journalists (from Italy, Sweden, West Germany and the UK) were welcomed on behalf of the organizers of the Poznań International Fair and the Polish Chamber of Foreign Trade.

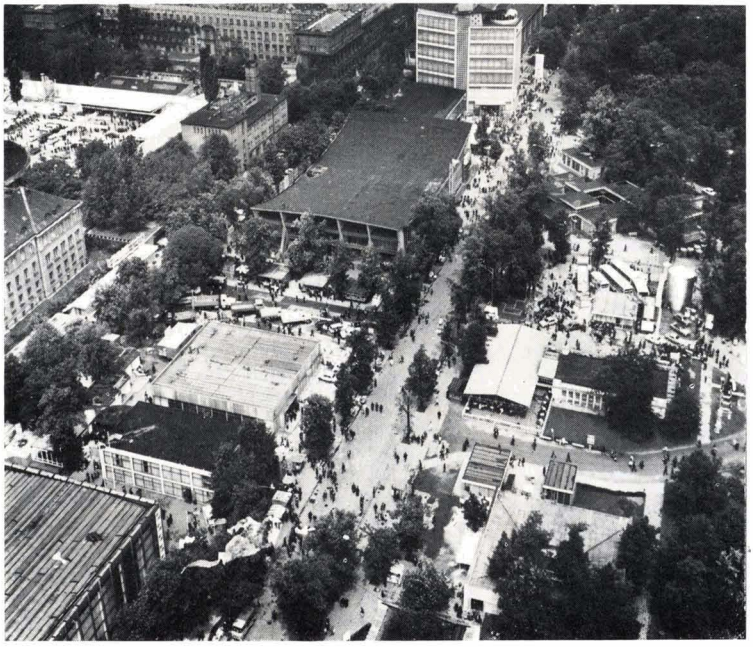

Fig. 1. Bird's-eye view of Poznan International Fair

This was followed by a visit to the 41st Poznań International Fair (PIF) at which a meeting was held with representatives of CHEMAK and POLIMEX-CEKOP. (The former organization is an association of 14 concerns which manufacture various types of equipment for chemical plants; CHEMADEX, one of the 14 manufacturers, designs and builds complete plants including beet and cane sugar factories. POLIMEX-CEKOP is a limited liability company acting as an import-export agency covering several specialized industrial divisions, including a Sugar Industry Division.)

ห้องสมุด กรมวิทยาศาสตร์

Among items exhibited at the PIF were a 1:75 scale model of the Xanthi beet sugar factory designed and built for the Greek sugar industry and planned to start operations in September 1972. Designed to handle 4000 tons of beet daily with the possibility of expansion to 5000 tons/day, the factory has been constructed in only 17 months and is the 40th complete sugar factory to be supplied by CHEMADEX. (It is understood that an order for another Greek sugar factory has been secured by CHEMADEX.) Another model of interest was that of a beet sugar factory supplied to Iran and incorporating a Steffen molasses treatment plant. Other models of pieces of equipment included a lime kiln, a sugar dryer (manufactured under licence from Newell Dunford Engineering Ltd.), a sloping trough diffuser (made under licence from A/S De danske Sukkerfabrikker) and a vertical shaft beet slicer having a capacity of up to 5000 tons of beet/day and in which the frames are changeable during operation of the machine, the speed of which is continuously controlled.

Full- and laboratory-scale equipment also to be seen at the PIF included a horizontal F-80 filter thickener of 80 m² filtration surface operating under a pressure of 0·3–0·8 atm and divided into 9 compartments rotating at 0·06–0·28 rpm, a 75-m² rotary vacuum filter and a 180-m² vertical beet pulp press with a throughput of 900 tons a day, in which the scroll rotates at 4 rpm, power being supplied from two motors mounted on top of the press housing.

The evening of 17th was spent at a splendid performance of *La Traviata* at the Opera House.

After a further visit to the PIF during the following morning, the party of journalists travelled by train via Wroclaw to the ancient town of Opole in Upper Silesia. From here, on the next day, they went by road to Nysa, about 50 km south-west of Opole and very near the Czechoslovakian frontier. At Nysa a tour was made of the ZUP (Industrial Equipment Works), another member of the CHEMAK group, which was established in 1945 to produce castings for railway and agricultural equipment. After a period during which it was concerned with repairing distillery and sugar factory equipment, the factory changed over to manufacture of sugar factory plant, hydraulic presses, heat exchangers and boiler fittings, and since 1955 has been the major Polish exporter of plant for the chemical and sugar industries. ZUP Nysa manufactures the DDS-type diffusers, stone catchers, filters, beet slicers, beet washers, pulp dryers, vertical and horizontal pulp presses and briquetting plant. (Other sugar factory equipment is made at Swidnica, Wronki and Kluczbork, which were not included in the programme.) While at ZUP Nysa, the visitors observed plenty of activity, including the aluminizing of diffuser scroll segments using a pressure spray and the handling of equipment in various stages of construction, including some destined for the East German sugar industry.

After returning to Opole, the party boarded the train for Kraków, travelling via Katowice, the centre of a very important industrial area containing the Silesian coalfields.

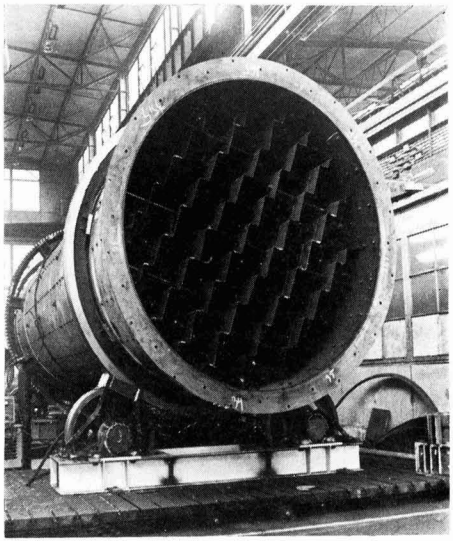

Fig. 2. Beet pulp dryer under construction at ZUP Nysa

The next stage in the official programme involved a visit to the CEBEA Central Design Office for Chemical Equipment in Kraków. Established in 1947, the office was first concerned with boiler-making problems. Eventually some departments developed to such a level that they became separate units. In 1963 CEBEA became the Polish centre for the design and standardization of equipment used in chemical engineering, the sugar industry and associated fields such as dust separation, hydraulic pressing, fluid drives and compressors.

Discussion during the visit was concentrated on the sugar industry, and films were shown about the Hrochuv Tynec and Hrušovany beet sugar factories (each with a daily slicing capacity of 4000 tons of beet) built by CHEMADEX in Czechoslovakia. The work undertaken by Poland in East Germany, involving the modernization of many sugar factories (18 have been modernized in 1970–1971, while the first factory to be so treated was Helmsdorf in 1969), was also described. Much technical information on Polish sugar factory equipment was supplied by the many technologists present at the meeting.

A tour of the COCH Research Centre for Industrial Refrigeration Plant, which is responsible for planning, design, pilot-plant construction and testing of units and pieces of equipment used in the refrigeration field, concluded the morning's programme.

The afternoon was spent on a conducted tour of Kraków, which, beside being an important industrial centre is also an ancient city and former capital of Poland. It has many old and famous buildings, including the 16th Century cloth hall and the Jagiellonian University (founded by Kazimierz the

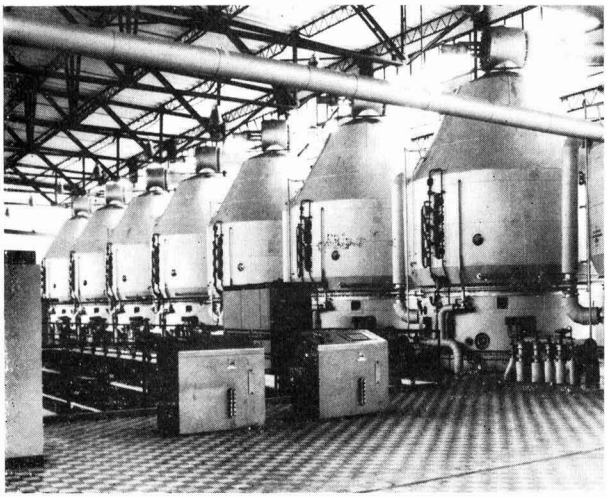

Fig. 3. Pan station at Hrochuv Tynec in Czechoslovakia

Great in 1364 and one of the oldest in Europe) at which the great astronomer Copernicus was a student. The most important building in Kraków, however, is the royal fortress, the Wawel, built by the Polish kings in the 11th Century above a steep cliff on the north bank of the Vistula and acting as nucleus of the city. The Wawel is a treasury of Polish history, and the Cathedral within its walls is the resting place of many of Poland's kings and queens.

From Kraków the journalists flew, on the morning of 21st June, to Warsaw. The flight took them over typical eastern Polish country, with rolling plains and considerable tracts of forest, an indication of the importance of forestry and agriculture even in modern Poland.

On arrival in the capital, the visitors made their way to the Club of the Chief Technical Organization (NOT), where they met representatives of the Polish technical press, including Mr. S. NIKIEL, the editor-in-chief of the Polish sugar journal *Gazeta Cukrownicza*. It was pointed out that the Technical Periodical Publishers, a division of NOT, published 68 titles in 1971, representing 9 million copies printed in that year.

After lunch at the Hotel "Europejski", which is situated near the Tomb of the Unknown Warrior and the Opera House, the journalists were taken on a conducted tour of Warsaw, including the Old Town (Stare Miasto), the Liazenki Park (in which is an imposing memorial to Chopin and the royal palace of the last Polish king as well as numerous royal lodges) and the Cathedral of St. John. Members of the party expressed admiration at the achievement of rebuilding Warsaw, as it originally was, from the ruins of World War II, when 85% of the city was razed to the ground. During the evening the party attended a performance of *Die Fledermaus* at the Operetta Theatre.

On the morning of 22nd June a visit was paid to the Warsaw Pump Factory, which was established in 1908 to produce small centrifugal pumps, orchard spray pumps and steam pumps for clean water, mainly to meet the need of sugar factories. Now the factory produces many different types of pumps for various industries, although most of the products are made to special order on a "one-off" basis rather than mass-produced. During the tour, pumps for use in the sugar industry were evident, particularly the 40R95 rotary beet pump. Considerable research into the problem of erosion caused by sand and grit in flume water has led to the development of this pump, which has been found to be virtually free from erosion after long use. After the main factory, the visitors were taken around the training school, where apprentices undergo a 3-year course in draughtsmanship, engineering and general workshop practice including welding.

The 6-day programme concluded with a luncheon at the Hotel "Europejski" at which final speeches were made on behalf of the Polish hosts and their guests.

Generally, the visits were enlightening and demonstrated the considerable efforts being made by Poland to establish itself in the forefront of the world's manufacturing industry, particularly in the construction of sugar factory equipment and of complete beet and cane sugar factories. While it has been admitted that many items are built under licence from outside

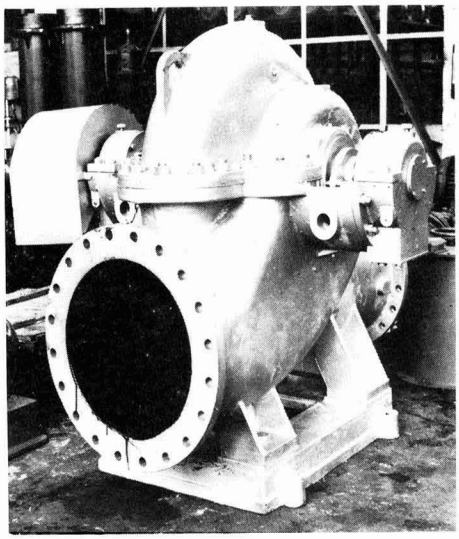

Fig. 4. Pump for pure and slightly contaminated water as well as sugar juices under construction at the Warsaw Pump Factory

Poland, it was evident that the engineers and designers are making a valuable contribution by suggesting and carrying out modifications to suit particular requirements. The Polish organizations have had much experience in the chemical engineering and sugar industry fields, and their enthusiasm for meeting the requirements of modern sugar manufacture has been clearly evident.

Cane response to nitrogen fertilization

By M. K. SHINGAREY and J. R. KAKDE

(Punjabrao Krishi Vidyapeeth, Akola, India)

MAHARASHTRA is known to produce very high yields of sugar cane in India, and recovery is also high. The crop is locally heavily manured, and the nitrogen doses for adsali[1] planting are the highest in the Deccan area of the State. In order to determine the optimal fertilizer application level, experiments were conducted at the Sugarcane Research Station, Padegaon, during 1960–61 to 1968–69.

Methods and Materials

The cane and sugar data used in the present paper were obtained from the Agriculture Department, Maharashtra. The data in question pertain to one completed experiment (randomized block design, 1965–66 to 1968–69) at the Sugarcane Research Station, Padegaon, on adsali plant cane with different levels of nitrogen.

Levels of 150 lb P_2O_5 and 150 lb K_2O were applied per acre as well as 10 tons farm yard manure. Nitrogen was applied in the form of ammonium sulphate in amounts of 0, 150, 300, 450 and 600 lb/acre. The variety of cane grown was the currently dominating Co 740.

Analysis of variance showed that the results were significant. Since data for both cane and sugar tonnage were available, their economic analysis has been carried out for both to facilitate comparison. Sugar yields were available for 4 years, but the yield data for cane pertain to 5 years and hence the results are not strictly comparable.

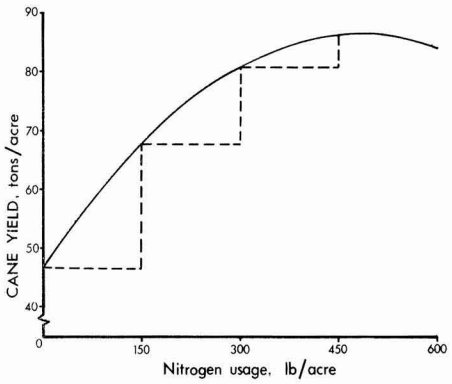

Fig. 1. Sugar cane response to nitrogen

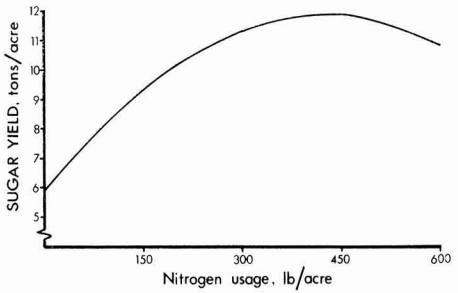

Fig. 2. Sugar response to nitrogen

Economic analysis of the data was carried out by fitting a production function. A simple quadratic function ($y = a + bx + cx^2$) was preferred as there was only one variable and the function also explained increasing and decreasing returns.

Results and interpretation

The response equations developed for sugar cane and sugar were as follows. Knowledge of the response curve is useful in determining the economical use of fertilizers.

Sugar cane

$$y_c = 46{\cdot}6226 + 0{\cdot}16656\,x - 0{\cdot}00017372\,x^2 \ldots . (1)$$
$$\qquad (0{\cdot}04702)^* \quad (0{\cdot}00003846)^*$$
$$R^2 = 0{\cdot}8987$$

Sugar

$$y_s = 5{\cdot}877475 + 0{\cdot}2280061\,x - 0{\cdot}000032785x^2 . . (2)$$
$$\qquad (0{\cdot}0009924)^* \quad (0{\cdot}000002319)^*$$
$$R^2 = 0{\cdot}8594$$

* Figures in parenthesis are the standard errors of the respective coefficients and indicate that the coefficients are significant at 1% level.

[1] Adsali cane is an 18-month crop planted in July.

where y_c and y_s are the yields of cane and sugar, respectively, in tons/acre, and x is the quantity of nitrogen in lb/acre.

The values of R^2 indicate that about 90% of the variation in the yield of cane and about 86% of the variation in the yield of sugar is associated with the use of the variable factor, i.e. nitrogen.

Derived yields

The derived yields at various levels of nitrogen application can be determined by substituting the dose of nitrogen for x in the above response equations. The derived yields at various levels of application of nitrogen are given in Table I.

Table I

	Cane		Sugar	
Nitrogen, lb/acre	*Yield, tons/acre*	*Increment in yield, tons/acre*	*Yield, tons/acre*	*Increment in yield, tons/acre*
0	46·6226	—	5·8775	—
50	54·5163	7·8937	7·1958	1·3183
100	61·4414	6·9251	8·3502	1·1544
150	67·6989	6·2575	9·3047	0·9545
200	72·9558	5·2569	10·1673	0·8626
250	77·4051	4·4493	10·8291	0·6618
300	80·9558	3·5507	11·3287	0·4996
350	83·6379	2·6821	11·6635	0·3348
400	85·5517	1·9138	11·8343	0·1708
450	86·3963	0·8446	11·8413	0·0070
500	86·4700	0·0737	11·6943	—0·1470
550	85·6803	—0·7897	11·3633	—0·3310
600	84·0194	—1·6609	10·8785	—0·4848

It may be observed that each additional dose of 50 lb nitrogen adds less and less to the total product. At 500 lb application of nitrogen (450–500), the sugar cane yield reaches a maximum, and thereafter it starts to decrease. Similarly, sugar yields are maximum at 450 lb (400–450) application of nitrogen and thereafter total yield of sugar starts decreasing. The relationship between response and treatment is not a discrete one but a continuous one and therefore each unit of input affects the yield. The treatment which affords the maximum yield may be obtained by equating to zero the first differential of the response equations, viz:—

Cane

Since $y = 46{\cdot}6226 + 0{\cdot}16656\,x - 0{\cdot}00017372\,x^2$

$$\frac{dy}{dx} = 0{\cdot}16656 - 0{\cdot}00034744\,x \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$\therefore$ Maximum yield is given where $x = \dfrac{0{\cdot}16656}{0{\cdot}0034744}$

$= 479{\cdot}39$ lb/acre.

The maximum cane yield is then 86·5469 tons/acre.

Sugar

Since $y = 5{\cdot}877475 + 0{\cdot}0280061x - 0{\cdot}000032785x^2$

$$\frac{dy}{dx} = 0{\cdot}0280061 - 0{\cdot}00006557\,x \quad \ldots\ldots\ldots\ldots (4)$$

and maximum yield is given where $x = \dfrac{0{\cdot}0280061}{0{\cdot}00006557}$

$= 427{\cdot}12$ lb/acre which gives a yield of 11·9620 tons sugar per acre.

Application of more than 479·39 lb of nitrogen will cause a decrease in the total yield of cane while more than 427·12 lb nitrogen will reduce the total yield of sugar. Thus, with the fixed doses of P_2O_5 and K_2O (the recommended optimum doses in the state), maximization of sugar cane output through application of nitrogen will not bring about maximum output of sugar.

Maximization of profits

The farmer is not interested in obtaining maximum physical output, but in obtaining maximum profits. Profit maximization occurs at a level where the marginal value of the product equals the marginal cost of the resource. In other words the marginal physical product (MPPx) of the resource must equal the ratio of the price of the resource to the price of the product, i.e. MPP$x = \dfrac{Px}{Py}$, where Px is the unit price of input (nitrogen) and Py is the unit price of product (sugar cane). Determination of the optimum level of nitrogen application necessitates information about the prices of input and output.

The optimum level of fertilizer application may be determined by giving the value $\dfrac{Px}{Py}$ to the differential equations (3) or (4), where Px is the price of nitrogen per pound and Py is the price per ton of cane or of sugar respectively.

Under the conditions existing in Maharashtra $Py =$ Rs. 100 per ton for cane and Rs. 1500 per ton for sugar, while $Px =$ Rs. 1·50 per pound of nitrogen. Thus, for sugar cane

$$\frac{dy}{dx} = 0{\cdot}16656 - 0{\cdot}00034744\,x = \frac{1{\cdot}50}{100} \quad \ldots\ldots\ldots (5)$$

from which $x = 436{\cdot}12$ lb.

Thus 436·12 lb nitrogen at the above prices of nitrogen and sugar cane yields maximum profit. The yield that would be obtained at this level of application is 86·2226 tons per acre. Beyond this level of nitrogen the value of the additional yield of cane would not cover the cost of the additional unit of fertilizer.

For sugar,

$$\frac{dy}{dx} = 0{\cdot}0280061 - 0{\cdot}00006557\,x = \frac{1{\cdot}50}{1500} \quad \ldots\ldots (6)$$

whence $x = 411{\cdot}86$ lb. The yield of sugar at the level of application of 411·86 lb nitrogen per acre is 11·8507 tons per acre.

Since the prices of nitrogen and of cane and sugar are subject to variations, the optimum level of application of nitrogen would also vary and would have to be worked out in the same way as that above. Increased doses of nitrogen would also add to the labour cost for its application and also because of harvesting a larger output of sugar cane; this has been ignored in the above analysis, as has also the cost of manufacturing an increased output of sugar.

Assuming a constant price for cane or sugar, the most profitable level of nitrogen (and thus nitrogen

fertilizer demand) will be related to the price of the fertilizer, and values of the latter (p_N) can be calculated for levels of nitrogen application (x) by equating dy/dx to the ratio of p_N to the price of cane (p_c) or sugar (p_s), respectively, i.e.

$$\frac{dy}{dx} = 0{\cdot}16656 - 0{\cdot}00034744x = \frac{p_N}{p_c} \quad \ldots\ldots\ldots (7)$$

This is the point where the price of one pound of nitrogen is equal to the value of the extra cane or sugar it produces. With a value of Rs. 100 for cane and a nitrogen level of 400 lb/acre, the fertilizer price corresponding to maximum profits is 100 (0·16656 — 400 × 0·00034744) = Rs. 2·76 per lb. Table II gives corresponding prices for maximum profitability in the cases of various N levels and cane.

Table II

N level, lb/acre	*p_c, rupees*			
	60	80	100	120
100	7·96	10·54	13·18	15·81
150	6·87	9·15	11·44	13·73
200	5·82	7·77	9·71	11·65
250	4·78	6·38	7·97	9·56
300	3·74	4·98	6·23	7·48
350	2·70	3·60	4·50	5·40
400	1·66	2·00	2·76	3·31

Graphs for the relationship between nitrogen price and demand can be drawn, as in Fig. 3, separate curves existing for the varying cane prices.

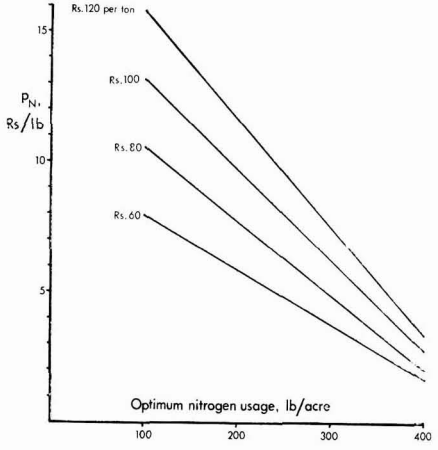

Fig. 3. Derived demand curve for nitrogen at different prices of sugar cane

Such curves can be combined in the form of a graph of optimum nitrogen usage or demand against the ratio of p_N to p_c; this is a representation of equation (7) and is given as Fig. 4. Optimum nitrogen applications, calculated from equation (7) for different values of the cane price and cost of nitrogen fertilizer are given in Table III. It will be seen that, although these prices vary, the optimum nitrogen figure is the same (443 lb/acre) for the three cases where the ratio of p_N:p_c is the same at 0·0125.

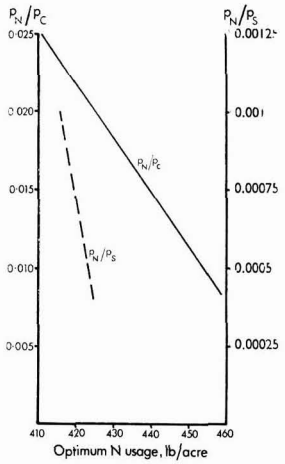

Fig. 4. Derived demand curve for nitrogen

Table III

Price of nitrogen, p_N (Rs. per lb)	*Price of cane, p_c (Rs. per ton)*	*Ratio p_N:p_c*	*Optimum nitrogen (lb/acre)*
1·0	60	0·0167	431
1·25	60	0·0208	419
1·5	60	0·0250	407
1·0	80	0·0125	443
1·25	80	0·0156	434
1·5	80	0·0187	425
1·0	100	0·0100	451
1·25	100	0·0125	443
1·5	100	0·0150	436
1·0	120	0·0083	455
1·25	120	0·0104	449
1·5	120	0·0125	443

In Table IV appear similarly calculated figures showing how the ratio of the price of nitrogen fertilizer to the value of the sugar produced affects the optimum level of nitrogen dosage.

Table IV

Price of nitrogen, p_N (Rs./lb)	*Price of sugar, p_S (Rs./ton)*	*Ratio p_N:p_S*	*Optimum nitrogen, (lb/acre)*
1·0	1000	0·00100	412
1·25	1000	0·00125	408
1·5	1000	0·00150	404
1·0	1500	0·00067	417
1·25	1500	0·00083	414
1·5	1500	0·00100	412
1·0	2000	0·00050	419
1·25	2000	0·00063	417
1·5	2000	0·00075	416
1·0	2500	0·00040	421
1·25	2500	0·00050	419
1·5	2500	0·00060	418

Here again, the same figure of 419 lb N per acre corresponds to a price ratio of 0·0005 and 412 lb/acre to a ratio of 0·001.

Sugar cane agriculture

Cane growers need period of consolidation. G. T. CRAWFORD. *Producers' Rev.*, 1971, **61,** (7), 3–5. In connexion with a wage claim by the Australian Workers' Union for an increase of $10 per week for all adult male wage rates the writer considers that Australian cane farms do not have the capacity to meet such increased labour costs nor was such an increase justified. Growers' incomes had "improved to the level of 1960" after several years of survival prices only. Growers badly needed a period of consolidation. They faced substantial repayments of capital debts which were a first call on incomes and they had a pressing need to re-equip their farms with new machinery if the industry was to remain competitive in the world market.

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Generation of varietal change. ANON. *Producers' Rev.*, 1971, **61,** (7), 17–19.—The cane variety position in Queensland today is compared with that which existed 26 years ago when the crop was made up largely of foreign canes such as Badila, POJ 2878, Co 290, EK 28 and 1900 seedling. The Queensland bred canes included Q28, responsible for some 9% of the crop, and Trojan and HQ 426, together making up 14%. Today, with the exception of the widely grown N:Co 310, locally bred or "Q" varieties predominate. What the position will be 20 years hence the writer wisely refuses to predict.

* * *

Switch to mechanical harvesting dramatic but orderly. G. T. CRAWFORD. *Producers' Rev.*, 1971, **61,** (7), 49–51.—A survey made immediately prior to the 1971 season revealed that 1560 chopper-type harvesters and 345 whole-stalk harvesters would handle 96% of the crop. An interesting table is given showing the dramatic increase in mechanical harvesting in Queensland over the past decade. The proportion of the crop harvested mechanically increased from 8·7% in 1962 to an estimated 96% in 1971.

* * *

Bureau survey shows growers' needs. K. C. LEVERINGTON. *Producers' Rev.*, 1971, **61,** (7), 53–55.—The Sugar Bureau conducts surveys among cane growers to find out their needs and to help evaluate priorities in research programmes. A recent survey in the Mackay area has reference to irrigation, and results of the survey and current experimental work are described. Another survey was concerned with the cane farmers' sources of information on fertilizers, pests and diseases, and cane varieties.

Fighting Fiji disease. C. G. HUGHES. *Producers' Review*, 1971, **61,** (7), 58–60.—The rapid spread of this serious disease in Queensland since 1969 is described and an account given of legislation and other measures designed to control it, including the elimination of susceptible cane varieties and development of resistant varieties. It is important that farmers should be able to recognize symptoms in their own cane.

* * *

Resistance of Krish sorghum to four strains of sugar cane mosaic virus in Queensland. D. S. TEAKLE and A. J. PRITCHARD. *Plant Disease Reporter*, 1971, **55,** 596–598.—The somewhat complex position of susceptibility of alternative host plants to sugar cane mosaic virus is discussed. When plants of Krish sorghum were grown in the field at Lawes in Queensland, the incidence of natural infection by a Johnson grass strain of sugar cane mosaic virus (SCMV) was regularly less than 3%. In glasshouse inoculations the incidence of systemic infection in Krish seedlings was regularly less than 30% for the Johnson grass, the sugar cane and the sabi grass (*Urochloa mosambicensis*) strains of SCMV, and was nil for the Queensland blue couch grass (*Digitaria didactyla*) strain. When all four strains of SCMV were inoculated together, infection in Krish seedlings was less than 40%. Efforts are being made to transfer the SCMV resistance of Krish sorghum to important grain and fodder sorghums.

* * *

Destruction of excess cane. C. R. NALDER and I. T. FRESHWATER. *Cane Growers' Quarterly Bull.*, 1971, **35,** 4–6.—In northern Queensland (Innisfail—Tully area) 170,000 tons of cane had to remain uncut in 1970. Very little of the cane was maintained or stood-over which meant that most of it had to be fairly promptly destroyed so that it did not adversely affect the ratoon crop. The methods adopted by different growers, depending upon machinery available, are described. It is some 16 years since growers were faced with the problem of destroying large quantities of cane, a melancholy or unpleasant experience for them.

* * *

H.48-3166—Central Area. A. A. MATTHEWS. *Cane Growers' Quarterly Bull.*, 1971, **35,** 7–8.—This Hawaiian variety was approved in 1968 for 8 Central District mills in Australia. It gives excellent plant crops, germinates well except in soil of low moisture, and shows early vigour, but ratooning is uncertain

and problems arise in mechanical harvesting. Advice to growers is: "If H.48-3166 has given good results on your farm, you would be well advised to persist with it. But, if the cane has given erratic results, it would be preferable to discard the variety in favour of a less spectacular but more reliable cane."

* * *

Are wallabies and kangaroos a nuisance on your farm? C. D. JONES. *Cane Growers' Quarterly Bull.*, 1971, **35**, 8.—Normally these animals do not attack cane plants unless their natural food is scarce, e.g. through drought. They can be deterred by the simple expedient of sprinkling ordinary blood and bone garden fertilizer on plants or rows round the perimeter of the field, for the animals appear to hate the smell of this substance.

* * *

Legumes in the Mackay district. E. A. PEMBROKE. *Cane Growers' Quarterly Bull.*, 1971, **35**, 9–11. The decline in the planting of legume cover crops that has taken place in recent years among cane growers is discussed. Uncertain supplies of seed and high cost are given as two of the reasons. In 1961 some 130 tons of legume seed was used, as against only 71 tons by 1967. Since then, however, the position has improved and more growers, conscious of the many benefits, are now growing cover crops, especially those in nut grass (*Cyperus rotundus*) areas. The benefits from legume crops include nitrogen fixation, weed control, suppression of nut grass, prevention of compaction by rain and minimizing of soil erosion.

* * *

A short history of striate mosaic disease. J. A. CURRIE. *Cane Growers' Quarterly Bull.*, 1971, **35**, 12–13. The varieties Pindar and Q57 are, fortunately, the only commercial varieties in the Burdekin area that are susceptible to the disease, the major varieties Q63, Q68, Q80 and Q85 being resistant. Distribution, symptoms and economic importance are discussed. With regard to control, advice to the grower is simply to switch to resistant varieties.

* * *

Nut grass—a weed pest. A. W. FORD. *Cane Growers' Quarterly Bull.*, 1971, **35**, 14–16.—This common cane weed, a sedge, is described and its potentially rapid rate of increase emphasized. In a glasshouse experiment a single tuber or "nut" had increased to 91 nuts after only 8 weeks. Although nut grass is a serious weed pest of cane, it can be kept under reasonable control by a common-sense combination of cultivation and herbicides. Most popular of the latter are 2,4-D and "Bromacil". Complete eradication may be achieved by fumigation with methyl bromide but this is too expensive for large-scale treatment; however, it could be only a matter of time before a chemical is developed which will enable nut grass to be completely controlled at an economical cost.

Yellow spot disease in North Queensland. B. T. EGAN. *Cane Growers' Quarterly Bull.*, 1971, **35**, 21–22. A severe epidemic of this disease caused heavy cane losses in 1971, owing to an abnormally wet season, which favours the spread of the disease. Innisfail had over 50 consecutive wet days, while cloud cover was heavy and rainfall above average. The symptoms and characteristics of the disease are discussed.

* * *

Cane grub new to Maryborough district. J. WRIGHT. *Cane Growers' Quarterly Bull.*, 1971, **35**, 23–24. A species of cane grub (*Antitrogus mussoni*) capable of causing severe damage has been discovered in the Maryborough district for the first time. Infestations have been associated only with sandy soil types. There are two other troublesome cane grubs in the area, i.e. *Lepidiota mungomeryi* and *L. frenchi*. The beetle and grub stages of *A. mussoni* are smaller than the other two and it has only a one-year life cycle as against a two-year life cycle for the other two species. Control may be obtained by applying a broadcast application of 308 lb of No. 20 crude BHC or 154 lb No. 40 BHC dust shortly before planting.

* * *

Aqua ammonia with ratoon fertilizer. A. A. MATTHEWS. *Cane Growers' Quarterly Bull.*, 1971, **35**, 27–28.—Cane growers who intend applying aqueous ammonia and ratooning mixture behind the same tine should check with the Bureau officer or fertilizer company representative to ensure that the phosphate in the ratooning mixture will not react with the ammonia, so changing from a soluble to an insoluble form. It should be remembered that the small saving in cost in applying could be more than offset by the reduction in the availability of the applied phosphate.

* * *

Birds are good neighbours. W. A. WEBB. *Cane Growers' Quarterly Bull.*, 1971, **35**, 29–30.—The benefits deriving from the presence of a number of bird species are discussed. The ibis or "farmers' friend" is a well known bird in the farming districts of Australia, including the sugar cane areas. Reference is made to the observations of R. W. MUNGOMERY in 1965 from which he concluded that the consumption of grubs by a flock of ibis could reach large proportions, even to the extent of a 75% reduction in grub population. It is thought that the ibis is gradually declining in numbers around intensively farmed areas, especially in the Burdekin area. The kitehawk or chicken hawk, which feeds on cicada nymphs, is well adapted to civilization, however, as is the raven which feeds on insects.

* * *

Some considerations for increasing profitability in sugar cane agriculture. T. CHINLOY and M. E. A. SHAW. *Proc. 1969 Meeting W.I. Sugar Tech.*, 43–47. Discussion is under three main headings: when to replant, the influence of cane quality on profitability, and profitability as a variety selection index. From data provided it is apparent that profits per acre

per annum rise to a maximum at the 3rd and 4th ratoon crops and then start declining. The replanting programme for maximum profitability should therefore be 20% of the area per annum, catering for a plant and four ratoon crops.

* * *

Re-examining experimental design for sugar cane. D. I. T. WALKER and J. C. HUDSON. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 48–60.—The authors believe conventional field trials to be rarely precise enough to give good answers to research problems or to give an adequate basis for recommendation to the farmer, at least on the scale normally feasible. They are already expensive and the cost is increasing. Although the investigations reported are incomplete it is thought they provide some stimulus to re-examine experimental programmes. There are three objectives: to reduce the area required by sugar cane experiments, to increase the ratio of information to "noise", and to ensure that the results are relevant to real-life agriculture.

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Observations on five commercial varieties grown in nutrient solution with different concentrations of sodium chloride. V. M. YOUNG-KONG and F. C. MCLEAN. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 16–70.—In Guyana soil salinity can be a major problem with cane. In the experiments described the five varieties of cane were grown on gravel and irrigated at intervals with a complete nutrient solution. They were exposed to different levels of salinity. Growth rates tended to decrease with increasing levels of salt. Flowering was completely inhibited in all varieties at the higher salt concentration. An important corollary to the investigation was the indication that a reassessment of optimum foliar levels of N, P, and K is required for new commercial varieties.

* * *

Land-forming for irrigation and drainage of sugar cane. J. A. KELLY. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 71–75.—Apart from catering for the use of infield machinery, land treatment or land forming is very necessary on many estates for irrigation purposes. There is evidence from recent Jamaican experience that surface irrigation of clays can be economically more desirable than their sprinkler irrigation, and further, to be no more demanding of available water resources. Other work has satisfied at least one large estate that land forming for surface drainage under humid conditions is the most desirable alternative to their present system of infield drains. Land forming work in Jamaica is at present limited by the lack of machinery and field engineering personnel. This problem is well recognized and efforts are being made to solve it.

* * *

Field experiments in Barbados on subsurface drainage using the trenchless installation principle. B. W. EAVIS and C. R. D. CRONEY. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 76–87.—The use of underground perforated plastic piping for drainage is steadily increasing in agriculture. The trenchless system of laying the piping, developed in England, is described. It is carried out by means of a powerful tracklayer tractor which has a large vertical blade mounted in the rear which cuts the trench for the plastic piping and greatly reduces costs. Its advantages in cane plantations are discussed, especially the elimination of surface drains, always an impediment with heavy mechanized equipment, such as tractors and harvesters.

* * *

An economic appraisal of flood fallowing of sugar cane fields in Guyana. V. V. PARVATAN. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 88–93.—Flood fallowing has been practised in Guyana from the early days of the sugar industry. Two-thirds of the area under cane consist of heavy clays which benefit from flood fallowing. The pros and cons of the practice are discussed, especially control of soil pests. The principles involved and the procedure adopted in the flood fallowing of sugar cane fields in Guyana are outlined. Financial estimates are made of some of the advantages accruing from flood fallowing. Because of the significant yield response which results from flood fallowing under suitable soil conditions, the annual loss of 7½% of total acreage does not reduce potential overall production. In fact 92½% of estates' acreage where flood fallowing is practised should outyield the 100% acreage which did not undergo flood fallowing.

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Phosphate responses in sugar cane in British Honduras. O. M. SEATON. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 94–100.—In British Honduras high phosphate fertilizing has been practised, possibly to too great an extent. This paper describes the relationship between leaf levels of phosphate, applied phosphate and cane yield. The results of 7 experiments investigating the effects on cane yield and sucrose content of POJ 2878 on a loamy sand and a sandy clay are presented. On the loamy sand high soil phosphate caused significant reductions in both cane and sucrose from 67½ and 135 lb/acre of added phosphate. Fertilizer phosphate at 67½ lb/acre increased cane yield in both plants and ratoons on the sandy clay but at 135 lb/acre yield response levelled off or declined even though native available soil phosphate was only 25 ppm. High phosphate application also produced a generally negative effect on juice quality. Leaf analysis proved useful in providing an index of phosphate status and indicated that the depressing effect of phosphate on yield was caused mainly by the imbalance created by consistent reduced absorption of nitrogen.

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Further work on the longevity of cane root systems. J. C. HUDSON. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 101.—A marcottage technique was used to examine the possibility that individual roots of different varieties might have inherently different life-spans in terms of their ability to support shoot growth, and

to determine whether this factor could explain the known differences in early juice quality between varieties. A table is given which shows the longevity of roots of 5 varieties of cane following marcottage. There does not seem to be a relation between root longevity and ripening characteristics though, of course, it need not be a causal relation. The age of the cane root when it is supporting the maximum growth rate is about the same for all varieties (i.e. about 2½ months from the emergence of the roots into the soil). However, there appears to be rather little communication between primary and secondary shoots of the late ripening varieties and a much greater contribution in the early ripening varieties; in the latter case a noticeably higher growth rate was recorded for the stalks supported by additional tillers after about four months of root age.

* * *

Herbicide and related investigations in Jamaica. R. BURGESS and J. TALBOT. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 102–111.—Two trials are reported which were carried out to measure the losses in yield resulting from varying intensities of weed competition and the effect on yield of weed competition at different stages of growth of the crop. Results obtained with numerous herbicides on many different weeds are given in tables. Two main factors influenced the performance of the herbicides at different sites: rainfall and weed species. "Gramoxone" and mixtures containing "Gramoxone" were the most effective. Other treatments were generally washed off the plants before they had time to act in the heavy downpours occurring in these areas. Of the residual pre-emergence herbicides "Gesaprin" was the most consistently effective on all sites.

* * *

Post-emergence weed control experiments in sugar cane with formulations of "Asulam" and "Ioxynil"/2,4-D. K. COOKE, C. G. PARKER and D. J. WILLIAMS. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 112–118.—Experiments are reported that were carried out in the West Indies to examine (a) the effect of added wetting agent on post-emergence weed control by "Asulam" at a range of doses and (b) the herbicidal activity of "Asulam" with and without added wetting agent in combined treatments with "Ioxynil"/2,4-D ester formulation. Results are summarized in a series of tables, including the susceptibilities of different species of weeds. Almost all major grass weeds were controlled to a commercially acceptable level for a period up to two months. These included *Leptochloa filiformis, Panicum fasciculatum, Digitaria* spp., *Echinochloa colonum, Eleusine indica, Brachiaria mutica* and *Brachiaria eruciformis.*

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Preliminary yield data of radiation-induced mutants in sugar cane. P. S. RAO. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 136–138.—The losses that can be incurred by the cane grower through profuse flowering (which has reached as high as 43% in Mexico) are discussed. Recent work at the West Indies Central Sugarcane Breeding Station has indicated that it may not be difficult to produce non-flowering mutants in some clones by irradiation. This paper presents the data on the yield components of subclones derived from irradiated clones.

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A note on the rôle of agricultural extension in the variety programme in Guyana. V. M. YOUNG-KONG. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 139–142. Increased assistance has been given in recent years to the managers of sugar estates in Guyana by Experiment Station staff in planning future planting and selection of the best cane varieties. Estates obtain their initial supplies of new varieties from the Guyana Sugar Experiment Station at Sophia in Demerara. This paper describes visits to the estates, showing how they reduce the gap between technologist and estate manager and assist in improving agricultural practices. Reasons are given for the rapid multiplication of the newer promising varieties.

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Field mechanization in British Honduras. O. M. SEATON. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 143–148.—In the last five years mechanization has made rapid strides in British Honduras. Reasons given for this are: (1) the rapid expansion of estate cane area to more than double, (2) a scarcity of workers in the areas where expansion took place, (3) the absence of tradition among unskilled workers to rely on the industry for their sole support all the year round, and (4) the acceptance by Government and estate management that mechanization was a necessity if the industry was to remain viable when world market prices were low. Methods of land preparation, field layouts, drainage, planting and crop maintenance are described.

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Field mechanization in the Jamaican sugar industry. T. CHINLOY, M. B. HARRISON and K. E. NEWMAN. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 149–152.—The various operations on an estate calling for mechanization are discussed in turn, such as land preparation, planting, fertilizing, weed control, drainage, pest control, cane cutting, cane loading, cane transport, land forming, irrigation, etc. Sociological implications are also discussed. Markedly fewer young male and female workers are entering the industry.

* * *

Engineering research on recumbent sugar cane harvesting and cleaning. J. E. CLAYTON and H. D. WHITTEMORE. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 156–159. An account is given of the history of sugar cane mechanical harvester development in the United States and of the nature of the research work at present being carried out on the subject. Base cutters, auger pick-up device and cleaners are discussed in turn.

Harvester development in Florida, Puerto Rico, Louisiana, Australia and Hawaii. J. E. CLAYTON. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 160–165.—In this paper the most recent mechanical harvester developments in each of the five countries mentioned in the title are discussed in turn. Developments from 1964 to the present time are also covered. The point is emphasized that different cane growing countries need different kinds of harvester to suit their particular conditions. Even in one country conditions may vary sufficiently to require more than one type of harvester.

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An industrial engineering approach to manual cane cutting. A. L. BALDWIN and M. W. FISHER. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 166–177.—This paper is an account of the cane cutter's work in Guyana and of the hand tool or tools used by him. The cutlass is the traditional tool. Numerous cane knives from other countries were considered and are illustrated with photographs. Industrial engineering techniques were applied to the investigation in Guyana and from an examination of the ergonomic aspects it was possible to specify an improved type of cane cutting knife. The knives specified were put into trial and were found to reduce work content of cane cutting by approximately 10% and to reduce stump length by just over an inch. An implementation programme was undertaken on estates and approximately 25% of the cane cutters employed by Bookers Sugar Estates Ltd. should be using the new type hand tools in the near future.

* * *

Mechanical planting of cane in the dry season in Barbados. J. C. HUDSON. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 178–179.—In Barbados the dry season planting of cane is not much practised because of the risk of failure. How success was obtained through watering at planting time is described, a gallon of water being supplied in the furrow for every plant.

* * *

Avoiding farm dam failures. E. G. SPRY. *Cane Growers' Quarterly Bull.*, 1971, **35**, (1), 31–33.—Recent floods in Australian cane areas have found the faults of some farm dams. Apart from the cost of rebuilding dams there is the loss of valuable water which may be needed, especially in the case of drought. The common causes of dam failures are discussed under four headings—poor siting of the wall, poor design, poor construction and lack of proper maintenance.

* * *

Statistical data for Pernambuco sugar cane crops over 14 seasons. C. E. F. PEREIRA. *Brasil Açuc.*, 1971, **78**, 8–9.—Figures relate to the seasons extending over the period 1957/58 to 1970/71 when cane production increased from under 7 million to over 10 million tons. Weights of sugar, in terms of refined and unrefined sugar, are also given.

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A journey to Peru as a delegate to the first Latin-American entomological congress, 12-18th April 1971. P. GUAGLIUMI. *Brasil Açuc.*, 1971, **78**, 27–29.—An account is given of the Latin-American Entomological Association, and its congress, including a list of the papers read relating to sugar cane pests.

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The distribution and sampling of the adult froghopper *Aeneolamia varia saccharina* **on sugar cane.** D. E. EVANS. *Trop. Agric.* (Trinidad), 1971, **48**, 255–262. The majority of the froghopper adults were found on the three uppermost leaves of the stalk, showing that the most suitable position for the spray-droplet collecting cards used in studies on ultra-low-volume insecticide application techniques was the mid-point of the second leaf. Assessment of the efficiency of the system of froghopper sampling, a modified form of that proposed by FEWKES and BUXO[1], which had been adopted by Caroni Ltd. for estate use, showed that samples of 200 stalks should be used for the first annual brood and 100 per field for later broods.

* * *

Identification of Raoul grass: first step in identification. ANON. *Sugar Bull.*, 1971, **49**, 272–275.—This grass is the latest weed threat in the Louisiana sugar cane belt. The grass often occurs in cane along with Johnson grass and is difficult to eradicate. A description of the weed, with photographs, is given to assist cane growers to recognize Raoul grass should it appear in their fields. [Raoul grass is *Rottboellia exaltata*—Ed.]

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Sugar cane irrigation and its timing. S. S. P. CHI and T. PO. *Sugar News* (Philippines), 1971, **47**, 204–210. Soil-water-cane relationships are discussed and the requirements of cane for water at different stages of its growth referred to. Since irrigation water application costs money it is economical to apply the water in proportion to the needs of the plant, which will depend not only on age but on time of planting, soil, etc. Instrumental methods for determining the available water in the soils (and, hence, when to apply irrigation) are described.

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Ecologic tests of some clones of the '59 series at the Luzon Experiment Station. A. M. GALVEZ, I. L. JIMENEZ, M. A. TETANGCO and M. A. PROVIDO. *Sugar News* (Philippines), 1971, **47**, 212–213.—Five varieties of the 1959 series bred at La Granja Experiment Station were compared with two commercial varieties at the Luzon Experiment Station during the crop year 1968–69. They were compared in regard to yield of cane, sugar yield, tillering and other agronomic characters. The heaviest average weight of stalk was registered by Phil. 591668.

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Review of variety trials in Luzon for crop years 1964-1969. A. M. GALVEZ *et al. Sugar News* (Philippines), 1971, **47**, 214.—These trials involve some varieties of the 1954, 1955, 1956, 1957, 1958 and 1959 series

[1] *Rpt. Tate & Lyle Central Agric. Research Sta.*, 1966, 116–146.

produced at the La Granja Sugarcane Experiment Station and the 1961, 1962 and 1963 series bred at the Tarlac Breeding Substation. Some varieties from Queensland, Taiwan, Hawaii, Coimbatore, Puerto Rico and Barbados were also involved in the trials.

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Screening of some sugar cane varieties to field rat preference. C. C. JESENA. *Sugar News* (Philippines), 1971, **47,** 222–224.—Rats cause losses by eating cane but even more by wounding stalks so that they become infected with diseases such as red rot. Of 58 varieties exposed to rats under controlled conditions only two, B 39246 and B 43337, were only slightly damaged, all the others suffering medium to severe damage. It is concluded that even by using less preferred varieties it is not possible to minimize rat damage to the crop.

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Independent tractor tests. ANON. *Australian Sugar J.*, 1971, **63,** 189–190.—A report of tests on ten tractors in the 45–60 h.p. range is discussed. This was done because of doubts expressed by cane growers concerning the advertised horse power ratings, as given by manufacturers. A table summarizes the results obtained. In most cases the horse power ratings from the tests were very similar to manufacturers' ratings. The report was released by the Australian Tractor Testing Committee.

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Investigations into problem soils. ANON. *S. African Sugar J.*, 1971, **55,** 415.—A concerted effort is being made to throw light on the reasons for poor cane growth on weak sandy soils in the main cane belt and on certain problem soils in the Midlands and at the Coast where an aluminium toxicity factor is suspected. Means of overcoming the problems economically are being sought.

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Operating costs of slew-type loaders. H. SCHMIDT. *S. African Sugar J.*, 1971, **55,** 429–431.—This paper was presented at a seminar organized by the Industrial Mechanization Committee in Natal and describes the changes made by the Umhlatuzi Sugar Co. in utilizing three slew-type loaders for handling the daily output of about 700 metric tons of cane. The various changes in equipment found necessary are described. Some drawbacks found were that short cane presented difficulties, that cane arriving at the mill was not as clean as hand-loaded cane, and that mechanical loading was not ideally suited to a tramway system. The cane cutter or labourer earns more but at no extra cost to the grower. It is felt that as wages increase in Natal mechanical loading will help to maintain present harvesting costs. There will be no return to hand-loading by the company concerned.

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The status of Raoul grass as a weed. R. W. MILLHOLLON. *Sugar Bull.*, 1971, **49,** 291–292.—General information is given on this grass weed of Louisiana cane fields. It was probably introduced from the West Indies or South America about 20 years ago and, unlike Johnson grass, it does not form creeping rhizomes but is spread purely by seed.

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Tassel control in Hacienda Progreso. S. S. GARRUCHO and V. RAMON. *Sugar News* (Philippines), 1971, **47,** 258–262.—The response of the variety Phil. 56-226 to "Reglone" treatment for tassel control gave an estimated increase of 13·557 tons of cane per hectare, an increase of 2·26% sucrose and a highly significant increase of 44·72 piculs of sugar per hectare, resulting in a considerable increase in net income.

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Resistance tests of some promising Phil. varieties to sugar cane smut. F. R. HUSMILLO. *Sugar News* (Philippines), 1971, **47,** 263–264.—Results are given of trials carried out by the La Granja Sugarcane Experiment Station from 1968 to 1970, work being carried to the first ratoon crop. The field-plot inoculation method was employed. Among the tested Philippine varieties 2 were rated as very highly resistant, 6 as highly resistant, 7 as moderately resistant, 3 as average, 12 as moderately susceptible, 1 as highly susceptible and another one as very highly susceptible. The two varieties recommended for commercial planting were Phil 6033, rated as highly resistant, and Phil 5698, rated as moderately susceptible. Results are summarized in a table.

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An inter-relationship between irrigation, manuring and kind of plantation. G. K. ZENDE. *Sugar News* (India), 1971, **3,** (1), 36–37.—Conclusions are drawn from experiments carried out at the Sugar Cane Research Station, Padegaon, relating to irrigation, fertilizers and time of planting. Maharashtra has higher yields of sugar cane than any other state in India. Irrigation needs to be applied at intervals but does not show a proportionate increase in cane yield above 115 acre-inches. Nitrogen in excess of 300–375 lb/acre does not give increased yields and is not economical.

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Use of different forms of fertilizers. V. P. VAIDYA. *Sugar News* (India), 1971, **3,** (1), 37–38.—It is emphasized that, in the fertilizing of sugar cane, it is important to pay close attention to the soil type and nutrient status. The various forms of N-P-K fertilizer available in India are discussed.

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The dry savannahs of the Ureña and their employment for sugar production. ANON. *Azúcar y Productividad* (Venezuela), 1971, (1), 5–10, 19–22.—The possibility of growing sugar cane satisfactorily in the area, assuming irrigation is possible, is discussed. Water may be available from certain rivers or from underground sources. A proposed pilot scheme of 100 hectares, which is being laid out, is described.

Sugar beet agriculture

Control of *Cercospora* leaf spot of sugar beet. J. R. WALLIN and W. F. BUCHHOLTZ. *Plant Disease Reporter*, 1971, **55,** 479–482.—Sugar beet leaf spot control in South Dakota was achieved by a spray programme covering the entire growing season. Suppression of the fungus by various chemical applications at specific times was illustrated by leaf spot counts, beet tonnage and sugar yields during a 3-year period. The disease appeared between 20th June and 10th July. In 1963, a severe leaf spot year, three fungicide applications during July and August controlled the fungus so that treated plots yielded 12 tons/acre more than the control plots. Four to six applications reduced leaf kill by the disease and thus increased beet and sugar yields.

* * *

Beet industry participating in unique research venture. R. DIVELBISS. *Sugar Beet J.*, 1971, **34,** (3), 2–5·—A new sugar beet research station, the Saginaw Valley Bean and Sugar Beet Research Farm, is to be opened located on 119 acres in south-west Michigan. Michigan's important sugar beet and bean industries will equally share ownership of this new research farm. These two cash crops are dependent upon the same growers. Growers of both crops will benefit from joint research and research expenditure will go twice as far when results are applicable to both crops.

* * *

Environmental pollution and the sugar beet producer. L. S. ROBERTSON. *Sugar Beet J.*, 1971, **34,** (3), 6–8. Environmental pollution has been defined as the unfavourable alteration of our surroundings. Soil and water pollution and its concern for the sugar beet farmer is discussed. The sugar beet farmer who allows his soil to "blow" is contributing to the air pollution problem and damage from dust may occur in many ways. Fertilizers used to excess may collect in streams and lakes, perhaps causing excessive algal and water weed growth. Weedkillers and pesticides may also contribute to pollution if not properly used.

* * *

Leaf spot control possible. F. B. RUSSELL. *Sugar Beet J.*, 1971, **34,** (3), 10–11.—Leaf spot disease of sugar beet (*Cercospora beticola*) is not necessarily a serious disease, as its incidence is very dependent upon weather conditions. In the eastern beet growing areas of the USA crop losses have usually been minimal, the sugar beet varieties grown having carried sufficient resistance to allow growers to escape without a preventive spray programme. Aerial spraying with modern systemic fungicides early in the season gives good control when needed. "Mertect 360" at 5 ounces per acre has given good results.

* * *

Damage forecast and spray warning schemes in sugar beet cultivation with special reference to virus diseases. W. STEUDEL. *Zucker*, 1971, **24,** 465–470.—The methods of estimating damage to sugar beet through virus diseases carried by vectors are reviewed, as is the system of informing growers when to spray early in the season, based on observations of aphid populations, as carried out in European countries. Much success has been achieved by this procedure in the case of leaf curl in eastern and central Europe and beet yellows virus.

* * *

Possibilities and limitations of the development of multiple-row beet harvesters. K. VOGT. *Zucker*, 1971, **24,** 503–506.—Beet harvesting techniques in Europe are briefly reviewed. They vary with factors such as farm management practice, and a number of conditions in Germany have led to the general adoption of the single-row machines which top, lift and load in a single operation. The same conditions must be met by high-capacity multi-row machines if they are to be successful in Germany.

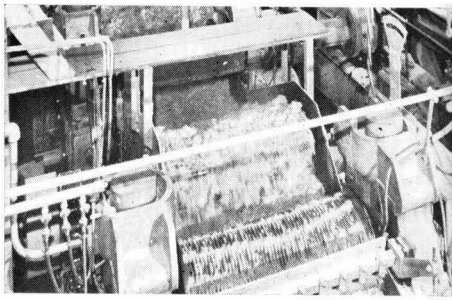
* * *

Organochlorine pesticide residues in sugar beet and its by-products. L. VAN STEYVOORT, L. ZENON-ROLAND and P. H. MARTENS. *Publ. Trimest. Inst. Belge Amél. Betterave*, 1971, (1), 1–13.—A survey was made of the use of "Aldrin" and especially of "Heptachlor" and "Chlordane" in sugar beet crop protection in Belgium. Residual amounts of these pesticides found in beet from treated experimental plots and factory products are given. A table shows the highest amounts of pesticide residues detected in roots, tops, sugar, molasses and lime sludge. It was concluded that the concentrations of pesticide residue detected in all of these would have only a negligible toxic significance.

* * *

The growth, pests and diseases of sugar beet in Belgium in 1970. L. VAN STEYVOORT. *Publ. Trimest. Inst. Belge Amél. Betterave*, 1971, (1), 15–32.—Some details of the crop such as mean yield and sugar content are given. Cool weather again favoured millipede attack. Mangold fly was troublesome in some areas requiring insecticidal treatment. Aphids appeared late but multiplied rapidly in early July, resulting in increased incidence of sugar beet yellows compared with the previous year. It was estimated to have caused a loss of 9·3% compared with 7·4% in 1969.

Cane sugar manufacture



The ecology of *Leuconostoc mesenteroides* and control of post-harvest biodeterioration of sugar cane in Jamaica. R. H. TILBURY. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 126–135.—Investigations at Frome revealed that the soil was the principal source of *L. mesenteroides*, although it was also found on green and burnt cane. The infection occurred mainly at harvest time through contact between the cane and contaminated machetes or soil, but insects and the air may also have acted as minor vectors. Rainfall increased the degree of infection. Control through dipping in formaldehyde solution was ineffective. On the other hand, dextranase at 0·0025–0·025% concentration and optimum juice conditions of pH 4·5–5 and 40–42°C reduced the dextran content of mill juice by 72%. Nearly 40% of crusher juice analysed over a 3-month period contained very large quantities of dextran which correlated positively with rainfall and over-maturity. Cane staleness, another form of post-harvest deterioration, occurs continually but has much less severe economic effects.

* * *

Tower Hill raw sugar factory—British Honduras. J. H. S. MILLINER. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 210–213.—Information is given on the processes and equipment at Tower Hill cane sugar factory which has a crushing capacity of 300 t.c.h. to produce 120,000 tons of raw sugar per season.

* * *

Multiple-effect evaporators in the sugar industry. E. B. ELLIOT. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 214–230.—The principle of operation of the conventional vertical submerged-tube evaporator is outlined and factors to be considered in design are set out. Amongst future developments discussed is a multiple-effect evaporator composed of vessels of rectangular plan section joined together to form a continuous unit. Advantages are: reduced space requirements, uniform distribution of the load so that supporting beams can be made smaller, more even steam distribution, low vapour velocity between vessels with consequent minimization of entrainment, smaller radiation losses, improved drainage, and considerably reduced installation costs.

* * *

Finger-type scraper for top rollers. L. R. MACAULAY. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 231–232. Details are given of a finger-type scraper installed to clean the top rollers on four mills at Ste. Madeleine sugar factory in Trinidad. Similar to the scraper used to clean the drainage (Messchaert) grooves in feed and discharge rollers, the finger-type scraper has the advantages of reduced cost and labour requirements compared with a toothed scraper plate and only touches the root of the roller groove so that it does not polish the surface to cause wear and slippage as does the scraper plate.

* * *

Introducing mechanization and controls in a sugar factory. M. G. PEARSE. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 233–237.—Factors to be considered in evaluating the advantages of installing equipment and automatic controls are discussed with particular reference to the cane yard, quality measurement and sampling, as well as communications and alarms. Details are set out of the procedure used in planning an automatic juice temperature control for a juice heater.

* * *

A pragmatic evaluation of instrumentation programmes. W. HUNTER. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 238–241.—Guidance is given on evaluation of instrumentation schemes for cane sugar factory processes and equipment. The procedure set out lists the basic equipment required and improvements that should be brought about by means of an existing or new scheme. The article is restricted to pneumatic controls.

* * *

Monitoring condensates by specific conductivity measurement. C. FARNUM. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 242–243.—Information is given on the scheme used to detect sugar in condensate from the pans and first three effects of the evaporator at Ste. Madeleine sugar factory. Based on measurement of the conductivity of dissolved solids in the water (and hence of the ash associated with sugar), the unit has a measuring range of 1–100 micromhos and activates a visual indication as well as an audible alarm if the measurement exceeds a pre-set level; the α-naphthol test is then used as a check. A conversion factor of 0·5–0·6 ppm dissolved solids per microhmo is applied. False alarms are avoided by ensuring that the electrode is always immersed in the water being monitored.

* * *

Trials with an ultrasonic leak detector. W. HUNTER. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 244.—Brief mention is made of an ultrasonic measuring unit used at Ste. Madeleine to detect leaks in the more inaccessible vapour and vacuum pipes. The scheme has quickly paid for itself.

Multiple-effect evaporator control system. J. J. QUINTERO. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 245–250.—See *I.S.J.*, 1970, **72**, 338.

* * *

Capacity and efficiency of a vacuum filter. J. G. H. BADLEY. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 251–252.—The operation of a rotary vacuum filter handling clarifier mud at a Barbados sugar factory is described, tabulated data covering the period 1955–69. Minor modifications, including re-locating of associated equipment, are mentioned as are the improvements brought about by these and the installation of a second rotary filter.

* * *

Clarification of Oliver Campbell filtrates. C. M. G. FORREST. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 253–254.—See *I.S.J.*, 1972, **74**, 52.

* * *

Oil in boiler water. G. A. SMITH. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 255–258.—The oil in boiler feedwater at Reform sugar factory in Trinidad was reduced (in the case of No. 1 boiler) from 85 ppm to about 35 ppm by modifying the oil separator and reducing the amount of oil used in the boilers. Details are given of the steps taken to solve the problem which, it is admitted, can be further reduced.

* * *

Carbide sludge as a substitute for temperlime. J. M. RAGNAUTH and A. BUHLER. *Proc.* 1969 *Meeting W.I. Sugar Tech.*, 259–262.—Experience at Ressouvenir sugar factory (Guyana) in the use of carbide sludge instead of quicklime is described. Carbide sludge is the waste from acetylene production and contains typically 46% calcium hydroxide, 6% calcium carbonate and 47% water plus a minute quantity of magnesium hydroxide. Advantages of its use include elimination of slaking and monetary savings, while any effect on clarification and subsequent processes is on the positive side. In addition, evaporator scale is softer and therefore more easily removable.

* * *

Milling research in the University of Queensland. M. SHAW. *Paper presented to the* 14*th Congr. I.S.S.C.T.*, 1971, 18 pp.—A survey is presented of the research work conducted at the University of Queensland during the 4–5 years since publication of "The mechanics of crushing sugar cane" in 1967, in which MURRY & HOLT reported the more important findings from work carried out in the Mechanical Engineering Dept. since 1952. The present paper concerns work on cane preparation, mill feeding, roll load and torque factors, and mill extraction. MILSIM and MILSET computer programmes used for the last-named subject are also described.

* * *

The French screw press on cush-cush—a step toward maximizing milling capacity. W. B. KIMBROUGH. *Paper presented to the* 14*th Congr. I.S.S.C.T.*, 1971, 8 pp.—Development of the French continuous screw press for bagacillo dewatering is described and details given of commercial models installed at Bryant and Talisman mills in Florida and at St. Mary Sugar Cooperative Inc. in Louisiana. Performance data for these presses are presented and discussed.

* * *

The French screw press at Osceola Farms Company. R. FANJUL. *Paper presented to the* 14*th Congr. I.S.S.C.T.*, 1971, 7 pp.—The performance of a French K-70 screw press handling bagasse from the final mill of a 4-mill tandem at Osceola Farms Co. in Florida is reported. In 1970/71 the press handled 456,000 tons of cane, lowering last mill bagasse moisture from an average of 55·79% to 52·10% and reduced milling loss by 45·4% with a monetary gain for extra sugar recovered of $304,000, while over the four seasons it has been in operation it has given an average gain of $268,000 per season. Maintenance costs are between 2 and 3 cents/ton of cane and operating costs are below the expected level, while installed cost of a K-88 model of capacity equivalent to 8000 t.c.d. is given as $350,000.

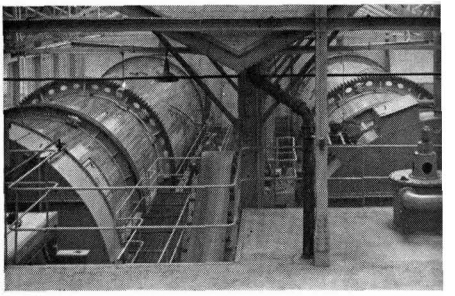
* * *

The mechanism of extraction in the cane sugar diffusion process. P. W. REIN. *Paper presented to the* 14*th Congr. I.S.S.C.T.*, 1971, 13 pp.—A mathematical model describing cane juice extraction in diffusion has been devised and found to fit satisfactorily to experimental data obtained with laboratory diffusion in which bagasse of four different preparations was used. Two mass transfer coefficients are involved, one referring to washing of readily available sucrose from broken cells and particle surfaces, and the other to a slower process of extraction from unbroken cells and from within the bagasse particles; a third parameter is introduced which represents that fraction of juice extracted by easy, rapid washing as opposed to the tightly-held juice. That extraction takes place by means of a combination of washing and diffusion is demonstrated by the variation in model parameters with temperature and degree of preparation. Comparison of the parameter values with results obtained in a fixed-bed pilot-plant diffuser indicated the extent to which extraction is affected by the hydrodynamics of flow through a packed bed.

* * *

The maceration process in cane diffusion. M. BARRE. *Paper presented to the* 14*th Congr. I.S.S.C.T.*, 1971, 11 pp.—After comparing percolation (spraying a layer of cane or bagasse on a grid with juice of decreasing Brix) with maceration (immersion of cane or bagasse in juice so that each particle is surrounded by juice), the author describes the "Saturne" diffuser manufactured by Sucatlan Engineering and gives some results of trials with the diffuser at Málaga in Spain, where value of E (ratio between sucrose % bagasse and sucrose % diffusion juice) of 0·426 and 0·435 were obtained. (See also *I.S.J.*, 1971, **73**, 61–62, 126.)

Beet sugar manufacture



Raising the quality of sugar beet in Kirgiziya. M. N. BARKO and F. N. DOBRONRAVOV. *Sakhar. Prom.*, 1971, **45**, (8), 36–38.—The need to improve various aspects of beet agriculture, including the beet varieties grown in the Kirgiz region, is emphasized in view of the deterioration in beet processing properties. Press and thin juice quality in 1966–1969 were lower than in 1950–1953.

* * *

Effect of the cationic and anionic composition of beet on the natural alkalinity value. M. Z. KHELEMSKII, D. G. GOMANYUK and I. B. RABINOVICH. *Sakhar. Prom.*, 1971, **45**, (8), 39–42.—Investigations of raw and 2nd carbonatation juice composition indicated that a low natural alkalinity occurred where the magnesium and calcium contents were high (particularly the former) while the potassium, oxalate and phosphate contents were low. In beets from certain regions of the Ukraine the natural alkalinity had a negative value where the non-albumin nitrogen and reducing matter were high; it was positive where the potassium and sodium contents when added together exceeded the total mineral and organic acids contents in 2nd carbonatation juice. Advice is given on fertilizer application whereby the natural alkalinity can be raised and the processing quality of beet improved.

* * *

Efficacy of forced ventilation of beet. A. M. ELAGIN. *Sakhar. Prom.*, 1971, **45**, (8), 43–46.—Reference is made to various experiments on forced ventilation of beet piles and to the cost factor involved. Information is also given on tests in which forced ventilation was coupled with moistening of the stored beets. Of three methods compared, the best as regards simplicity, reliability and low capital costs as well as loss reduction was considered to be that in which an air stream was blown at an angle of 20–30° to the horizontal over a 3–5 cm layer of water flowing along the flume beneath the stored beet. This reduced daily sugar losses by 0·005% compared with the norm.

* * *

The Swiss beet sugar industry. ANON. *Sugar y Azúcar*, 1971, **66**, (8), 14–17.—Information is given on processes and equipment at Aarberg factory/refinery with a mention of Frauenfeld sugar factory.

* * *

Optimization of campaign length in sugar factories. A. HUCULAK. *Gaz. Cukr.*, 1971, **79**, 189–194.—See *I.S.J.*, 1970, **72**, 148.

Sugar factory equipment. ANON. *Gaz. Cukr.*, 1971, **79**, 195–196.—Information is given on a fluidized bed dryer/cooler for sugar, which is made by Polimex-CEKOP under licence from Newell Dunford Engineering Ltd.

* * *

Use of rubber lining in a continuous diffuser. M. RYCHLICKI. *Gaz. Cukr.*, 1971, **79**, 197.—Preliminary tests on the effect of raw juice on rubber used for lining, e.g. of the scroll exterior in a continuous diffuser, showed that the physico-chemical properties did not undergo any great change, even during 100 days of a campaign.

* * *

Sugar beet storage during the campaign at East German sugar factories. M. KUBACK-SZMIDTGAL. *Gaz. Cukr.*, 1971, **79**, 198–199.—A survey is presented of the beet storage methods used in East Germany, and the classification system used in selecting beet for storage is explained.

* * *

Effect of crystals on the electrical resistance of sugar solutions. V. I. TUZHILKIN and I. N. KAGANOV. *Sakhar. Prom.*, 1971, **45**, (9), 20–22.—Investigations into the effect of sugar crystals on electrical conductivity and resistance and hence on massecuite boiling control based on these factors have shown that there is no equation for resistance calculation which is universal in its application to all massecuites and that increase in electrical resistance will vary according to the massecuite parameters. Larger crystals will exhibit lower resistance than smaller crystals, and the passage of air bubbles, normally present in massecuite, between electrodes will increase the resistance reading, since they do not conduct electricity.

* * *

New centrifugals for the sugar industry. V. D. VASIL'EV, M. V. KOVALEV and B. N. TERESHIN. *Sakhar. Prom.*, 1971, **45**, (9), 22–27.—Details are given of various types of centrifugals produced in the Soviet Union for the sugar industry.

* * *

Experience in conversion of a (coal) gas-fired lime kiln at Samborskii sugar factory (USSR) to natural gas firing. A. LYAKHOV and E. FERENCHAK. *Sakhar. Prom.*, 1971, **45**, (9), 41–42.—The advantages obtained by conversion of the lime kiln mentioned in the title to natural gas firing are reported and guidance given on factors to take into consideration for such a conversion.

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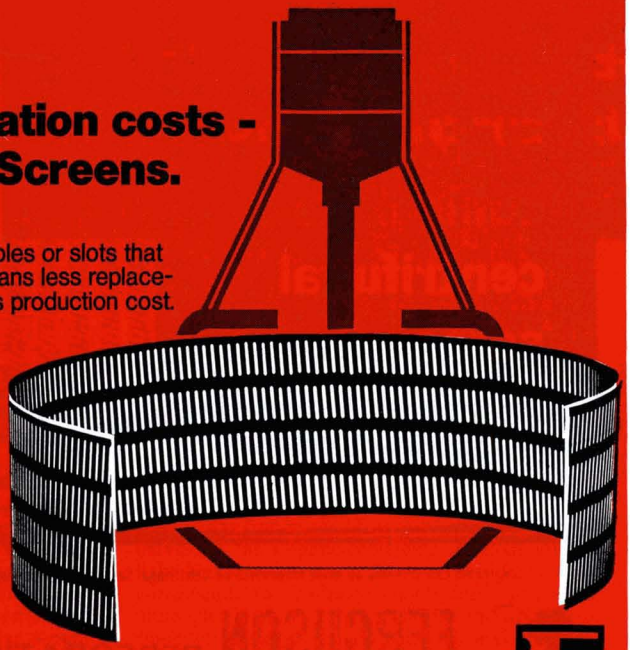

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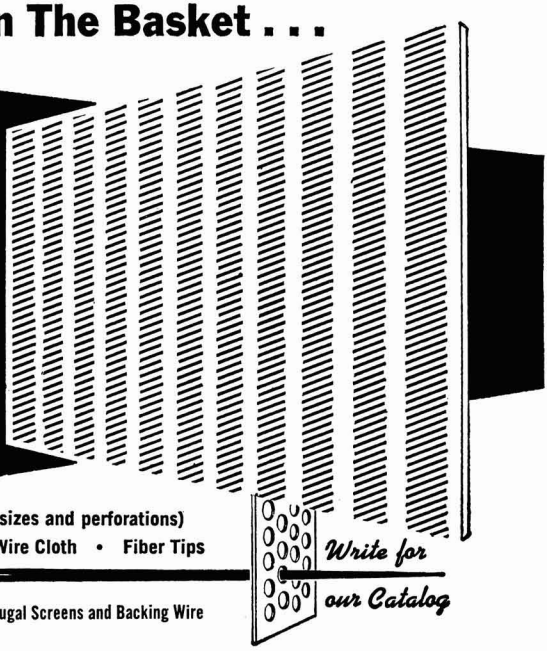

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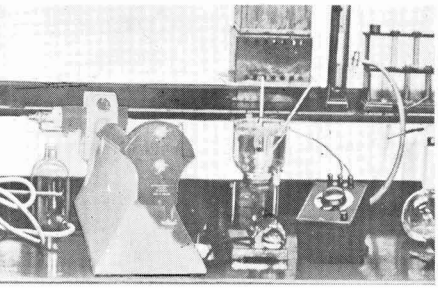

Laboratory methods & Chemical reports

The chemistry of juice purification. V. PREY, H. ANDRES, W. BRAUNSTEINER and H. HOLLE. *Zeitsch. Zuckerind.*, 1971, **96,** 323–328.—The chemical and physico-chemical reactions occurring during carbonatation are examined with 31 references to the literature. Particular attention is paid to the formation of coloured decomposition products and the possibility of reducing juice coloration. A 40% fructose solution subjected to alkaline decomposition for 80 hr and fractionated with "Sephadex G 25" yielded 15 fractions of varying molecular weights up to a maximum of 2350. The pattern was similar to that of sucrose decomposition under identical conditions. Application of hydrogenation during alkaline decomposition of the fructose solution yielded fractions of which the maximum molecular weight was 180, and even after 240 hr the fractions of greatest colour intensity were only slightly yellow, as opposed to dark brown without hydrogenation. Similar tests with dihydroxyacetone, in which simultaneous hydrogenation yielded a water-white solution, demonstrated the possibility, under ideal conditions, of preventing condensation of low molecular decomposition products to higher molecular coloured compounds by hydrogenation.

* * *

Effect of pH on passage of pectic matter into diffusion juice. M. I. DAISHEV and N. L. TROYANOVA. *Sakhar. Prom.*, 1971, **45,** (7), 17–20.—Laboratory tests in which various buffering solutions were added separately to beet brei showed that not only the pH of the solutions but also their ionic composition affected pectin hydrolysis, although with all solutions, including water treated with SO_2 gas to pH 2 and then with ammonia, the minimum content of pectic matter was observed at pH 4–4·5, maximum peptization being obtained with MacIlvaine mixtures covering the pH range 2–8. The pectin content rose on each side of pH 4–4·5, the increase being much more marked on the alkaline side, where the differences between the effects of the various solutions was also greater than in the acid pH range. In further tests, the minimum colloid content occurred at lowest pH of added solution, except in the case of SO_2-treated water, where the minimum colloid content was found at pH 7·5. In these tests there was no definite pattern to the colloid content-pH curves.

* * *

Examination of the effect of the sulphite ion on formation of colouring matter during heating of hexoses. L. D. BOBROVNIK, R. RUSO and R. FAJARDO. *Sakhar. Prom.*, 1971, **45,** (7), 31–36.—The effects of sodium sulphite and bisulphite on fructose and glucose solutions in the presence or absence of glycine during prolonged heating at 60°C and 90°C were studied. Although sodium bisulphite was the stronger decolorizing agent, sodium sulphite had a greater colour inhibiting effect[1] which was more marked with glucose than with fructose and was considerably greater in the presence of glycine. (Melanoidin formation in the glucose-glycine system was greater than in the fructose-glycine system, whereas the reverse was true in the absence of glycine.) Spectral curves for the sulphite-containing solutions in U.V. light had a maximum at 283 nm (found earlier to correspond to hydroxymethylfurfural formation, although HMF was found only in the absence of sulphite), while without sulphite the maximum was at 265 nm. Paper chromatography showed that sulphite inhibited formation of compounds having R_f values greater than that of the hexose while allowing formation of others with R_f values smaller than of the hexose, indicating the formation of sulphite-hexose complexes and particularly complexes of sulphite with hexose decomposition products. Organic acids formed in the presence of sulphite were qualitatively and especially quantitatively different from those formed in its absence, possibly in connexion with stabilization by the sulphite of an intermediate enolic compound capable of being oxidized to aldonic or sugar acids according to the oxygen content, in turn governed by the temperature. At 60°C the pH of an equimolar hexose + sulphite solution fell more than with a pure hexose solution, whereas at 90°C it rose, particularly in the case of fructose. Electrophoresis indicated yellow colorant fractions migrating to the cathode in the presence of sulphite, while in the absence of sulphite brown fractions were observed migrating to the anode and yellow ones migrating to the cathode, the latter being more dispersed than the brown fraction. Eluates of the yellow fractions formed in the presence of sulphite had a maximum at 233 nm in glucose solution and at 228 nm in fructose solution, corresponding to 3:4-dideoxyhexosulose in *trans*-hydrate or *cis*-pyranose form[2]. It is suggested that sulphite stabilizes 3:4-dideoxyhexosulose, which as a *cis* isomer in the absence of sulphite in a weakly acid medium may be quickly converted to hydroxymethylfurfural, and that one of the enolic compounds is a precursor of the yellow colorants.

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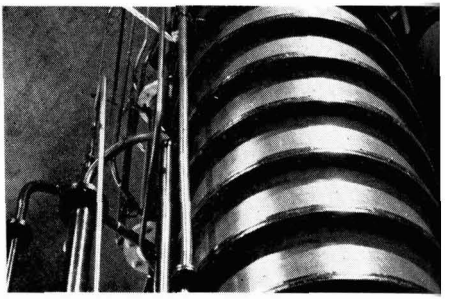
[1] *See also* PIECK & HENRY: *I.S.J.*, 1964, **66,** 199.
[2] FLEMING *et al.*: *Proc. 13th Congr. ISSCT*, 1968, 1781–1800.

By-products



Study of the prehydrolysis-sulphate process to obtain dissolving pulp from bagasse. V. LOPUJÁ and C. TRIANA. *CubaAzúcar*, 1970, (Jan./March), 31–39, 58–64.—In order to prepare dissolving pulp it was found necessary first to depith the bagasse and then reduce the pentosan content by a pre-hydrolysis stage. Experiments showed that this requires the use of autoclaves with direct steam heating; the best results were found when the temperature was increased to 170°C over 30 minutes, with a hydrolysis time of 120 minutes and a bagasse:water ratio of 1:4. This gave a yield of 73·2% and a pentosan content of 6·88% (compared with the original 21–28%) and ash content of 0·63%. The product could be converted to a satisfactory dissolving pulp, in which the fibre structure was preserved, by a suitable process employing a cooking time of 90 minutes at 160°C and a "sulphurity" of 20%, the bagasse-liquor ratio being 1:6. Active alkali consumption was 16–18%.

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Molasses as animal feed. S. C. GUPTA. *Sugar News* (India), 1971, **2,** (10), 17–21.—A general review is presented of the use of molasses as animal fodder on its own or mixed with urea, ammonia or bagasse. Molasses dehydration is also briefly discussed.

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Sugar cane bagasse—how good as roughage ? ANON. *Sugarland* (Philippines), 1971, **8,** (1), 34.—Reference is made to animal feeding tests in Australia, Puerto Rico and the USA where bagasse has proved satisfactory as roughage.

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Preparation and properties of clinical dextran. J. MALEK and A. BELL. *Sobre los derivados de la caña de azúcar*, 1970, **4,** (2), 13–25.—Technical dextran produced at Central España Republicana in Cuba, using the R-15 strain of *Leuconostoc mesenteroides*, and a native dextran produced in the laboratory using strain B-512 were subjected to treatment for production of a clinical dextran having a M.W. range of 40,000–70,000. It was first purified by reprecipitation from water solution by adjusting to 6% ethanol concentration, and the dextran then hydrolysed by stirring a solution at 90°C after addition of HCl to 0·1–0·12N. The hydrolysis was followed by viscosity measurement and stopped at the required moment by neutralization. The hydrolysed dextran was then fractionated by adding ethanol to required concentrations, and the clinical dextran obtained shown to have similar properties to the commercial products of other countries.

Standardization of a microbiological method for determining biotin in cane molasses. Comparative study of its content in molasses from the 1968 and 1969 crops. M. AGUILERA. *Sobre los derivados de la caña de azúcar*, 1970, **4,** (2), 37–46.—The method developed is the measurement of growth of a yeast, *Neurospora crassa* 30/a3+, on a standard medium to samples of which molasses and aliquots of standard biotin solution are added. The biotin content is obtained from the weight of mycelium after 5 days' growth at 30°C. Samples from ten factories in the 1968 and 1969 crops varied between 1·1 and 2·9 γ biotin per g.

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Determination of the technological parameters of the process of obtaining furfural from bagasse by the direct method. A. V. MILOVANOV, E. CORONA and M. SOSA. *Sobre los derivados de la caña de azúcar*, 1970, **4,** (3), 3–15.—Studies are reported on the high-pressure hydrolysis of the pentosans content of bagasse to furfural using sulphuric acid as catalyst. The most suitable concentration of H_2SO_4 for practical purposes was found to be 1·5% on raw material. The highest yield and most rapid formation of furfural was found at the highest temperature (170°C) of the range studied. Flow of steam passed for separation of the furfural was varied; at 4 volumes/hr the yield was higher at 12% on bagasse, while at 2·5–3·0 volumes/hr it was reduced to 10%. In order to achieve a yield of at least 60% of theoretical, at least 3·0–3·5 volumes/hr must be used, but the optimum depends on the economics of furfural recovery from the larger volume of steam condensate. Methods of increasing the yield from a digester by increasing the charge of bagasse are discussed and a thermochemical compression studied whereby additional quantities of raw material may be added to the digester after the combined action of pressure, high temperature and the catalyst have caused the original bagasse volume to shrink. The use of whole bagasse is compared with that of partially depithed bagasse; the yields obtainable are 60–65% and up to 67·5% of theoretical, respectively.

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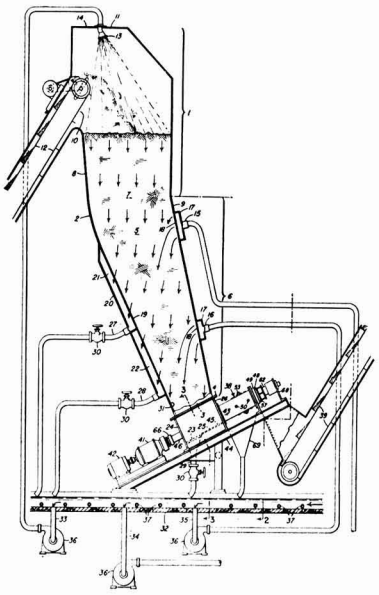
Pingtung pulp factory progressing. P. C. KWAN and S. I. WANG. *Taiwan Sugar*, 1971, **18,** 53–55.—Conclusions from feasibility studies carried out into bagasse pulp manufacture in Taiwan are listed and information given on the sulphate process to be used in the bagasse pulp factory under construction at Pingtung, which is planned for a yearly output of 100,000 metric tons of pulp.

Patents

UNITED KINGDOM

Cane diffuser. WARD FOODS INC., of New York, N.Y., USA. **1,244,046.** 23rd December 1968; 25th August 1971.

The diffusion units operated as individual stages in the system of US Patent 3,425,869[1] are described in detail. The hopper 2 is of rectangular cross-section and receives suitably disintegrated cane through an opening in the top of the rear wall 8, the cane being delivered by a suitable conveyor 12. The hopper is filled as shown with cane which moves downwardly under gravity and is positively removed from the lower part 6 of the hopper at a rate equal to the feed rate so as to give a constant level in the hopper and a continuously descending column of cane.



Extraction liquid is supplied to the column through the manifolds 17 and perforations 18 in the front wall 9, as well as from nozzle 13 in the cover 14 of the hopper. Liquid drains from the bed through perforations in rear wall 8 and passes into manifolds 21, 22 as well as into duct 29, from which it is drained separately. The drainage and recycling is so arranged that the fresh cane is extracted with the liquid richest in sugar while the liquid applied at 15 and 16 is weaker, corresponding to the more exhausted state of the cane as it passes down the column. The drainage of liquid is effectively across the column of cane as a result of the inclination of the walls 8 and 9 and the pressure of the height of the cane column and the smaller cross-section of the hopper at its lower end helps to cause a compression of the cane which aids extraction.

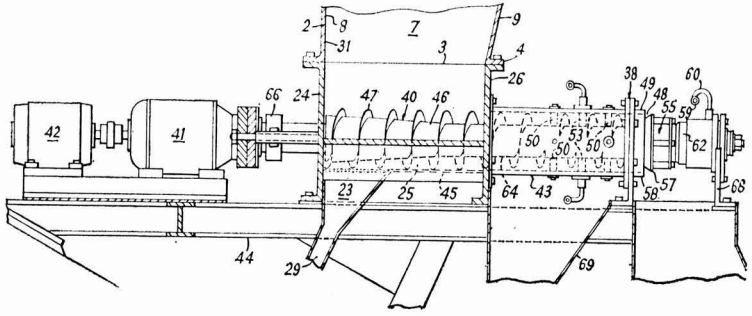
The exhausted cane is withdrawn by passage into the feed part of presses 38 which expresses further quantities of juice through funnel 69. The press reduces the moisture content to only a mild level, e.g. 70%, before discharging the cane to the conveyor 39 feeding the next stage of the system.

* * *

Screw press. WARD FOODS INC., of New York, N.Y., USA. **1,244,047.** 23rd December 1968; 25th August 1971.

The multiple screw press 38 (for positive removal and juice extraction from the cane at the bottom of the hopper in the preceding patent) has four screws

[1] *I.S.J.*, 1969, **71**, 348.



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, England (price 25p each). United States patent specifications are obtainable from: The Commissioner of Patents, Washington, D.C. 20231 USA (price 50 cents each).

40, each driven through reduction gearing 41 by an individual motor 42 and having its own cylindrical barrel 43 in which the cane from the hopper 2 is compressed. The press slopes upwards to aid drainage of expressed liquid through outlet 23. The casing 26 has a bottom wall 25 which includes a concave bed for each screw 40, which are of uniform pitch.

Within the barrels 43, however, the shafts 46 are of uniform diameter but the screws of decreasing pitch as they approach the extrusion orifices 48 in the outer ends 49 of the barrels. The cane is thus subjected to compression against hydraulic pressure applied to the plugs 57 by pistons 62. Rotation of the cane is prevented by pins or lugs 50 within the barrels, the screw flights being interrupted at these points. Juice expressed from the cane passes through perforated linings within the barrels and escapes into the funnel 69.

* * *

Syrup seeding for continuous crystallization. SOC. FIVES LILLE-CAIL, of Paris, France. **1,244,543.** 4th December 1969; 2nd September 1971.—Into the inlet of a continuous vacuum pan is introduced a (diluted) magma, prepared by grinding a massecuite (in a rotary ball mill) with its own mother liquor to give a suspension of crystals of pre-determined size within a syrup. The massecuite is withdrawn from the pan and passed through the grinding mill, the outlet of which is connected with the pan inlet (by way of a mixing chamber in which the level is controlled to avoid entry of air into the pan). Withdrawal of the massecuite for grinding is by a proportioning pump, the delivery of which is regulated as a function of the feed rate of syrup entering the pan.

* * *

Cane diffuser. BRAUNSCHWEIGISCHE MASCHINENBAU-ANSTALT, of Braunschweig, Germany. **1,248,259.** 30th December 1968; 29th September 1971.

The diffuser trough 11 consists of side walls 11a and a screen forming the base 12 which extends upwardly at one end 13 while at the outlet end 14 it is open. Above the screen is a drag conveyor with side chains and transverse bars. Beneath the screen are chambers 16 which receive juice percolating through the layer of bagasse on the screen and return it by pumps 17 and pipes 18 to distributors 19 above the bagasse but nearer the feed end. Crushed cane enters the trough from hopper 27 fed by conveyor 26. The hopper delivers to a swivelling feed spout 28 and so to a baffle plate 36 feeding a scraper belt 37, hot extraction liquid being applied at the same time to the layer of bagasse which is thoroughly mixed by its rapid change of direction of movement. On discharge from conveyor 37 the cane falls onto screen 12 and is carried at constant speed to the outlet end while being sprayed with progressively weaker juice.

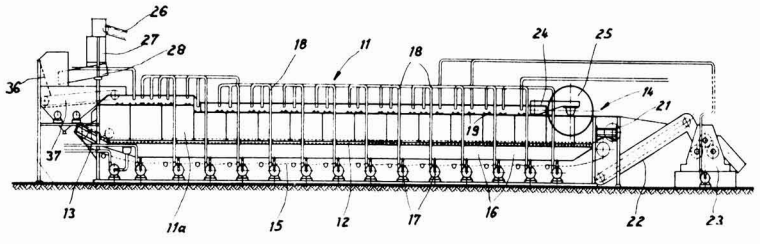
At the end of the screen the bagasse layer is compressed by brake roll 25 at about 0·4–0·6 kg.cm^{-2} and the water content extracted; the brake roll rotates at an adjustably slower speed than the bagasse blanket motion so that the latter tends to pile up in front of the roll, thus rearranging the bagasse layer, increasing the duration of squeezing and consequently reducing the moisture content. The compressed bagasse is then transferred by throwing roll 21 onto the conveyor 22 feeding the dewatering mill 23. Water added at the discharge end circulates in counter current to the cane and becomes progressively richer to give juice which is withdrawn from the compartment 16 nearest the feed end of the trough.

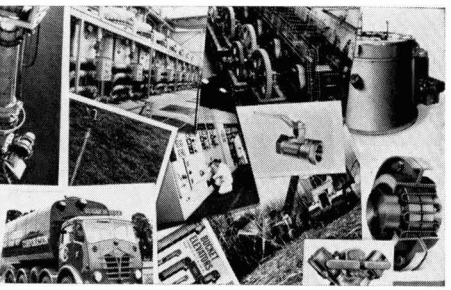
* * *

Beet harvester. R. G. DUQUENNE, of Ramecroix, Belgium. **1,248,850.** 18th December 1969; 6th October 1971.

* * *

Continuous production of sucrose fatty acid esters. R. ISMAIL, of Spich, Germany. **1,250,204.** 11th December 1968; 20th October 1971.—A solution of sucrose with 0·05–2% w/w of an alkaline catalyst in a polar solvent (dimethyl sulphoxide), together with a separately-prepared solution of a C_1–C_6 aliphatic or cyclo-aliphatic mono- or poly-hydric alcohol ester of a C_{12}–C_{22} straight-chain saturated or unsaturated fatty acid in an aliphatic or aromatic hydrocarbon or chlorohydrocarbon solvent (a hydrocarbon) of b.p. 70–250°C, are fed continuously (at flow rates to give a molar ratio of 1:1 sucrose:fatty acid ester) into a series of at least three reaction zones connected in series, being intensively intermixed at 40–150°C (80–90°C), any alcohol liberated being distilled off under reduced pressure. The mixture issuing from the last reaction zone after a mean residence time of 1–15 (3–20) hours is passed to a settling vessel where it divides into two phases; the polar solvent phase containing the sucrose ester is removed and concentrated by evaporation under reduced pressure in a dryer and the solvent recycled.





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.

Equipment for the sugar industry. POLIMEX-CEKOP Ltd., Warszawa, Czackiego 7/9, P.O. Box 815, Poland.

A folder containing leaflets of all sugar factory equipment obtainable from Polish manufacturers through the central export agency, POLIMEX-CEKOP, is available from the address given above. Available in five languages (English, French, German, Spanish and Russian), each leaflet gives diagrams of the equipment, technical data, description of design and operation and terms of delivery. Every individual piece of equipment required for a complete sugar factory or refinery is included.

For more detailed information on larger units such as beet pulp drying plant, molasses desugaring stations and diffusion units, pamphlets are also obtainable from POLIMEX-CEKOP.

Special brochures describe the processes and equipment used in a sugar factory having a daily slicing capacity of 4000 tons of beet as supplied by POLIMEX-CEKOP, and the Bahawalnagar cane sugar factory supplied by Poland to Pakistan (the factory has a crushing capacity of 1500 t.c.d. with a possibility of expansion to 2000 t.c.d.).

A 183-page catalogue gives complete details, specifications, diagrams and photographs of pumps available from the Warsaw Pump Factory through POLIMEX-CEKOP. A special indicator in English, German, Polish and Russian helps the reader to see at a glance the field of application of each pump as well as giving translations of the column headings.

Literature carrying the CHEMADEX name gives information on the various types of complete factories the organization can supply and lists the sugar factories already delivered to various countries.

A 28-page booklet in English presents full details of the "Rotary Louvre" sugar dryer/cooler manufactured at Swidnica under licence from Newell Dunford Engineering Ltd. The publication describes erection of the plant, its operation, maintenance, lists recommended oils and greases, explains heater operation and describes the instrumentation. Detailed diagrams are also presented.

For information on the latest developments in sugar factory equipment there is a wide selection of literature available in the form of periodicals such as the "POLIMEX-CEKOP News", "Chemak News" and brochures from the various enterprises within CHEMAK.

* * *

Beet analysis data processing. Stone-Platt Crawley Ltd., Gatwick Rd., Crawley, Sussex, England.

Beet deliveries at each of the British Sugar Corporation factories are weighed, sampled and analysed in the normal way. Data from the weighers and tarehouse at ten factories (to be expanded to all the Corporation's plants by 1974) are recorded for each load on paper tape which is taken daily to the computer-based central accounts system at Peterborough, where the details and value of the load are calculated and notified to the grower, accounts being settled monthly.

A stub card is issued for each load and is the key to the system; it is punched to identify the grower, contract number and load, and is inserted into readers at the dirty beet station, the clean beet station and the saccharimeter station where light, passing through the holes punched in the card, is received by an array of photocells which pass the information to the Stone-Platt data collection cubicle. A uniselector searches for the calling station, identifies it and locks it on to the data recording system until the data are accepted and recorded. Indicator lights at the reader advise the operator that the call has been accepted, that information is being recorded, that recording is complete, or that for some reason the record has not been properly completed. In this case, the operator presses a reset button and the record is repeated. Besides this automatic recording direct from the weigher and saccharimeter signals, a keyboard operator adds information on the number of roots and weights of tops in the sample.

This equipment is also designed to give a measure of priority to certain "slow" inputs and incorporates means of booking time ahead for those stations which have a long cycle time. Data from other "fast" stations can meanwhile be recorded and printed.

A diode matrix cooperates with a group of plug-in relays to encode the single-wire digital data into eight-wire ASC 11 code for transmission to the printer which produces the paper tape and a page-printed record kept at the factory. Unsatisfactory records requiring reset and repeating are identified on the print-out by a query mark and the corresponding tape entry is not accepted by the computer. To identify the records, tarehouse staff can print the date and factory code at will, the latter being pre-set

for print-out by means of a push-button. The data collection equipment operates at high speed and with great accuracy, and embodies checks to reduce the chance of wrong information being passed to the computer.

* * *

Conveyors. Marshall Handling Equipment Ltd., Carlton, Nottingham, NG4 3DY England.

A new light-duty belt conveyor, the "Minorveyor Mk. II", is announced. Obtainable in lengths up to 22 m and standard belt widths of 305, 457 and 610 mm (other widths are available on request), the conveyor has a height adjustment of 75 mm and can take a maximum distributed load of 320 kg. Intermediate sections are obtainable in 1·2 and 2·4 m lengths, and a special arrangement permits the belt tension to be accurately measured.

The "Minorveyor Mk. II" is just one of a number of various types featured in a brochure recently produced by Marshall Handling Equipment. The conveyors have many applications, and among customers listed in the brochure are the British Sugar Corporation Ltd. and Tate & Lyle Ltd.

* * *

Proportional injection. Metering Pumps Ltd., 49–51 Uxbridge Rd., London W.5, England.

An automatic system for injection of one or more chemical solutions into a main process stream at a rate proportional to the main flow is announced. It consists of one or more "Metriflow" injection pumps operated by water or compressed air, a meter actuated by the main flow, and a pilot valve rotated by the meter which controls the pump's stroke. A 1½-in meter unit can handle liquid flows no greater than 1500 gal/hr, while a 2-in meter is needed for flows up to 2800 gal/hr. Accurate proportioning is obtainable down to flows in the range 50–100 gal/hr. For greater flow rates than given above, the meter is fitted in a by-pass around an orifice plate or venturi tube in the main pipeline. Injection rates range from 0·4 to 37·5 gal/hr. The pump stroke can be varied during operation or at rest.

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Vibrator motor. Triton Engineering Co. (Sales) Ltd., Kingsnorth Industrial Estate, Wotton Rd., Ashford, Kent, England.

A new 1-hp vibrator motor is announced which can develop a force of 3250 lb at 1500 rpm. This A.C. motor, operating at 400/440 V, 50 Hz on 3-phase current (other 3-phase voltages and frequencies can be supplied in the range 110–650 V), has a large-diameter shaft rotating in heavy-duty roller bearings. The junction box, cast integrally at the top of the motor body, contains the Triton anti-vibration rubber terminal block which "slots" into grooves on the inner side walls of the junction box and is retained by pressure from the combined lid-nameplate, so avoiding the use of fixing screws and facilitating maintenance. A centrally-positioned eyebolt is provided adjacent to the junction box for lifting purposes.

* * *

Hygienic flooring. Armalux Flooring Ltd., 6 Regal Industrial Estate, Birmingham Rd., Stratford-on-Avon, Warwicks., England.

"Fordura 30" is a new quick-drying, seamless floor surface especially designed for use where a high standard of hygiene is required, as in sugar factories and refineries. It is a heavy-duty, solvent-free urethane resin system that can be laid as a new surface or on top of existing floors, even where the surface is not level, without hindrance to the customer's production. It dries in a few hours, is virtually everlasting, is lower in cost than systems using other materials while providing similar or better properties, and is resistant to the action of sugar, lactic and citric acids. The resin component will not support the growth of bacteria. It is also suitable for buildings where steam or hot water cleaning systems are the general practice. The surface can be smooth or completely non-slip, while the colour, although naturally light brown, can be as required through incorporation of special aggregates.

* * *

FYSON BELT CONVEYORS. C. J. R. Fyson & Son Ltd., Soham, Cambs., England.

Various types of mobile belt conveyors available from C. J. R. Fyson for a wide range of duties are featured in a brochure, which also briefly mentions static and special conveyors also obtainable from the company. The Fyson "Packhorse", described in a separate leaflet, is designed to handle boxes, cartons and sacks up to a maximum distributed load of 400 kg (100 kg maximum unit load) over a length of 7, 8 or 10 metres, according to model.

* * *

MATERIAL HANDLING EQUIPMENT FOR EVERY TYPE OF INDUSTRY. Fletcher Sutcliffe Wild Ltd., Horbury, Wakefield, Yorks., England.

Fletcher Sutcliffe Wild Ltd. was formed in 1969 from a number of companies including Fletcher and Stewart Ltd. and Richard Sutcliffe Ltd. The latter firm had been manufacturing belt conveyors for more than half a century. Information on belt conveyor components and bunkers is contained in a brochure available from FSW.

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BUCKET ELEVATOR AND BELT CONVEYOR. A. & C. Jenner Ltd., Clarendon Works, Mitcham, Surrey, CR4 1YE England.

Leaflet M.35 from Jenner gives details of the "Masterlift" bucket elevator available with bucket widths up to 3 ft and elevator speeds of 40 ft/min. The buckets are bunched together at the feed point to eliminate spillage, but immediately afterwards they separate and continue travelling at a pitch of 12 inches, so that continuous flow from a belt conveyor or hopper can be converted to unit loads for distribution to one or more discharge points, where the buckets undergo controlled rotation. Leaflet M.13 describes the "Beltmaster" Series IIm belt conveyor which is available in belt widths from 300 to 1220 mm and standard speeds in the range 3–43 m/min. The new Jenner type of conveyor section permits a very long adjustment to be made on all components, such as tension rollers, all the main functioning units being carried in tee-slots in a specially designed extruded aluminium section which acts as the conveyor side member.

East African sugar statistics, 1971[1]

	Kenya	*Tanzania*	*Uganda*	*East Africa*	*East Africa*
	1971				1970
	(*metric tons, tel quel*)				
Initial stocks	12,480	10,359	3,171	26,010	43,604
Production	124,073	95,787	141,031	360,901	356,264
Imports	59,087	18,420	10,779	88,286	19,406
Transfers between Countries	304	—304	0	0	0
	195,944	124,262	154,981	475,187	419,274
Exports outside East Africa	0	0	8	8	5,039
Consumption	183,062	116,842	152,429	452,333	391,009
Final stocks	12,882	7,420	2,544	22,846	23,226

Brevities

International Sugar Research Symposium.—The Fifth International Sugar Research Symposium, sponsored by the International Sugar Research Foundation Inc. in association with the Ninth Congress of the International Union of Nutritional Sciences, is to be held on the 6th September at the National Medical Centre, Mexico City. Papers are grouped under two headings: "Sugar growth and development"' and "Energy, sucrose and a balanced diet" and are concerned with aspects of nutrition involving sugar.

* * *

Indian sugar import needs.—The President of the Indian Sugar Mills' Association is reported by Reuter[2] to have said that India needs to import about 500,000 metric tons of sugar immediately to tide the country over a present shortage and to check price rises. The President said that current stocks of about 1·2 million tons will be just sufficient to meet demand for four months and that no fresh supplies will come to the market from factories until December. He estimated a shortfall in production in 1972/73 of 500,000 tons over projected consumption and said that any imports made should be set aside as a buffer stock. The London Terminal Market reacted promptly to the report but prices eased later on the New York Market; traders were doubtful that India had the physical capacity to handle imports of 500,000 tons and also were unsure whether India had sufficient foreign exchange holdings to cover the cost of importing such a quantity[3]. The reported shortage was expected to jeopardize the Indian commitment to the United States Sugar Quota, currently slightly over 84,000 tons.

* * *

Tongaat Group Ltd. report, 1971/72.—The final result of the 1971/72 season for Tongaat Sugar (Pty.) Ltd. was an all-time record sugar production of 191,282 tons, compared with a previous best of 185,233 tons and 141,571 tons for the 1970/71 season. Cane crushed amounted to 1,745,132 tons, as against 1,283,642 in 1970/71. The season lasted 45 weeks and, in an attempt to reduce its length, 27,000 tons of cane were diverted to Mount Edgecombe mill. Overall sugar recovery, at 86·57%, was the highest since 1961, and all raw sugar was of very high pol. The Company fields produced their second highest crop on record, 617,539 tons, but the sucrose content was well below average at 12·59% on cane, largely owing to the good rains experienced during the crop. The company's fleet of over 500 vehicles and tractors, together with 300 trailers, transported a record of 1,581,000 tons of cane to the mill. The high prices of sugar enabled the South African industry to repay the balance of the Government-guaranteed bank loans, and, with reasonable weather, the 1972/73 season promises to be as successful.

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Animal feed from cane by-products in Australia[4].—Millaquin Sugar Co. is establishing a plant for mixing spent wash from Bundaberg distillery with bagasse and grain as a cattle feed.

British beet harvesters for Japan.—Ransomes Sims & Jefferies Ltd., of Ipswich, recently received the first bulk order from Japan for British-designed and -built sugar beet harvesters. Extensive trials were carried out during the 1970 beet harvesting campaign with a Ransomes "Powerbeet" harvester and have resulted in the order, placed through Hokkai Ford Tractor Ltd., Ransomes' distributor in Japan.

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Caribbean Cane Farmers' Association Conference.—The Hon. MICHAEL MANLEY, Prime Minister of Jamaica, was scheduled to open the 11th Conference of the Association in Kingston, Jamaica, on the 29th August. Papers are to be presented on extraneous matter and factory efficiency (by Dr. IAN SANGSTER), land preparation and cane varieties in the Caribbean (by TOM CHINLOY), sugar in the EEC (by S. NORMAN GIRWAR), techniques in reducing the cost of production of sugar (by V. V. ELLIOTT) and land reform (by Dr. D. MAHARAJ). Participants were expected from many cane growing countries throughout the world, as well as from the Caribbean and Central America.

* * *

Guyana sugar crop 1971.—Details have been published by the Guyana Sugar Producers' Association of the results for each factory during the 1971 crop as well as summaries of factory data, totals and weighted means for 1960–1971 for the whole industry. The tonnage of cane crushed in 1971 amounted to 4,244,900 long tons, with an average pol content of 10·53% and average fibre of 15·85%, compared with 3,712,035 tons in 1970 with 10·21% pol and 15·59% fibre. Sugar output reached 368,843 tons of 98·02 average pol, corresponding to 11·27 tons of cane per ton 96° sugar, as against 311,149 tons of sugar, also of 98·02 average pol, produced in 1970 and corresponding to 11·68 tons of cane per ton 96° sugar. The net grinding time was increased from 66·44% to 74·36%, largely owing to a reduction in time lost through strikes from 11·28% in 1970 to 1·63% in 1971.

* * *

Australian sugar school expansion[5].—It has been announced that the second stage of the Sugar School at the Mackay Technical College, costing more than $A 250,000, will be constructed in the near future. It is anticipated that the building will be completed by the middle of next year. The first stage of the School was completed in June 1971 at a cost of $A 173,000. The School is designed to provide classroom and laboratory accommodation for the sugar industry students undertaking the Certificate Course in Sugar Chemistry and for students completing the Cane Tester's Certificate course. The facilities available are unequalled elsewhere in Australia.

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[1] C. Czarnikow Ltd., *Sugar Review*, 1972, (1085), 133.
[2] *Public Ledger*, 5th August 1972.
[3] *The Times*, 7th August, 1972.
[4] *Australian Sugar J.*, 1972, **64**, 36.
[5] *Queensland Newsletter*, 27th July 1972.

Brevities

New Mexican sugar factories[1].—Recent plans to expand the industry in Mexico are now being translated into reality. Work has commenced on the construction of three new sugar factories which it is estimated will involve about $40 million. The largest of the three will cost some $18 million and will be located at the village of Eduardo Chavez in the state of Tabasco. The factory will be called "La Chontalpa" and will have a designed capacity to crush 6000 tons of cane per day, producing some 90,000 tons of refined sugar each year. There is provision for later expansion to 9000 tons of cane per day giving an anticipated annual output of 120,000 tons of sugar. It is also planned to construct supplementary plants at a later stage on the site of this factory in order to utilize the by-products of sugar production. There are plans to manufacture cellulose, paper, hardboard panels, yeast, fodder for cattle and to distill alcohol. The other two factories are smaller, costing about $11 million each, and will be situated in the state of San Luís Potosí. To be called "El Naranjo" and "Tambaca", these two mills will produce raw sugar for further processing at a central refinery being planned for the site of the "Plan de Ayala" mill in Ciudad Valles. Once they are operational, the "Agua Buena" mill, which was constructed early this century, will be phased out. All three mills are expected to be in operation by May 1974 and it is hoped that they will achieve capacity performance during the 1975/76 season. In addition to the direct investment in the factories an additional $24 million has been allocated for the development of cane fields and supporting facilities. About 20% of the equipment for the new factories will be imported but the remainder will be manufactured in Mexico.

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Uganda sugar expansion[2].—The rapid increase in sugar consumption in Uganda requires measures to increase production, according to the Minister of Agriculture. Although the United States has granted an export quota of 15,000 tons under the Sugar Act, it has not been possible to utilize this because of under-production. It is reported that the Uganda Government intends to develop a new sugar cane area in Bugoso in the South and in Acholi in the North of the country. Plantations and smaller farms are to be built up. The Government has granted special privileges to local and foreign investors if they support the development of the sugar industry in Uganda.

* * *

Thailand drought[3].—The northern region of Thailand is reported to be suffering from a prolonged and severe drought. Sugar cane has sustained considerable damage and doubts have been expressed whether the campaign commencing in October will yield more than 500,000 tons, white value, compared with the 800,000 tons which was at one time forecast.

* * *

Brazil sugar expansion[4].—The Brazilian Dept. of Agriculture recently sent 1800 tons of cane seedlings to Altamira (Para), on the Trans-Amazon highway being built in northern Brazil. The seedlings are to be used for growing seed cane in the area as a first stage in the development of additional sugar production. It is to be followed next year by installation of a mill of 30,000 tons/year capacity[5], near Itaituba and Altamira, which are river ports as well as being on the highway. New areas for cane are being sought because of the high cost of land in São Paulo state.

* * *

Puerto Rico sugar factory re-opening[6].—After two years of inactivity, Central Los Caños has once again started operations under the administration of the Land Authority of Puerto Rico. The mill had closed in 1970 when the cooperative which owned it went bankrupt. The mill will crush part of the excess cane left after the closing of Central Monserrate.

US sugar quota, 1972

	Initial quotas	*Shortfall/ Reallocations*	*Revised quotas*
	—— (*short tons, raw value*) ——		
Domestic Beet	3,500,000	—100,000	3,400,000
Mainland Cane	1,643,000	0	1,643,000
Hawaii	1,218,238	0	1,218,238
Puerto Rico	175,000	0	175,000
Philippines	1,401,761	0	1,401,761
Argentina	82,698	2,800	85,498
Australia	210,797	0	210,797
Bahamas	0	61	61
Bolivia	0	54	54
Brazil	596,719	20,207	616,926
British Honduras	36,755	1,245	38,000
Colombia	73,508	2,490	75,998
Costa Rica	96,396	2,526	98,922
Dominican Republic	691,846	23,429	715,275
Ecuador	88,102	2,983	91,085
Fiji	46,190	0	46,190
Guatemala	81,730	2,160	83,890
Haiti	29,812	0	29,812
Honduras	17,387	440	17,827
India	84,403	0	84,403
Ireland	5,351	0	5,351
Malagasy Republic	12,597	0	12,597
Mauritius	31,074	0	31,074
Mexico	611,852	20,720	632,572
Nicaragua	69,725	2,361	72,086
Panama	43,500	0	43,500
Paraguay	7,027	238	7,265
Peru	426,998	14,460	441,458
Salvador	46,484	1,574	48,058
South Africa	59,628	0	59,628
Swaziland	31,074	0	31,074
Taiwan	87,763	0	87,763
Thailand	19,316	0	19,316
Venezuela	66,481	2,252	68,733
West Indies	206,788	0	206,788
	11,800,000	0	11,800,000

Philippines flood damage[7].—The most serious effects of the recent flooding in the Philippines has been found among crops other than sugar. In Luzon, where most of the damage occurred, about 25% of Philippine sugar is made and, fortunately, 1971/72 crop operations have been concluded. There is, however, new crop cane under water and it will be some time before the effects of any damage can be assessed.

* * *

Thailand sugar exports[8].—Thailand exported a record 307,219 tons of sugar during the first five months of this year, according to the deputy managing director of the Thailand Sugar Corporation. In May alone, over 52,577 tons were exported, compared with 145,000 tons exported during the whole of 1971. He also said that Thailand was committed to export about 129,210 tons of sugar during the next few months and estimated 1971/72 production at 650,000 tons.

* * *

New US sugar factory.[9]—BMA is to build a new sugar factory near Hillsboro, North Dakota, which will cost $30,000,000, and will process beets from an area of 50,000 acres.

[1] C. Czarnikow Ltd., *Sugar Review*, 1972, (1084), 129.
[2] F. O. Licht, *International Sugar Rpt.*, 1972, **104**, (18), 7–8.
[3] C. Czarnikow Ltd., *Sugar Review*, 1972, (1084), 127.
[4] *Sugar y Azúcar*, 1972, **67**, (6), 42.
[5] *Bolsa Review*, 1972, **6**, 391.
[6] *Sugar y Azúcar*, 1972, **67**, (6), 43.
[7] C. Czarnikow Ltd., *Sugar Review*, 1972, (1085), 132.
[8] *Public Ledger*, 17th June 1972.
[9] *Zeitsch. Zuckerind.*, 1972, **97**, 292.

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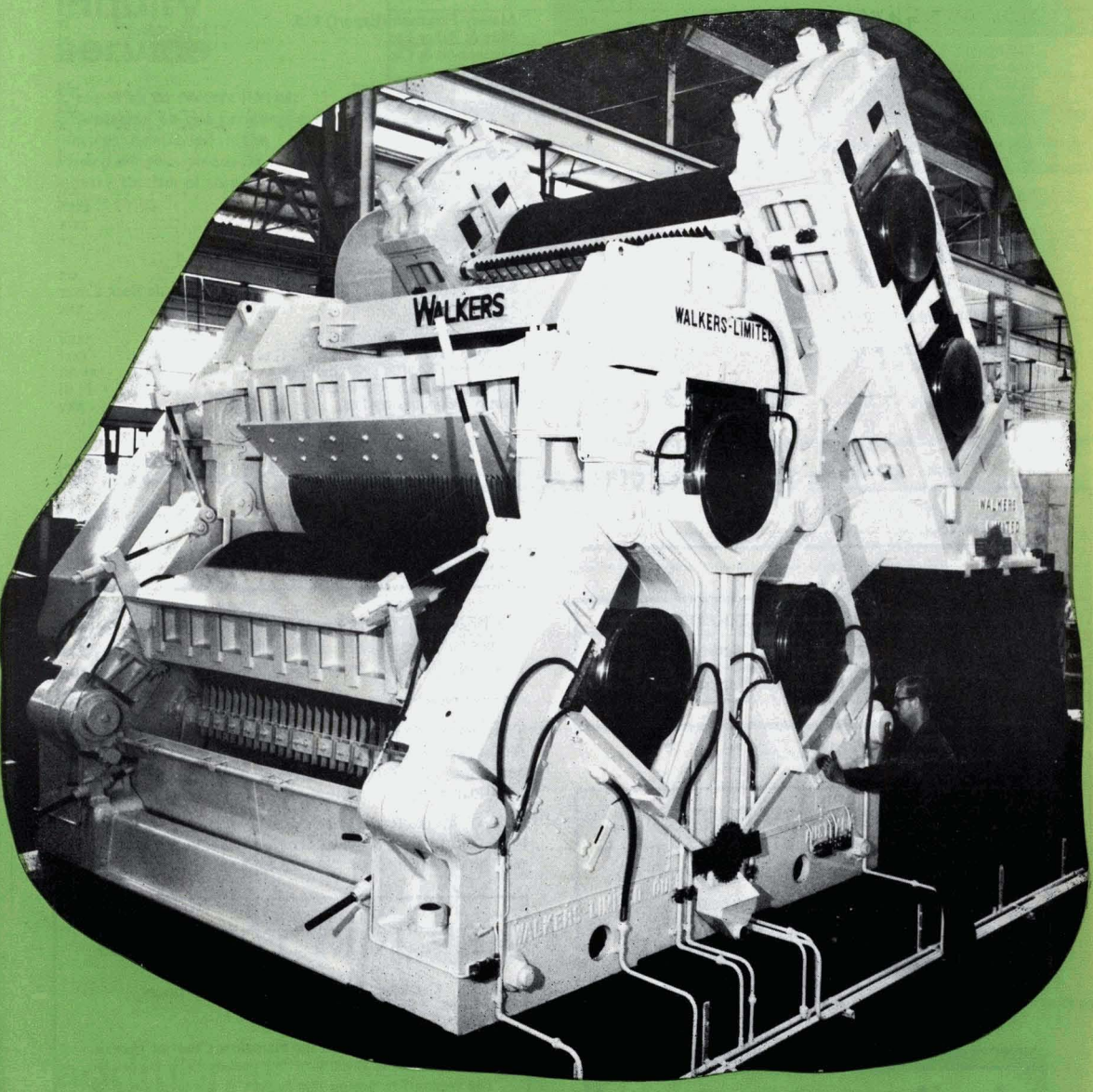

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To be responsible to the Factory Manager for all operations from cane receipt through milling to sugar bagging plus related utilities.

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Responsible to the Production Manager for the supervision of all factory operations on a rotating eight-hour shift basis.

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Responsible to the Maintenance Engineer for the inspection, repair and scheduled maintenance of process plant.

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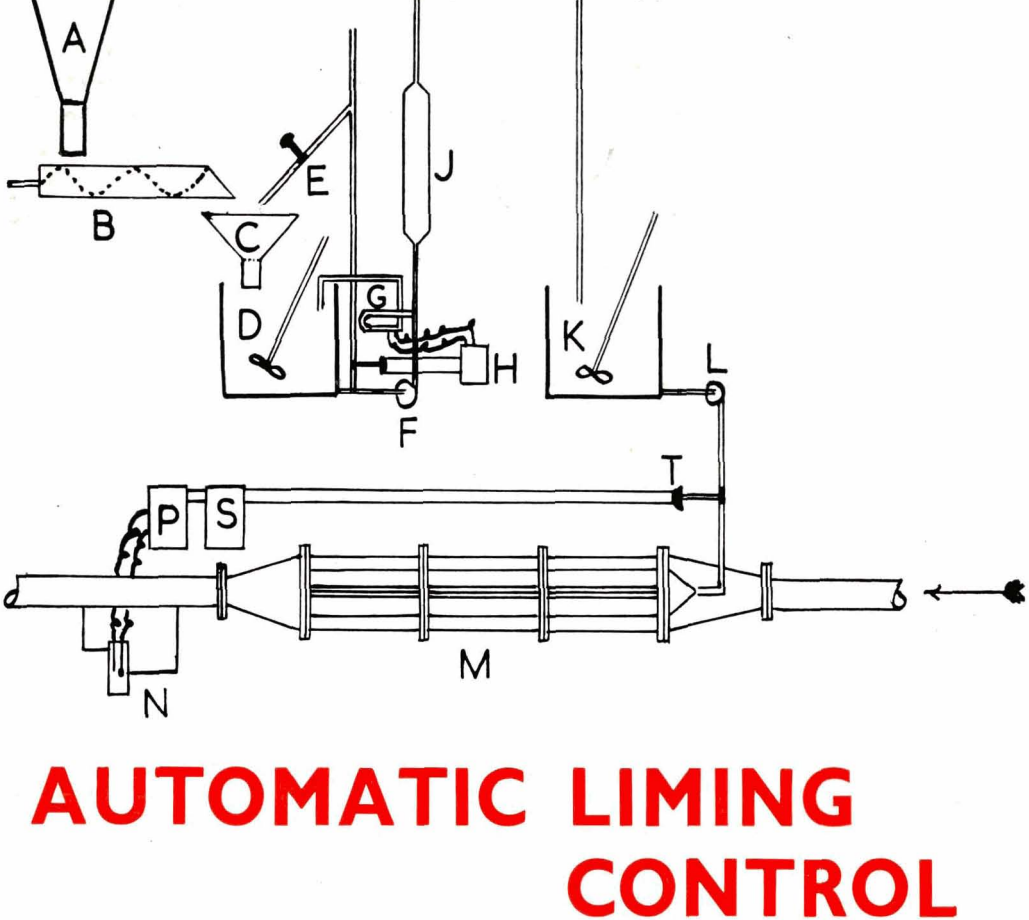

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J—Stand-pipe for ensuring that Meter is always full.

K—"Correct" Milk-of-Lime Tank, with Stirrer.

L—Centrifugal Pump for "Correct" Milk-of-Lime to Process.

M—Mixer Unit.* (U.K. Patent 891,713; other patents pending).

N—Flow-through Electrode System for pH Control.

P—pH Transmitter.

S—Recorder/Controller for pH Control of Liming.

T—Automatic Valve for Controlled Addition of "Correct" Milk-of-Lime to Mixer unit.

* See *I.S.J.*, 1958, **60**, 213

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