International Sugar Journal

VOL 65 *May, 1963* No. 773

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Published by
The International Sugar Journal Ltd.
Central Chambers, The Broadway,
London, W.5.
Telephone: EALing 1535
Cable: Sugaphilos, London, W.5.

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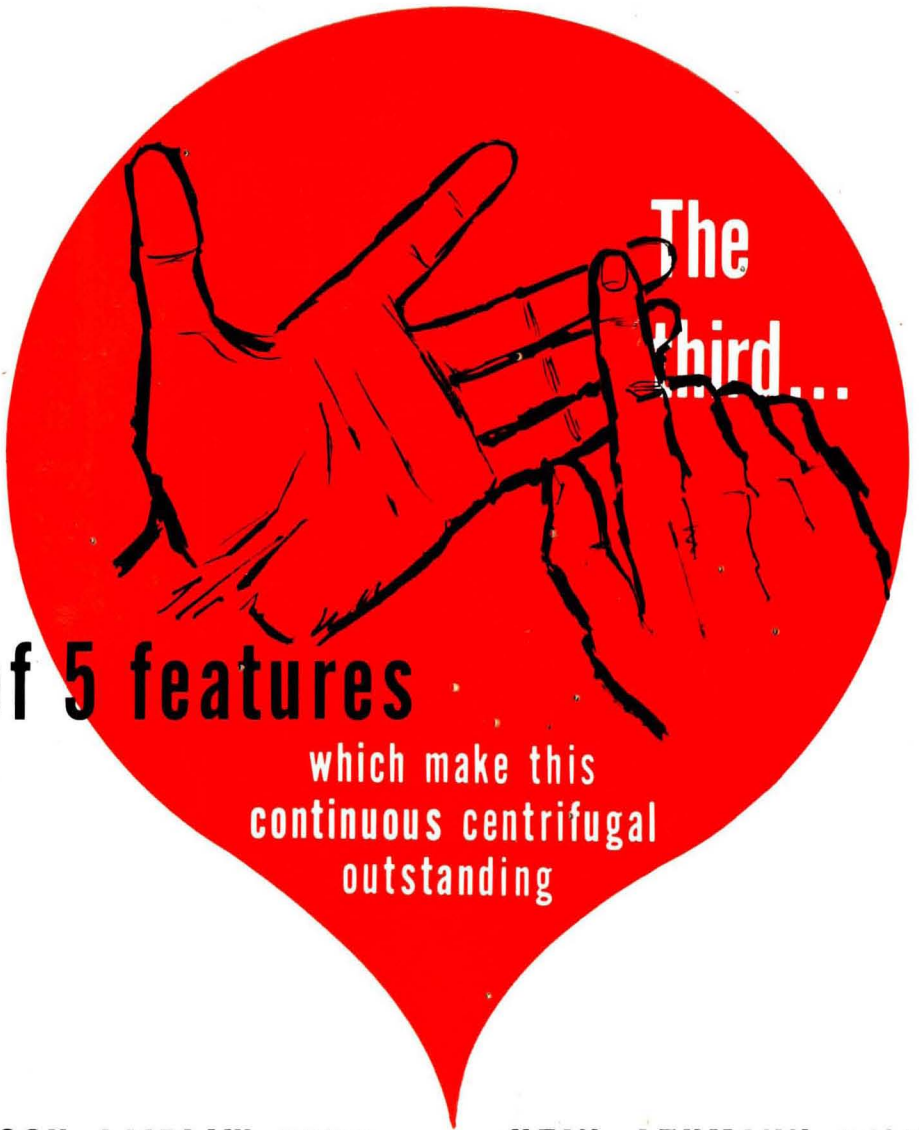
Annual Subscription: 32s 0d or $5.00 post free
Single Copies: 2s 6d or 45 cents plus postage



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THE
INTERNATIONAL SUGAR JOURNAL

VOL. LXV MAY, 1963 No. 773

NOTES AND COMMENTS

The International Sugar Council.

The fourteenth Session of the International Sugar Council was held at the seat of the Council in London on 3rd and 4th April 1963. The Session was presided over by Dr. H. J. SCHARMER (Federal Republic of Germany) the Chairman of the Council for 1963. It was attended by representatives of forty countries, by observers from the Governments of Argentina and Jamaica and by a representative of the Secretary-General of the United Nations.

The Council noted that following accession by Trinidad and Tobago on 21st February 1963, 43 countries were now members of the present Agreement. In this connexion the Council was pleased to welcome an application from the Government of Jamaica for accession to the Agreement.

The Council surveyed the market situation and the supply and demand position for the year 1963. It adopted the revised estimate by its Statistical Committee of the net import requirements of the free market for 1963, amounting to 11,940,000 metric tons raw value. The Council noted that the import requirements of the United States of America from foreign sources were now estimated at 3,810,000 metric tons raw value making a total for the requirements of the world market of 15,750,000 metric tons raw value. Details of that estimate will be published shortly. The Council considered this revised estimate against the latest forecast of supplies available for export to world destinations in 1963 and noted that taking the year as a whole requirements appeared to be considerably in excess of supplies. It is too early to assess with any degree of accuracy the probable outturn of sugar crops this year. Obviously actual export performance will depend on the size of the harvest. Similarly, changes in stocks will affect the level of requirements and of supplies available for export. The Council will review the estimates again at its next meeting.

The Council considered the situation arising from the expiration of the 1958 Agreement on 31st December 1963 and adopted a Resolution the text of which appears below.

The Council noted with satisfaction that the first volume of its study "The World Sugar Economy—Structures and Policies", relating to national sugar economies and policies covering 105 countries and territories, would be available within the next fortnight. The book, designed as a comprehensive work of reference was welcomed by members of the Council as a most valuable source of information for the sugar community.

Resolution on the continuance of the International Sugar Agreement.

The Council, considering that the International Sugar Agreement of 1958 expires on 31st December 1963; Desiring to continue international co-operation in connexion with world sugar problems; Recognizing that the prolongation of the present Agreement beyond 31st December 1963 will require the acceptance by Member Governments in accordance with their constitutional procedures of a suitable Protocol; Requests the Executive Director, in conjunction with the Secretary-General of the United Nations, to arrange for the preparation by 15th May 1963 of a draft Protocol: to continue the Agreement in its present form beyond 31st December 1963, and this to continue in being the Council which shall *inter alia* consider possible alternative bases for a new draft Agreement to replace in due course the existing Agreement as extended; Requests the Secretary General of the United Nations to circulate this draft Protocol to Governments and to convene a short Conference preferably at the seat of the International Sugar Council and if practicable not later than 1st July 1963 to consider the draft Protocol and to make arrangements for it to be opened for signature.

C. Czarnikow Ltd. comment[1]: "It is, of course, quite clear that the most important subject under consideration was the continuation of the Agreement itself. At present it is scheduled to expire at the end of 1963 and, with the differences of opinion which caused the Review Conference of 1961 to end so inconclusively still prevailing, it has for some time been abundantly clear that there could be little hope of a new and effective Agreement to enter into operation from the beginning of next year. The Council has done much good work, however, and it has undertaken, and is now engaged upon, several valuable studies and it would be unfortunate if these were to

[1] *Sugar Review*, 1963, (605), 71.

come to an untimely end. Furthermore, if the structure of the Council were at this stage to be destroyed the loss of confidence which would follow would certainly increase the difficulties confronting any new approaches to international co-operation in the commodity. It is therefore the subject for some satisfaction that the Council should have taken steps to prolong the life of the Agreement in its present form.

"Neither the Council's communique nor its resolution on the continuance of the International Sugar Agreement mention a time limit by which it is proposed to extend its life, but it would seem likely that annual extensions until such time as a new Agreement could be established would be acceptable to the various member nations".

* * *

U.K. terminal market rules change[1].

A £5 limit to fluctuations in London sugar futures took effect after the 6th April under new rules agreed by the Committee of the Terminal Sugar Market Association. The Rule stipulates that the market will close for 30 minutes when, during trading hours, a bid £5 above or an offer £5 below the previous closing price is unaccepted. Trading in current month is exempted from limit.

Under amendments to existing rules the duration of each call must not exceed 15 minutes with the final call opening at 16.45 hours. After-hours trading is also to be regulated. All business must be recorded before the market re-opens. All trading must cease 30 minutes after the official close of the New York Market until 10.00 hours on the next business day. There shall be no trading on Saturdays, Sundays or recognized U.K. public holidays.

* * *

U.K. sugar surcharge suspended.

The Ministry of Agriculture, Fisheries and Food announced that the Sugar Board's surcharge previously levied at the rate of 4s 8d per cwt of refined sugar (½d per lb) was suspended on and after the 10th April. The suspension, said the Ministry, was made possible by the continuing rise in the world market price of sugar.

The surcharge was 28s 0d per cwt up to the 3rd January, when it was reduced to 18s 8d; on the 12th February it was further reduced by 14s 0d and it has now been completely removed. The surcharge, which is levied under the U.K. Sugar Act of 1956, is to cover the cost to the Sugar Board of selling sugar at the world price which it has bought at the "negotiated price" from suppliers under the Commonwealth Sugar Agreement and also at the special prices paid to the South African sugar suppliers and the British Sugar Corporation.

Since the world market price went above the "negotiated price" the Board has been making a profit so that it now has become able to continue without levying the surcharge previously necessary to balance its accounts.

* * *

U.S. supply quotas, 1963[2].

The announcement was made in early April that the Department of Agriculture had authorized for immediate purchase and importation the balance of the global quota, amounting to 204,341 short tons raw value. Delivery will be required to be made by 15th November and doubts have been cast in some quarters as to whether such a tonnage could be made available by that date. Allocations made to date, according to reports received so far, amount to some 50,000 short tons.

When quota shortfalls were announced at the end of February it was not possible to announce reallocations in respect of the entire tonnage concerned. The balance, which amounted to just short of 37,000 short tons has now been allotted and the quota position as it stands at present is as follows:—

Short tons raw value	*Statutory quotas*	*Short-falls*	*Reallo-cations*	*Global quotas*	*Total*
Domestic beet	2,698,590	—	—	—	2,698,590
Mainland cane	911,410	—	—	—	911,410
Puerto Rico ..	1,140,000	-220,000	—	—	920,000
Hawaii.....	1,110,000	—	—	—	1,110,000
Virgin Islands..	15,000	—	—	—	15,000
Philippines	1,050,000	—	107,914	—	1,157,914
Ireland.....	10,000	—	—	—	10,000
Canada	631	—631	—	—	—
United Kingdom	516	—516	—	—	—
Belgium	182	—	—	7,622	7,804
Hong Kong....	3	—3	—	—	—
Argentina	20,000	—	—	42,356	62,356
Dominican Republic	322,152	—	10,816	176,353	509,321
Peru	192,152	—	—	185,152	377,304
Mexico	192,152	—	76,883	—	269,035
Brazil	182,416	—	—	282,659	465,075
B.W.I./Br.Guiana	91,351	—	26,222	—	117,573
Australia	40,378	—	—	135,862	176,240
Taiwan	35,510	—	—	31,500	67,010
French West Ind.	30,355	—	—	65,849	96,204
Colombia[e]	30,355	—	—	46,144	76,499
Nicaragua	25,200	—	—	15,300	40,500
Costa Rica	25,200	—	—	10,100	35,300
Ecuador	25,200	—	—	28,572	53,772
India	20,332	—	—	90,000	110,332
Haiti	20,332	—	7,267	5,854	33,453
Guatemala	20,332	—	82	12,780	33,194
South Africa ..	20,332	—	—	70,951	91,283
Panama	15,177	—	—	—	15,177
El Salvador....	10,309	—	1,989	6,500	18,798
Paraguay	10,023	—	—	—	10,023
British Honduras	10,023	—	—	—	10,023
Fiji	10,023	—	—	12,230	22,253
Netherlands ..	10,023	-10,023	—	—	—
France	—	—	—	24,438	24,438
Réunion	—	—	—	10,500	10,500
Mauritius	—	—	—	28,400	28,400
Southern Rhodesia....	—	—	—	10,878	10,878
Not yet released	—	—	—	204,341	204,341
	8,295,659	231,173	231,173	1,504,341	9,800,000

[1] *Public Ledger*, 6th April 1963.
[2] C. Czarnikow Ltd., *Sugar Review*, 1963, (605), 72.

THE CULTIVATION AND PROCESSING OF KENAF (Hibiscus cannabinus)

by The Tongaat Sugar Company Limited, Natal, South Africa

by T. G. CLEASBY, Ph.D. and C. E. DENT, B.Sc.

PART II

HARVESTING

The harvesting of kenaf at Tongaat is carried out by hand, the labour being skilled in the art of cutting

Cutting kenaf by hand in the field

sugar cane. Harvesting machines or combines would not work satisfactorily on a large proportion of the land planted to kenaf at Tongaat owing to its hilly nature.

Two techniques were tried during the harvesting season. These were, first, stacking the freshly cut kenaf stalks in bundles weighing approximately two tons, and mechanically loading these bundles into tractor drawn trailers and then transporting them to central ribboning stations. The average haul from field to ribboning station was approximately one mile.

The second technique was an in-field operation which was originally seen on the North Atlantic Kenaf Corporation's plantations in Guatemala and Haiti.

(a) THE CENTRAL RIBBONING STATION

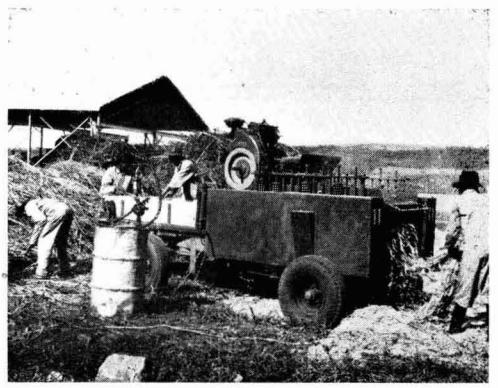
This system has the advantage that it can be worked on a two-shift basis if a portable electric lighting plant is available. This has the advantage of doubling the daily capacity of the machine and reducing the total number required. There are, however, some disadvantages which have been listed below —

1. The cost of transporting the kenaf stalks to the machine has to be borne.
2. The shives have to be gathered and disposed of.
3. The possibility of the kenaf arriving at the machine a day or more after being cut which allows the juices to become tacky, making it more difficult for a shive-free ribbon to be produced.
4. The extensive area required for drying the ribbons and the labour required to hang the ribbons on the drying lines. Also, because the drying lines have to be relatively close to each other, it was found that drying was not as rapid as in the in-field operation where the full length of the ribbon was exposed to the sun.
5. The larger number of labour units required.

(b) THE IN-FIELD METHOD.

The main disadvantage of this technique lies in the fact that it can only be worked on a single shift basis. It does, however, have a number of advantages which are as follows —

1. The transport of sticks and shives is eliminated.
2. The method generally requires less labour than the central ribboning station.
3. The number of cutters can be regulated to the capacity of the ribboning machine. This means



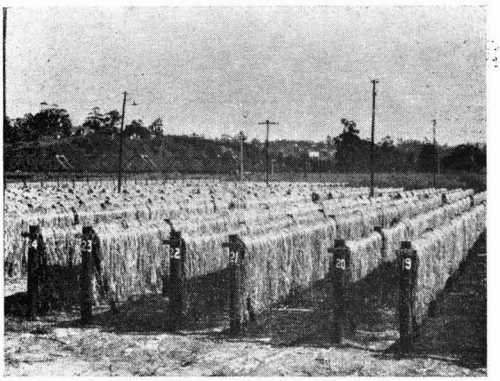
A Jaeggle ribboning machine working

that fresh sticks are always presented to the machine and better, cleaner ribbons result.

4. The drying is more rapid as the full length of the ribbon is exposed to the sun and ribbons can be baled a few hours after hanging.

When kenaf is ribboned in the field, the field is divided into strips of about thirty feet in width by means of drying lines which are set up ahead of the cutters. The cutters work in the area defined by the two drying lines, and lay the sticks in small bundles end to end alongside the drying lines. The machine moves behind the cutters and the sticks are fed into the machine, the ribbons being hung on one of the drying lines. The machine advances a few yards at

a time so that the kenaf only has to be carried the minimum distance. Although the nature of the land



Kenaf fibre on the drying lines

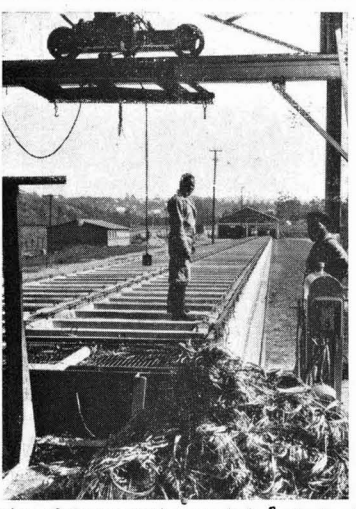
at Tongaat is not ideally suited to this technique it showed a saving of about fifteen units of labour over the central station system for a given quantity of ribbons.

For maximum efficiency in utilizing machines, the solution is to use the in-field technique during the day and the central station system at night. This has been tried successfully at Tongaat.

When the ribbons are air-dry they are baled and then stored under cover until they are required for retting.

Fibre Extraction

The method of fibre extraction used at Tongaat is bacteriological retting, carried out in Flader continuous counter-current canals. The canals are



General view of the two retting canals from the loading end. Ribbons, hydraulic ram and operating mechanism can be seen in the foreground.

each 508 feet in length, 6 feet wide and 5 feet deep and built of reinforced concrete. It was found that after three months of operation the concrete had to be protected against acid attack by an epoxy resin paint.

In the counter-current canal system the water flows slowly through the canal in one direction while the fibre, which is hung on wooden slats supported in wheel mounted glass fibre frames, is moved through the canal by means of a hydraulic ram, in the opposite direction. The frames which measure 6 ft × 3 ft are loaded with about 240 pounds of dry ribbon while supported on a stand at the loading end of the canal. The ribbons are tied around the middle to prevent entanglement when the frame is lowered into the water by means of an electric hoist.

Water

Waste water from the sugar factory is used to feed the retting canals. This water is available from May to December in a normal season and is about 34°C, the optimum temperature for the development of pectin-destroying bacteria. Its flow is controlled to ensure that the pH of the water leaving the canal is above 4·5. It has been found that the amount of water required is approximately 35 gallons per minute per canal. With a fibre output of about 140 pounds per hour per canal this represents a water usage of 150 pounds per pound of fibre which is considerably higher than the generally accepted figure of between 50 and 100 to 1 but, as has been previously stated, there is ample warm water available from the sugar factory and so the higher flow rate is an advantage.

Observations on the Retting Process

Retting appears to take place in four phases. In the first phase the ribbons absorb water which causes the displacement of air and gases. The absorption of water causes the ribbons to swell and this results in the opening up of the cortex and parenchyma cells, thus providing easy entrance for the retting organisms. During this period leaching of the water-soluble constituents takes place.

The second phase which commences two to three days after the immersion of the ribbons in the canal results in the softening of the ribbons. It is thought that in this phase there is a decomposition of the carbohydrates and nitrogenous compounds which form organic acids with a further liberation of gases.

In the third phase anaerobic bacteria decompose the pectins and destroy the parenchyma cells, thus freeing the individual strands of fibre from the cortex and parenchymatous tissues. During this phase large quantities of gases are liberated, this being particularly noticeable each time the trays are moved along the canal. Organic acids are formed in larger quantities than in phase two and this is shown by the pH curves. There is, however, no clear demarcation between the second and third phases but the end of the third phase is indicated by the point where there is a rapid increase in pH.

In the fourth phase there is no further production of acid. It is thought that in this phase aerobic bacteria might play an important part in the retting process by a moderate attack on the lignin, resulting in more successful fibre liberation at the normally resistant root ends.

The end point of retting, that is, when the fibre strands are completely separated from the parenchymatous tissue, is of importance if the maximum possible throughput is to be obtained from the canal. The danger of over-retting with the canal system is small.

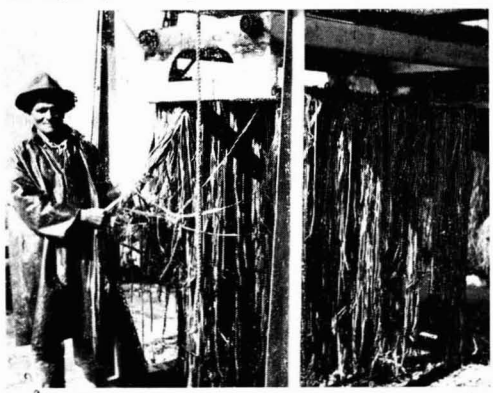
The temperature along the length of the canal falls and a drop of as much as 11°C has been recorded during the winter months. The necessity for additional heating along the length of the canal is a factor which will have to be investigated at some time in the future.

The following table shows the pH and temperature measured at mid depth along the length of the canal, during a typical ret.

pH results from kenaf canal

North Canal			*South Canal*	
Temp.	*pH*		*Temp.*	*pH*
34	8·7		34	9·4
34	8·65		32	9·3
32	7·45	STAGE IV	31	7·6
32	7·2		31	7·5
32	6·3		30	6·2
31	5·8		30	5·7
31	5·5		30	5·45
30	5·35		30	5·3
30	5·2		29	5·2
29	5·15	STAGE III	29	5·1
29	5·1		28	5·05
29	5·1		27	5·05
28	5·05		27	5·0
28	5·0		27	4·95
27	4·95	STAGE II	27	4·95
27	4·9		27	4·95
27	4·9		26	4·9
26	4·9	STAGE I	26	4·9

The fibre is at present air dried on lines but when the capacity of the plant is increased, forced drying equipment will be installed in order to limit the area required and the inconvenience resulting from prolonged wet weather.

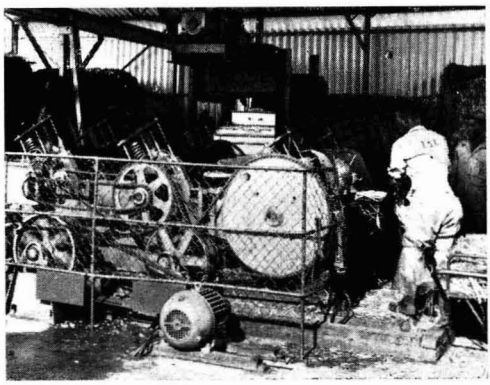


Retted ribbons hanging in fibre glass frames prior to washing

Washing of the Fibre

The first retted fibre produced at Tongaat was washed in a machine of the twin drum type which had a brushing action while the fibre was sprayed with water. The quality of the fibre was excellent but this machine produced about 30% of tow. The capacity of the machine was also low, approximately 12½ pounds of dry fibre per operator per hour, and it required eight units of labour to operate it.

This machine has been superseded by a Jaeggle washing and squeezing machine which has washed up to 4 tons of fibre in a three shift day using only 4 operators per shift. The fibre is not as clean as that washed by the original machine but very little tow is produced.



A Jaeggle washing machine working

Loss of Weight on Retting

Careful records are kept of the variety, the weight of ribbon loaded into the canal and the weight of fibre recovered. The following figures have been extracted from these records.

Variety	*Dry weight of ribbon*	*Dry weight of fibre*	*Loss of Weight*	*% recovery of fibre*
Purja	18791	8764	10,027	46·7
Cuba 108	14600	7504	7,096	51·4
Rhodesian	7980	4402	3,578	54·5
Java	28197	15034	13,163	53·5

Labour Required for Operating the Retting Plant

The Tongaat retting installation has been laid out to reduce handling to a minimum while at the same time allowing for future expansion. The high initial cost of the canals, frames and hoists is offset by the ease of handling the material and the continuity of the process.

Most of the labour is at present used in hanging the fibre on the drying lines and in its subsequent collection for baling after drying. By the installation of a drying

Baled kenaf fibre

tunnel and a more rapid baling press it is considered that the present capacity of up to four tons per day can be doubled without an increase in the amount of labour required. As a matter of interest sixty-three units of labour are employed at the moment and divided into three shifts of sixteen units each plus two baling shifts of five units each. The remaining five units are employed on the maintenance of frames and machines.

Fibre Quality

While some excellent fibre has been produced at Tongaat, the quality has generally fallen short of what has been aimed at. The reason for this was primarily a disastrous drought which restricted growth in the crop and at the same time exaggerated the incidence of disease. Harvesting was furthermore delayed for one month to allow time for extra growth to take place and in consequent the crop was ribboned in an over-mature state. This resulted in ribbons with a high shive content. Again lack of experience in the ribboning of the kenaf stalks means that inferior ribbons were sometimes produced. It must be realised that 1961/62 was the first year of large scale kenaf growing and that is no reason why all the above factors cannot be put right in future years.

As an example of what can be produced, an analysis made by Dr. H. Schneider of Zürich of yarn spun by Ropes & Mattings Ltd., of Durban, on the 26th February 1962, from kenaf fibre grown at Tongaat in 1961, showed a fibre fineness of 239·7 metres per gram with 79% of the fibres averaging 4·2 inches.

This fibre was washed in a brush type washing machine and any weak fibres were probably lost in the large proportion of tow produced by this machine. A subsequent sample analysed by Dr. Schneider and washed in the Jaeggle machine gave fibre finenesses of 209·7 metres per gram with 79·3% averaging 4·32 inches and 194·8 metres per gram with 79·8% also averaging a fibre length of 4·32 inches.

Conclusion

It was stated in the introduction that the aim at Tongaat is to produce a kenaf fibre equivalent to jute export hearts. It has been admitted that this aim has not yet been achieved, although considerable progress has been made in spite of the most unfavourable growing conditions which were experienced this year. There appears, however, to be no basic reason why it should not be achieved given time to develop plant varieties and agricultural methods to suit local conditions and also to improve processing techniques.

Sugar (as nematocide)[1]. Anon. *World Crops*, 1963, **15**, 38.—It is pointed out that the discovery has been made in America (Horticultural Field Laboratory, Orlando) that sugar applied to the soil in the right quantity can act as an effective nematocide. Sugar mixed with nematode-infested soil at rates of 1–5% by weight killed all nematodes within 24 hr. The sugar is claimed to kill the pests by increasing the osmotic pressure of the soil solution in which they live, the nematodes dying as a result of dehydration following loss of body fluid. This is claimed to be the first demonstration of nematocidal activity in a substance that is not regarded as toxic in the usual sense. If successful or economic on a large scale this technique may provide yet another use for sugar. Nematodes are troublesome with many cultivated crops, tropical and temperate.

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Safety rules for farm chemicals. Anon. *Producers' Rev.*, 1962, **52**, (10), 9 and 13.—A brief safety code of 10 precautions is given on the former page and a more detailed discussion promised in the next issue. In the second a warning is issued in the case of contract aerial spraying, covering written contracts including protection against claims for damages.

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Filter-press cake and tomato plant growth. M. del C. C. Fernández. *J. Agric.* (Univ. Puerto Rico), 1962, **46**, 167–170.—The results are given of pot experiments covering tomatoes grown in sterilized and unsterilized soil, each with and without 1% filter press cake, and in sand. The plants in sterilized soil plus cake were the first to flower and gave a significant increase in yield over other treatments. It is suggested that filter-press cake contains some growth-promoting substance which is inhibited by soil organisms.

[1] *See also I.S.J.*, 1962, **64**, 33.

SUGAR CANE AGRICULTURE IN JAMAICA

Proceedings of the Jamaican Association of Sugar Technologists, 1961[1]

SEEING that some 50% of estate cane in Jamaica is irrigated and that the total cost per acre, £20, is the largest single cost, how to reduce to a minimum the water used and how to make the most efficient means of distribution become two of the major agricultural problems. In a paper entitled "Symposium on Long Furrow Irrigation", these problems are discussed by T. CHINLOY *et al.* in the light of the results obtained from 10-acre blocks situated on two soil types. The comparison is made between the "twig" system with its ½-chain furrow and the "long furrow" system with furrows up to 5 chains. In addition to details of flumes, siphons and spiles used for feeding water into the channels, records are given of water flow and absorption measurements, cane growth measurements including sheath moisture, and yield. The more outstanding facts that emerge include an economy in water, some 3½ in to 4½ in against a normal of 6 in under the twig system. There is also an apparent drop in yield in the middle of the long line but, with the more even distribution in the latter, the overall yield is held to be as high as under the twig system. Under modern conditions of labour costs and mechanization, the advantages are all in favour of the long line.

A paper by M. W. GOODMAN deals with the rather technical subject of the factors which enter into the economic operation of fixed-wing aircraft in agriculture. In considering the question of cost, it is held that the fact that charges are normally fixed on an acreage basis instead of the more general hourly basis is a definite handicap to the more extended use of aircraft.

T. C. EWELLS describes in detail the seasonal development, growth, and death of tillers, leading to the final stalk population in spring planted B 42231 and B 4362. The general conclusion is that it is tillering during the first four months which is of importance and that delayed cultivations, whether for weed control or banking up, may be harmful.

Varieties:—A general review of the varietal situation is given by C. E. M. SMITH. There has been little change in the general situation since 1959 and the main theme is an account of the performance of varieties of the B 51–B 53 series with recommendations for their extended trial.

Weeds:—A. J. CARRINGTON, in discussing the control of weeds, pointed out the difficulty that arises from a lack of understanding of the particular weed under review. This paper consists in the main of a tabulated statement of some of the approximately 400 weeds which were illustrated at the Conference by coloured slides. Linnean and vulgar names are given together with a brief description and, in cases, comments as to reaction to weed killers and toxicity to cattle, etc.

Pests:—In a paper on the cane fly, *Saccharosydne saccharivora*, J. R. METCALFE gives a history of the cane fly and its life cycle with the rapid rise in population, the spread and ultimate decline. Appreciable losses occur only when growth is poor. Control by pesticides with the risk of building up a resistant race is also discussed.

H. M.-L.

AGRICULTURAL ABSTRACTS

Red rot of sugar cane—criteria for grading resistance. K. V. SRINIVASAN and N. R. BHAT. *J. Indian Bot. Soc.*, 1961, **40**, 566–577.—See *I.S.J.*, 1962, **64**, 289.

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Importance of lesion width in assessing resistance of sugar cane varieties to red rot [*Glomerella tucumanensis* (Speg.) Arx and Mueller]. ANON. *J. Indian Bot. Soc.*, 1961, **40**, 641–644; through *Plant Breeding Abs.*, 1962, **32**, 5124.—Average lesion length in inoculated canes is considered unsatisfactory as a criterion for assessing resistance or susceptibility to *Glomerella tucumanensis*. Using a total of 681 varieties the suitability of eight new criteria was assessed and four were shown to be of particular value. These are (1) yellowing or drying of the tops, (2) lesion width, (3) occurrence and nature of white spots in the lesions and (4) number of nodes crossed by the pathogen. The four other characters were of confirmatory value. A key to six resistance classes is provided which is based on the eight characters.

Rats and the transmission of ratoon stunting disease. J. ADSUAR. *J. Agric.* (Univ. Puerto Rico), 1962, **46**, 239–240.—C. WEHLBURG[2] has reported the field rat as a vector of ratooning stunting disease. In a small experiment covering 23 plants from 16 two-eyed cuttings, the author found no confirming evidence.

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The Thysanoptera of Puerto Rico. S. M. GAUD. *Tech. Paper Agric. Exp. Sta.*, (Univ. Puerto Rico), 1961, (32), 159 pp.—In this detailed study of the *Thysanoptera* are to be found frequent references to species found on sugar cane.

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Sugar cane soils of South Arcot District. T. A. GOVINDA IYER *et al. Indian J. Sugar Cane Res. & Dev.*, 1962, **6**, 221–227.—This report of a survey shows the general characteristics to be low N and P but high K and Ca. Five types are distinguished.

[1] *J.A.S.T.J.*, 1961, **23**.
[2] *Sugar*, 1956, **51**, (3), 27–29; *I.S.J.*, 1956, **58**, 243.

A technique for the elimination of red rot–susceptible sugar cane seedlings at an early stage. K. V. SRINIVASAN. *Curr. Sci.*, 1962, **31,** 112–113; through *Plant Breeding Abs.*, 1962, **32,** 5125.—Six-week old seedlings are sprayed with a conidial suspension of *Glomerella tucumanensis* and placed immediately in a humidity tent of polyethylene film permitting diffused light. Within 72 hr of inoculation dark red spots develop on the young shoots. After noticing the reactions, the seedlings are clipped back to promote the development of new leaves for confirmatory tests. Resistant seedlings are planted out for determining adult plant reaction by the usual plug technique. The seedling technique is not sufficiently sensitive to distinguish between high and moderate resistance but it enables almost all of the susceptible plants to be eliminated.

* * *

Chemicals in sugar cane culture with regard to pest control. T. P. S. TEOTIA *et al. Indian Sugar*, 1962, **12,** 225.—The work done on the subject of chemical control of insects is briefly reviewed, and a tabulated statement, classified under the respective insecticides, gives the treatment and respective cost thereof of the various pests.

* * *

Chemical aspects of soil fertility. G. W. COOKE. *Soils and Fertilizers*, 1962, **25,** 417–420.—The article is a general discussion of the nutrient elements in the soil, the cations on the one hand and the anions on the other, and of the factors controlling their availability. But it contains some rather too sweeping claims such as, that adding extra nutrients allows us to control chemical soil fertility and that the main problems in highly developed agriculture are in diagnosing deficiencies. The importance of organic matter is admitted in grassland and "natural" soils but less so in long-cultivated arable lands, yet soil moisture, so largely dependent on organic matter, is shown to affect crop yields through controlling nutrient availability.

* * *

Tillering studies. II. Adsali. S. K. SASTRY and A. VENKATACHARI. *Indian J. Sugar Cane Res. & Dev.* 1962, **6,** 190–200.—The studies concerned Co. 419 planted in 4 successive months, June–September, in 3 successive years. Germination of "A" shoots was completed in 30–45 days with a survival rate of 35–49%; "B" and "C" shoots followed, with major tillering completed in 135 days after planting. Tiller mortality commenced 60–75 days after planting, first in "B" shoots. Tiller mortality amounted to 67–75% in "B" tillers, 62–67% in "C" tillers and 48–65% in "D" tillers. Ultimate tiller survival ranged from 29 to 34%.

An evaluation of the effectiveness of selecting sugar cane varieties from plant and first stubble crops. D. T. LOUPE. *Diss. Abstr.* 1962, **22.** Order No. 62–51, p. 2935 (Abst.); through *Plant Breeding Abstracts*, 1963, **33,** (1), 540.—The relative usefulness of five characters, number of stalks, erectness, vigour, Brix and stalk diameter, in making initial selection in populations of plant cane seedlings or stubble cane seedlings was studied, the experimental material consisting of 100 seedlings from each of five crosses. The most reliable selection criterion in plant and stubble cane was shown to be stalk number, but all other characters were found to have some value as selection criteria.

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The Mizzi cane harvester. ANON. *Australian Sugar J.*, 1962, **54,** 461.—A single page is mainly occupied with illustrations of the latest form of the Mizzi harvester which cuts, chops and delivers the chopped cane into wire-meshed bins holding 3 tons each.

* * *

A new way of weed control in sugar cane. F. E. ZUELLIG. *Sugar News* (Philippines), 1962, **38,** 547, 548.—The superiority of "Gesaprim" over other weed killers is noted, the advantages lying in its insolubility, giving effective control over a long period, and its activity in the case of both broadleaved weeds and grasses. The best time for applying is given as: plant canes, immediately after planting; ratoon canes, immediately after harvest and removal of trash.

* * *

Studies on the germination of sugar cane. I. Effect of keeping setts before planting. R. R. PANJE and P. S. GILL. *Indian J. Sugar Cane Res. & Dev.*, 1962, **6,** 185–189.—Delays may occur, in particular when distributing new varieties of cane, between cutting and planting setts. A delay of one or two days reduces germination but germination is substantially improved when the setts are first dried and then soaked from 2 to 4 hours before planting. The main advantage of soaking is shown to be an insurance for a good stand.

* * *

Studies of wild *Saccharums*. I. Root Systems. O. P. NEGI. *Indian J. Sugar Cane Res. & Dev.* 1962, **6,** 201–207.—The forms include six of *S. spontaneum* and one each of *S. robustum* and *Erianthus arundinaceus*. *S. spontaneum* shows two types, the first deep, non-spreading with rope systems (groups of 2–5 roots bound together), the second shallow, spreading and without rope systems. The two remaining species are shallow, wide-spread feeders with no rope systems.

THE GLADES SUGAR HOUSE

By ALFRED WEBRE, Jr. and FRANCIS C. SCHAFFER

THIRTEEN months from ground-breaking to startup! This is the record of the newest co-operative sugar factory in the U.S.A., the Glades Sugar House. Engineering of this 6250 t.p.d. factory was started on the 1st July, 1961, ground-breaking was held 2nd October, 1961, and the plant went on stream during the week of 19th November, 1962. The engineers for this $13,000,000 project were Arkel Engineering Corporation of Baton Rouge, while the general contractors were Farrel-Abarca Corporation of Ansonia, Connecticut and San Juan, P.R.

The Sugar Cane Growers' Co-operative of Florida, as the organization is formally named, is set to participate in a large share of the Florida sugar industry expansion. The Co-operative's fifty-one member growers and one independent grower have planted 22,000 acres from which they expect to harvest in excess of 900,000 tons of cane for their first crop. This large initial crop has occasioned several increases in the scope of the project since it was originally envisaged. Starting in early 1961 with a preliminary plan for a 3000 t.p.d. operation, a feasibility study was made by the engineers that indicated a factory of a minimum capacity of 5000 t.p.d. should be built with provision for an ultimate capacity of 8000 t.p.d. However, after construction was under way, it was decided to undertake part of the expansion immediately, so additional equipment and facilities have been included to provide a nominal capacity of 6250 t.p.d. and a peak capacity of about 6500 t.p.d.

The Glades is an interesting sugar house in that a number of unusual problems have been solved in more or less unconventional ways.

Fig. 1

To start with, all the cane is delivered in semi-trailers, with no railroad or field cart deliveries. It is cut by hand (Fig. 1), loaded mechanically by J. & L. Engineering Co. "CaneMaster" loaders into

Fig. 2

in-field units (Fig. 2) and transferred to the trucks (Fig. 3) which bring it to the factory. It was necessary

Fig. 3

to design a system to store and handle cane for the potential ultimate capacity of 8000 t.p.d. using truck deliveries limited to daylight hours. This was solved by sending 40% of the cane directly to the mill (Fig. 4)

Fig. 4

and the remaining 60% to a 100 ft × 380 ft storage area (Fig. 5), serviced by two high-speed (450 f.p.m.) P. & H. bridge cranes of 100 ft span, each with a 6-ton pay-load grapple. The main cane carrier is worthy of note in that it is drawn by the new outboard roller chain manufactured by the Chain-Belt Company.

Fig. 5

The cane is prepared by two sets of Farrel-Birmingham knives, driven by Worthington 800 h.p. single-stage turbines. The 12-roller Farrel-Birmingham mill tandem of 38 in × 84 in rolls (Fig. 6) is preceded by an electro-magnet and over-and-under feed rolls. Each mill is driven by a 1000 h.p. Worthington single-stage turbine through two Farrel-Birmingham speed reducers. All turbines exhaust at 20 p.s.i.g.

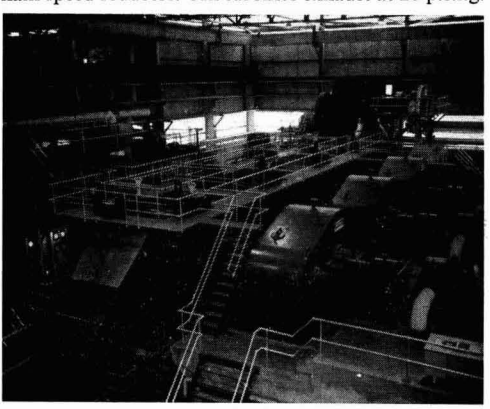


Fig. 6

There is an air clutch between the first and second reduction. Air clutches also operate the rubber belt intermediate carriers driven from the front rolls and the juice pan drag conveyor driven from the top roll. The tandem is operated from a control platform, where a console panel allows the mill operator to perform any essential function. A compound maceration system is used, with chokeless pumps to handle the juice from the last two mills. The mixed juice is pumped by a rubber-lined pump to a Fletcher Maxwell-Boulogne scale. This scale together with a Mirrlees Watson magma pump represent the only equipment of European manufacture in the factory.

The boiler room consists of two 120,000 lb/hr Riley units and one 60,000 lb/hr Union Iron Works unit, all with Riley spreader stokers, oscillating grates and fly ash arrestors. The ashes are sluiced automatically to a disposal pit. The steam pressure is 400 p.s.i.g. at 550°TT (approx. 100° of superheat). Automatic combustion controls complete the boiler room.

The power plant (Fig. 7) consists of two 2500 kW 2400-volt Worthington multi-stage, non-condensing turbo-generators. The turbo-generators exhaust at 20 p.s.i.g. The building is kept under positive pressure of about 1 inch w.g. by means of centrifugal blowers to prevent entrance of dust, fly-ash, etc.

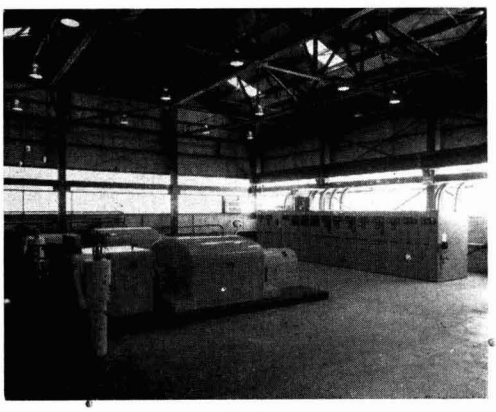


Fig. 7

In the boiling house all controllable variables are regulated by Minneapolis-Honeywell instruments. All instruments are mounted in a glass-enclosed, air conditioned control room located at the centre of the pan floor to allow observation of all pans, evaporators and other equipment (Fig. 8). Space has been allowed in this room for the eventual complete automation of all pan floor operations.

The limed juice is heated by first effect vapours in three 3000 sq. ft. Nadler heaters and settled in four 22 ft 4-tray "Rapi-Dorr" clarifiers. The filter station consists of two 8 ft × 16 ft "Rapi-Floc" filters. Mud is slurried and pumped to a disposal pit some distance from the factory. Clarified juice is heated with exhaust steam in two 1500 sq. ft. Nadler heaters.

The completely automatic evaporation station is an interesting one. First, there are three 10,000 sq. ft. Abarca bodies, any two of which can operate together, either in series or in parallel. Then there are six 8500 sq. ft. Abarca bodies, arranged as two triples to work in series after whatever combination of the larger bodies may be in operation. Thus, there are nine bodies, with five on the line at any time, giving, in effect, a dual evaporation station to allow for cleaning without interruption of operations. It has been the experience in the Florida Everglades that the evaporators scale up very rapidly, making it necessary to clean after as little as 50 or 60 hours of operation. This has been the subject of investigation by the older sugar houses in the area for many years, with no real solution as yet forthcoming. Therefore, the evaporator arrangement will provide flexibility to cope with whatever situation may develop in the future.

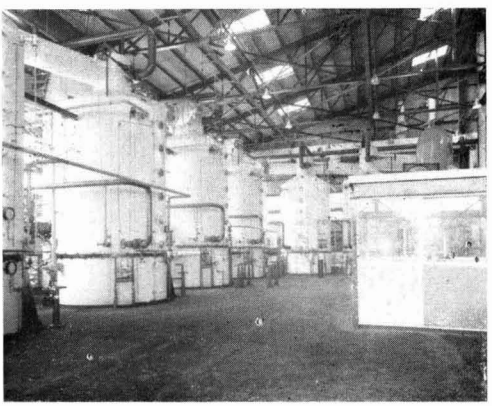


Fig. 8

In the boiling house there are three different steam pressure systems, all controlled and interlocking. For use of various steam ejectors, heating coils, etc., 150 p.s.i.g. steam is available. The standard exhaust pressure is 20 p.s.i.g. and the vapour pressure 10 p.s.i.g. The pans can operate on either system, and if the latter is used, it will be connected in to the first effect vapour. When pans are operated on vapours, an automatic makeup maintains the pressure in the vapour system; if pans are cut off, an automatic valve releases vapour so that the evaporation in the evaporator bodies being "robbed" is maintained.

The pan station, also of Abarca manufacture, consists of four 2000 cu. ft. units of 4000 sq. ft. heating surface (Fig. 9). All units have automatic vacuum control. The low-grade pan is equipped with a supersaturation instrument for seeding. All discharge and cut-over valves are manipulated hydraulically from push-button stations in front of each pan.

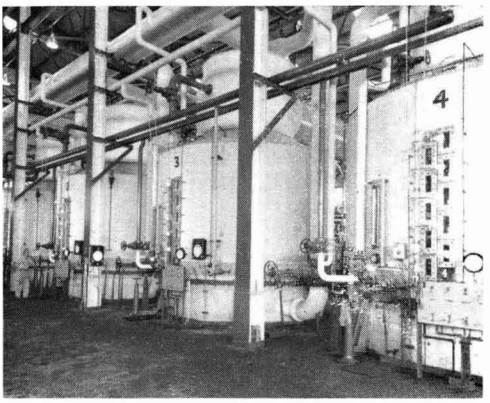


Fig. 9

The high-grade pans discharge into two 2200 cu. ft. pan receivers while the low-grade pans dump into six 2200 cu. ft. crystallizers equipped with Dyer-Blanchard cooling coils (Fig. 10).

The high-grade centrifugal battery consists of five Western States 30 in × 48 in 1200 r.p.m. fully automatic units. The low-grade centrifugals, also manufactured by Western States, are 30 in × 40 in 1800 r.p.m. semi-automatic units. All these centrifugals (Fig. 11) are individually motor-driven, direct connected. The timers are located directly in front of the battery, while the control panels are located in a sealed air-conditioned room to prevent the intrusion of dust into the relays.

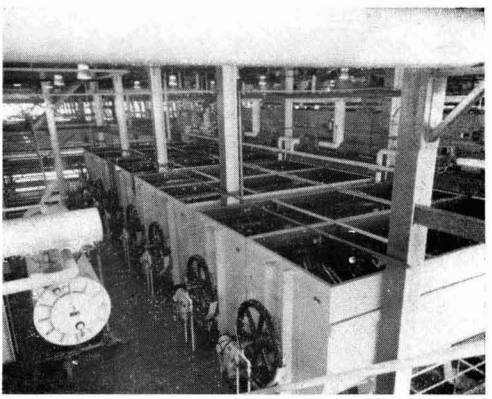


Fig. 10

The induced draught cooling tower has a capacity of 18,000 g.p.m., which is recirculated at all times regardless of the demand in the boiling house. It is anticipated that the water will never rise above 95°F and will average 85°F. This has allowed use of multi-jet-spray condensers on the evaporators and multi-spray condensers on the pans, the latter to

allow control of the water over a 0–100% range, advantageous in pans. The multi-jet-spray for the evaporators will provide sufficient flexibility of operation for automatic control of the evaporators.

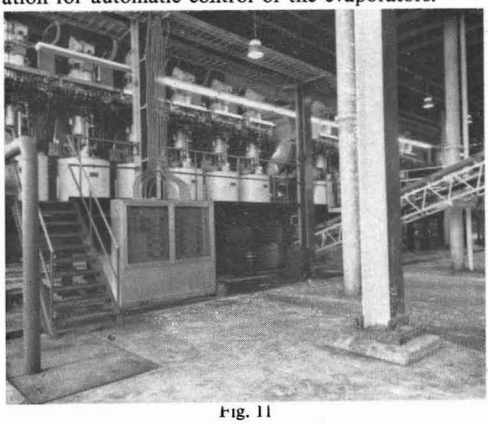


Fig. 11

The handling of condensate is more elaborate than in most sugar houses—it is separated and collected in three different tanks (Fig. 12). The first tank collects steam which has condensed in a calandria (not in a heater). This is pumped to the boiler feed water heater without further ado. The condensate from the last calandria of the evaporators is used exclusively for maceration after having been cooled

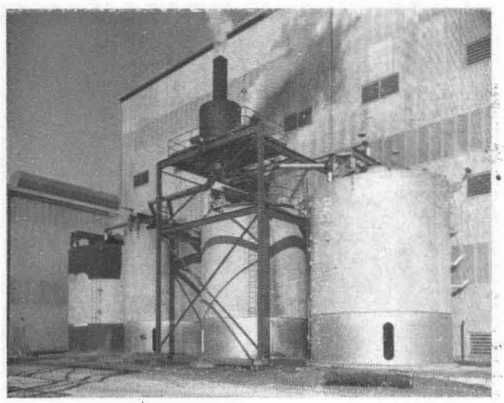


Fig. 12

in a heat exchanger by the mixed juice. All other condensate is collected in the third tank and comprises the house hot water system. Any excess from this system will go to the boiler feed water area for analysis and possible use as boiler feed. After analysis, any surplus is stored in large outdoor tanks—as boiler feed makeup if pure and as house water supply if not. This water system allows the plant to operate without a water treatment plant. (There is a connexion to the municipal water supply for potable and miscellaneous uses.)

The sugar produced goes initially to a 300-ton capacity overnight bin. From this bin the sugar will be carried in a 12-yard dump truck to a 30,000-ton bulk warehouse (Fig. 13), to be stored by a sugar slinger. The bin allows all trucking to be done during

Fig. 13

the daylight hours. A belt conveyor mounted under the bin allows for direct loading to railroad cars for rail shipment of raw sugar (Fig. 14).

To round out the installation, there are two 1,700,000-gallon molasses tanks, one 400,000-gallon fuel oil tank and one 600,000-gallon excess condensate tank. The fire protection system consists of a 150,000-gallon elevated water tank and a 400,000-gallon ground-level water tank, the latter feeding a 1000 g.p.m., 100 p.s.i.g., automatic diesel-driven fire pump, with a fire loop around all main buildings.

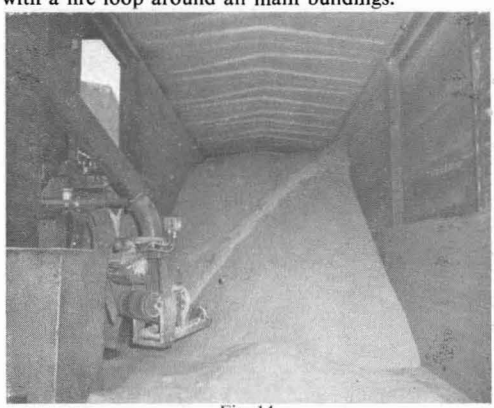


Fig. 14

The most obvious unconventional feature about the Glades is the unusual yet pleasantly handled colour scheme. All vessels, pipes, pumps, equipment and structure have been painted in a manner to reflect their uses; and yet the combinations of colours throughout the factory presents an ever changing atmosphere of gaiety to the usual cold, drab metal monsters found in most sugar houses.

SUGAR CANE MUD FILTRATION

By W. F. GUILBEAU, E. E. COLL, and J. T. JACKSON

Southern Utilization Research and Development Division, New Orleans, Louisiana

Reprinted from The Sugar Bulletin, 1962, **41**, 62–66.

THE necessity for efficient mud filtration to obtain a good clear juice, equal to or better than the clarifier juice, cannot be overestimated. The inefficient method for handling the mud by screening instead of filtering with rotary vacuum filters has caused reduction of processing rates and resulted in a poorer grade of raw sugar. Before the adoption of rotary vacuum filters for separating juice from the mud, the plate and frame pressure filters were used and still are being used with satisfactory results as reported by JACOBS[1].

In the sugar cane industry all over the world the procedure for handling the mud for the filter presses was to dilute with water, add lime, and heat, and in some cases to decant clear juice after settling. The residual settled mud was diluted, heated, and filtered in the plate-and-frame presses using square weave or twill cotton cloth. The filtrate was sent directly to the evaporator. The addition of lime was necessary for good filtration in the presses, and today with the rotary vacuum filters the use of lime has improved the filtration of mud[2]; JENSEN reported that "it was impossible to achieve efficient washing due to low pol in cake. It was considered that the soil colloids introduced with the cane could be a cause of this difficulty and that these colloids might be flocculated by liming the muds to a high pH value. The results exceeded expectation and the pol of the cake was reduced to 1·8%."

An excessive amount of lime in the mud may be helpful occasionally, but is objectionable most of the time as the filtrate must be returned to the clarification system in order to prevent precipitation when the juices differing considerably in pH are mixed. With the adoption of the rotary filter using copper screens, the procedure used in plate-and-frame press filtration was not followed closely. This resulted in poor performance of the filter, producing high sugar losses in mud cake and cloudy filtrate. This condition necessitated return of the juice to the clarification system and the resultant overloading of this system frequently required a grinding slowdown or mill stoppage. Loss of time was eventually eliminated by increasing clarifier capacity and installation of more rotary filters, but juice quality was not improved.

The installation of cloth[3] on rotary vacuum filters helped to improve the filtration of the mud and has enabled a factory to increase its milling by not returning the filtered juice to the clarification system. In order to show the extent of improvement in the filtration of mud with cloth on the rotary vacuum filter, and also help determine the effectiveness of a polyelectrolyte in filtration, this paper reports on a series of laboratory scale experiments conducted during the 1961 grinding season. A leaf type filter, 4½ inches in diameter with 0·10 sq.ft. of filtering area furnished by Dorr-Oliver Inc.,* was used for the experiments. The filter was connected to a graduated cylinder and operated under vacuum, using cloth for a filtering medium. Readings of volumes filtered were taken at intervals of 3, 6, 10, 15, and 20 minutes.

The processing of sugar cane and filtering rates of muds are affected by the variety of the sugar cane and differences in its composition. The weather conditions, harvesting methods used, and foreign impurities introduced with the cane are other factors affecting juice clarification and mud filtration. Table 1 shows the composition, with approximate ranges of concentrations of the principal constituents of raw juice solids that may affect filtration. This variation in composition will have some relationship to the processing characteristics of the sugar cane juices.

Table I

Juice constituents

	% of Soluble Solids	
	Min.	*Max.*
Sugars		
Sucrose	70·0	88·0
Glucose	2·0	4·0
Fructose	2·0	4·0
Mineral Constituents		
Calcium (CaO)	0·19	0·45
Magnesium (MgO)	0·11	0·22
Sulphate (SO_4)	0·10	0·73
Chloride (Cl)	0·12	0·36
Silica (SiO_2)	0·10	0·18
Organic (Non-sugar) Constituents		
Starch	0·001	0·050
Wax, fats, phosphatides	0·05	0·15
Gums	0·30	0·60
Protein	0·50	0·60
Foreign matter introduced with the sugar cane		
Trash—leaves and cane-tops	2·0	20·0
Soils, clay, sand, muck—pounds per ton cane	1·3	80·0

In Table 2, the filtered volumes are given for some mud samples collected during pilot plant processing tests[4] on sugar cane juices during the 1961 crop. The large difference between the low and high filtered volume is undoubtedly due to a large extent to the differences in composition shown in Table I and the

[1] *Proc. 4th Conf. Amer. Soc. Sugar Cane Tech.*, 1953, 85–89.

[2] *Proc. 24th Conf. Queensland Soc. Sugar Cane Tech.*, 1957, 201–210.

[3] VRABLIK & DAHLSTROM: *Proc. 7th Conf. Amer. Soc. Sugar Cane Tech.*, 1959.

[4] COLL *et al.*: *Sugar Bull.*, 1962, **40**, 181–185.

* Use of a company and/or product named by the Department does not imply approval or recommendation of the product to the exclusion of others which may also be suitable.

other previously mentioned conditions. The volumes of filtrate collected during the first ten minutes have been used for comparison in all tests. This 10-minute period is long for the filtration cycle of a rotary filter, as the cycle is usually between 3 and 10 minutes.

Table II

Filtration rates of clarifier muds

Variety	Run No.	c.c. filtered time minutes 3	6	10	15	20
C.P. 44-101	27	8	20	31	39	46
" "	19A	19	29	35	46	55
" "	29	19	30	48	57	65
" "	20	21	32	49	64	84
" "	5	26	40	53	66	77
" "	1	30	45	55	67	78
" "	6	30	46	60	72	81
" "	13	35	45	56	67	76
" "	15A	46	51	66	70	75
" "	2	38	56	70	86	96
C.P. 36-13	14	13	18	26	32	40
" "	16	23	30	35	42	47
" "	28	36	45	55	64	70
N. Co 310	9	22	32	42	51	58
" "	7	34	51	67	80	90
C.P. 52-68	11A	32	42	51	60	74
C.P. 55-30	3A	36	52	57	67	72
" "	18	33	50	72	88	102
" "	4	39	60	76	90	105
" "	26	61	82	100	106	110

The readings for a period over 10 minutes would not be applicable to rotary vacuum filters but could be used for other types of filters with very much longer cycles. These indicate that there is as much as 323% difference in the filtered volume between the lowest and the highest volumes for the muds tested. This large difference between the volumes of the mud tested should make one hesitate before undertaking any large scale factory tests before some pilot plant investigations were made.

Filtration tests were made on mud alone, mud with addition of bagacillo and lime, and mud with addition of bagacillo, lime and "Separan"*[5]. The filtered volumes are given in Table III, and the average values are plotted in Fig. 1. The volumes filtered in 10 minutes were converted to percentages for comparison. Addition of bagacillo and lime showed an improvement of 27%, while the bagacillo-lime-"Separan" combination showed still better improvement of 48% in the average filtered volume. On examining the three curves of Fig. 1, it will be observed that the use of sufficient bagacillo and the bagacillo-lime-"Separan" combination results not only in higher filtered volumes, but makes much longer filtering cycles possible or more juice filtered during the same time. In the filtration tests 6 pounds of bagacillo and 0·003 pounds of "Separan" were added to the mud before filtering. The longer cycles would be very beneficial where plate-and-frame presses or other filters[6] are used. All filtrate clarities were good enough to send directly to the evaporators and in no case would have to be returned to the clarifiers.

Table III

Filtration rates of mud

PURE MUD

Run No.	Time minutes—c.c. filtered 3	6	10	15	20
20	21	32	49	64	84
26	61	82	100	106	110
27	8	20	31	39	46
28	36	45	55	64	70
Ave.	32	45	59	68	78
%	100	100	100	100	100

BAGACILLO AND LIME ADDED

Run No.	Time minutes—c.c. filtered 3	6	10	15	20
20	34	48	73	94	123
26	72	102	128	152	164
27	11	27	41	52	62
28	32	42	54	66	74
Ave.	37	55	76	91	106
%	114	121	129	133	135
20	34	48	73	94	123
21A	54	80	103	126	146
24	33	48	62	76	88
26	72	102	128	152	164
28	32	42	54	66	74
30	41	59	72	83	94
Ave.	40	58	76	93	107
%	114	121	129	133	135

BAGACILLO "SEPARAN" AND LIME ADDED

Run No.	Time minutes—c.c. filtered 3	6	10	15	20
20	42	64	98	110	154
21A	60	87	113	138	160
24	32	48	65	80	94
26	74	108	136	164	178
28	38	50	64	76	88
30	41	65	78	91	104
Ave.	44	66	87	104	122
%	126	138	148	149	154

During the 1961 season experiments were performed using "Separan" in the processing of sugar cane juices[7]. Mud samples were taken from these experiments and filtration tests on the muds were made. No bagacillo or "Separan" was added to the mud before filtering. The results are given in Table IV, and the averages are plotted in Fig. 2. The filtration rates of the muds when "Separan" was added to the heated juice in the flash chamber before entering the clarifier were 41% higher than for muds without "Separan". Again it can be noted from the slope of the curve that a longer cycle can be obtained by using "Separan" in the juice.

[5] MILES & ACONSKY: *Proc. 8th Conf. Amer. Soc. Sugar Cane Tech.*, 1961, 98–120.

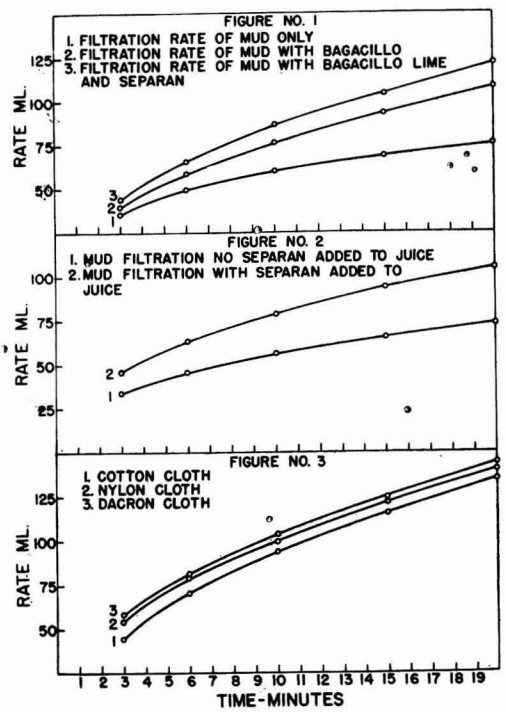
[6] LUKE: *Proc. 7th Conf. Amer. Soc. Sugar Cane Tech.*, 1959.

[7] COLL *et al.*: Comparative Pilot-Plant Tests on a few approaches to Sugarcane Juice Clarification. *Sugar Bull.* (in press).

Table IV

Filtration rates of clarifier muds—with and without "Separan" in juice

Run No.	c.c. filtered time minutes 3	6	10	15	20
WITHOUT "SEPARAN" IN JUICE					
1	31	47	57	69	79
3A	36	47	51	54	55
5	32	42	57	70	81
7	35	52	66	77	87
11A	30	40	48	57	65
Ave.	30	46	56	65	73
%	100	100	100	100	100
WITH "SEPARAN" IN JUICE					
1A	35	48	59	72	79
3	64	86	106	125	139
5A	44	60	76	92	106
8	31	49	62	71	86
11	54	74	92	108	122
Ave.	46	63	79	94	105
%	139	137	141	145	144



Another group of mud filtration tests was made using three types of cloths—(1) cotton twill cloth of the type normally used with plate-and-frame presses; (2) "Nylon No. 304" cloth supplied by E. R. VRABLIK of the Eimco Corp.*; and (3) "Dacron" fabric cloth used on Dorr-Oliver "Rapi-Floc" filter supplied by Mr. RICHARD, representative of the Dorr-Oliver Co.* All three cloths gave good filtration, and all filtered juices had clarities better than the clarified juices. In these tests all muds were treated with bagacillo, lime and "Separan." In Table V are tabulated the results obtained with the three different cloths, and the averages of the results are plotted for comparison in Fig. 3. All of the tests were made with clean new cloths. How much the rates will change with used cloths has not been determined. A fabric cloth which is not binding and is capable of being thoroughly washed by direct steam or hot water is absolutely necessary for the efficient performance of any filters, especially rotary type filters where cloth cannot be removed for washing.

Table V

Filtration rates of mud

Run No.	Time minutes—c.c. filtered 3	6	10	15	20
COTTON TWILL CLOTH					
25	47	76	98	120	138
23A	39	56	71	87	100
22	51	79	108	134	155
21A	38	68	96	124	148
Ave.	44	70	93	116	135
%	100	100	100	100	100
"NYLON 304" CLOTH					
25	55	80	103	124	142
23A	48	64	79	94	108
22	63	95	121	151	175
21A	46	72	95	118	138
Ave.	53	78	99	122	141
%	120	111	107	105	104
"DACRON" CLOTH					
25	54	78	100	120	139
23A	55	72	87	102	115
22	58	86	111	137	163
21A	60	87	113	138	160
Ave.	57	81	103	124	144
%	130	116	111	107	107

SUMMARY

Experiments were conducted to determine filtration rates under various conditions, with the addition of bagacillo, lime, and "Separan", of the muds from sugar cane juice clarification. The results indicated that the rates were affected by composition of the sugar cane and by foreign matter (soil and trash) introduced with the sugar cane, the type of filter media (cloths) used, and the use of "Separan AP-30". Large variations were observed in volume filtered owing to the composition of the sugar cane and foreign matter. The volume filtered was higher with the use of "Separan AP-30" and the filtering cycle was increased. The type of cloth used had some effect on filtration of the muds.

AUTOMATIC DRY-PROCESS BAGASSE BOARD PLANT

By J. MANTEL

FORMAL dedication of the new National Bagasse Products Corp. plant at Vacherie, La. (Fig. 1) marked the first commercial conversion in the United States of sugar cane bagasse into a variety of low, medium and high density flat pressed boards, ranging in weight from 20 lb to 60 lb per cu.ft., and in thickness from $\frac{3}{8}$ in to 2 in. The boards have a hard, glossy, light-coloured surface and permit direct application of wood grain printing, plastic laminates or wood veneers with complete freedom from telegraphing or show-through. A graduated board structure, made possible by the world-patented Bähre-Bison air-felting system that places the longer, coarser fibres in the centre and builds up increasingly finer, shorter fibres towards both top and bottom surfaces, gives maximum dimensional stability and good screw holding properties (Fig. 2). The boards will be marketed under the registered trade mark "Fibron."

The plant was designed by Raphael Katzen Associates, Consulting Engineers, of Cincinnati 13, Ohio.

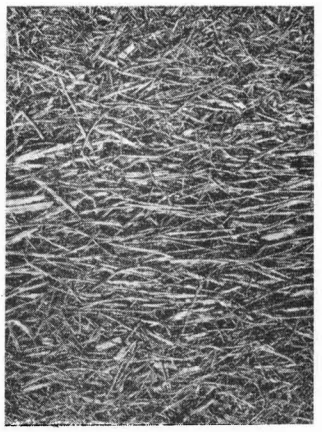


Fig. 2. Cross section photo of an unpressed Interbasse board showing the symmetrical, well-balanced, graduated structure.

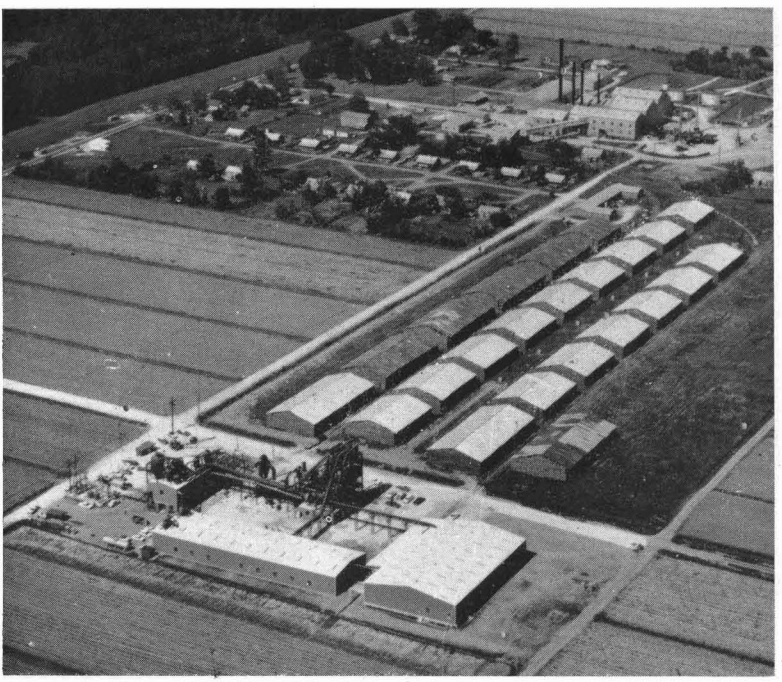


Fig. 1. Aerial view of the New National Bagasse Products plant in Vacherie, La., shows three large buildings in foreground which house the automatic processing facilities. Adjacent to the plant are rows of stacked bagasse covered with corrugated steel.

In order to make the system available for industry all over the world, a new company was formed, viz.:— Interbagasse Products Engineering Corp., P.O. Box 237, Basel, Switzerland, incorporating Bähre (manufacturers of the Bison board making equipment), National Bagasse Products Corp., New York, experts in fibre preparation, and van Rietschoten & Houwens' United Machinery Corp. N.V., Rotterdam, Holland, consulting engineers.

The new Vacherie Plant consists of the following main components: (a) a fibre preparation section, (b) two board production lines, and (c) a finishing line. Production was started with one production line. The second production line started November 1962,

increasing production to approximately 100 tons of board per day. The production line now in operation includes a single-opening Bison hotplate press. Its fast action permits utilization of the latest quick-setting resins, thus reducing the cycle time to 3½ minutes on an average. In order to cut down trim losses and to meet the standard sizes used in both door factories and the furniture industry, the presses are designed to make boards up to 5 ft × 20 ft (Fig. 3). For the same purpose the press of a proposed third production line will make boards up to 8 ft × 24 ft, so that after start-up of the third line it will be possible to produce boards of different size, thickness and density at the same time.

Utilization of sugar cane bagasse as a raw material for the production of panelboard is basically different from utilization of wood wastes for the same purpose. Both systems use hydraulically-operated pressing units and a more or less automatic finishing line. The main difference is in the treatment of the raw

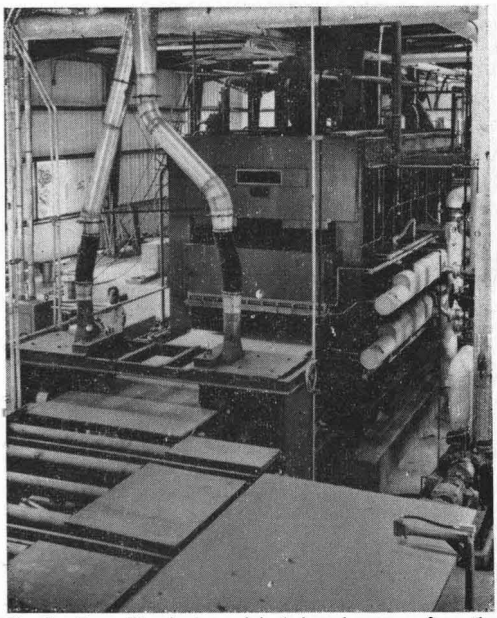


Fig. 3. Every 3½ minutes a ¾ inch board emerges from the 5 × 20 ft single-opening fast-action press for a run through the automatic rough-edge trim saws.

material. Wood particle board plants use flakers for cutting up their raw material into chips or flakes. After being dried these chips can be converted immediately into panels. Sugar cane bagasse requires special treatment, however. Raw bagasse contains as much as 49% water on an average, 45% fibre and 6% soluble solids. The 45% fibre, being the water-insoluble portion of the bagasse, includes soil, foreign material and ash. Soluble solids include sucrose, fructose and glucose as major constituents plus small amounts of soluble organic compounds of inderterminate nature. All of these 'ingredients" except the fibre must be removed, or the boards will be of poor quality. The development of an effective "dry process" fibre preparation system took years and years of extensive (and expensive) research, but it was worth while. Bagasse is an excellent raw material for quality board production. Interbagasse's dry process fibre preparation system removes all dirt and pith from the fibre and cuts it into any of several desired lengths. The system frays both ends of each fibre to create good interlocking characteristics, and classifies fibres of different lengths and sizes automatically.

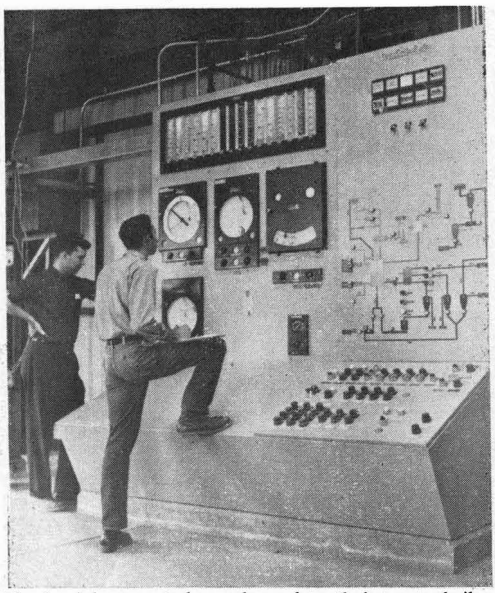


Fig. 4. A huge control console regulates the hot water boiler, waste furnace, dust collection and transport systems.

The basic distinguishing feature of Interbagasse's process compared with the wet processes used in the manufacture of insulation board, hardboard, paper and paper products from bagasse, is in this treatment of the bagasse fibre. The wet processes clean the bagasse by a washing process and convert it into wet pulp by cooking it at a high temperature in water to which certain chemicals have been added. The board and paper products are manufactured from this pulp. The Interbagasse system cleans and prepares the fibre mechanically without cooking it in water. Fibre prepared in this manner retains its natural strength and resiliency. The integration of this method of fibre preparation with the German Bähre-Bison board-making system, makes possible close control of quality, and economical volume production of an extremely varied line of board products from sugar cane bagasse.

SUGAR-HOUSE PRACTICE

New type heat exchanger for sugar crystallizers. S. NORTH COOMBES. *Rev. Agric. Sucr.* (Mauritius), 1962, **41,** 203–204.—Details and diagrams are given of a heat exchange element[1] for crystallizers. It consists of a pair of rotating concentric hollow shafts which provide an annular space for the passage of the cooling water. Numerous radial tubular branches closed at their outer ends and attached to the outer shaft tube house smaller diameter inner tubes which open into the inner shaft tube. The smaller tubes are open at both ends. Thus water fed to the inner shaft tube flows through the smaller radial tubes into the larger radial tubes, then into the annular space between the shaft tubes and so through the crystallizer. The radial tubes may be replaced by a looped tube, one end connected to the inner shaft tube and the other end to the outer shaft tube.

* * *

Apparatus for continuous extraction from beet and sugar cane. E. REINEFELD. *Zucker*, 1962, **15,** 554–556.—The performance of a De Smet diffuser used at Salobreña sugar factory, Spain, for both beet and cane extraction is discussed. The cane was cut with cane knives to a maximum of 50 mm and passed via a crusher and three-roller mill into the diffuser where it was extracted with 3–4 times its volume of juice and water. The bagasse was then passed through two further three-roller mills, the juice being returned as feed to the diffuser. The diffusion juice was mixed with the juice from the crusher and from the first mill. Draught was 105–110% on cane (more than half the juice being obtained as crusher and first mill juice) and losses were 0·35% on cane. Without the De Smet diffuser, losses were 0·98% raw juice production on cane. Retention time was 60 min, and extraction temperature 85–90°C. It was found that the cane particles swelled when they came in contact with the juice in the diffuser, which retarded extraction.

* * *

The filling of adsorption columns. G. PIDOUX and L. MIRABEL. *Zucker*, 1962, **15,** 568–572.—The charging of adsorption columns with decolorizing material is discussed mathematically with the aim of obtaining optimum decolorizing conditions. The concept of "inactive volume" is introduced to describe that volume unoccupied when a sugar solution of sufficient theoretical volume to wet all the adsorbent, particularly bone char, does not in fact fill all the available space. This concept justifies practices which originally were considered only empirically. Reasons are enumerated for the existence of this inactive volume which term is also of use in comparing filling methods and decolorizing materials. Comparison of charging methods in laboratory tests revealed that simultaneous filling with char and sugar solution or adding the char to the solution in the column have the greatest positive effect on the "column usability", while adding the solution to the char until the required height is reached has the least positive effect and is not recommended. The effect of column diameter on the inactive volume is also discussed. A bibliography of 34 references is appended.

Refining cane raw sugar. K. ČIŽ. *Listy Cukr.*, 1962, **78,** 233–235.—The refining scheme at Čakovice sugar factory, which uses a 3-boiling process, is described and some results are given. White sugar massecuites total 180% and yellow sugar massecuites 120% on incoming sugar at a re-boiling number of 3·15. The quality of the loaf and crystal sugar produced is of required export quality.

* * *

Bulk storage and transport of raw sugar in Cuba. A. V. KAMENETSKII. *Sakhar. Prom.*, 1962, (12), 11–14.—Details with illustrations are given of the bulk handling installations at the ports of Matanzas and Guabal and information is given on the system of unloading from the centrifugals into rail tankers "azúcar granel" (which has larger crystals than normal raw sugar, a maximum moisture content of 0·5–0·6% and a purity of 98, and is specially manufactured for bulk transport purposes). A further rail-ship bulk installation is planned for the port of Cienfuegos.

* * *

Determination of the power required for disc-type mixers. N. R. FREPON. *Sakhar. Prom.*, 1962, (12), 19–23.—Formulae are developed for calculating the power requirement of a mixer operating without massecuite (this value is essential for adjustment of the mixer after installation) and the power usage for mixing of the massecuite. The coefficients of resistance of the massecuite to the movement of the discs and vanes are determined from a graph showing their dependence on temperature as found in tests at a number of factories using final-product massecuite. Charts reproduced for a 12-disc mixer operating at constant speed are discussed. It was found that optimum mixing occurred with cold, and consequently more viscous, massecuites. On this assumption it is recommended that for a number of mixers arranged in series the speed of the last should be lower than that of the first mixer. Sample calculations are given for mixer power usage and for selection of electric drives.

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Mill technology (in Australia). J. H. NICKLIN, L. R. BRAIN, B. G. ADKINS and A. D. DOOLAN. *Ann. Rpt. Bureau Sugar Expt. Sta.*, 1962, 72–77.—In cane analysis investigations it was found necessary to dry pressed cane for determination of the moisture content. It was found impossible to determine the cane fibre content by a simple method after first pressing the cane, although it is suggested that the press could be used for the total analysis of individual cane consignments. A cutter-grinder of Australian manufacture has been compared with a fibrator for cane preparation and has been officially recommended for comminution of cane before fibre determination by washing. A dipping refractometer has been tested and found to be highly suitable for determining the Brix of juice, cane and bagasse extracts and could

[1] *U.K. Patent* 854,371.

well replace the Brix spindle in factory control. Improved techniques with a Webre vacuum pan showed that massecuite temperature varies markedly across the diameter of a tube and consequently massecuite temperatures are not expected to give information on causes of uneven boiling. On the steam side of the calandria temperature variations of up to 15°C were found, with the highest temperatures near the steam inlets. De-superheating sprays were installed and resulted in more regular temperatures. However, tests at a calandria pressure of 5 p.s.i.g. (10 in Hg) showed no changes in boiling characteristics with or without superheating of the inlet steam. Since it appears that the heat transfer near the steam inlets is increased by the greater steam velocity past the tubes at these points, an improvement in steam distribution is expected by providing inlets around the pan. In tests at Proserpine it was found that vapour velocity is the most important factor affecting evaporator entrainment while Brix and liquid level are of secondary importance. An arrestor based on a wooden maze and a wire gauze has been constructed and appears to be an economical solution to the entrainment problem. In tests a plate-and-gauze device reduced entrainment to about 2000 p.p.m. and a wooden maze then reduced it further to 150 p.p.m.

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Effect of the structure of ion-exchangers on their capacity for decolorizing sugar solutions. J. ŠTAMBERG and Z. VAŠÍČEK. *Chem. Prumysl*, 1962, **12**, 213–219; through *S.I.A.*, 1962, **24**, Abs. 803.—The structure and properties of the three chief groups of decolorizing resins are surveyed. These are: (1) polycondensation products of aromatic amines and formaldehyde, (2) aliphatic polyamines of medium alkalinity, and (3) strongly basic styrene complexes. The resins (1) have higher decolorizing power when used in crushed form, but have lower capacity and shorter life than the others have. Resins (2) are effective either crushed or as beads. Resins (3) are nearer in decolorizing power to (1), and have the best capacity for the colouring matters in molasses, and the longest life of the three types.

* * *

Trial running of the pilot sulphitation process. K. H. LIU. *Taiwan Sugar Quarterly*, 1962, **9**, (3), 39–41.—The various types of sulphitation process are discussed, and a flow sheet presented of the hot liming variant with sulphitation at 65–85°C to pH 7·4, heating to 105–110°C, settling, evaporation and syrup sulphitation. This is to be investigated using a pilot plant, initial trials being atypical because of immaturity of cane, poor sucrose yield, etc.

* * *

Filtration equipment. ANON. *Bol. Azuc. Mex.*, 1962, (159), 20–27.—A review is made of various types of filters, including plate-and-frame presses, Vallez and Sweetland leaf filters, vertical and horizontal leaf filters, and rotating drum vacuum filters.

Selecting pumps for a liquid sugar plant. ANON. *Pumping*, 1962, **4**, 272–275; through *S.I.A.*, 1962, **24**, Abs. 748.—Problems in the pumping of liquid sugar and syrup slurries of active carbon or lime ("lime sucrate") are discussed in connexion with the equipping of Brown & Polson's new liquid sugar plant at Millwall, London[1]. Water-cooling of the mechanical seals of the pump glands is recommended to prevent the formation of crystals in the leaking syrup and consequent rapid wear of the stuffing-box. Abrasion caused by slurries can be prevented by keeping the slurrying liquor at a high Brix. Aeration for scum clarification is effected by means of an air bleed fitted to the suction side of the clarifier supply pump. A flow diagram of the refining process and photographs of some of the standard types of pumps installed are shown. The pumping of high-viscosity liquid glucose (for blending with liquid sugar) is briefly discussed.

* * *

Principles of storage and pneumatic transport of sugar. W. KELM and E. BECK. *Süsswaren*, 1962, **6**, 425–428, 548–549, 666, 668–673; through *S.I.A.*, 1962, **24**, Abs. 801.—Storage of sugar without risk of moisture absorption (owing to the hygroscopicity of sugar, with increases with increasing invert sugar and ash contents) requires adequate insulation of the silo with a positive internal air pressure, maintenance of relative humidity at $\geq 60\%$ at 20°C, and uniform grain size (90% > 0·4 mm) and uniform grain size distribution of the sugar, which should be stored at $\geq 0{\cdot}04\%$ moisture content. For moving sugar in or out of a silo or road or rail tankers, pneumatic transport, by suction, pressure or air-pressure fluidization, is preferred for reasons of hygiene, ease of coupling of piping, low maintenance, and ease of cleaning of apparatus. Suitable plant is surveyed in detail, with diagrams and illustrations. Fluidization requires the use of a "Fluisator" for homogenization of the sugar-air mixture. Apparatus and procedures discussed include filters, the measurement of filling height and sugar weight in silos, different types of air compressors, and tanker design. One installation for storage and pneumatic transport of sugar (16–20 tons/hr), together with control equipment, is described; a diagram of another plant is also given.

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Export muscovados. I. GURZA and L. GUTIÉRREZ M. *Bol. Azuc. Mex.*, 1962, (160), 23–33.—Raw sugars exported to the U.S.A. have shown, according to figures from the New York Sugar Trade Laboratory, a polarization which has increased steadily to the average of 97·78° for 1961. Production of high polarization sugars of this type is achieved by attention to a number of factors in the manufacturing process which are discussed and the technique and its results described, as is the system of quality control adapted for export sugars.

[1] *I.S.J.*, 1962, **64**, 148.

Determination of an attenuation curve for beet diffusion. P. V. GOLOVIN. *Sakhar. Prom.*, 1962, (11), 6–7.—A sample graph of cossette sugar *vs.* time is presented based on an equation developed by substituting numerical values in the author's previous equation for diffusion time calculations. The final equation takes the form: $ln\ S = ln\ S_o - 1.316\tau$, where S = sugar losses in diffusion, S_o = sugar content of the cossettes, and τ = diffusion time. The graph assumes an initial cossette pol of 16·8% and a diffusion time of up to 1·3 hr.

* * *

The selection of rational schemes and equipment for ventilation of sugar beet piles. N. A. BORODYANSKII. *Sakhar. Prom.*, 1962, (11), 61–67.—Investigations have shown that a lateral scheme with a central air feed will meet demands for optimum ventilation, while longitudinal ventilation may be used in low and narrow piles. The use of axial fans is advocated and certain Soviet types are discussed. Numerous diagrams and calculations are presented.

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Purification of pond water. S. G. BONDAR'. *Sakhar. Prom.*, 1962, (11), 68.—At Lannovsk sugar factory, where the diffusion supply water is taken from ponds, it was found necessary to treat the foul pond water with milk-of-lime (0·15% CaO on weight of water) after a dry summer. This caused settling of the larger conglomerates and gave a transparent, odourless water.

* * *

Mechanical vapour compression in sugar factories. G. VERNOIS. *Zuckererzeugung*, 1962, **6**, 286–289.—Mechanical vapour compression is described with reference to the practices in Belgian and French factories where turbo-compressors are used to raise the temperature of vapour bled from the 1st evaporator effect by about 10°C. The treated vapour is then returned to the 1st effect. Such treatment obviates the need for addition of throttled live steam. A practical example is given of a quintuple-effect evaporator with vapour compression with a description of the automatic control system. A considerable advantage of vapour compression is the lower temperature in the heating chamber of the 1st effect compared with the conventional multiple-effect pressure evaporators which use exhaust steam from a turbo-generator and throttled live steam. It is shown that the installation of a turbo-compressor would generally enable the slicing capacity of a factory to be raised by some 50% without the need for increasing the boiler-house output. The introduction of vapour compression in the pan station of a French sugar factory resulted in a 5% saving in steam.

Infection and disinfection in the sugar industry. H. GRUSZECKA. *Gaz. Cukr.*, 1962, **64**, 289–292.—Sources of bacterial infection in sugar production are discussed, and disinfectants used particularly for beet piles are mentioned including copper and iron sulphates and potassium permanganate. The various types of micro-organisms associated with sugar manufacture and methods of combating them are reported.

* * *

New ideas and trends in the burning of limestone in shaft kilns. K. KLEMENT. *Listy Cukr.*, 1962, **78**, 230–232.—Measures adopted in the burning of limestone to obtain greater efficiency, higher quality lime and increased CO_2 content in the waste gases are summarized.

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Utilization of the punched card system at Franken sugar factory. W. LEIBIG. *Zeitsch. Zuckerind.*, 1962, **87**, 601–603.—Applications for a punched card system in a sugar factory are discussed using the example of the system used at Franken.

* * *

Statistical data analysis and factory control in the sugar industry. W. SCHMIDT. *Zeitsch. Zuckerind.*, 1962, **87**, 202–205, 354–361, 434–439, 604–611.—Whether a proposed new process is better than the conventional one or whether it appears to be so only as a result of accidental fluctuations can only be determined by considering the scatter of the determined values. This particularly applies where the differences are small and the degree of scatter great, e.g. the considerable scatter as a function of different beet varieties when comparing factory processes. Only with large differences (50 or 100%) can a correct distinction be drawn without statistical analysis. A newly developed significance test is described which has the advantage of simple calculations and is time saving. The solution of a three-factor problem by variance analysis is demonstrated using as examples the effect of lime doses, juice purification process and beet varieties on filtration. It is thus possible to determine the steps necessary to control the process.

* * *

Longitudinal or lateral ventilation of beet in piles? G. S. BRIND. *Sakhar. Prom.*, 1962, (12), 30–31.—The advantages and disadvantages of lateral and longitudinal ventilation are compared, with references to experimental results. The lateral scheme has been found suitable for wide piles (20–30 m). A scheme utilizing ventilating tubes protruding through the top of a pile at fixed distances and set out in a staggered formation gives the same results as longitudinal ventilation but is cheaper.

Purification of juice from Kuban' beet with colloidal calcium carbonate. S. S. KUTSEV. *Sakhar. Prom.*, 1962, (12), 9–11.—The absorptive capacity of colloidal $CaCO_3$ is compared to that of active carbon. A juice purification scheme is described in which milk-of-lime of 6–7% CaO content is saturated with CO_2 to form a $CaCO_3$, 2CaO complex which is precipitated as a colloid. The colloid is stabilized by first adding a small amount of raw juice to the milk-of-lime, and is then used for preliming. Colloidal substances in the juice coagulate and the non-sugars are absorbed by the $CaCO_3$. The precipitate is separated from the prelimed juice and a second amount of colloidal carbonate added (the same quantity as in preliming) at 50–60°C, when the non-sugars are absorbed during mixing. The juice is heated to 102°C, saturated to optimum 2nd carbonatation alkalinity and the precipitate separated. This scheme was compared with the standard system in laboratory tests, which showed that the purity of juice and the purification efficiency with the proposed scheme rose sharply despite the lower lime usage. Studies have revealed that Kuban' beet juice requires greater amounts of lime for colloid precipitation than from other areas because of the high content of negatively-charged colloidal non-sugars which coagulate when colloidal $CaCO_3$ is added.

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Synthetic ion-exchangers. Tentative decolorization of sugar juice with anion-exchangers. T. J. RABEK and D. ŻUCHOWSKA. *Bull. Acad. Polon. Sci., Ser. Chim.*, 1962, **10,** 57–62; through *S.I.A*, 1962, **24,** Abs. 685.—Solutions of beet 2nd and 3rd product sugars at 30–35°Brix and 80°C were passed through a column containing one of six weakly basic and strongly basic anion-exchange resins, all of Polish manufacture (with the exception of "Asmit 259"). The decolorizing power per cycle was defined as the amount of sugar (g) from which 90% of the colour is removable by 1 g of resin. The decrease in decolorization with increasing volumes of solution and the fall in decolorizing power over the first 10 cycles are reported in graphs.

* * *

The optimum heating surface distribution of a multiple-effect evaporator. A. BUCZOLICH and A. ZÁDORI. *Cukoripar*, 1962, **15,** 309–312.—It is shown by means of empirical values that, with optimum distribution of the heating surface of an evaporator, the ratio of the h.s. of the individual effects is equivalent to the ratio of the heat loading:heat transfer coefficient. Under such conditions, the total temperature drop is at a minimum. It is further shown that with optimum distribution of the h.s., the surfaces of the individual effects are in a ratio equivalent to the ratio of the temperature drops, so that a graph of temperature *vs.* heating surface is linear. If the last effects are overloaded, the curve is convex from above, and if the first effects are overloaded, the curve is concave from above. By constructing such a graph from actual measurements it is possible to determine the optimum heat distribution from a given evaporator if the total h.s. of the evaporator at a required temperature drop is known (the latter is calculated from the temperature difference between the vapour and juice spaces).

* * *

Application of automatic control in the British Sugar Corporation Limited. IV. J. C. MACDONALD and R. M. J. WITHERS. *Automatic & Remote Control (Proc. 1st Int. Congr. Int. Fed. Autom. Control)*, 1960, 252–260; through *S.I.A.*, 1962, **24,** Abs. 790.—The main features of three systems are described: electronic beet costing, with analysis of samples by automatic polarimeter and automatic recording of data for each delivery on punch cards; an automatic lime kiln and constant density milk-of-lime plant; and an integrated system of beet factory control applied at Wissington factory. In the latter system the process is controlled by successive closed loops, with over-riding control of the cascade type when the levels in the thick juice, thin juice and raw juice tanks rise out of a "dead" zone into an "off-normal" zone. The over-riding control is effected by a series of simple electronic analogue computers which are manually pre-set to a desired pattern.

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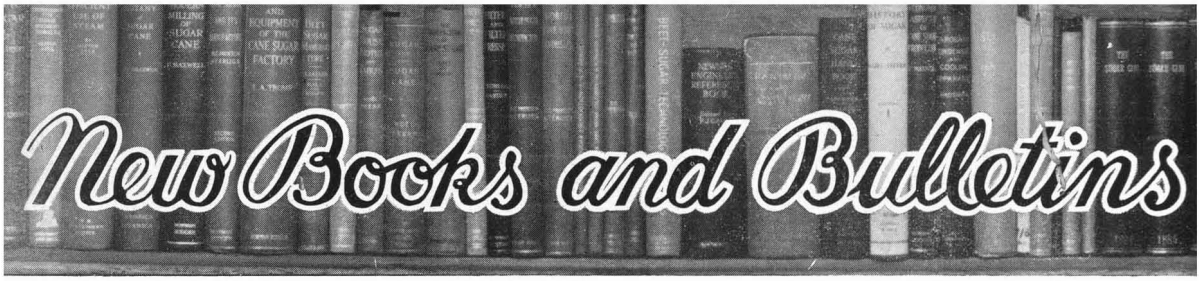
pH control in dairies and sugar factories. E. CIOLFI. *Indust. Alimentari*, 1962, **1,** (1), 85–87.—The importance of maintaining juice within pH limits during evaporation is described, and also the achievement of optimal pH values during the stages of juice purification. Typical pH ranges and values for raw juice and sugar factory products are listed, and a laboratory model and portable pH meters illustrated.

* * *

Tests on the storage of harvested beet in 1961. L. SCHMIDT, P. FEKETE, J. NOVOTNÝ, M. ŠOUREK and B. VORLIČKOVÁ. *Listy Cukr.*, 1962, **78,** 243–248.—Results of tests conducted at 11 Czechoslovak factories are discussed. At six factories the storage piles contained only 15–20 metric tons of beet, while the piles at the other factories were larger. The results are discussed in detail by factories. While the average losses for all 11 factories over a storage period ranging from 15·5 to 58·0 days approximated to the figures experienced during 1953–60, the losses were approximately 20% higher in the larger piles than in the small piles. Manual lifting was compared with mechanical harvesting as regards the quality of the lifted beet and results are to be published later. Ventilation tests, with forced and natural air circulation, are to be carried out with large piles; favourable results are anticipated. Covering the piles with mats of synthetic materials have not reduced losses. Mouldy beet suffered a considerable drop in technical value and exhibited a rise in invert sugar which was double that in healthy beet; the molasses yield was also increased by 25%. With sprouting beet the changes were somewhat smaller.



50th Anniversary, Tucumán Agricultural Experiment Station, 1909-1959. 64 pp.; 8 × 10¼ in. (Agricultural Experiment Station, Tucumán, Argentina). 1962.

This publication, Pub.Misc. No. 10, records in detail the development of the Station from its inception in 1909. It was founded to study the problems arising from the desire to improve the standards of agriculture generally and not merely of the sugar industry. The various stages in this development cover the sub-division of the Station into its five sections. The sugar cane, not unnaturally, plays a leading rôle in this work, particularly after the setback due to the mosaic oubreak about 1916 which gave its impetus to varietal breeding.

The account covers also the laws by which the Administration is governed, a list of Presidents and members of the governing body, of the Directors, among whom the name of W. E. CROSS (1916–46) figures prominently, and of the technical staff personnel. It also includes a full list of the Station's publications.

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Soils of the Sugar Belt. Part 3. B. E. BEATER. 46 pp.; 5½ × 8½ in. (Oxford University Press, Warwick Square, London E.C.4.) 1962. Price: 40s. 0d.

This volume completes the survey of the Natal Sugar Belt contributed to the Natal Regional Survey, the two earlier volumes of which have been reviewed[1]. The present volume deals with the soils of Zululand including the Pongola Irrigation Settlement. The contents fall into three sections, the first of which (17 pp.) deals with the general features of the tract, topography, climate, irrigation and drainage and also areas under cane, with a brief note on development in the Bantu reserves. The second section (16 pp.) describes the soil groups met with in Zululand and links them with the Natal groups previously described on the one hand with the soil classification drawn up at the Third Inter-African Soil Conference on the other. Problems of soil transportation, inasfar as these affect soil classification, and the extent to which sugar cane is grown on the several groups are included.

Section three (12 pp.) starts with a more detailed description of nine as yet undescribed soil series of which eight do not occur south of the River Tugela, making a total number of about thirty-seven. General fertility is discussed under the headings of carbon, nitrogen and organic matter; available nutrients; exchangeable bases and salinity.

The book is accompanied by detailed maps, tabular statements and illustrations, and the three volumes form a most excellent presentation of the subject on which the author and his associates may be highly congratulated.

* * *

The Australian Sugar Yearbook. Vol. 22, 1963. 400 pp.; 7¼ × 10 in. (The Strand Press Pty. Ltd., 236 Elizabeth St., Brisbane, Queensland, Australia.) 1963. Price: £A1.10s.

The latest edition of the Yearbook follows closely the lines of the 1962 edition. It opens with the "Sugar Industry Directory," which contains the names of members of the various cane and sugar organizations in Queensland. A number of short articles are presented, including some abstracts of papers from the 11th Congress of the ISSCT, followed by "Twenty Facts about the Australian Sugar Industry." After reports from various official bodies comes the "Sugar Statistics" section, giving an abundance of data on cane and sugar production in Queensland. The bulk of the Yearbook is the section on the Australian sugar mills and districts, with a mass of data on mill performances, maps, illustrations, tourist information, etc. An index to advertisers and contents is appended.

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Proceedings of the 7th Technical Session on Bone Char 1961. V. R. DEITZ, F. G. CARPENTER, H. M. ROOTARE and Mrs. M. C. PETER. 334 pp.; 8 × 10½ in. (Bone Char Research Project Inc., National Bureau of Standards, Washington 25, D.C., U.S.A.) 1962. Price: $15.00.

This present volume, the last in the series since the Bone Char Research Project Inc. is to be wound up this year, is a record of the 1961 meeting in Washington. A total of 61 delegates attended, a keyed photograph being included, and the Proceedings are dedicated to G. P. MEADE, veteran sugar refiner, author and scientist whose name is well-known to our readers. A list of the industrial sponsors and 1961 Board of Directors of the Project are presented together with the introductory remarks of the Associate Director of the N.B.S., who welcomed delegates.

The bulk of the book which follows gives the texts of the papers presented, together with the ensuing discussions. In conclusion appear a list of abbreviations used and name and subject indexes to the papers.

[1] *I.S.J.*, 1958, **60**, 110; 1960, **62**, 140.

Index to the Proceedings of the International Society of Sugar Cane Technologists. Volumes I–X (1924–1959). 100 pp.; $6\frac{1}{4} \times 9\frac{3}{4}$ in. (Mauritius Sugar Industry Research Institute, Reduit, Mauritius.) 1963.

The Organizing Committee of the 11th Congress of the ISSCT entrusted the Mauritius Sugar Industry Research Institute with the task of preparing and publishing this index to the Proceedings of the first ten Congresses. It is divided into an author and a subject index and also gives information on the Congresses (date, location, names of general chairmen, vice-chairmen, secretaries and sometimes treasurers). In both indexes the publishers have followed the broad classification of topics as generally adopted in recent Proceedings (agriculture, breeding, entomology, pathology and factory), while in the subject index each main topic has been divided into several sections, under which papers are listed in alphabetical order of authors. In some instances the name of the country in which any particular work was carried out or to which it relates has been inserted. Details of the special and standing committees of the ISSCT are given for each Congress and a list of miscellaneous publications of the ISSCT is appended.

The book is very clearly printed and has a neat flexible cover. However, it has two principal drawbacks: first, the user who is trying to survey the work of a particular author has to look through all the sections, and a single author index without classifications would be simpler and more convenient. Second, there are no cross-headings and only a few double entries which are described as "unavoidable". In fact, the selection of only one subject for the listing of a paper is a mistake, in the reviewer's opinion, since there are a number of instances where users of the index might easily look for a paper under the wrong headings. As a single instance, a paper on the influence of boiling conditions on sugar crystal composition as reflected by filtration rate is listed only under "Sugar refining" whereas the reader might well look under "Boiling" and "Chemical control," in which case he would not find the reference he seeks. Thus, the usefulness of the index is impaired by the lack of double and triple entries.

Nevertheless the availability of an index to all ten Proceedings in a single slim volume is one which will be appreciated by all who have need to seek references to work presented at the Society's Congresses.

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German-English Chemical Terminology. A. KING and H. FROMHERZ. 588 pp.; $6 \times 8\frac{3}{4}$ in. (Verlag Chemie G.m.b.H., Weinheim/Bergstr., Germany.) 1963. Price: DM 48.—; 86s 0d.

This is the 4th edition, revised and enlarged, of a book first published in 1934[1] which was highly praised and for which a good sale was predicted. The same could certainly be said of the present edition. It is basically a bilingual introduction to chemistry, with English passages on the left-hand page and the corresponding German texts on the right-hand. Words and expressions appearing for the first time in both texts are printed in italics and appear in the appropriate index at the end of the book. Each page is divided into sections indicated in the margin by the letters from a to i. Thus, to find an English or German work, the reader is given not only the page but also the appropriate part of the page. The indexes contain more than 10,000 expressions compared with 4000 in the first edition. The topics cover elementary, organic, inorganic and physical chemistry, and the structure of matter and chemical forces. A table of international atomic weights with the names of the elements in both languages is appended, as is a short section on mathematical expressions and abbreviations. The book is well printed (the reviewer has noticed a few insignificant errors) and is highly recommended to anyone interested in learning scientific German.

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Zucker-Jahrbuch 1962/63. (Sugar Yearbook.) Ed. H. HAHN. 972 pp.; $5\frac{3}{4} \times 8\frac{1}{4}$ in. (Verlag Alfred Röper, Schlüterstr. 56, Hamburg 13, Germany.) 1963. Price: DM 28.—; 50s 0d.

The latest edition of this well-known yearbook follows much the same pattern as previous editions with the material brought up to date. It contains information on West German sugar factories and on the world's sugar factories, addresses of national and international sugar organizations, trade concerns, institutes, etc., regulations covering the West German sugar industry, and a section (by S. FRIEDRICH, Chairman of the Committee of the German Sugar Association) on the world sugar market and on the sugar economy of EEC and EFTA. Information is provided on some sugar machinery manufacturers (all German with one exception) and this is followed by a Buyers' Guide. A name and subject index is appended. The contents pages for each section are in German, French and English. The section on sugar factories makes no mention of the Ceylon sugar factories (this same information has been omitted by other authorities) but the other data seem to have been well vetted; for instance, the new Florida factories are included, although the location of one is misspelt. The book nevertheless is a very useful guide to the world sugar industry.

Bagasse paper and cellulose in Argentina[2].—The Ledesma and Famat companies have been granted the benefits of the promotion scheme for the paper and cellulose industry for the plant they are to set up in Ledesma, Jujuy Province, which is to have an annual capacity of 30,000 tons of cellulose and 30,000 tons of various types of paper. Bagasse is to be the raw material and technical assistance of a foreign company has been obtained for the project.

[1] *I.S.J.*, 1934, **36**, 404.

[2] *Fortnightly Review* (Bank of London & S. America Ltd.), 1963, **28**, 199.

LABORATORY METHODS AND CHEMICAL REPORTS

A review of the methods used in calculating a sugar factory report. F. A. SUBARAN. *J.A.S.T.J.*, 1961, **23,** 61–68.—The formulae for stock calculations laid down by the Jamaican Sugar Technologists' Association are reviewed and an account is given of some slight modifications with sample calculations and balance forms.

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Supersaturation and the rate of crystallization. A. BRIEGHEL-MÜLLER. *Zucker*, 1962, **15,** 596–600.—The concept of supersaturation and undersaturation is discussed and the definition of supersaturation given by CLAASSEN is demonstrated with a triangular diagram. This is compared with one for the definition given by SMYTHE which incorporates the crystallization factor and is similar to one developed by the author which takes the form: $z'' = 100\,\frac{Bx - Bx'}{100 - Bx'}$, where z'' = amount of sugar capable of being crystallized out or absorbed by the solution (per 100 parts by weight of the solution) of Brix Bx, and Bx' = the Brix of the saturated solution. This definition has been used in the determination of the rates of crystallization and solution for 60–100 purity technical solutions at 30, 50 and 70°C. The values are tabulated. The rapid determination of the crystallization rate in molasses is discussed and the method of SMYTHE[1] is described. However, for molasses an electric balance is required instead of a torsion balance. For high viscosity molasses, crystallization should take place in a state of rest and not in a stirred solution. This eliminates the source of error mentioned by SMYTHE, viz. irregular coating of the thread used to suspend the crystal.

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Colorimetric determination of traces of iron in sugar industry products with α,α′-dipyridyl. M. KARVÁNEK and R. BRETSCHNEIDER. *Listy Cukr.*, 1962, **78,** 226–230.—Quantitative determination of trace iron in sugar products with α,α′-dipyridyl has been tested and procedures for each of three groups of sugar factory products are described. Refined sugar solutions (5 g in 20 ml water) are heated on a water bath until they are clear and 2 ml dilute HCl (1:3), 0·5 ml standard iron solution (50γ Fe), 1 ml 10% hydroxylamine hydrochloride solution, 1 ml 0·1% α,α′-dipyridyl solution and 25 ml 20% ammonium acetate solution are added. The solution is made up to 50 ml with distilled water and the colour measured photocolorimetrically after 30 min. Raw sugar solutions and raw, thin and thick juices are first treated with 10 ml conc. HCl and 10–20 ml saturated potassium permanganate, and after decolorization the solution made up to 100 ml with distilled water. After filtration, 10–20 ml of the solution (according to the estimated iron content) are transferred to a 50 ml flask and three drops of 10% potassium iodide solution and some drops of 0·1N sodium thiosulphate are added, the latter to decolorize the iodine. The procedure is then as with the refined sugar. Molasses and green and black syrups are first boiled in water (15 g/100 ml) and then treated as sugar juices above. Analyses of various sugar products were carried out and the results are tabulated.

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Molasses foam and its measurement and prevention. H. OLBRICH. *Zeitsch. Zuckerind.*, 1962, **87,** 612–615.—The theory of foam formation is considered generally and using molasses as an example. The measurement of the foaming capacities of molasses is discussed with reference to its composition and physicochemical properties and to the work of BLISS[2] and VALTER & ČIŽ[3]. Various types of apparatus for determining the foaming capacities are described with numerous references to the literature.

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Accelerated determination of molasses standard purity. I. S. CHEN'. *Sakhar. Prom.*, 1962, (12), 6–9.—Tests have shown that the method proposed by SADOVYI for saturation of molasses is much more rapid that the conventional method since it is shown mathematically that the rate at which sugar is dissolved in an undersaturated molasses sample is much greater than the crystallization rate of sugar from a supersaturated molasses sample. Thus, adding sugar at 60°C to molasses of approximately 82·5% dry solids and allowing to dissolve gives as accurate a result as the conventional method which takes 15 times as long. Formulae to be applied to the experimental data are presented and an explanation of the great difference between crystallization and dissolving rates is offered. AKINDINOV's method of determining the refractometric Brix after 9 hr is also more rapid than the standard method but gives less accurate results.

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Chromatography of organic substances. VI. Thin-layer chromatography of carbohydrates. V. PREY, H. BERBALK and M. KANSZ. *Mikrochim. Acta*, 1961, 968–978; through *S.I.A.*, 1962, **24,** Abs. 713.—Carrier layers of silica gel G or kieselguhr G (Merck) were used, with 10 cm lengths and development times of 30 to 80 min. Various solvent mixtures were tested; a naphthoresorcinphosphoric acid spraying reagent was found best. Separations of glucose-sucrose, fructose-sucrose, glucose-fructose-sucrose, and raffinose-sucrose were effected. Raffinose could be separated from sucrose even in mixtures with unfavourable quantity ratios, e.g. in molasses. An improved wedge strip technique for such separations is described.

[1] *I.S.J.*, 1961, **63,** 120.
[2] *I.S.J.*, 1954, **56,** 196.
[3] *Listy Cukr.*, 1953, **69,** 31–32.

A contribution to the study of the Maillard reaction. J. DJBOURG and P. DEVILLERS. *Bull. Soc. Chim. France*, **1962,** 605–608; through *S.I.A.*, 1962, **24,** Abs. 729.—The glucose-glycine compound previously obtained in acid solution[1] was subjected to alkaline degradation either in the presence of oxygen[2] or in the absence of oxygen. The products were separated and quantitatively analysed. In the presence of O_2 the products were glycine, erythronic acid and dicarboxydimethylamine, with smaller quantities of formic, arabonic, glyceric and glycollic acids; in the absence of O_2 the products were glycine and lactic acid, with a smaller amount of the unchanged compound. It is suggested that oxidation causes the formation of a peroxide at the 3-carbon atom, followed by breakage of the 2-3 carbon link.

* * *

New modification for the separation of sugars by paper chromatography. W. G. JAFFE. *Acta Cient. Venez.*, 1961, **12,** 135–136; through *J. Sci. Food Agric. Abs.*, 1962, **13,** ii–207.—Previous methods involved the use of badly smelling solvents but this method employed methyl ethyl ketone, acetone and water in the proportion 10:4:1. $AgNO_3$ was used in the detection of the spots, followed by washing with a solution made up from 40% NaOH in water and 95 parts of methanol. The development was completed with 5% sodium thiosulphate. Washing and drying followed. Results were given in table form relative to glucose. Simple sugars could be separated in 16–24 hr but disaccharides, amino-sugars and uronic acids required two days. The smallest amounts of sugars which could be detected by the method were given.

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A review of recent developments in the chemistry of sugar beet. A. CARRUTHERS. *J. Amer. Soc. Sugar Beet Tech.*, 1962, **12,** 31–42.—This review touches on the increased knowledge of beet juice constituents, the effects of thermophilic bacteria in diffusion which give rise to lactic acid production and imidodisulphonic acid formation by reduction of nitrate to nitrite which reacts with sulphur dioxide, the acid-base equilibrium during clarification, measurement of K, Na, amino acid N and betaine, detection of various oligosaccharides, polarography of floc-forming material, use of radio-carbon techniques and high-voltage electrophoresis, and recent polarimeter designs including automatic instruments.

* * *

Chemical research on the reaction products of glucose and ammonia. I. Changes occurring in glucose in aqueous ammonia solution. M. KOMOTO. *J. Agric. Chem. Soc. Japan*, 1962, **36,** 305–310; through *S.I.A.*, 1962, **24,** Abs. 730.—The products from the heating of glucose in aqueous ammonia solution were examined by paper chromatography, with elution of some of the spots for further analysis. Some fructose and mannose are formed, and condensation of glucose with ammonia also produced some glycosylamine and diglycosylamine. At least eight different imidazole compounds were detected; it is inferred that glucose decomposition products are converted to unstable α-diketones and aldehydes, and that the α-diketones react with ammonia and an aldehyde to give an imidazole and water. Lactic acid was also detected and was presumably produced from methyl glyoxal from glucose decomposition. Colouring matter formed was separated by dialysis through a cellophane membrane and had 43·44% C, 6·96% H and 8·11% N (empirical formula $C_{22}H_{34}N_2O_9$). On reaction with $NaIO_4$, formaldehyde and formic acid were produced, which suggests that the molecule has a primary alcohol at one end, and part of the sugar structure on a carbon atom next to the alcohol radical. Infra-red absorption frequencies suggest an OH or NH bond. With increased heating of the glucose and ammonia, the reducing power and ammonia content decrease rapidly, and colour increases rapidly; the coloured compound is thus thought to be a product of direct reaction between ammonia and glucose. With increasing proportion of ammonia to glucose, the amount of imidazoles formed increase linearly with the ratio, and colour increases up to a molecular ratio of 2:1 and then decreases, perhaps owing to increasing pH.

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Chemical research on the reaction products of glucose and ammonia. II. Separate quantitative determination of glycosylamine, glucose and ammonia. M. KOMOTO. *J. Agric. Chem. Soc. Japan*, 1962, **36,** 310-313; through *S.I.A.*, 1962, **24,** Abs. 731.—The reaction products (see previous abstract) were separated from glucose by passing them through a "Dowex-50" cation-exchange resin column, which passes the glucose, and subsequently washing out the glycosylamine and ammonia with HCl. The glucosylamine was estimated by the anthrone colour reaction, with 1·5N HCl solution as control comparison instead of water. The glucose was also determined by the anthrone method, with water as control solution. Ammonia was measured by the indophenol method. Diglycosylamine is not retained by the resin, but the small amounts present do not interfere significantly in the glucose determination.

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Separation and determination of alkali and alkaline earth ions in molasses by ion exchange chromatography. S. Y. CHEN. *Taiwan Sugar Quarterly*, 1962, **9,** (3), 33–38.—Cations from molasses were adsorbed by passing the sample through a column of "Dowex-50" cation exchange resin on the H cycle. The alkali cations were eluted with 0·2N HCl containing 30% MeOH (Li^+), 0·2N HCl (Na^+), 0·5N HCl (K^+), 1·0N NH_4 acetate (Mg^{++}), 1·5 N NH_4 acetate (Ca^{++}), 2N NH_4 acetate (Sr^{++}) and 3·5N NH_4 acetate (Ba^{++}). Recovery of added amounts of the cations varied between 98·63 and 100·95%. Very little differences were found between values obtained directly from molasses and after ignition and resolution.

[1] *I.S.J.*, 1958, **60,** 51.

[2] DUBOURG & NAFFA: *Bull. Soc. Chim. France*, **1959,** 1353–1362.

BY-PRODUCTS

Storage of molasses. E. R. DE OLIVEIRA. *Brasil Açuc.*, 1962, **59**, (5 & 6), 192–195.—The importance of suitable storage for molasses for use in a distillery is discussed as well as various factors concerned. Tanks made of metal plate are recommended, their capacity being influenced mainly by the capacities of the sugar factory and of the distillery, as well as the duration of the working campaign, capacities of 500,000–1,000,000 litres being common. Construction is generally in cylindrical form, of steel plate, the thickness of which decreases from the base upwards, e.g. 6 or 7 mm at the base to 4 or 5 mm at the top with a 3 mm thick cover. Location of the tanks is briefly discussed, and cleaning and maintenance are also described.

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Preparation of yeast from molasses without producing waste waters. A. REICHE, C. HILGETAG, A. MARTINI, M. LORENTZ and J. STOCKER. *Chem. Tech., Berlin*, 1962, **14**, 20–22; through *J. Sci. Food Agric. Abs.*, 1962, **13**, ii–151.—Full description is given of a continuous process for preparing yeast from molasses, in which formation of waste water effluent is substantially avoided and fresh water requirements are very largely reduced, by recycling the filtrate from the yeast obtained (together with some wash water) to the fermentation process, and washing the separated yeast in two stages. Part of the filtrate is bled off (for eventual K salt recovery) to remove K salts (and so enable the process to continue) and the remaining filtrate is combined with the first wash water, and the combined liquid (after suitable concentration) is returned to the yeast formation. The second wash water is recycled solely in the final washing of the separated yeast.

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The effect of different pressing cycles on the properties of hardboard from sugar cane bagasse. B. O. DE LUMEN, P. V. BAWAGAN and L. J. VILLANUEVA. *Proc. 9th Ann. Conv. Philippines Sugar Tech.*, 1961, 192–196.—Investigations were carried out to determine the effect of the nature of bagasse on the manufacture and properties of the hardboard produced. Pulp yield was greater from depithed than undepithed bagasse (90·25% *vs.* 85·05%) and smaller amounts of chemicals were used. Tabulated results show that cracks appeared in 35·7% of those hardboards produced from undepithed bagasse whereas hardboards produced from the depithed bagasse were free of cracks, and had a lighter brown colour. Depithed bagasse also gave a stronger and more serviceable hardboard than did undepithed bagasse.

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Sugar as chemical raw material. III. V. PREY. *Zucker*, 1962, **15**, 549–554.—Some information is given on tests concerned with reactions of sucrose and sugar by-products. The three groups cover reactions with an unaltered sucrose molecule (the principal one being the formation of sucrose esters for use as surface-active substances), reactions of sucrose derivatives or degradation products, e.g. formation of diisocyanate from saccharic acid produced by sucrose oxidation, and reactions of by-products from sugar production, in particular glutamic acid and betaine. Many of the reactions described are the subjects of patents, and 14 references are given to the literature.

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The economics of feed yeast from cane blackstrap molasses. P. R. PERALTA. *Proc. 9th Ann. Conv. Philippines Sugar Tech.*, 1961, 261–279.—See *I.S.J.* 1962, **64**, 182.

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Citric acid production from cane molasses. I. JANUSZEWICZ, H. IGNATOWICZ, I. KAMINSKA and K. MOSSAKOWSKA. *Gaz. Cukr.*, 1962, **64**, 292–295.—Egyptian and Cuban cane molasses samples were analysed for their suitability for citric acid fermentation. Their analyses are compared with those of beet molasses and fermentation procedures are described on the basis of these analyses.

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Sugar as an industrial raw material for non-food purposes. K. ČÍHAL. *Listy Cukr. Suppl.*, 1962, (10) 4–6.—Uses of sucrose and its derivatives are described with 21 references to the literature.

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Molasses as a raw material for the production of glutamic acid. V. P. MELESHKO and N. P. EGOROVA. *Sakhar. Prom.*, 1962, (12), 5–6.—Molasses was hydrolysed and the glutamic acid separated from the other amino acids by electrophoresis and subsequently analysed quantitatively. The tabulated data show that although the glutamic acid content of beet is lower at the end of the campaign, molasses is still a useful and cheap raw material for glutamic acid production.

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Vitamin B_{12} from sugar beet molasses. Cultivation of the nutrient solution with *Propionibacterium Shermanii*. E. D. MIKHLIN, N. V. TARASOVA and N. YU. RABAEVA. *Trudy Vsesoyuz. Nauch.-Issled. Vitamin. Inst.*, 1961, **8**, 71–79; through *Chem. Abstr.*, 1962, **57**, 1379.—Molasses, inverted with H_2SO_4, was mixed with activated carbon, separated from the carbon, and then mixed with 3·5–4% of corn syrup. *Propionibacterium Shermanii*, cultivated on this medium, formed 3·5–3·6 g of vitamin B_{12} in 1000 litres of solution, and 53% of the vitamin could be recovered in crystal form.

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Catalysis of acetylation reactions of sugars with an ion-exchange resin. G. M. CHRISTENSEN. *J. Org. Chem.*, 1962, **27**, 1442–1443; through *S.I.A.*, 1962, **24**, Abs. 727.—Octa-acetyl sucrose was prepared from powdered sucrose in 44·2% yield by stirring the sucrose in excess acetic anhydride for 6 hr at 55–60°C in the presence of 4% of "Amberlite IR-120" sulphonic acid resin. Good yields of tetraacetyl glucose and tetraacetyl fructose were similarly obtained from the respective sugars.

UNITED STATES

Beet toppers. H. C. OPPEL, of Boise, Idaho, U.S.A. **3,059,399.** 1st October, 1959; 23rd October 1962.

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Beet topper and harvester. W. S. TONSFELDT, of Sabin, Minn., U.S.A. **3,060,667.** 7th April 1960; 30th October 1962.

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Prevention of scale formation in evaporation of liquids (beet juices). S. E. KENT, of Chicago, Ill., U.S.A., *assr.* HODAG CHEMICAL CORP. **3,061,478.** 14th December 1959; 30th October 1962.—Reduction of scale formation in sugar juice evaporators is effected by carrying out the evaporation in the presence of e.g. 4–5 p.p.m. of a fatty acid ester (diester) of a glycoside, the fatty acid acyl radical of the ester having 8–22 (12–24) C atoms, e.g. coconut oil mixed fatty acid diesters of methyl glucoside.

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Production of L-malic acid by fermentation. S. ABE, A. FURUYA, T. SAITO and K. TAKAYAMA, *assrs.* KYOWA HAKKO KOGYO CO. LTD. **3,063,910.** 3rd February 1960; 13th November 1962.—*Aspergillus parasiticus* Speare (ATCC No. 13696) [*A. oryzae* (Ahlburg) Cohn] is cultivated under aerobic conditions at 20–30°C in a (liquid or solid) medium containing assimilable carbohydrate (sucrose, glucose, molasses, etc.), nitrogen (peptone, urea, an ammonium salt or $NaNO_3$), (pyruvic or fumaric acid as an accelerator) and inorganic salts (including at least one cation of the group Fe^{++}, Mn^{++}, Al^{+++} and Cr^{+++}), maintaining at pH 5·0–7·5 by the presence of 1-10% w/v of $CaCO_3$ and/or $MgCO_3$, after which the L-malic acid is recovered from the medium.

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High test molasses in L-glutamic acid fermentation. G. M. MIESCHER, of Terre Haute, Ind., U.S.A., *assr.* COMMERCIAL SOLVENTS CORP. **3,066,078.** 15th February 1961; 27th November 1962.—*Brevibacterium divaricatum* NRRL B-2311 or B-2312 is cultivated in a nutrient medium containing 3–7% (5%) of a carbohydrate (glucose, sucrose) until essentially maximum growth is attained (ca. 12 hr) when 3–7% (5%) high test molasses is added (over 4 hr) and the fermentation continued to give glutamic acid.

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Grab for cane stalks (harvester). S. A. THORNTON, of Jeannerette, La., U.S.A. **3,069,034.** 23rd October 1959; 18th December 1962.

Conversion of invert molasses (to 5-hydroxymethyl furfural). R. E. JONES and H. B. LANGE, *assrs.* MERCK & CO. INC., of Rahway, N.J., U.S.A. **3,066,150.** 2nd January 1958; 27th November 1962. The molasses solution is passed through a bed of granular cation exchange resin, of the phenolic cross-linked sulphonic acid type on the Na cycle, to separate by ion exclusion a solution containing the ionic cations and organic acids and a solution containing the major part of the sugar relatively free of such cations and acids. This solution is heated to a temperature over 250°C (250–380°C while passing continuously through a tube) in the presence of an acid catalyst, e.g. Al sulphate, to form the 5-hydroxymethyl furfural (which is separated after cooling).

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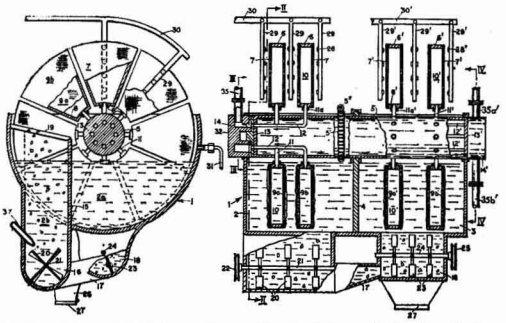
Filtering apparatus (for sugar syrups). P. LAVALLEE, of Paris, France, *assr.* G. GAUDFRIN. **3,061,477.** 5th November 1959; 30th October 1962.

The filter is designed for treatment of heavy syrup rich in sugar crystals, the insoluble products of carbonatation, carbon, etc. The syrup is admitted through pipe 31 into the compartment 2 of tank 1 which is separated by a bulkhead 4 from the other compartment 3. Supported by the walls and bulkhead is a rotating shaft 5 which carried two sets of filter discs 6,6′ divided into sectors 8,8′ on which is stretched filter cloth to form filtering surfaces 9a, 9b, 9a′, 9b′. From the insides 10, 10′ of the disc sectors, tubes 11 lead into the distributing heads 14, 14′ by way of tubes 12, 12′, and under vacuum supplied through pipes 35, 35a′, 35b′. Partition 15 in compartment 2, broken to permit passage of the discs, divides it into a filtering section 2a and a collector section 2b terminating in a well 16 which communicates with a well 18 under compartment 3 by means of a pipe 17. Partition 15 carries a number of stripper blades 19 to scrape accumulated deposits from filter faces 9a, etc., while vanes 20, 23 on motor driven shafts 21, 24 act as transfer and agitating devices. Each filter disc rotates in a plane along which are spaced charging, washing and discharging sections, the discs 6′ having in addition a drying section. Washing is by means of spray nozzles 28,28′ carried on pipes 29, 29′. All of the ports from the tubes 12, 12′ in the end plates 13, 13′ of the heads 14, 14′ are connected to the vacuum pipes by means of suitable annular channels, with the exception of one which is connected to a compressed air source, while a spray nozzle 37 admits dilution liquid to facilitate slurrying of collected sludge.

Copies of Specifications of United Kingdom Patents can be obtained on application to H.M. Patent Office, 25 Southampton Buildings, London, W.C.2. (price 4s. 6d. each). United States patent specifications are obtainable from: The Commissioner of Patents, Washington, D.C. (price 25 cents each).

The filtrate from the syrup entering compartment 2, together with wash liquor, is collected by pipe 35 and goes to process. When the port in plate 13, during its rotation, reaches the position opposite the source of compressed air, the appropriate sector of the disc 6 is expanded, the cake is scraped off by

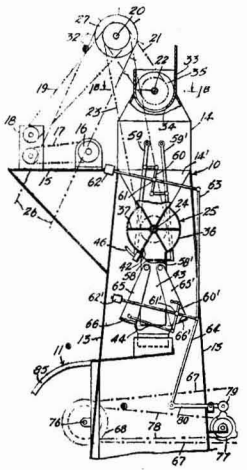


blades 19 and fall into the well 16. There it is slurried with diluting liquid from nozzle 37 and, with substantially less sugar content that the original syrup, is transferred through pipe 17 to compartment 3. Here it is again filtered and the filtrate collected through half the sectors 7′ to a channel in head 14′ and thence through vacuum pipe 35b′. It can then be used as the wash liquor for compartment 2. The sectors when washed by spray nozzles 28′ then deliver a dilute wash which is collected by another channel in head 14′ and so through pipe 35a′. The cake is discharged from disc 6′ in the same way as from disc 6, falling into a drain 26 to be discarded or salvaged as required.

* * *

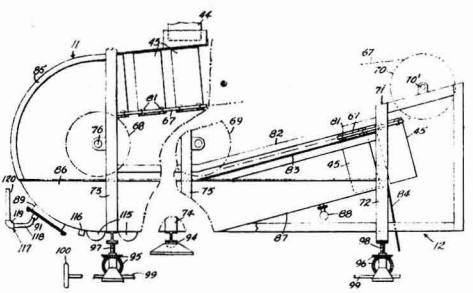
Apparatus for processing sugar cane. A. F. DE LA CALLE, of Mexico City, D.F.5, Mexico. **3,069,295.** 20th June 1960; 18th December 1962.

Cane chips produced by a shredder are carried by conveyor 26 with rakes 32 and are tipped into a trough 33 containing a driven screw conveyor 22. This is in two sections of opposite hand from the centre of the shaft so that the chips are carried from the middle to the ends of the trough. A series of holes 34 in the bottom of the trough permit the chips to fall through casing 14 into hopper 14′ with even distribution along its length. A motor 16, connected to a variable speed drive mechanism 18, is used to drive the shaft of the conveyor 26, the screw 22 and also the shaft of feeder 25. This comprises a shaft 24 carrying blades 37 and fitted with a mechanism whereby the shaft can move relative to the blades so compressing the chips before discharge through the outlet 43 of the feeder. The chips fall onto a series of fingers 58,58′ supported at the lower end of levers 59,59′ pivoted about casing 14 and actuated by the link lever 60 which pivots about 61. This also carries the long rod with the weight 62 at one end and link 63 at the other. A similar linkage 60′, with weight 62′ and connected to 63, is coupled with yoke-shaped members 65,65′ carrying gates 66,66′ and pivoted about the upper part of outlet 43. The lever systems are operated by the cam 77 and follower 79 through the linkage 64,80 so that when the gates



are opened as shown the fingers are closed and vice-versa. Thus as a result of the movement of the cam successive portions of cane chips are delivered from the feeder 25 into the outlet above gates 66 and then through opening 44.

They fall into cells of a cane diffuser 11 which is driven by the same motor which operates the camshaft so that the gate only operates when a cell is in position. The cell 45 is carried by means of a pair of endless chains 67 around sprockets 68,70 the lower travel being controlled by the movement of rollers 81 in guides 82,83. The cells are provided with perforated walls and seals round the upper edges and carry the cane chips round the lower end of the diffuser, under casing 85 so that the cane is immersed in liquid in the horizontal base. The cells then rise at the discharge end of the diffuser, following the guides, and



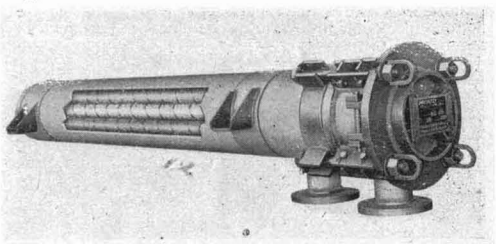
the extracted chips are discharged over plate 84, while the cell continues, eventually returning to the loading point under opening 44. Water is added through pipe 88 and juice withdrawn through discharge pipe 91. The rate of withdrawal, juice level, etc. can be separately controlled.

TRADE NOTICES

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

"Pronto" filters. American Plant Equipment Company, P.O. Box 292, 442 York Street, Elizabeth 4, N.J., U.S.A.

The "Pronto" heavy duty pressure leaf filter is built in 64 sizes ranging from 1 to 1074 sq.ft. of filtering surface; it is fully enclosed and its high flow rates



combined with uniform cake formation result in peak performance and thorough cake washing. Power sluicing affords the opportunity for plant automation, while a dry cake discharge model simplifies solids recovery. The tank closures are quick-opening, with hydraulic cover-lifts, while all-metal leaves are employed, either each with individual filtrate piping, or feeding to an internal or external manifold. A choice of constructional materials is available, as well as ancillary equipment such as precoat tank with agitator, pumping equipment, valves, controls, etc. Units of 514 sq.ft. filter surface, with 22 leaves spaced at 2-inch centres and housed in a 48-inch dia. stainless steel tank, are considered most suitable for filtering sugar refinery liquors and are installed at the American Sugar Refining Company plants at Boston, Brooklyn, Philadelphia, Baltimore and Chicago. These are effectively precoated with kieselguhr within 5 minutes using a rate of about 350 g.p.m. through the side feed port, which is provided with a baffle to prevent erosion of the filter surface. At the end of the filtering run, the unfiltered liquor in the tank is displaced by the introduction of compressed air into the top of the tank, when the cake can be sweetened-off with minimum liquor dilution. It may be sluiced finally for a few minutes using the "Power sluicers", which consist of stationary twin headers carrying a total of 92 spray jets with a layout designed in accordance with experimental findings to give maximum washing efficiency.

The "Pronto" tubular check filter is in use in a number of sugar refineries including three at the Montreal refinery of St. Lawrence Sugar Refineries Ltd. for trap-filtration of liquors which *should* be completely clear, e.g. before vacuum pans, liquid sugar tankers, etc.; they are safety intercepts especially suitable for automated plants. They are of low cake-capacity but permit extremely high flow rates, even with high-viscosity liquids, and consist of textile stockings of 2¼ inches dia. and 7 ft long; these are inserted into perforated metal tubes and held by a simple retaining ring. The tubes are located in a tubular tank with quick-opening closure, and when desired the stockings can be withdrawn—with the cake inside—and often replaced after laundering.

* * *

New Swedish gear pump. Albin Motor Co., Kristinehamn, Sweden; K. R. Gibbs & Co. Ltd., "Evesham House", 21 Evesham Road, Cheltenham, Glos.

This internal rotary gear positive-displacement pump is made in capacities ranging from 0·33 to 5 g.p.m. at a normal working pressure of 213 p.s.i. to larger pumps of up to 120 g.p.m. at lower pressures. These pumps can work with high viscosities, e.g. 3000 seconds Redwood No. 1 and at temperatures of up to 496°F (240°C).

Almost any liquid in which there are no suspended solids and which has some lubricating property, whether of high or low viscosity, can be pumped, including oils, treacle, molasses, glucose syrups, etc. The pump bodies are of fine grained grey cast iron with precision machined steel gears of typical Swedish workmanship. There is a variety of flange and foot mountings and a pressure relief valve can be supplied.

* * *

Plastic solenoid valves. The Severn Instrument Co. Ltd., Middle Spillmans, Stroud, Glos.

A new range of valves for low pressure corrosive service, such as pH control on effluent, have bodies of P.V.C., polypropylene or P.T.F.E., and diaphragms of P.T.F.E. or various rubbers. No metal is in contact with fluid, while pressures are 5 p.s.i. inlet and 3 p.s.i. maximum back pressure. Ports can be sized for metering purposes, while the solenoid is available in various voltages, 240 V. a.c. being standard.

* * *

Model AB80 continuous moisture meter. Kappa Electronics, Division of Fidelity Cars Ltd., 159 Hammersmith Road, London, W.6.

The Kappa Model AB80 continuous meter is a transistor-operated device designed to provide a direct and reliable method for the measurement of moisture content in a wide range of materials. The equipment measures the effect upon capacitance produced by the presence of the material in the electrostatic field of a suitably designed probe or cell; the capacitance is due to the physical properties of the material of which, for many substances, moisture content is a major factor.

The equipment comprises a high-frequency measuring head mounted adjacent to the cell (or probe) and a remotely-connected monitoring unit reading directly

the relative moisture content of the material. In addition to a direct reading large scale meter the monitoring unit also provides an external output signal for recording and automatic control applications.

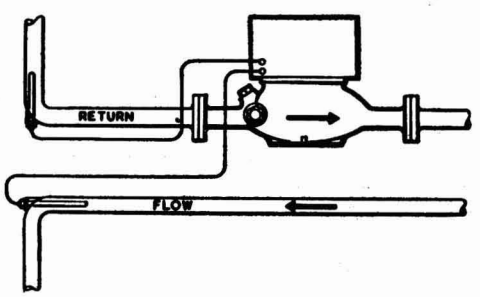
The adaptability of the measuring-head for use with various cells (or probes) together with high discrimination to changes in capacitance enables the equipment to be used for numerous applications covering a wide range of materials. Depending upon the material and its application to the cell, measurement of moisture content can be made from as low as 0·1% to upwards of 60%.

Although primarily designed for operating where there is a continuous flow of material, the equipment is equally useful for the measurement of automatically fed or manually selected samples and for monitoring the moisture content of bulk stored material.

* * *

The Pegus-Avedko Heatmeter. Norco Engineering Ltd., Burrell Rd., Haywards Heath, Sussex.

This instrument combines two parts—a flow meter and a heat computer in a compact casing. As seen in the drawing, two probes are inserted in the inlet



and outlet pipes for the heating fluid and the temperature difference combined with the rate of flow measured by the instrument is indicated in terms of B.Th.U. used by the heated body, be it a laboratory installation or factory plant.

* * *

PUBLICATIONS RECEIVED

PRECISE TEMPERATURE MEASUREMENT AND CONTROL. Fielden Electronics Ltd., Wythenshawe, Manchester.

A new booklet describes the full range of "Bikini" transistorized temperature instruments, and will provide a most useful source of interesting information for the man in any way concerned with the measurement and control of temperature. The booklet describes the advantages and operation of the Fielden "Bikini" range, with a list of typical applications some of which are illustrated.

* * *

POWDER CLASSIFIERS. Buell Ltd., 3 St. James's Square, London S.W.1.

A new leaflet, No. 1000/1/63, describes the Buell-van Tongeren powder classifiers which may be used for materials below 20 mesh at whcih size screening becomes difficult. The classifiers can take the place of these finer mesh screens and give equivalent results down to below 20 microns. The range available will take feeds from 100 lb to 50 tons per hour, and since there are no moving parts, maintenance costs are low and operation is continuous. There are three types—gravity, inertia and centrifugal—and the leaflet illustrates these and typical applications.

* * *

AUTOMATIC DUST CONTROL WITH THE "DALAMATIC". Dallow Lambert Ltd., Thurmaston, Leicester.

Folder 115 describes the Dallow Lambert "Dalamatic" continuously rated dust collector which is completely automatic and is the most compact of its kind in the world. Information is provided on the design and operation of the collector, including the various combinations making up the range.

* * *

FULL-VIEW ROTAMETERS. Brooks Instrument Co. Inc., Hatfield, Pa., U.S.A.

A new 4-page Bulletin, No. SP-1100, presents in a brief and comprehensive form the chief design features of the full-view rotameter. Models available cover a size range from 0·5 c.c./min to 200 g.p.m. and extensions permit indicating, alarm, transmitting and integrating of flows.

* * *

RENOLD CHAIN DRIVES. Renold Chains Ltd., Renold House, Wythenshawe, Manchester.

Savings in space, time, trouble and costs are features of Renold chain drives, the stock range of which goes up to 140 h.p. at 1200 r.p.m. and covers 90% of all transmission requirements. Standardized design drives are also available up to 4000 h.p. at 300 r.p.m., while advantages include no slip, low cost, space and power saving, quiet and smooth operation, increased production and long, trouble-free life.

* * *

Farrel-Birmingham changes name to Farrel Corporation.—At the annual meeting of Farrel-Birmingham Company, Inc., of Ansonia, Conn., U.S.A., on 21st March 1963, the stockholders voted to change the firm's name to Farrel Corporation, with effect from 1st April. The Farrel organization manufactures heavy machinery for the sugar industry and several other industries, as well as machine tools, rolls, castings, weldments, gears and gear drives.

* * *

Latin American market research.—All exporters need first-hand information on economic developments in the area, especially to-day when Latin American capacity to import is expanding rapidly. New exchange regulations, import incentives—and restrictions—new development trends and structural changes are constantly appearing and can be exploited, or avoided, by wise commercial policy.

Unidad de Investigaciones Economicas S.A. was established in 1958, and since then has carried out many independent research projects in Latin America as well as special projects on behalf of internationally known market research and economic development organizations.

The organization is starting a European Service in 1963, offering information and advice direct from Latin America. This service can include: (1) Authentic general information not only from standard sources but also from independent research not generally available to outside enquirers. (2) A comprehensive and confidential annual report covering markets and potential markets, competition, sales and general growth, analysis of agents' reports, etc. (3) Complete organization and supervision of suitable agencies to represent companies starting to introduce their products on the Latin American market. (4) Commercial and economic advice with personal representation at important meetings or negotiations. (5) Personal office facilities for representatives when travelling in Latin America.

The head office of the organization is at Jose Reyes 24, Santo Domingo, Dominican Republic, while the European Service is based on Box 901, Transit-Bern, Switzerland.

Sugar Industry Technicians Inc.

The 22nd Annual Meeting of Sugar Industry Technicians Inc. is to be held at the Sheraton-Atlantic Hotel, New York, during the 15th–17th May 1963.

The programme includes the following papers:

A further stury of sulphate in the refinery, by R. J. TYMANN and J. VLADYKA (Revere Sugar Refinery).

Continuous automated production of tablet sugar with dielectric drying, by B. B. JONES (Packaging Engineer, Savannah Sugar Refining Corp.).

Method of raw sugar analysis for evaluation of refining quality, by C. W. BEAL (California & Hawaiian Sugar Refining Corporation).

Mechanical arrangements for evaluating the decolorizing power of solid adsorbents, by FRANK M. CHAPMAN (Tate & Lyle Refineries Ltd.).

An automated clarification system, by A. J. ANCONA and F. DI DONATO (SuCrest Corp.).

Tablet and cubes manufacturing plant, by J. A. HARRISON, W. B. MAYHEW and J. J. NOGATCH (National Sugar Refining Co.).

An evaluation of the phosphoric acid and lime treatment of raw liquor at Victorias, by JOSE P. STO. DOMINGO (Victorias Milling Co. Inc.).

Double purging of remelt sugars, by HARRIS SCHENKER (Refined Syrups & Sugars Inc.).

Pressure and vacuum filtration of sugar liquors, by L. T. JENSEN (Great Western Sugar Company).

The technique of white sugar crystallization supplemented with vacuum pan tests, by ALFRED L. WEBRE (Consultant, Jackson Industries Inc.).

Standardization of Peruvian raw sugars, by Dr. PIETER HONIG and Dr. JAMES C. P. CHEN.

Rôle of carbon dioxide in the bone char process, by Dr. F. G. CARPENTER and Dr. VICTOR R. DEITZ (National Bureau of Standards).

Filtrability of clarified juice in relation to quality of raw sugar, by E. E. COLL, J. J. FRILOUX, N. A. CASHEN and W. F. GUILBEAU (Southern Regional Research Laboratory, U.S.D.A.).

In addition, a symposium will be held on the subject of "Solid adsorbents", the moderator being E. DWIGHT GILLETTE.

Brevities

Greek sugar production, 1962[1].—In 1962 a total of 6300 hectares were devoted to beet, producing a crop of 220,000 tons, from which 24,000 tons of sugar were made, 19,700 tons at the Larissa sugar factory and 4,300 tons at the Platy factory.

* * *

Venezuela sugar crop 1962[2].—The 1962 sugar crop in Venezuela amounted to 236,956 tons compared with 223,799 tons in 1961. According to preliminary estimates, production and consumption in 1963 will amount to 240,000 tons and 230,000 tons respectively.

* * *

Dutch sugar crop, 1962[3].—In the 1962 campaign in Holland 2,934,100 tons of beet, from 77,439 hectares (37·89 tons/ha), were sliced compared with 3,854,430 tons in the previous year when the yield was 45·46 tons/ha. Sugar outturn was 425,000 tons compared with 660,000 tons in 1961.

* * *

New factory for Venezuela[4].—The West German Government has offered to grant a long-term loan equivalent to 45 million bolívares to finance the installation of a sugar factory in the State of Portuguesa.

Imperial College of Tropical Agriculture

UK Association

President: H. J. PAGE, C.M.G., O.B.E.

Vice President: G. B. MASEFIELD, M.A., A.I.C.T.A.

The ICTA Association (U.K.) will hold an Open Meeting at Uganda House, Trafalgar Square, London W.C.2, on Friday, 19th July, at 2.45 p.m., when Dr. HARRY EVANS, O.B.E., Agricultural Director, Bookers Sugar Estates Limited, will speak on "The practical application of scientific procedures for the improvement of agricultural productivity in British Guiana". A welcome is extended to all who are interested. Admission is free.

Brevities

New factory for Brazil[5].—The foundation of a new sugar factory has been laid in the State of Rio Grande do Sul. The factory will cost 150 million cruzeiros and will have a production capacity of 350,000 bags of sugar, of 60 kg each.

* * *

New sugar factories for Portuguese East Africa.—It is reported[6] that the Banco de Fomento Nacional and the Banco Nacional Ultramarino have agreed to guarantee external financing contracts for the construction of sugar factories at Manhiça and Pungué in Mozambique.

* * *

U.K. beet price.—The guaranteed price for sugar beet in the U.K. will this year be based on a sugar content of 16·0% instead of 16·5% as hitherto. The basic price has been set at 124s 8d whilst differentials of 10s 0d will be payable for each 1% above or below that level, as compared with a differential of 7s 6d in force in previous years.

* * *

West German beet campaign, 1962/63[7].—Final statistics of the 1962/63 campaign show that though the area devoted to the crop was increased from 263,467 hectares to 296,683 hectares, deliveries of roots, at 9,225,489 metric tons, were down by about 104,000 tons compared with the previous season. The sugar content was higher than in 1961/62 and the final production of sugar amounted to 1,368,000 tons, white value, compared with 1,324,000 tons the year before.

* * *

Argentina mill closure[8].—The Federal Intervention in the Province of Tucumán has ordered the liquidation of the Santa Ana sugar mill and refinery which was bought by the provincial authorities in 1957. In 1962 an international call for tenders to buy the concern met with no response and the outstanding obligations are now estimated at 790m. pesos. On 20th February, 2000 workers and employees occupied the premises in protest.

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[1] *Zeitsch. Zuckerind.*, 1963, **88**, 47.
[2] *Fortnightly Review* (Bank of London & S. America Ltd.), 1963, **28**, 74.
[3] *Zeitsch. Zuckerind.*, 1963, **88**, 48.
[4] *Fortnightly Review* (Bank of London & S. America Ltd.), 1963, **28**, 74.
[5] *Zeitsch. Zuckerind.*, 1963, **88**, 100.
[6] *Fortnightly Review* (Bank of London & S. America Ltd.), 1962, **28**, 217.
[7] C. Czarnikow Ltd., *Sugar Review*, 1963, (596), 33.
[8] *Fortnightly Review* (Bank of London & S. America Ltd.), 1963, **28**, 199.

Japanese Sugar Imports[1]

Metric tons, tel quel	*Raws*	*Refined*	*Non-Centrifugal*	*Total*	*Total* 1961	*Total* 1960
			1962			
Argentina	8,627	—	—	8,627	23,170	—
Australia	274,319	—	—	274,319	96,158	122,407
Brazil	20,970	—	—	20,970	357,266	183,451
British Guiana*	—	—	—	—	—	783
Cuba	522,588	128	—	522,716	325,690	205,793
Denmark	—	—	—	—	—	2
Dominican Republic	8,660	—	—	8,660	106,808	79,516
Ecuador	—	—	—	—	15,040	7,503
Fiji	—	—	—	—	—	11,711
France	—	—	—	—	11,865	—
Hong Kong	—	—	—	—	22	—
Hungary	—	—	—	—	49	—
Indonesia	—	—	—	—	—	1,327
Norway	—	—	—	—	—	2
Peru	6	—	—	6	2,677	111,052
Philippines	—	—	—	—	5,023	47,583
Poland	10,576	—	—	10,576	10,500	—
Ryukyu	28,572	59,456	23,429	111,457	76,198	50,291
South Africa	82,582	—	—	82,582	—	—
Taiwan	421,615	8	6,875	428,498	361,819	459,932
Thailand	24,802	—	78	24,880	—	—
United Kingdom	—	—	—	—	150	90
U.S.A.	—	—	—	—	130	165
Venezuela	—	—	—	—	—	2,648
Other Countries	—	553	12	565	3	—
	1,403,317	60,145	30,394	1,493,856	1,392,568	1,284,256

* No sales of sugar were reported from British Guiana to Japan in 1960. It is possible that this quantity was described as "Demerara" although originating in Brazil.

Stock Exchange Quotations

CLOSING MIDDLE

London Stocks (*at 17th April* 1963)

Anglo-Ceylon (5s)	16/-
Antigua Sugar Factory (£1)	11/3
Booker Bros. (10s)	23/6
British Sugar Corp. Ltd. (£1)	26/-
Caroni Ord. (2s)	4/10
Caroni 6% Cum. Pref. (£1)	14/6
Distillers Co. Ltd. (10s units)	31/9
Gledhow Chaka's Kraal (R1)	18/-
Hulett & Sons (R1)	42/-
Jamaica Sugar Estates Ltd. (5s units)	4/9
Leach's Argentine (10s units)	16/9
Manbré & Garton Ltd. (10s)	48/-
Reynolds Bros. (R1)	18/9
St. Kitts (London) Ltd. (£1)	11/9
Sena Sugar Estates Ltd. (10s)	9/-
Tate & Lyle Ltd. (£1)	50/3
Trinidad Sugar (5s stock units)	3/8½
United Molasses (10s stock units)	35/6
West Indies Sugar Co. Ltd. (£1)	20/-

CLOSING MIDDLE

New York Stocks (*at 16th April* 1963)

American Crystal ($10)	48½
Amer. Sugar Ref. Co. ($25)	53⅜
Central Aguirre ($5)	25
North American Ind. ($10)	16
Great Western Sugar Co.	37⅜
South P.R. Sugar Co.	41⅝
United Fruit Co.	24⅛

Brevities

New beet factory for Spain.[2]—Three leading sugar manufacturers have applied for authorization to install jointly a beet sugar factory at San Martín del Camino, Léon, with a daily capacity of 2000 tons of beet. The new venture calls for an investment of 430 million pesetas.

* * *

Molasses pipeline in Colombia.[3]—A project is being studied for the transport of molasses by pipeline from Cali to the port of Buenaventura on the Pacific ocean. Negotiations are in progress for the export of Colombian molasses.

* * *

Puerto Rico factory closure.[4]—Central Constancia in Puerto Rico has been closed down and is for sale. It is a modern 3500-ton plant which has operated at a loss, however, as a result of lack of cane. In 1962 it crushed only 193,363 tons of cane, producing 17,820 tons of sugar.

* * *

New sugar factories for Egypt[5].—Three new sugar factories are to be erected in Egypt by the Nasr Sugar Company. The total costs of the three, which will be built at Kom Ombo, Deshna and Balena, will amount to about £E60 million.

* * *

Cane cultivation tests in California[6].—According to C. Brewer & Co., the University of California Extension Service is experimenting with sugar cane as a new crop in the Imperial Valley, the warmest and most southerly part of California. While cultivation may be feasible, however, it would require establishment of new cane sugar factories or substantial modification of existing beet sugar factories so as to handle this material. In contrast, beet can be processed in a cane sugar factory with little in the way of expensive modifications.

[1] C. Czarnikow Ltd., *Sugar Review*, 1963, (601), 53.
[2] *Fortnightly Review* (Bank of London & S. America Ltd.), 1963, **28**, 220.
[3] *Sugar y Azúcar*, 1963, **58**, (1), 56.
[4] *Sugar y Azúcar*, 1963, **58**, (1), 42.
[5] F. O. Licht, *International Sugar Rpt.*, 1963, **95**, (Supp. 3), 41.
[6] *Sugar y Azúcar*, 1963, **58**, (2), 60.