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The Journal of the TEXTILE INSTITUTE

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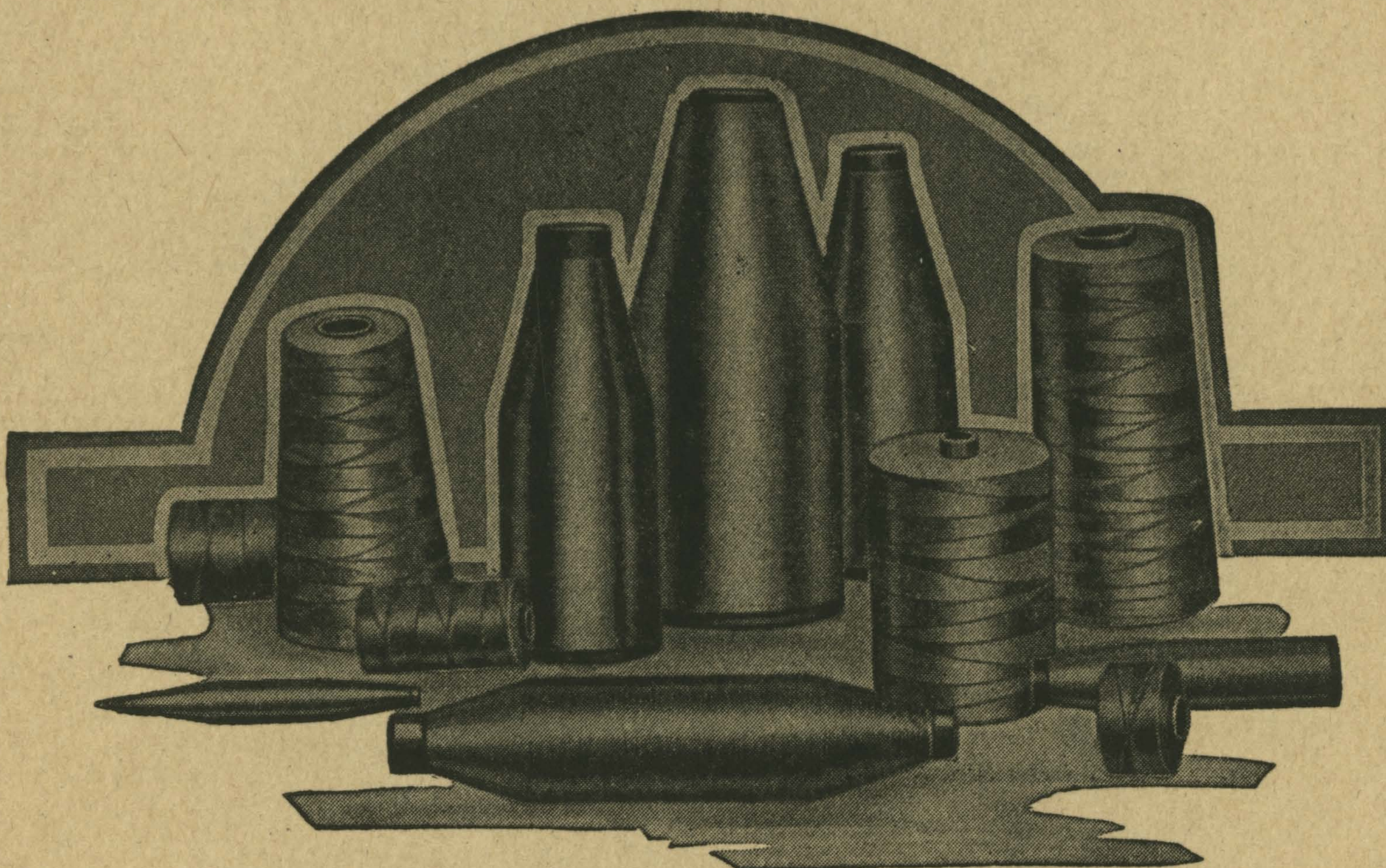
THE TEXTILE INSTITUTE
ST. MARY'S PARSONAGE, MANCHESTER



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THE TEXTILE INSTITUTE

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See also page iv.

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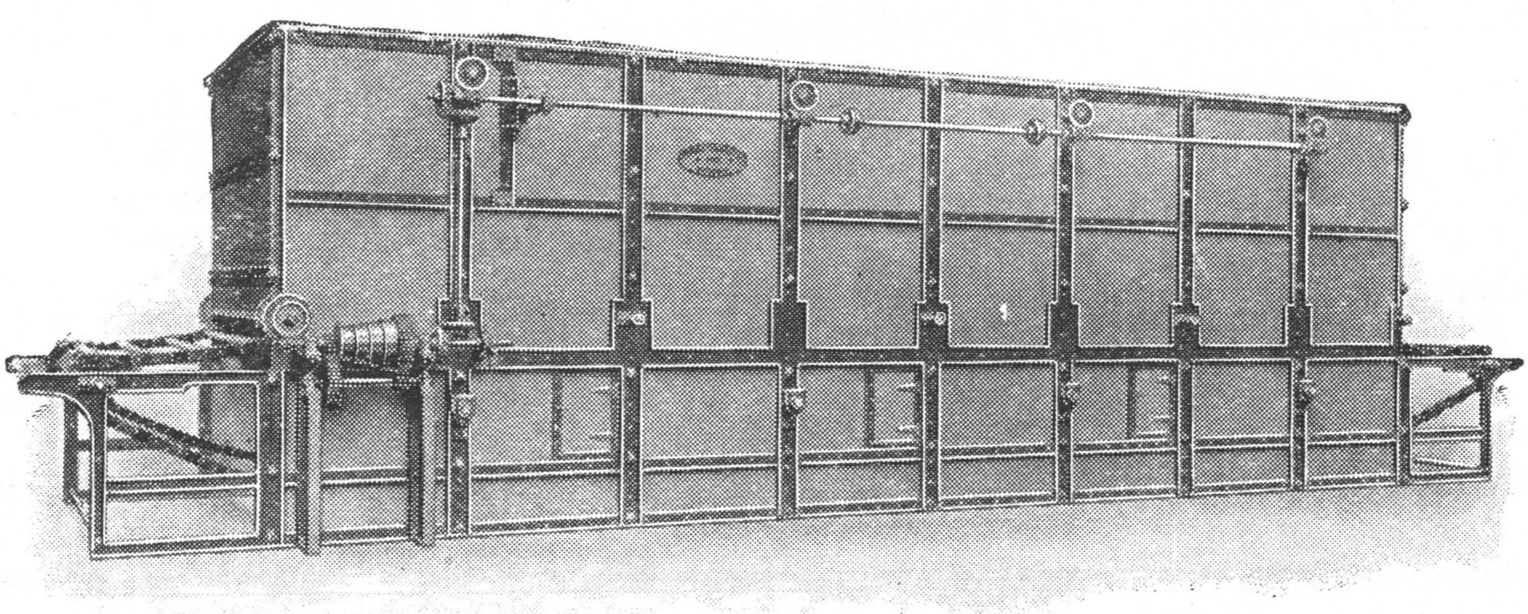

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THE JOURNAL OF THE
TEXTILE INSTITUTE

Vol. XVIII MAY 1927 No. 5

PROCEEDINGS

SEVENTEENTH ANNUAL GENERAL MEETING, AT MANCHESTER, 27th APRIL 1927

This meeting was held on the afternoon of Wednesday, 27th April 1927, at the headquarters premises at Manchester. Mr. W. Howarth, J.P., President, occupied the chair, and was supported on the platform by Messrs. J. Crompton (Vice-president and Chairman of Council), W. Frost (Vice-president and Hon. Secretary), and T. Fletcher Robinson (Hon. Treasurer). About forty other members were in attendance.

The minutes of the annual general meeting of 1926 were approved.

On the motion of Mr. J. Crompton, seconded by Mr. F. Nasmith, the annual report, as circulated, was adopted unanimously. This report, together with the balance sheet and accounts (1926) follow on pages P111–P121.

Mr. T. Fletcher Robinson, Hon. Treasurer, presented his annual report on the finances of the Institute, and moved the adoption of the Auditors' report, balance sheet, and accounts for 1926. Mr. W. W. L. Lishman seconded, and the motion was carried unanimously. The Treasurer's report was as follows—

In this, my thirteenth, Annual Report for the year ending 31st December 1926, I show the figures of past years to enable members to make a comparison of the finances for several years.

FOUNDATION FUND.—The invested capital of this fund on 31st December 1926, was £9,960 1s., as against £9,853 7s. the previous year. The difference is £106 14s., invested from a donation of £83 4s. 7d. from the Cotton Textile Industry Committee and from sundry small balances. The interest received was £506 1s. 11s., which has been transferred as follows—to *Journal* Account (see below), £410 7s. 7d.; to Revenue Account, £70 14s. 4d.; and for Mather Lecture, £25.

JOURNAL ACCOUNT.—The expenditure was £4,220 15s. 7d., being £404 11s. 7d. more than 1925; the income from sources other than membership subscriptions &c., being £3,098 1s. 7d., leaving a deficit on working account of £1,122 14s., which is £408 13s. 11d. greater than 1925. The *Journal* Account includes contributions received from the Research Associations—Cotton, £250; Wool, £150; Linen, £100; total, £500. The working deficit has been met by 25% of members' subscriptions, £627 6s. 5d.; £85 from Diploma Account; and by £410 7s. 7d. transferred from Foundation Fund interest. The cost of printing the *Journal* was £2,668 15s. 9d., this being £521 13s. 11d. more than 1925. The cost for 1926 was £146 2s. 1d. more than 1924, whilst there was an increase of members of 312 above 1924.

REVENUE ACCOUNT.—The income from members' subscriptions was £2,509 5s. 9d. from 1,090 members, being £124 19s. 7d. more than in 1925 from 1,105 members. Salaries and wages were £935 16s., being £210 16s. more than 1925. This increase is due to adjustments between headquarters accounts and those of the London Section; to an increase of office staff; and to normal advances in salaries and wages. There are the following increased costs—heating, lighting, and cleaning, £11 15s. 3d.; meetings and travelling expenses, £26 14s. 5d.; postages, telegrams, and telephones, £15 1s. 2d.; and printing and stationery, £58 15s. 6d; for depreciation of furniture, £15 15s. 1d. has been debited. The expenses of the Exhibition we held in 1926 were £26 19s. 10d.

London Section expenses were £286 1s. 1d., being £211 15s. 3d. less than 1926; this reduction is accounted for by the adjustment referred to above and to receipts from sub-letting.

Lancashire Section expenses of £26 10s. 8d. are £7 3s. 1d. less than 1925.

Yorkshire Section expenses were £68 6s. 3d., being £57 19s. 10d. more than in 1925.

Scottish and Irish Section expenses appear this year with a joint expense of £10 11s. 3d.

MEMBERS' SUBSCRIPTIONS.—The following figures are for comparison—1917, £851; 1919, £1,394; 1922, £1,694; 1923, £2,136; 1924, £2,265; 1925, £2,384; 1926, £2,905.

EXPENDITURE COMPARISON.—Rent, rates, heating, lighting, and cleaning have cost in 1918, £219 3s. 11d.; 1922, £300 19s. 5d.; 1924, £298 7s. 2d.; 1926, £313 4s. 9d.

Salaries and wages of staff (including *Journal*) at headquarters have been—1918, £453; 1920, £1,144; 1922, £1,465; 1923, £1,289; 1924, £1,248; 1925, £1,365; 1926, £1,579.

DIPLOMAS ACCOUNT.—The fees received up to 31st December 1926, were £979 13s. 8d., which, with £8 8s. for examination fees, make a total of £988 1s. 8d. from 98 Fellows and 83 Associates. After allocations to the *Journal* Account, to Revenue Account, and to cover the cost of printing, meetings, and examination expenses a balance of £679 12s. 9d. was left. Of this the Council decided to invest £650 in 5% War Stock, leaving on 31st December 1926, £129 12s. 7d. as uninvested balance.

SUMMARY.—After transferring from the Foundation Fund the whole of the interest received by that fund to the *Journal* and Revenue Accounts, as indicated above, there remains on Revenue Account for 1926 a debit balance of £34 12s. 9d. to be carried forward to 1927 account.

The net increase of members last year was only 120, against 192 in 1925; this reduction in new members last year, in spite of the impetus of the granting of Fellowships and Associateships, seems to me to be a serious matter. I would therefore impress upon members of the Institute and upon the Council the importance of securing a very considerable increase in the ordinary members during 1927.

ELECTION OF PRESIDENT.—Mr. J. Crompton moved the re-election of Mr. William Howarth as President for the ensuing year, and warmly commended Mr. Howarth's services during the past twelve months. Professor A. F. Barker seconded the re-election, and the motion was heartily carried.

The President, in responding, referred to one important development in connection with mills in Lancashire which he had foreshadowed a year ago. This was the idea of paying workers who attended Technical Schools and passed examinations. He was able to state that the system was now in practice in connection with nearly a hundred mills engaged in the Lancashire trade. This fact must have an important influence on the youth of the country engaged in the industry, for it would now be obvious to them that there was something to be gained by study and by making themselves proficient in their craft. Incidentally, he thought there was a greater pride in craftsmanship developing to-day than was the case a few years ago, and this was largely the result of efforts on the part of the Textile Institute. In conclusion, Mr. Howarth invited members to attend the Annual Conference at Bolton at the time of the Crompton Centenary celebrations.

VICE-PRESIDENTS.—The General Secretary (Mr. J. D. Athey) reported that there were three nominations for three vacancies. The nominations were—Messrs. F. Anderson (Portadown), Oscar S. Hall (Bury), and Wilfred Turner (Bradford). The President declared the three gentlemen named duly elected.

ELECTION OF COUNCIL.—The General Secretary reported that 17 nominations were received for 10 vacancies on the Council. A postal ballot ensued, and the scrutineers (Messrs. Shearer & Curtis) certified the result of the poll as follows—

Elected—Barker, A. F.; Barwick, F. W.; Boothman, W. T.; Kershaw, W.; Morton, W. E.; Nasmith, F.; Robinson, J.; Thornley, T.; Watson, S.; and Withers, J. C.

The President formally declared the gentlemen named duly elected.

APPOINTMENT OF AUDITORS.—On the motion of Mr. Howard Cheetham, seconded by Mr. W. B. Richardson, Messrs. Arthur E. Piggott, Son & Southworth were reappointed Auditors.

Council's Annual Report, Balance Sheet *and* Accounts *for* 1926

Presented at ANNUAL GENERAL MEETING, Wednesday, 27th April 1927

WHILST the past year's experience maintains an unbroken record of progress in membership strength, yet the augmented responsibilities following reorganisation under incorporation by Royal Charter, have materially increased the demands, not only on our financial resources, but also on the voluntary services of officers and members of committees. The Council desires to express the warmest appreciation of this generous and enthusiastic service in various directions. The Institute is mainly concerned with the advancement of science and technology in relation to the textile industries. To this end, it is now constituted as a recognised body for the grant of Diplomas to members who qualify therefor, by examination or otherwise; secondly, it arranges meetings in the various textile centres for the reading and discussion of papers of technical, scientific, and general interest, with subsequent publication and distribution; and, thirdly, offers prizes for annual competition on the part of students at technical colleges or other training institutions, in connection with the design and structure of textile fabrics and with the production of yarns. In the field of activity engaged in, the Institute makes a substantial contribution of service to the industry generally, and its claims for support are evidently meeting with growing appreciation and sympathy. In the case of one of the large industrial combines, for instance, each and every associated firm is represented in membership. In regard to the publication work of the Institute, greatly increased volume continues. Fortunately, this is materially assisted by co-operation and support on the part of Textile Research Associations, and also, in less degree, by annual subscriptions from the Weavers' Company and the Clothworkers' Company, all of which are gratefully acknowledged. Having regard to the fact that the annual membership subscription has been maintained at the pre-war figure, the Council views the financial position of the Institute with satisfaction. The officers particularly concerned with the direction of finance have consistently endeavoured to conserve resources and build up invested funds in order to ensure permanence of establishment. The Foundation Fund, in the absence of the annual revenue from which it would be impossible to maintain the current measure of expenditure on various branches of work, continues to grow if only at a slow rate. Moreover, commencing from the beginning of 1927, it has been decided to invest all subscriptions received in respect of life membership. Thereby, the annual income therefrom will be diminished for a time, but the investment should yield an increasing and permanent contribution to income. Under the new arrangement, individuals who take up life membership—the single subscription for which is a sum of not less than twenty guineas—will have the satisfaction of knowing that their subscriptions will definitely contribute to the permanent funds of the institution. An opportunity for additional investment has also arisen in connection with the Diplomas Scheme. The first complete year of operation of the scheme resulted in a volume of applications calculated to be abnormal. Therefore, the revenue forthcoming last year could not reasonably be applied entirely to that period, particularly as the expense of the administration of the scheme is likely to increase and the income to diminish. Therefore, the Council decided to invest a sum of £650 from the income received. Taking the financial position as a whole, a small adverse balance is recorded, but, if there is no unexpectedly large addition to expenditure in 1927, the balance should be recovered in the current year as a result of increased membership.

INSTITUTE DIPLOMAS—The scheme under which qualification of members may now be certified has met with a favourable reception. To 31st December 1926, the total number of applications for the Fellowship numbered 160, of which 98 were granted, whilst 137 members had applied for the Associateship, 83 of whom were successful. A number of applications were deferred pending supply of additional information or, as to Associateship, pending examination. Two oral examinations in general textile technology, in connection with the Associateship, were conducted during 1926. Of thirteen candidates who presented themselves, nine passed, and one of the nine passed with special merit. An interesting feature of the applications as a whole has been the somewhat large proportion of claims presented by foreign and colonial members, and in this connection the Selection Committee has sought, and readily secured, the advice and assistance of corresponding Members in various countries. From the outset, the Committee has striven towards the maintenance of a high standard of qualification. Apart from the terms of the actual Bye-Laws, the Committee appreciates the desirability of provision of supplementary regulations in printed form. In this matter, however, it was early decided to build up regulations gradually as a result of decisions based on experience. Definite regulations are now in course of preparation and should be available for applicants later in the present year.

ANNUAL CONFERENCE—Notwithstanding postponement as a consequence of the general strike, the Annual Conference held eventually at Buxton in October last year, proved an attractive fixture. The municipal authority welcomed the Conference, and the Mayor of Buxton kindly extended an official reception to Institute representatives and delegates. The Derbyshire resort is possessed of exceptional facilities for conference purposes. The Annual Mather Lecture was contributed by Sir William Bragg, K.B.E., who made a valuable contribution on the subject of "The Fine Structure of Animal and Vegetable Substances as Revealed by X-Rays," whilst an important paper was presented by Mr. J. A. Robertson, M.I.E.E., M.I.Mech.E., on "Centralised Electricity Production." Mr. Percy Bean, F.C.S., also contributed an interesting paper on "The Sizing of Artificial Silk Yarns." The social side of the fixture was appreciated by the members and friends in attendance, and a special visit to the Ferodo works at Chapel-en-le-Frith proved extremely interesting.

JOURNAL OF THE INSTITUTE—The *Journal* for 1926 contained 238 pages of Proceedings, 662 of Transactions, and 436 of Abstracts. The volume of transactions is the largest ever published by the Institute, not only in the total number of pages but also in the number of separate papers. Whilst the Textile Research Associations have slightly increased their output, the number of papers submitted by private workers has increased very considerably. The Council regards this as most gratifying, and sees in the fact evidence of the stimulus to research provided by the Institute Diplomas Scheme. The pages devoted to Abstracts have also increased by about 50, but the only serious demands received from Members are for yet more. The Publications Committee hopes to meet these requests and is pleased to record that some members have generously offered their assistance in widening the ground covered.

THE INSTITUTE PREMISES—The growth of the Institute is making increased demands on the accommodation available at the headquarters premises at Manchester. The Council has given special consideration to this matter, and decided upon rearrangement. The present Council Room is to be ultilised for the general office, secretarial, and editorial accommodation, whilst a small room will also be available for committee purposes or for private interviews on the part of visiting members. The Council Room will be transferred to the position previously taken up for general offices, &c. Other minor alterations are involved in the scheme, in order to provide for extended library accommodation and for storage. The scheme reduces the size of the Council Room, and curtails the capacity hitherto enjoyed with respect to availability of this room for meetings of various description. Having regard to facilities for hire of suitable rooms for meetings in the same building, however, it is not expected that serious inconvenience will arise in this connection. The Council has endeavoured to make provision to meet the Institute's requirements for the remainder of the period of the lease of the premises—seven years—but recognises that, in due course, the whole question of adequate accommodation may need serious consideration. The rearrangement will certainly add to the facilities for members, and the Council hopes that increased service and use will accrue. The London offices and rooms at 38 Bloomsbury Square are continued, and the arrangement for joint occupation, thereby considerably reducing the annual expense, has proved satisfactory. The Yorkshire Section Committee also continues the arrangement under which the engagement of an assistant-secretary provides an office address at Sykes' Chambers, 37a Ivegate, Bradford.

ANNUAL COMPETITIONS: FABRICS AND YARNS—The woven fabrics competition under the Crompton Memorial Fund Scheme again proved extremely interesting, and the premier award—to a student-competitor of Bradford Technical College—was in respect of a range of specimens of outstanding merit. In this instance, the presentation of the specimens was in exceptionally complete form, and the descriptions of the fabrics submitted represented a distinct advance on anything of the kind yet attempted by any other competitor in any year. In response to various representations, and recognising the possible need of change in relation to existing conditions and circumstances, the Competitions Committee has considerably modified the terms of the prospectus for 1927. A fairly substantial reduction in the number of specimens required from competitors in the principal competition has been provided for, the object being to improve the chances of the evening student as against the day student. The total prize money offered has been increased. Last year's competition in respect of special yarns, for which prizes were kindly provided by Messrs. R. Greg & Co., South Reddish, did not attract many competitors, but the results were considered quite satisfactory for a first effort, and the competition is continued.

TEXTILE SOCIETIES AND KINDRED ORGANISATIONS—The Institute has maintained its interest in the efforts of the various Textile Societies and kindred organisations by undertaking the secretarial duties and meeting the cost incidental thereto, in connection with the annual conference of representatives of these organisations held at various centres. The last conference took place at Blackburn Technical College when the principal speaker (Mr. J. H. Dawson, of Brierfield) made the interesting announcement that, as a result of correspondence with secretaries, he had ascertained that the delegates in attendance represented a total strength of not less than 10,000 members. The 1927 joint conference is to take place on 29th October, at Manchester, by invitation of the Athenæum Textile Society.

INSTITUTE FOUNDATION FUND—The total amount to the credit of this fund is £9,960 1s. 0d., invested in Government securities, and there was a small balance at bank, at 31st December, of £1 17s. 7d., as against £25 at the same date in the previous year. In 1926, the only donation to the fund was that of £83 14s. 7d. (including 10s. bank interest) from the Cotton Textile Industry Committee (Wembley Exhibition). Taking the Crompton Memorial Fund contribution at the nominal figure of £2,000, the total of the Foundation Fund at the end of the year reached £11,961 18s. 7d.

COUNCIL AND COMMITTEE MEETINGS—The following is the record of meetings held during the year (1st January to 31st December 1926)—Council, 10; Selection (Diplomas), 16; Publications, 10; Propaganda, 2; Finance, 11; Crompton Prize Fund, 4; Lancashire Section, 4; Yorkshire Section, 6; London Section, 10; Irish Section, 2; Total, 75; as against 76 in the previous year. In addition to the foregoing, four small committees met for the consideration of special matters.

SECTION MEETINGS AND LECTURES—Six meetings of the Lancashire Section, one exhibition, and one joint meeting; three of the Yorkshire Section and one joint meeting; six of the London Section and two visits; two of the Irish Section; and two of the Scottish Section were held during 1926, at which papers were read and discussed.

MEMBERSHIP—The membership at the end of 1926—to be carried forward to 1927—was made up as follows—Honorary Members, 7; Life Members, 26; Members, 1,282; Junior Members, 78; Non-subscribing Members, 2; Total, 1,395.

The totals for the foundation year (1910) and the years 1918 to 1926 were—1910, 233; 1918, 612; 1919, 724; 1920, 856; 1921, 904; 1922, 994; 1923, 1,039, 1924, 1,083; 1925, 1,275.

The Council lament the loss by death during 1926 of George H. Aked (Bingley); J. Cameron (Middlesex); George M. Lees (Galashiels); Joseph Taylor (Blackburn); Hugh S. Walker (Huddersfield); and F. Whowell (Tottington, Bury).

Dr. The Textile Institute—Balance Sheet

1925 £	s.	d.	LIABILITIES	£	s.	d.	£	s.	d.
264	12	0	Subscriptions paid in advance				193	2	0
			Life Membership Subscriptions Account— Balance as at 31st Dec. 1925	43	17	10			
			Subscriptions received during year ...	51	0	0			
				94	17	10			
			Less 10% transferred to Revenue Account ...	9	9	9			
43	17	10					85	8	1
—			Life Membership Special Reserve Account				41	0	0
97	10	0	Perpetual Membership Special Reserve Account				97	10	0
2500	0	0	Crompton Prize Fund				2500	0	0
9878	7	0	Foundation Fund				9961	18	7
—			Diplomas Account				679	12	7
146	16	10	Crompton Prize Fund Scheme—Income and Expenditure Account Balance				135	7	6
150	0	0	*Journal* Account—Reserve to 1927, Subscription received from B.C.I.R. Assn. for period unexpired				125	0	0
295	10	11	Sundry Creditors, as per list				324	6	5
			Revenue Account—						
			Balance as at 31st Dec. 1925	58	5	4			
			Less Deficit for Year as per Revenue Account	34	12	9			
58	5	4					23	12	7
£13434	19	11					14166	17	9

T. FLETCHER ROBINSON, *Hon. Treasurer.*
J. CROMPTON, *Chairman of Council.*

as at 31st December 1926 **Cr.**

1925 £ s. d.	ASSETS	£ s. d.	£ s. d.
	Cash at Bank—		
27 10 2	General Account	646 3 0	
25 0 0	Foundation Fund Account	1 17 7	
			648 0 7
5 12 11	Cash in hand		0 5 4
	Sundry Debtors—		
	Journal Account—Outstanding Advts. ...	374 19 3	
	Outstanding Subns.	3 8 10	
420 8 1	Hire of Rooms	0 7 6	
			378 15 7
	Furniture, Fittings and Library Account—		
	Balance as at 31st Dec. 1925	371 8 2	
	Additions during the year	158 3 1	
		529 11 3	
	Less Depreciation, 25% on £39 12s. 0d.		
	,, ,, 12½% on £489 19s. 3d.	71 2 11	
371 8 2			458 8 4
	London Section Furniture Account as at 31st Dec. 1925	130 13 7	
	Less Depreciation, 12½%	16 6 8	
130 13 7			114 6 11
3 10 0	Deposit on Electricity and Gas		9 10 0
	Perpetual Membership Capital Investment Account—		
97 10 0	£99 1s. 6d. 5% War Stock, 1929–47, at cost		97 10 0
	Crompton Prize Fund Capital Investment Account—		
	£1000 5% War Stock, 1929–47 ...	1000 0 0	
	*£1125 4% L. M. & S. Rly. Preference Stock	1500 0 0	
2500 0 0			2500 0 0
	Foundation Fund Capital Investment Account—		
	£3737 14s. 9d. 5% War Stock, 1929–47, at cost	3503 7 0	
	£1000 0s. 0d. 5% National War Bonds, 1927 (Mather)	1000 0 0	
	£4550 0s. 0d. 5% National War Bonds, 1928	4550 0 0	
	£1000 0s. 0d. 4% Funding Loan, 1960–1990	800 0 0	
	£105 5s. 3d. 5% War Stock, 1929–47, at cost	106 14 0	
9853 7 0			9960 1 0
£13434 19 11			£14166 17 9

*As originally standing at date of gift and subject to present Market Values.

AUDITORS' REPORT TO MEMBERS

We report to the members that we have examined the above Balance Sheet together with the books and vouchers of the Institute and that we have obtained all the information and explanations we have required.

We further report that in our opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Institute's affairs according to the best of our information and the explanations given to us, and as shown by the books of the Institute.

2nd February 1927. (*Signed*) ARTHUR E. PIGGOTT, SON & SOUTHWORTH
56 Mosley St., Manchester. *Incorporated Accountants, Auditors*

Dr. The Textile Institute—Revenue Account

1925 £ s. d.	EXPENDITURE	£ s. d.	£ s. d.
142 6 3	To Rent and Rates	215 12 7	
	Less Proportion to *Journal*	71 17 6	143 15 1
	,, Secretarial and Editorial Remuneration...	1050 0 0	
	,, ,, London Office (allocated) ...	100 0 0	
490 0 0	*Less* Editor's Salary, £450, and General Secretary's Contributions to *Journal*, £60	510 0 0	640 0 0
	,, Office Wages	429 16 0	
235 0 0	*Less* Proportion to *Journal* A/c. ...	134 0 0	295 16 0
	,, Office Expenses — Heating, Lighting, and Cleaning	97 12 2	
53 6 3	*Less* Proportion to *Journal* A/c. ...	32 10 8	65 1 6
71 11 5	,, Sundries—Rooms, Canteen, Attendant, Utensils		69 16 6
18 8 10	,, Travelling Expenses	15 4 3	
51 18 1	,, Meetings (including Travelling) Expenses	81 17 1	97 1 4
99 8 6	,, Postages, Telegrams, and Telephones ...		114 9 8
152 5 0	,, Printing and Stationery		211 0 6
5 10 1	,, Insurances		6 0 6
15 17 0	,, Audit and Accountancy Charges		15 18 0
	,, Subscriptions—		
1 1 0	Institute of Psychology	1 1 0	
2 2 0	British Institute of Industrial Art ...	2 2 0	
	Inquiry *re* Technical Education ...	10 10 0	13 13 0
53 1 2	,, Depreciation on Furniture &c.—Manchester	71 2 11	
18 13 4	,, ,, ,, ,, London ...	16 6 8	87 9 7
497 16 4	,, Sections' Expenses—London	286 1 1	
33 13 9	Lancashire	26 10 8	
10 6 5	Yorkshire	68 6 3	
—	Scotland	6 10 0	
—	Northern Ireland ...	4 0 3	391 8 3
6 9 0	,, Bank Charges *less* Interest		
	,, Exhibition Expenses		26 9 10
1 11 0	,, Charter Celebration Dinner—Balance ...		—
	,, Empire Textile Conference—		
56 17 5	Expenditure over Receipts		—
3 0 0	,, Painting and Decorating		—
—	,, Deficit on *Journal* £410 7s. 7d., see A/c.		—
2020 2 10			2177 19 9
132 19 11	,, Excess Income over Expenditure ...		—
£2153 2 9			£2177 19 9

T. FLETCHER ROBINSON, *Hon. Treasurer.*

J. CROMPTON, *Chairman of Council.*

for the Year ended 31st December 1926 Cr.

1925 £	s.	d.	INCOME	£	s.	d.	£	s.	d.
			By *Membership Subscriptions*—						
			Life Membership 10% of Balance ...	9	9	9			
			Subscriptions (1926 Account) paid in advance per Balance Sheet, 31/12/25	264	12	0			
			,, *Membership Subscriptions*—						
			998 Members at £2 2s.	2095	16	0			
			20 Members at £1 1s. (half year) ...	21	0	0			
			1 Member at 10s. 6d. (part)	0	10	6			
			68 Juniors at £1 1s.	71	8	0			
			3 Juniors at 10s. 6d. (half year) ...	1	11	6			
				2464	7	9			
			Arrears paid during 1926 (see Balance Sheet for Subscriptions paid in advance)	18	18	0			
			Dividend on £99 1s. 6d. 5% War Loan	5	0	0			
			Annual Subs.: The Weavers' Co. ...	21	0	0			
				2509	5	9			
			Less 25% to *Journal* Account ...	627	6	5			
1793	9	6					1881	19	4

TOTAL ARREARS at 31st Dec. 1925		£130	4	0
ARREARS WRITTEN OFF	...	17	17	0
Total Arrears Current	... ...	£112	7	0

1925 £	s.	d.		£	s.	d.
20	0	0	,, Administration Expenses in connection with Crompton Prize Fund Scheme ...	20	0	0
—			,, Bank Interest (*less* Charges)	12	18	1
—			,, Empire Textile Conference Reports—Receipts (*less* Expenses)	7	15	3
339	13	3	,, Transfer from Foundation Fund Income from Investments Account	70	14	4
—			,, Transfer from Diplomas Account ...	150	0	0
				2143	7	0
—			,, Excess Expenditure Over Income ...	34	12	9
£2153	2	9		£2177	19	9

Audited and found correct,

2nd February 1927. ARTHUR E. PIGGOTT, SON & SOUTHWORTH

56 Mosley St., Manchester. *Incorporated Accountants, Auditors.*

Dr. The Textile Institute—Journal Account

1925 £ s. d.	EXPENDITURE	£ s. d.	£ s. d.
343 14 9	To Outstanding Advertisement Accounts, brought down		319 12 3
128 6 10	,, Outstanding Reprints &c., brought down		65 8 0
2147 1 10	,, Printing, Posting and Reprints		2668 15 9
36 9 10	,, Literary Contributions	56 16 8	
7 12 9	,, Abstracts ,, ...	29 6 5	
			86 3 1
450 0 0	,, Editorial Remuneration	450 0 0	
60 0 0	,, Secretary's contributions	60 0 0	
			510 0 0
103 5 0	,, Wages (*less* £25 Ring Yarn Association)		109 0 0
21 12 10	,, Postages and Telegrams		21 13 0
20 2 4	,, Stationery		26 8 10
5 1 0	,, Binding		2 6 9
9 1 9	,, Purchase of *Journals* &c.		6 17 8
31 4 5	,, Travelling Expenses		9 6 3
71 3 1	,, Rent and Rates (proportion)		71 17 6
26 13 1	,, Heating, Lighting, and Cleaning (proportion)		32 10 8
51 3 3	,, Advertisement Commission		50 11 3
150 0 0	,, Reserve—Subscriptions from B.C.I.R. Association carried down		125 0 0
293 11 3	,, Sundry Creditors for Printing &c., carried down		240 4 7
£3966 4 0			£4345 15 7
319 12 3	To Outstanding Advertisement Accounts, brought down		374 19 3
65 8 0	,, Outstanding Accounts for Reprints and Subscriptions brought down		3 8 10

T. FLETCHER ROBINSON, *Hon. Treasurer.*
J. CROMPTON, *Chairman of Council.*

for the Year ended 31st December 1926 Cr.

1925 £	s.	d.	INCOME	£	s.	d.	£	s.	d.
250	0	0	By Reserve—Subscriptions from B.C.I.R.A. brought down				150	0	0
230	13	10	,, Outstanding Accounts for Printing brought down				293	11	3
			,, Subscriptions—						
10	10	0	Clothworkers' Company				10	10	0
300	0	0	Cotton Research Association	250	0	0			
			Linen Research Association	100	0	0			
150	0	0	Woollen and Worsted Research Assn.	150	0	0			
							500	0	0
1	8	6	,, Donations				1	1	0
1434	17	1	,, Advertisements and Subscriptions ...	1433	1	7			
489	14	3	,, Reprints Account	456	9	8			
							1889	11	3
319	12	3	,, Outstanding Advertisement Accounts, carried down				374	19	3
65	8	0	,, Outstanding Subscriptions, carried down				3	8	10
£3252	3	11					£3223	1	7
590	16	8	,, Transfer of 25% Total Membership Subscriptions				627	6	5
			,, Transfer from Diplomas Account ...				85	0	0
			,, *Balance*—Deficit (£410 7s. 7d.)						
123	3	5	,, Transfer from Foundation Fund Income from Investments Account to meet the above Deficit				410	7	7
£3966	4	0					£4345	15	7

JOURNAL EXPENDITURE	£4345	15	7
JOURNAL INCOME ...	£3223	1	7
Deficit on Working Account	£1122	14	0

£	s.	d.		£	s.	d.
150	0	0	By Reserve—Cotton Research Association, brought down	125	0	0
293	11	3	,, Sundry Creditors for Printing &c., brought down	240	4	7

Audited and found correct,

2nd February 1927.
56 Mosley St., Manchester.

ARTHUR E. PIGGOTT, SON & SOUTHWORTH
Incorporated Accountants, Auditors.

Dr. The Textile Institute—Crompton Prize Fund for the Year ended

1925 £	s.	d.	EXPENDITURE	£	s.	d.
26	10	9	To Printing and Stationery	35	16	0
23	12	2	,, Purchase of Specimens	33	15	6
8	0	0	,, Mounting of Specimens	16	5	0
2	9	9	,, Postages, Carriage &c.	7	11	4
116	4	6	,, Prize Awards and Expenses	142	7	3
20	0	0	,, Administration Expenses	20	0	0
—			,, Outstanding Accounts carried down	1	11	3
196	17	2		257	6	4
146	16	10	,, Balance carried down	135	7	6
£343	14	0		£392	13	10

Dr. The Textile Institute—Foundation Fund for the Year ended

1926	EXPENDITURE	£	s.	d.
Oct. 21st.	To Mather Lecture	25	0	0
	,, Transfer to *Journal* Account to meet deficit for the year	410	7	7
	,, Balance transferred to Revenue Account	70	14	4
		£506	1	11

Dr. The Textile Institute—Diplomas Account

EXPENDITURE	£	s.	d.	£	s.	d.
To Sundry Expenses—Printing and Meetings	64	13	1			
,, Expenses *re* Examinations	8	16	0			
				73	9	1
,, Transfer to *Journal* Account				85	0	0
,, Transfer to Revenue Account				150	0	0
,, Balance carried down				679	12	7
				£988	1	8

T. FLETCHER ROBINSON, *Hon. Treasurer.*

J. CROMPTON, *Chairman of Council.*

Income and Expenditure Account 31st December 1926 — Cr.

1925 £	s.	d.	INCOME	£	s.	d.	£	s.	d.
113	10	0	By Balance brought forward				146	16	10
130	13	0	,, Albums Subscriptions				156	3	0
4	11	0	,, Competition Entrance Fees				3	14	0
50	0	0	,, Dividend on £1000 5% War Stock ...	50	0	0			
35	3	1	,, Dividend on £1125 4% L.M. & S. Rly. Stock	36	0	0			
							86	0	0
9	16	11	,, Refund of Income Tax				—		
£343	14	0					£392	13	10
146	16	10	By Balance brought down				135	7	6
			,, Outstanding Accounts brought down ...				1	11	3

Income from Investments Account 31st December 1926 — Cr.

1926	INCOME				£	s.	d.
Feb. 8—By	Refund of Income Tax	4	10	0			
March 1—,,	Dividend—£4550 5% War Bonds	113	15	0			
May 1—,,	,, £1000 4% Funding Loan	16	0	0			
June 1—,,	,, £105 5s. 3d. 5% War Stock ...	2	12	7			
,, 1—,,	,, £4737 14s. 9d. 5% War Stock ...	118	8	4			
Sept. 1—,,	,, £4550 5% War Bonds	113	15	0			
Nov. 1—,,	,, £1000 4% Funding Loan	16	0	0			
Dec. 1—,,	,, £4843 5% War Stock	121	1	0			
					506	1	11
					£506	1	11

for the Year ended 31st December 1926 — Cr.

INCOME	£	s.	d.
By Diploma Fees	979	13	8
,, Examination Fees	8	8	0
	£988	1	8
By Balance brought down	679	12	7

Audited and found correct,

2nd February 1927. ARTHUR E. PIGGOTT, SON & SOUTHWORTH

56 Mosley St., Manchester. *Incorporated Accountants, Auditors.*

HALF AN HOUR'S TALK ABOUT TRANSPORT

Annual General Meeting of the Institute, 27th April 1927, the President, Mr. W. Howarth, in the chair.

Introducing the speaker, Mr. E. Latimer, managing director of the Manchester Ship Canal Company, the President said he was sure the members of the Institute would be glad to hear such an authority as Mr. Latimer on some of the present day transport problems.

Mr. Latimer said he was pleased to have the opportunity to address a gathering of textile men, since textile goods and raw materials formed no small part of the general bulk of material to be dealt with in transport problems. The subject was one of great age; probably it was as old as mankind itself, and in the present day problems it presented ever-increasing difficulties. That these problems might be studied under the best possible conditions and by those most fully qualified to do so, an Institute of Transport had been formed a few years ago which in its constitution and objects was founded upon lines parallel to those of the Textile Institute. To-day, traffic was largely seeking and using the roads, and he would like to say at the outset that the problems arising from this state of affairs should be seriously and carefully considered by all, however indirect their interests therein appeared to be. At one period in the industrial history of this country it seemed that traffic, beyond that of pleasure-seekers and individuals, had deserted the roads. The advent of railways, said the lecturer, so soon developed into a network of lines covering the countryside, had seemed to sound the death-knell of road traffic, and he felt sure that many who were familiar with the pre-war state of our roads would agree that even as recently as 1900 it seemed that no considerable use of these means of communication was likely to be made. In this respect we were much behind France, for example, where adequate use of the roads, as well as suitable vehicles for such use, were to be noted many years before the war. But though delayed, development in this country of the use of roads, when it did come, came with great strides. It might be well to refer first to the legislation side of the subject, said Mr. Latimer, and he would remind his audience of the formation, in 1909, of the Road Board. Its first chairman was Sir George Gibb, one time general manager of the North Eastern Railway Company. The Board had, by the same Act of Parliament that authorised its establishment, wide powers which covered the ability to raise capital. But though such a Board existed, and both steam engines and internal combustion engines were being freely used and experimented with for road traffic, it was the Great War which gave an all-powerful impetus to road transport. Motor transport was demanded for military purposes to a hitherto unprecedented extent, and factories came into being to supply the demand which, when the war ended, turned their attention and their stores of experience to the problems of civil porterage. Large numbers of soldier-drivers were available, and the present day road traffic, presenting as it does well-nigh insuperable problems to county and borough authorities, was the rapid and ever-growing outcome of this combination of circumstances. To aid in the control of transport generally, and to deal with war-time railway and motor traffic affairs, the Ministry of Transport was formed, and taxation assumed new aspects not only from the point of view of the amount imposed, but from the need to arrive at an equitable basis upon which to levy it. It was not too much to say, said the speaker, that the whole force of the country had been transformed by this rapid adoption of a new mode of transit. It must be borne in mind, however, that increasing use of the roads had an effect upon the railways, wherein an enormous wealth of capital was sunk, which could not be overlooked. Competition between road and rail was in certain respects and to a definite extent, no doubt desirable, but it was not desirable to force railways too far along the line of poverty which would happen if road users were not adequately taxed. The railways not only were heavily capitalised, a stake in the country not lightly to be ignored, but employed nearly three-quarters of a million persons. These workers, of all ages and grades, would inevitably suffer if rail transport fell into too complete desuetude. The lecturer then devoted some time to consideration of facts and figures connected with road vehicles and the basis upon which they were and might be taxed, and in a very direct manner gave point to his plea for general consideration of the problems arising from the enormously increased volume of road traffic. Mr. Latimer referred briefly to the other modes of transport which might be considered, such as that by sea, by canal, or by the air; he touched upon the motor 'bus *v.* tramways controversy, and concluded a most interesting address by a brief *resumé* of the history of achievement and facilities offered by the Manchester Ship Canal. He had previously presented each member of the audience with a publication of the Ship Canal Company entitled "Manchester and the Sea," which was of such excellence that an appreciative reference must be accorded to it; the illustrations therein, in particular, deserve commendation. A hearty vote of thanks to Mr. Latimer, for which he expressed his gratitude, terminated the proceedings.

Lancashire Section

Meeting at the Institute, St. Mary's Parsonage, Manchester, Friday, 11*th February* 1927, *Mr. F. Nasmith, F.T.I., in the chair.*

THE ORGANISATION AND ACTIVITY OF THE DRESDEN TEXTILE RESEARCH INSTITUTE

The Chairman, in asking Dr. Krais to read his paper to the Section, said that the object of the Lecturer was to tell them something about the research work which was being undertaken in Germany. Science, as they all knew, had no frontiers, and they were extremely glad to have Dr. Krais among them. In other countries there had been rapid developments in connection with what might be termed community research work as apart from ordinary research work, which private individuals usually undertake. The growing desire to learn some more definite facts about the textile industries should receive all the help and encouragement this country could mete out to it. It was the intention of Dr. Krais to tell them something about the methods and manner of conducting such community work in Germany.

Dr. Krais then read the following paper—

"It was in the latter part of the year 1917, when a number of leaders of the German textile industry arrived at the conviction that it had become a necessity for their industry to cultivate scientific research and to become permeated by scientific methods more than hitherto. Of the high value of such a permeation brilliant examples had been given by the rapid progress and development of the electrical engineering and chemical manufacturing industries, the latter showing the high values of such a permeation, especially in its dyestuff making and pharmaceutical branches. The main ideas of the textile industrials at the time mentioned were that it seemed necessary firstly, to make use of those textile materials which could be grown or manufactured within the country—such as flax, hemp, silk, cellulose yarns, and artificial silk—to the utmost extent; secondly, to improve the methods of growing, manufacturing, and preparing these materials; thirdly, to utilise foreign and exotic textile materials as far as it was possible to have them imported, as economically and as well as possible, eventually using them over and over again; fourthly, to find new means and ways for producing or manufacturing new fibrous materials, by natural growth as well as by artificial make.

The acceptance of these ideas as being promising led to the foundation of quite a number of Textile Research Institutes, mostly at places where textile experts were already prominently in action, and where textile schools had been established.

The towns in question are Aachen, Crefeld, Dresden, Karlsruhe, München-Gladbach, Reutlingen, and Sorau. A Kaiser Wilhelm Institute for fibre research has also been founded in Dahlem, near Berlin. Later on it has been tried to organise the work of all these places to a certain extent, and to procure capital for them by the election of a General Council, consisting of Government and industrial representatives, with a sub-committee of scientists. It was quite natural that several of these institutes undertook mainly such work as was in direct connection with those fibrous materials which made the bulk of the work of the industries of their district, so Aachen and wool, Crefeld and silk, Sorau and bast fibres. This went on very well until the money inflation made almost all the funds collected vanish into nothing. Since then every one of the institutes has had to find its own means, and consequently many a large and longsighted plan of work had to be given up, and very severe reductions of the number of persons employed and of the expenses incurred had to take place. I think it was necessary to give you this short general preface in order to make the development of the Dresden Institute more easily comprehensible.

The Institute was founded in 1917, and began its work in 1918. Its organisation was primarily that of a private association, with the aim of erecting a research institute, its object being worded in the regulations as follows—"Promotion of science in all parts of the textile industries, that is, of all industries connected with fibrous materials, including cellulose and paper yarn." Dresden being situated in the centre of the very large and many-sided Saxon textile industry, which comprises almost all textile materials and also all possible methods of spinning, weaving, knitting, dyeing, and finishing it was from the beginning intended to work in its Textile Institute not only on one class of raw material, but on all of them. It was planned to make it into a universal institute as far as possible. In order to realise this rather large programme, the founders of the Institute, who enjoyed from the very beginning the most assiduous and whole-hearted support by the Saxon Government, made it a principle that not one single head only should take the scientific lead, but that a group of experts should be called to perform the research, one of them being the leader merely as *primus inter pares*. I am convinced, personally, that the adoption of this principle is one of the most important factors. The textile engineer, chemist, physicist, botanist, and biologist—they all must work together harmoniously if one-sidedness is to be avoided. The second question was, always provided that money was plentiful, how far the Institute should be fitted out with textile machinery. Opinions have been divided about this point; the scientists, from their experience as teachers, were of opinion that the best way of carrying out new ideas would be to study them out as far as possible within the quietness of the Institute, and then try to make them practicable by experiments in the factories. Several members of the Council, however, were of different opinion. They would have preferred to see the Institute fitted up with plants for spinning wool and worsted, cotton and flax, silk, and so on, and also for weaving, knitting, finishing, &c A beginning has been made in this direction, but when the money inflation set in everything except laboratory work at the Institute and practical work in the factories had to be given up. I may say that the scientists feel rather more content with the present condition. Of course this is only to be understood as a general rule; there is no objection whatever to put up a single machine or other for some special purpose. But the Dresden Institute, being not a school, has no regular use for complete manufacturing sets of machinery of any kind.

The year 1923 brought about a further development of the organisation of the Institute. From a private association it was transformed, by charter of the Saxon Government, into a Corporation of Public Right, as we call it, that is, into an Institute, the regulations of which are under Government control. The Director became a Government official, and the Council is now composed of representatives of the Saxon Government, the German Government, the textile industries, the township of Dresden, the Saxon Chambers of Commerce, and of the textile workmen. The first paragraph of the regulations reads now as follows—"The object of this Institute is to carry out and promote scientific research on behalf of the textile industry, including dyeing, calico printing, and finishing; of the textile machinery industry, of all the industries concerning fibrous materials, including paper pulp, straw pulp, cellulose, and paper, and also all the branches of trade, business, and national economy connected with the industries mentioned before." As you see, the Institute's object is now defined in a much wider sense, and at the same time much more distinctly than before.

It was more in the way of natural development than by purpose that the work done at the Institute is at present divided mainly into three general classes.

First, investigations, analytical work, testing work, &c., of a shorter character, taking up not much time for each case.

Second, larger problems, given to the Institute for investigation by industrial firms or persons.

Third, problems which the scientists themselves think useful to solve or to try to do so.

It became quite evident that an almost daily intercourse with men of technical or commercial activity, standing in the midst of daily routine work, is absolutely necessary for keeping up a lively pulsation of an institution which is meant to aid technical progress. Some people have been afraid that by the Institute doing analytical work of all kinds two disadvantages might show themselves, the one being that the general standard of its work might be lowered, it thus failing to keep the standard of a highly scientific research institute. Secondly, it has been feared that competition might arise between the Institute and the conditioning houses and other public laboratories. Neither of these misgivings has so far been justified. On the contrary, it is the very conditioning and analytical laboratories which hand over to the Institute almost daily the more intricate and difficult cases of investigation, and secondly, the scientists are in a position to learn and see from such cases which questions, faults, mistakes, &c., are the most numerous and important. So it is from these very cases that they can make their conclusions as to what kind of research work will be the most urgent and useful.

A few words must now be said regarding inventory, staff, and financial conditions. The inventory consists of a very good library, containing about 1,500 volumes, being continually replenished by recent publications and by the keeping of more than 40 periodicals. The latter are carefully looked over for useful publications, and of these short abstracts are made by the staff. A general catalogue of all publications is being kept up to date. The second item is a large mechano-technical laboratory, containing all necessary apparatus for testing strength and elasticity, fastness to rubbing, &c., of all kinds of textiles. Microphotography, inspection in ultra-violet light, and many other necessary methods can be applied. A small workshop enables the staff to have simple apparatus constructed, and to keep everything in good repair. The third item comprises two chemical and physical laboratories, which are kept up to date, and in which all kinds of investigations can be made. A good collection of fibrous materials, chemicals, &c., enables us to make all sorts of investigations on a small scale, and also to experiment in a somewhat larger measure.

The staff at present consists of one technologist in the engineering line with three assistants, one chemist with one assistant and four or five students, who are working at their diploma or doctor dissertations at the Technical High School. Of course these students help the staff in many cases and learn a lot by their staying with us. The themes of their scientific tasks are such that they are of interest to the industries we work for, and at the same time of such a character that they will be accepted by the High School professors. Botanical, biological, and bacteriological work is done by colleagues, who were members of the staff in former time and have now found other positions. Besides the staff of scientists, there is, of course, a sufficient number of employés to do the correspondence, book-keeping, and general work.

The financial side of a scientific institute is, as you will know, always a somewhat difficult matter. However, we are happy to say that after some very hard times indeed the situation is at present fairly satisfactory. There are, on one side, limits due to the general present condition in our country; on the other, due to the fact that the textile industry to a very large extent is not yet convinced sufficiently of the usefulness of science for their welfare, and is consequently not willing to support science by money contributions. Looking at this question from the generally adopted standpoint, it may seem obvious that small firms of spinners, weavers, knitters, or commission dyers, being managed from an almost exclusively commercial view, cannot see where their advantage could come in from science. They are not in a position to make renovations or even small alterations; they are shy of experiments. Nevertheless, everything new in the line of machinery, oils, dyewares, chemicals, and processes is offered to them daily by the producing firms; their representatives, advertisements, &c., following them to any refuge they may seek. These small firms are not yet able to see that just for such questions the Institute comes in useful by being in a position to give them impartial advice, if a choice between several similar products is to be made. To come back to the finances, they had to be distributed upon as many shoulders as possible, in order to ensure steadiness, and with this view the following system has been found successful so far. The salary of the Director is paid by the Saxon Government; that of a second professor is paid, for a certain period, by the township of Dresden. The Institute receives a certain amount of money in form of remunerations for their experts, these being paid throughout, not to the staff, but to the Institute itself. A further and about an equal amount comes in by the annual contributions of the members of the Institute and of gifts by friends. I am glad to say that the number of true friends and supporters, though not very large yet, is increasing.

All this would not be sufficient to keep the Institute going if an arrangement had not been come to, according to which the five Saxon Chambers of Commerce cover the remaining deficiency, which amounts to about one-third of the total expenditure. This total is 70,000 marks, making £3,500. I think you will consider it modest.

Having now described the development and general conditions of our Institute, I will tell you something about its activity. When we began to work, we found it a first necessity to make our own tools to a certain extent, and to find new methods for investigation. This was very much on the same lines, and in the same directions, as those in which the scientists of the British Institutes found it necessary to proceed. Our Senior, the Mechano-technologist, Professor Ernst Mueller, has invented and constructed much new and useful apparatus, of which I may mention one for measuring very exactly the staple of fibres and the numbers of yarns. Also an apparatus for determining the tension of yarns during any period of the spinning process. Another one for testing the friction resistance of fabrics. He also devised a very handy means for determining moisture in small but numerous samples of textiles, using evacuated vessels of the shape of weighing flasks at water bath temperature. Our biologist, Professor Alois Herzog, who is now professor at the Technical High School, Dresden, has worked out with immense patience and perseverance, and with a truly scientific spirit and genius, a very large number of new methods for determining fibres, mixtures of fibres, and the shape and size of their cross-cuttings. All this is very intricate microscope work; so are also his investigations regarding the behaviour of fibres in polarised light and in the ultramicroscope. The results of these labours he has published in the Institute's journal, *Textile Forschung*, and lately brought into systematic order in two books, the one concerning natural and artificial silk, the other one flax and hemp and their discrimination. Professor P. Waentig, who was with us till 1923, has done useful and important work regarding the production of cellulose from wood by chlorine gas. This led to the cottonisation of flax and hemp by similar methods, which seemed at one time of great importance, and may become so again.

To say something of my own work. This was, in the most happy way, supported and stimulated by the co-operation of my colleagues, including my very zealous and inventive assistant, K. Biltz, as well as by the continuous friendship and encouragement of our governmental and industrial supporters. I had the chemical and physical department to take care of, and first of all it seemed to me to be necessary to bring some order and system into the determination of the various alterations, which are unavoidably connected with the manufacturing treatments of fibrous materials. As regards fastness of dyes, detrimental effects of washing and bleaching, and also of their beneficial effects, of the permanency or non-permanency of several finishing methods, I was fairly well posted up by what I had experienced and experimented upon during my 15 years' apprenticeship as a dyemaker's and dyeworks' chemist, the latter in England, and also afterwards during 11 years as an expert on my own hook. Beginning work at Dresden, with a new outlook, and I must and have pleasure to say, a much wider sphere of interest, I found that little was known about the properties of single fibres as to their mechano-technic properties, whilst those of yarns and fabrics were pretty well defined. I began to construct an apparatus for testing single fibres, taking in consideration what I had seen in this line. After some improvements it has found approval, so that about forty examples of it have been sold, mainly to scientific institutes and artificial silk works. With this apparatus I could make some rather interesting statements, as, for instance, that the breaking load of the wool fibre is much higher than it had been supposed to be; also that the extension curve of the wool fibre is divided into three distinct periods. The statements which could be made with this apparatus regarding the influence of chemical treatments upon single fibres, as, for instance, of the several dyeing processes upon wool, of acids upon artificial silk, and of storing on weighted silk, have been useful. Later on I have tried to collect the progress of the last ten years made in textile chemistry in as short a manner as possible. This little book has found much approval, but it also was found fault with, because it seemed to concern itself with German literature only, not sufficiently regarding the work done in other countries. This is certainly a fault, but I can claim the excuse that at that time foreign textile literature was much too expensive for the means of our Institute.

It was evident that the Institute must not keep the results of its labours for itself, but some way of publishing them must be found. This had to be done in such a manner that the home industry, and especially the members of our Institute, should have the advantage of being first informed. From 1919 to 1922 we have published a quarterly journal, the *Textile Forschung*, which contains all the original publications. But by the end of 1922 this way of publication became much too expensive. We have therefore made an arrangement with the *Leipziger Monatschrift für Textilindustrie*. In this journal, which has a wide circulation, our essays are published as well as the short abstracts from the textile literature, which I have mentioned before. Three times every year our publications are put together, forming an issue of the *Leipziger Monatschrift*, and in this way we inform our members of what the Institute is doing without incurring much expense.

An annual meeting of the members is held, at which the report of the year's financial, personal, and scientific doings is given, and the members have occasion to speak of their requirements and wishes as regards the work of the Institute. In conclusion, I may give you a short abstract of the last two annual reports, to show that the activity of the Institute is steadily increasing.

In 1924 we had to make out 333 reports regarding analytical and testing work, consultations, and research work; in 1925, 626. Of the latter about 30% have been concerning wool, 30% concerning cotton, 12% regarding artificial silk; 8% silk; 5% flax, and the remaining 15% concerning several fibrous materials, mostly exotic, also about water questions, new processes, statistics, &c.

In 1926 a further increase has taken place, the total number being 726. Wool took 25%, cotton 23%, artificial silk 19%, silk and flax 5% each. The increase of the work done regarding artificial silk, from 12% to 19%, is rather significant.

I hope to have given you now a sufficiently accurate description of the development, structure, and work of the Dresden Institute, and I hope that this step, taken with the full approval of the President of our Institute, may lead to communications and intercourse which will be useful for all concerned, and which I have endeavoured to initiate some years ago by applying for the membership of the British Textile Institute."

Discussion

A Member inquired whether it was possible to gain access to the literature published by Prof. Herzog respecting his research work on fibres by means of polarised light ? Dr. Krais replied that Prof. Herzog had published two books, which were obtainable from the publishing firm of Julius Springer, of Berlin. The books had not been wholly translated into English as yet, but there were excellent abstracts to be found in the *Journal of the Textile Institute.*

Mr. H. P. Greg gathered that in the Research Institute at Dresden the machine makers took part in the deliberations of the governing body. Did they take an active and a helpful part ? There was a good number of machine makers in this country, but doubt had been expressed as to exactly what amount of help they would give in research work.

Dr. Krais admitted that the attitude of the machine makers was somewhat of a problem but nevertheless some success had been experienced with them. The General Director of the largest textile machine manufacturing firm in Saxony, the Hofmann Maschinen Fabrikat in Chemnitz, was a member of the Grand Council, while about 10 or 12 other machine makers' firms were also members of the Institute. Perhaps they were not particularly willing to spend money to assist the Institute, but in the way of affording information, or carrying out experiments, they were very obliging indeed.

Mr. F. Scholefield said he had had the pleasure of hearing Dr. Krais give some account of the great work which had been done by the Commission of which he was a member upon the "Determination and Standardisation of Fastness." He had put so many questions to him then that he felt rather ashamed to put any more. There were, however, one or two points upon which he would like some information. One was with regard to the relation of the Dresden Research Institute to maufacturers and producers generally. Perhaps it was not unfair to say that in this country we had met with difficulties in our research work in regard to obtaining permission to enter factories, and so on. There had been some slight fear that something seen in one works might inadvertently be communicated to another works. Again, manufacturers who had had problems which really lent themselves very well to research investigations had been loth to put them foward for the reason that the elucidation might give competitors an advantage over the particular firm who were puting forward the problem. He would like to hear what Dr. Krais' experience was of German manufacturers in that sense. Secondly, in view of the large amount of work which seemed to be done of an analytical and testing character, had there not been any outcry from private practitioners, chemists, and so on, who earned their livelihood by doing that kind of work, on the ground that they had to encounter competition from a State-aided Institute ?

Dr. Krais said that, of course, there were in Germany similar firms to those referred to by Mr. Scholefield, but that in a number of instances the Dresden Institute had succeeded in overcoming their resistance and calming their fears. On the other hand, there was a large number of other firms who sought the assistance of the Dresden Institute quite openly, though, of course, the work done for them was regarded as strictly private and confidential, and was never disclosed to any third party without specific permission. It was probably quite correct to state that many firms would rather leave a problem unsolved altogether, or try to solve it in their own works, as well as or as badly as possible, before they would refer it to a Research Institute. At the annual meetings of the Institute, every possible assurance was given to the members that the problems they submitted for elucidation would be regarded as confidential, and that a thoroughly conscientious effort would be made to solve them. But, of course, the Institute only knew of the problems it received; it knew nothing of those which were not submitted to it. Furthermore, it was only in very rare cases that the Institute learned whether it had done well or not. When they did a large amount of work, and submitted their considered report, the firm concerned merely said, "thank you." This would appear to be courteous upon the face of it, but then, on the other hand, they might have said something quite different in the privacy of their own office. For instance, they might have said, "What silly fellows! They have not understood our question at all." The workers at the Institute did not, of course, claim to be as wise as it was possible for anyone to be. They were now asking firms who sought their assistance, as often as was deemed advisable, "How did our last work please you?" In most cases, he was happy to say, they had received expressions of approval. The work was not regarded with disapproval by consultants, analysts, and other professional workers in public practice. Ordinary testing work was not undertaken by the Institute in the strict sense of the term. The fees charged by the Institute were somewhat less than those required by public analysts and others who had to maintain their own laboratories. As soon as a firm began to send oils and soaps, &c., for analysis they were referred to the public analyst. The Institute was prepared to investigate intricate problems and clear up difficulties which even an analytical chemist in professional practice was prepared to refer to them for solution. There was no competition in any sense of the word with professional practitioners. He had himself been President of the local section of the German Chemists' Association, of which many professional practitioners were members, and had never had the slightest sign of unfriendly feeling evinced towards him.

Professor W. E. Morton proposed a vote of thanks be accorded to Dr. Krais for his interesting and informative paper. One could not help being struck by the apparent similarity between the conditions existing in Germany and those which prevailed in this country. This was evident not only in the attitude of industry to research, but also in the steps that the Dresden Research Institute took to solve the difficult problems submitted to it. All in this country who were connected with research work thoroughly appreciated the wonderful achievements of German scientists. It was very pleasing to realise, as the Chairman had stated, that science knew no boundaries and knew no nationalities. One was struck by the similarity of the organisation of the Dresden Institute to that of many Institutes in this country. The fundamental work such Institutes were undertaking was a vital necessity. This was a point, of course, which it was somewhat difficult to make clear to the practical man, because he did not quite see where the scientist was leading to. He did not know whether the German industrialist had any difficulty in following the trend of research in Germany. It would be interesting to know that steps were taken in the German technical publications to appeal to industrialists for support. There was no doubt that the technical publications in this country somewhat scared the practical man. As Dr. Krais had rightly said, the Institute only knew of the problems that were presented to it; it knew nothing of those which were withheld. The man who never asked for assistance never found out what could be done for him. If everybody in this country—and apparently in Germany as well—took a more lively interest in institutions for research work, they would soon ascertain what value they could derive from them.

Mr. W. Kershaw seconded the vote of thanks. There were two points in the lecture which should be carefully noted. The first was the necessity for Research Associations to be bound up with an industry, and the second was contained in the last paragraph of Dr. Krais' paper, wherein he stated he would be glad to let English workers have access to the results of his research work, and asked for the same facilities in return.

The Chairman wished to support the vote of thanks. It was very important there should be a frank interchange of ideas throughout the whole world. Dr. Krais had held out a helping hand towards the workers of this country. The Textile Institute had an excellent *Journal* which published reports of its proceedings. Unfortunately, in the case of the Dresden Institute they had not been able to maintain their own journal, and had now to rely upon one of the commercial technical journals for assistance. Quite candidly, he would have liked to have had the direction of that technical journal in this country if he could have got hold of such reports. It must be an excellent way of publishing them and a very cheap one.

Dr. Krais, in briefly responding to the vote of thanks, said it was hardly possible to attract the sympathies of industrialists by means of technical publications. They could only be attracted, and induced to render assistance, by means of propaganda, such as sending out pamphlets. The Dresden Institute was very near the Central Station, and thus many people passing through to Leipzig, Zwickau, and so on, and even travelling across Europe, called to see the staff. When they did so, an endeavour was always made to enlist their sympathies in a practical manner by becoming members of the Institute.

The vote of thanks was carried unanimously by acclamation.

INDUSTRIAL PSYCHOLOGY AND THE PREVENTION OF WORRY AMONG WORKERS

By A. R. Knight, B.A.

Chadwick Trust Lecture, at the Institute, Manchester, 25th February 1927, Col. F. R. McConnel in the chair.

By arrangement with the Chadwick Trust, a lecture on the above-named subject was given as stated. There was a good attendance, invitations having been extended to representatives of many organisations. Dr. C. S. Myers, Director of the National Institute of Industrial Psychology, was to have been the lecturer, but was unable to attend, and Mr. Knight, a member of the staff of the Institute, deputised.

Mr. Knight traced the development of worry among workers—from fear, on the one hand, and annoyance on the other. The first type of worry expressed itself in nervousness and timidity; the second in annoyance and irritation. He also briefly described the aims and methods of industrial psychology, as practised at the National Institute, which is a scientific association, not for profit, founded to apply the human sciences to the everyday practical problems of industry in the factory, office, and mine.

Dealing with the worry, unhappiness, and inefficiency caused by the fact that many workers were not engaged in the occupation for which their abilities and temperament most fitted them, he described the methods employed by the Institute in devising scientific tests which enabled firms to select from among a group of applicants those best fitted for particular jobs. These tests were intended not to supplant, but to aid the interview. The interview, which the Institute had made far more systematic and reliable, was still necessary for obtaining information as to the candidate's temperament and character as distinct from his mental or other abilities. The tests already devised covered such varied work as retail salesmanship, spinning, weaving, wall-paper designing, packing, and biscuit-making. They increased the *morale* of a firm, for they insured that the workers were engaged on work which was congenial to them. They also prevented a boy or girl from drifting for months from one unsuitable job to another until he or she lost self-confidence and ambition. All the firms who used such tests were satisfied; the employees, too, were happier and more satisfied in their work. In connection with this aspect of his work, the industrial psychologist also helped boys and girls to choose wisely their future occupations. The Institute had given such vocational guidance to a large group of London children. Tests had been devised to estimate the children's intelligence, scholastic acquirements, and mechanical and other special abilities. But naturally the Institute's advice was not based on the tests alone; close attention was also paid to the children's own inclinations, and further valuable information was secured from parents and teachers. Some time after this advice had been given the children were revisited to find out of what use the advice had been. It was found that, of those who had taken the advice, 80 per cent. were satisfied with their work, their prospects, and their pay. They were also earning more than those who had not taken the Institute's advice—of whom less than 40 per cent. were satisfied. At present research was being carried out. Six hundred children were now being examined and advised by the Institute, and their subsequent careers were being compared with those of a "control" group of six hundred children who had not received the Institute's advice.

But, Mr. Knight continued, the selection of the right man for the right job, and the right job for the right man, was only one of the many ways in which industrial psychology could assist in removing worry and promoting ease and economy of effort.

Turning to what the Institute had done inside the factory or mill, he spoke first of monotony and fatigue. It must not be assumed, he said, that everyone disliked monotony. Some people preferred a monotonous job which allowed their mind to wander to scenes and events more exciting than those of their factory environment. But others who suffered boredom under these conditions were far happier if allowed to change their work from time to time. Such change of work, when properly arranged, did not promote slackness. On the contrary, it had invariably been found to increase output—in some cases by as much as 20 per cent. Cases were also quoted where fatigue and irritation had been removed and output increased by "movement study." For example, in one factory girls were at work on machines which were turning out much less work than was possible, chiefly because the girls were making useless movements and tiring themselves unnecessarily. It was found that 3,600 useless movements were made each day by each girl. By showing them how to eliminate the unnecessary movements, and by arranging the material to suit their mental and physical needs, an increase in output of 13 per cent. was obtained, and the girls felt far less tired and harassed than before. So, too, in such different occupations as coal-hewing and chocolate packing, the elimination of unnecessary movements and the substitution of smooth, rhythmical arm movements for jerky ones, had increased output—in the one case by 16% and in the other by 35%. The miners declared that they could swing their picks more freely and aim more accurately, while the girls in the chocolate factory spontaneously expressed their gratitude for the easier nature of their work.

Rest-pauses, of the proper length and at the proper time, also reduced fatigue and increased contentment. Records of the hourly output of any worker would show that, if there were no official break, unofficial pauses would be made as fatigue set in. Official rest-pauses, correctly introduced, had a much better psychological effect; and though shortening the working time, they increased the daily output. In a spinning mill, and in a bank—to mention only two examples—highly satisfactory results had been thus achieved.

Lighting and ventilation also had a definite effect on health and *morale*. The industrial psychologist studied scientifically what lighting and ventilation were suited to different types of work. He had been able, in many industries, and specially in cotton spinning, to effect substantial reductions in sickness and accident rates, accompanied by equally substantial increases in ease and speed of work.

Having described the many other ways in which the industrial psychologist prevents worry in industry, Mr. Knight referred to the Institute's work in reducing the breakages in a number of large restaurants in London and Liverpool. The investigators reduced the breakages, he said, not by sitting in their armchairs and spinning theories, but by going into the restaurant, obtaining the co-operation of the whole staff, and noting at just what points the breakages occurred and to what causes they were due. They found that some of the accidents arose at special danger-points which could, by careful study, be made almost fool-proof; that other accidents were due to bodily conditions, such as fatigue; and that others were more frequent when the girls were subject to mental strain brought about by worry and irritation. By removing these causes, the Institute was able to reduce the breakages by more than half.

The lecture concluded with the exhibition of a number of lantern slides, some of which illustrated several of the vocational tests devised by the Institute, while others represented graphically some of the results of the Institute's other work in respect of the human factor in industry.

A hearty vote of thanks was accorded Mr. Knight. Mr. F. Arrowsmith, in expressing the thanks, said that whilst they regretted the circumstances of the absence of Dr. Myers, his deputy had given an address of arresting interest throughout.

Yorkshire Section

Section Annual Meeting, 7th April 1927—Chairman's Report and Abstracts of papers read thereat.

The following are abstracts of the report by Mr. Henry Binns, Chairman of the Section Committee, and of the papers by Messrs. Baines and Frobisher, read at the Section Annual Meeting, of which notice was published in the April issue of this *Journal* on page P101.

Mr. Binns said half the troubles in the world have been caused by people who refuse to accept Euclid's axiom that the whole is greater than the part.

A careful analysis of the textile trades, and especially of the wool textile trade, shows how highly specialised are its numerous sections. Men's minds are fixed on the minute details of one operation until, unconsciously perhaps, their mental horizon becomes limited. The process, which is only part of the whole, tends to become, in their minds, the whole. The deeper one dives into specialisation in any subject or industry the greater is the need for a periodic return to the surface from which one may survey the whole thereof. To avoid some of these difficulties, amalgamation of specialist firms is taking place in order that their combined efforts may provide a cheap, reliable, and complete article. Specialisation and amalgamation are working harmoniously together for the common good in commercial life.

Competition in the world's markets from both old and new manufacturing nations is making us realise that our advantages do not rest so much on modern machinery as on the accumulated skill and experience of the past. This refined experience is the root cause of the perfection in quality and the reliability of

British textile goods. Machinery may be easily transferred, but human judgment and skill are so subtle and delicate that they cannot readily be passed from one country to another. The development of this ability is an educational quite as much as an industrial problem. Knowledge casually picked up during the course of daily work has been found to be unreliable. Knowledge gained by systematic and progressive study under expert guidance, combined with practical experience, had been shown to be sound. Continuous practice of one operation has a tendency to limit the ability to tackle a new problem. A general technical training, with some knowledge of applied science coupled with practical experience, is known to fit a man to deal with new involved and difficult problems. A well-balanced theoretical and practical training for our young men seems therefore to be most desirable if th British textile trade is to maintain and improve upon its present position in the world's markets.

The function of the Textile Institute is to deal with a part only of textile problems, to define that part, and to make it fit in with the functions of other organisations having the same ultimate aim in view. The Institute is neither the "parent" no the "elder brother" of numerous kindred organisations, but it has the privilege of extending the right hand of fellowship to all going in the same direction. The conference of Textile Societies and Kindred Organisations in which the Institute takes an active part, recommended that joint meetings, to be addressed by a prominent speaker, should be held once a session. With this aim in view, most successful meetings have been held during the winter. One of these was held in Bradford, at which our President, Mr. William Howarth, spoke. This gathering was a valuable means of drawing together a large number of technologists and those particularly interested in the scientific aspect of the wool textile trade. Sir Edwin Stockton had a large and appreciative audience at a similar gathering in Keighley, while Mr. Geo. Garnett had an excellent reception at Batley. Our Hon. Sec., Mr. R. G. Bailey, was invited to give an address to the Halifax Textile Society, and the Huddersfield Textile Society asked your Chairman to give an address. There can be no doubt as to the value of these co-operative efforts. The platform of the Institute was also occupied at Huddersfield by Dr. Barker and Mr. Hirst, of the British Research Association for the Woollen and Worsted Industries. The policy of the Yorkshire Section is definitely towards active co-operation with the Research Associations. The most important gathering of the year was that at which Mr. Philip Snowden was the speaker in the Bradford Council Chamber. It is highly desirable that influential meetings of this character should be held in the different districts covered by the Institute from time to time.

The second function of the Institute is to develop the diplomas scheme authorised by the Charter granted by the Government. This scheme includes co-operation with the Board of Education in raising the standard of teaching of textile technology throughout the country. Examinations will be instituted in order to test the technical and practical ability of applicants for the Associateship. Original work of a substantial character will be required to qualify for the Fellowship.

In the hope that it may remove any misunderstanding concerning the place of the Diplomas in the work of the Institute, I would like to make a short statement purely on my own responsibility. The Textile Institute is specially concerned "with the advancement of science and technology in relation to the textile industries." This implies a high standard of attainment, and appeals in the main to those who are now, or who hope to have, control of the most up-to-date staffs and machinery. It is a distinct advantage for ambitious young men to associate with those of higher abilities and to read the results of the latest investigations in the *Journal ;* hence it is good for them to join the Institute as members. This must not be taken to imply that they will become either Associates or Fellows, which honours will be sparingly granted on merit alone, and are certainly, in my humble opinion, well worth trying for. The Selection Committee which adjudicates upon applications for diplomas is composed of practical men technologists, scientists, and of representatives of the Board of Education. Without hesitation I can say that this Board has set a high standard of attainment—both theoretical and practical; at the same time it is the most sympathetic and impartial body of men with which it has been my pleasure to be associated.

To date 100 Fellowships have been granted, and 93 Associateships. Yorkshire has 25 Fellows and 24 Associates. An interesting feature of the applications as a whole has been the large proportion of claims presented by foreign and colonial members, and in this connection the Selection Committee has sought, and readily secured, the advice and assistance of corresponding members in various countries. During the present year it is hoped to make definite regulations for the guidance of applicants and also to institute written examinations for the Associateship.

Through the medium of its *Journal* the Institute has a third important function—that of publishing original work. The trade press is recognised as an important factor in educating trade opinion, but original articles are usually too long and too involved to be printed in full therein. Moreover, in the trade press articles are not subjected to the critical judgment of experts in any way comparable to that imposed by a scientific journal such as that issued by the Institute. The Abstracts Section of the *Journal* and Reports of Meetings are of great importance also.

The Woven Fabrics Competition under the Crompton Memorial Fund Scheme again proved extremely interesting, and the premier award—to a student competitor of the Bradford Technical College—was in respect of a range of specimens of outstanding merit. In this instance the presentation of the specimens was in exceptionally complete form, and the descriptions of the fabrics submitted were a distinct advance on anything of the kind yet attempted by any other competitor in any year. We heartily congratulate Mr. Sutcliffe, A.T.I., on his well-deserved success.

From this outline of its functions, said Mr. Binns, it would be realised that there was no textile organisation with the same powers as those of the Textile Institute in any part of the world. This imposes a responsibility on each member to maintain and raise the standard of efficiency in the trade. This could only be done by making serious effort even at the price of personal sacrifices. It should be a pleasure to each to begin by carrying out his duties as officers, councillors, or members, faithfully. The standards set in the next few years will be those upon which future generations will pass judgment. An impartial examination of the standards previously mentioned would reveal that they might accurately be declared to be very high. It was for each to use every available influence to encourage young men to aim high and not to be content with anything less than the best. The Chairman, in conclusion, announced the names of those to be recommended to Council as members of the Yorkshire Section Committee. He then asked Mr. A. R. Baines, F.T.I., to read his paper, of which the following is an abstract.

THE ADVANTAGES OF THE INSTITUTE'S DIPLOMAS TO THE TEXTILE INDUSTRY AND COMMERCE

In these times of rapid transport and communication the world moves forward as a whole, whether it be in science, art, or forms of amusement. No one country can for long out-distance all others in any particular phase. In the prosperous late Victorian era this country went ahead at a tremendous rate; its prosperity was largely due to the pre-eminence of the textile industry as a whole. That rate of progress has slowed up very considerably. Other nations have learnt the craft of cloth making, and former customers of ours are now producers and competitors. We can only maintain our position by concentration on our job of producing the best fabrics in the world at competitive prices.

It will possibly have been noticed by those who have to handle many classes of fabrics, that when talking to mill owners, or at any rate those in authority, the lower the grade of fabric produced the less the heads of those concerns favour technical education; the underlying thought possibly being that they must rely more upon the handicraft and skill of the operatives to produce the article successfully than on the staff who produce the designs and blends. The makers of these low grade fabrics have in all cases been most severely hit by foreign competition, and I think that, apart from depreciated currency, foreign competitors have tackled the question in a more scientific manner. I think that at last the technically trained man is coming into his own. This is of great value to the heads of affairs. He knows that the work done under the trained man will be better, more accurately, and quicker done. The cumulative result will be that when engaging a new foreman, under manager, &c., a more highly trained man will be required. Slowly but surely it is being brought home to our heads of concerns that rule-of-thumb methods, though they may work out right in practice, will have to give way to the trained man who can reason out the why and wherefore of a rule of thumb method, and take a short cut based on scientific facts and reasoning, and thus possibly avoid lengthy and expensive experiments. The conviction has gained ground steadily that success in manufacturing industries, in the higher phases of commerce, and in every pursuit requiring technical knowledge, depends very largely upon the thorough and complete training of those who are charged with the control of the different kinds of work in which the army of operatives are engaged. Intelligent and highly skilled workers are indispensable, but unless they are properly directed by efficient and expert officers, they can effect but little.

For those who are intended to occupy the highest posts in industrial life, a sound secondary education, supplemented by appropriate University training, is the best preparation. It is only in the University or tertiary grade of education that specialised or technological training for the higher industrial posts should commence. Owing to the conditions under which manufacturing is now carried on, it is difficult to select competent foremen from the rank and file of workmen. The ordinary hands gain a very limited and circumscribed acquaintance with the details of the manufacture in which they are engaged, and have little opportunity of acquiring that general knowledge of various departments of work, and of the materials, and uses of the machinery employed, which is essential to the foreman or overlooker. He is a brave man who dare prophesy in these somewhat disturbed times, but I think I am quite safe in saying that in 20-25 years—a generation—there will be few positions of trust in a textile factory that will not be filled by men technically trained, having passed through a thorough theoretical and practical course at some recognised centre, and who at least have earned the Diploma of an Associateship of the Textile Institute. It is difficult to assess the value of such a qualification to the practical business man, but it must be patent to everyone that a Diploma conferred by the Institute must have a very beneficial effect on the recipient when applying, say, for a Government appointment. There is a peculiar streak in the average Englishman that makes him, at any rate, in public, rather scornful of superior learning. Really he is not; he admires it, and realises that the man properly so equipped is well up the ladder, and as General Harington so aptly said not long ago, "the rungs are well sprung."

There is one danger of assessing a man's value on his purely academic qualifications. There are men who have a knack of passing examinations easily, and yet cannot apply their knowledge, and however we may admire pure scientific knowledge *qua* knowledge, it must not be forgotten that we are looking at this question from a business man's standpoint; the academically qualified man has to produce saleable goods at a profit or he is not welcomed in business. We are getting more and more specialised, and this has a tendency to narrow our outlook. Technical education is calculated to widen the outlook, and although the exigencies of business confine us to narrower limits in after life, we get such a knowledge of outside operations that at any rate we get a partial appreciation of other people's troubles, and can admire their efforts to overcome them. Referring to other professional institutions, Mr. Baines pointed out that all banks insist on a fairly high standard of education, and unless a youth has matriculated or passed some corresponding examination, he must as a rule, within a specified time, pass the preliminary examination of the Institute of Bankers. In the insurance world, the companies mostly acknowledge the gaining of an Associateship of their Institute by a £10 a year rise, and up to £25 per annum is given for gaining a Fellowship. It is extremely difficult to summarise the advantages of the Institute's Diplomas to the textile industries. The possession of a Diploma indicates ability, and the more numerous the holders the higher the status of the trade will become. The necessity for those engaged in the trade to keep up-to-date, and the difficulty of doing this while at the same time carrying on their specific industries, must not be overlooked.

The third paper read to the gathering was that of which an abstract follows; it was read by Mr. A. Frobisher, B.Sc.

THE IMPORTANCE OF CO-OPERATION BETWEEN SCIENTIFIC AND TECHNICAL ORGANISATIONS

Speaking upon the above subject, Mr. Arnold Frobisher said—When I was asked to speak on the importance of co-operation between scientific and technical organisations in the wool textile industry, it did not at first cross my mind that, being intimately connected with one of these organisations, I might be in great danger of making an *ex parte* and perhaps somewhat prejudiced statement. If I do so, therefore, I trust I may be forgiven, and I propose to take shelter behind the two previous speakers—the first of whom spoke about the importance of increasing one's assets; and the second about the value of increasing one's academic qualifications. If I do not go into great detail as to the functions of some of the organisations I mention, it must be put down to a desire to refrain from appearing dictatorial; and if I over emphasise those of any particular organisation it must not be thought deliberate, but merely that I cannot help it.

The first organisation I shall mention is, appropriately enough, at a meeting such as this, the Textile Institute. The Textile Institute is the widest in scope, and concerns itself with all branches of the textile industry—including not only wool, but cotton, linen, and silk. Its task for all these branches of textiles is, among other things, to provide a platform and a means of publication for the dissemination of existing or new knowledge. Its function in awarding diplomas and prizes of the highest standing in textiles has already been referred to by the previous speakers. The Textile Institute is an example of an organisation which should have the widest possible clientèle. Then we come to organisations devoted solely to one branch of textiles. Amongst such may be mentioned the Research Associations, with separate establishments for wool, cotton, linen, and silk. In this category may also be put the textile departments of Technical Colleges and Universities dealing, in most cases, with mainly one of the group of textiles. Their duty is to teach the art and science of textile technology and to provide recruits to industry, while that of the Research Associations is not only to keep the educational establishments up to date with material for teaching, but also to provide the industry with a more precise knowledge of existing processes, and with the aid of science to ensure its future progress. We then have specialised divisions where attention is confined to a definite section of the trade. Most valuable work of this kind has been and is being done by the Society of Dyers and Colourists. Again, we have geographical divisions, exemplified by the various local textile societies, which bring before a particular district the best brains and the latest information which may be of direct or indirect interest to that district. The work of the Bradford Conditioning House is well known; it falls, perhaps, into a category of its own.

After this brief outline, I wish to put forward one or two suggestions in an informal way, with a view to stimulating thought as to the interdependence of these various organisations. I will take as a starting point that one and all desire progress. Now we are told that "Necessity is the mother of Invention," and I suggest that the other parent of invention is "Research," with its attributes of scientific deduction and creative ability. We may have two extremes—first, research unrestricted as regards subject, method, and aim. This, for want of a better term, may be styled pure research, and is the type usually best carried out in a University or College. At the other extreme we have work with but little degree of freedom, as exemplified in the ordinary works testing laboratory, &c. In between these we have many variations. In industry, we are more concerned with investigation which allows freedom in method and aim, while restricting the subject of the investigation to some particular material or process. What we may call fundamental research undertakes to broaden the basis of knowledge upon which industry rests. It may at first sight seem to have no immediate practical application, but the scientific understanding of processes and treatments must be admitted to be a vital factor in their further development. Another type of work, highly important to industry, is where both aim and subject are restricted, and method only is left free to the worker. This type seeks to effect improvements in specified and existing machines, materials, and processes. We next pass to classes of work in which method is the restricted quantity, where the application of known scientific principles is brought to bear on a particular industry or process. It is merely the intelligent application of a scientific discovery to a particular operation.

Having defined the various aspects of scientific and technical work, we must now decide as to the relation between the various agencies endeavouring to deal with them. It has already been pointed out that free and unrestricted or pure research is most suitable for University and College research laboratories. There is no immediate need for hurry in such work. It need not necessarily lead to anything more than the general advancement of knowledge. Academic seclusion and calm creates an atmosphere highly suitable for this work. We then come to a second type. Work which is devoted to a particular industry, and which can only be done by highly trained observers and investigators. This is work which is of vital importance to the industry as a whole, and which has a common value to all engaged in it. Its very nature renders it difficult and expensive for individual firms to undertake it. It is essentially a case for co-operative effort, and it is such work that a Research Association undertakes. To come to a third class of work, namely, that with a view to effecting improvements in existing processes, we find a much wider field. One must pay due regard to the skill of the operator and to trade traditions. Development has often come, by trial and error, on the hit-or-miss principle of the factory experiment. This type of work is almost unlimited, and all the organisations referred to can assist by showing the way towards systematic investigation, supplying fundamental knowledge and expert advice on the scientific principles of the processes involved. Technical Colleges and Universities can assist by the spread of fundamental knowledge in such subjects as mechanics, mathematics, physics, and chemistry, and so give the potential inventor in the works the necessary training in systematic deduction and precision of thought. We require scientifically trained minds amongst overlookers and managers, in order to utilise improvements in method or machine. Let the Technical Colleges and Schools make this their aim, and they will have done a great deal towards the ultimate building up of industry. Textile Societies can materially assist in the collection and collation of the traditional knowledge of the industry. There is a vast store of information which has never been gathered together, and which would reveal a wealth of knowledge. This knowledge is spread about the industry, and is possessed by individual skilled operatives, many of whom are unable adequately and clearly to express it. The collection of this information and its publication is a valuable work for the Textile Societies. The Textile Institute can assist by setting a standard of scientific attainment for workers in the industry. The ultimate aim should be the creation of a really reliable literature of the processes of the industry that makes use of them. This can be fostered by lectures, discussions, and the dissemination of scientific papers and literature. It can serve to keep the trained minds emanating from the Technical Colleges up to date and in touch with the latest scientific developments. It is its function to watch for possible lines of advance and to foster the spirit of scientific inquiry.

We thus find that all scientific and technical organisations in the wool textile industry are mutually related, while each one has its own definite place in the effort to obtain the highest efficiency.

In conclusion, let all parties work harmoniously together, each carrying out its own function and working one with the other. Herbert Spencer said that "When a man's knowledge is not in order, the more of it he has the greater will be his confusion." It is to prevent any possibility of confusion that the organisations to which I have referred should keep in the closest contact one with the other in a spirit of the friendliest co-operation.

INSTITUTE MEETING ADDRESSED BY A U.S.A. MEMBER

Tests and Specifications in the Production of Textiles for Industrial Purposes

On a visit to this country, Mr. Edwin Marble, of Worcester, Mass., U.S.A., for many years a member of the Textile Institute and one of the first in the United States to be admitted a Fellow of the Institute, addressed a luncheon meeting of members of the Lancashire Section Committee and of the Research, Testing, and Inventions Advisory Committee at the Institute headquarters at Manchester on Friday, 13th May, Mr. Frank Nasmith presiding.

Mr. Marble spoke of the work of the D13 Committee of the American Society for Testing Materials, the Committee named being concerned with textiles. The first fabric dealt with was the square woven tyre fabric. A Sub-committee prepared a scheme of tests and decided on methods of testing, and after two years of experience the standards were officially adopted. Sub-committees then worked on similar lines in relation to other fabrics, and lastly in regard to Rayon. In the formation of these Sub-committees, the usual procedure was to secure a group of members having a common interest in a particular fabric or industrial problem. The consumers were always allowed to be in the majority as compared with the producers, whilst a small number of technical or scientific workers, not connected with either, held the balance of voting power. Any proposal carried was later submitted to the entire Committee. If approved, the plan operated for two years, and then became permanent, subject to amendment by reason of any change of conditions. Besides the fabrics, the Sub-committees considered correlated matters—testing machinery, humidity, and nomenclature.

Committee D13 started twelve years ago with 13 to 15 members, and to-day it had 200. Most of the testing houses had been available, whilst the Bureau of Standards and the Army and Navy Departments were represented in membership. A better understanding had been reached between producer and consumer, whilst disputes and litigation had been greatly diminished Many a contract was "subject to A.S.T.M. standards," and no higher endorsement could be given. Continuing, Mr. Marble said he was aware that difference of conditions in different countries prevented general uniformity, but he certainly thought there was abundant scope in England for something to be done in regard to nomenclature. He suggested that the Institute might seriously consider applying for full membership of Committee D13 for the Chairman of its Committee concerned with testing. Finally, Mr. Marble referred to developments taking place in the production of textiles for industrial purposes as distinct from production of textiles for clothing and domestic use. Of America's production over 60% was now for industrial or mechanical purposes. As instances, he mentioned the volume of textile materials for motor tyres and car furnishings, and the great weights called for by the electrical industry. The requirements for industrial purposes involved more exacting standards of production, and standard tests would need greater attention. The production of textiles, calculated *per capita*, was now greater than ever in the United States. Consequently, he had every confidence in the future of the textile industries.

Mr. Nasmith said that this country had been well served by Chambers of Commerce in regard to work now done in America by the D13 Committee. He did think, however, that something might be done in the matter of nomenclature.

On the motion of Mr. J. Crompton, Mr. Marble was warmly thanked for his statement.

NOTES AND NOTICES

Annual Conference Programme

The programme for the Institute's Annual Conference, to be held in association with the Crompton Centenary Celebrations at Bolton during Whit-week, has now been issued to those members of the Institute who have notified attendance. The Conference promises to be of a decidedly interesting character. On the Whit-Tuesday evening there will be a reception at the Town Hall by invitation of the Mayor and Mayoress (Sir Thomas and Lady Flitcroft). On the Wednesday norning the Conference will commence at 10 o'clock in the Derby Hall, when four papers will be contributed. For the most part it is hoped that papers will be available in printed form, and contributors will briefly review their contributions. The Conference will be resumed on the Thursday morning at 10 a.m., when a further instalment of four papers, including the Mather Lecture, will be submitted. On the afternoon of each day there will be interesting visits to works, whilst members will also participate in proceedings connected with the Crompton Centenary celebrations. The papers to be contributed will form a valuable record of historical interest covering various developments since the advent of Crompton's mule in regard to the cotton industry. The Publications Committee of the Institute has decided to issue the papers in the form of a separate and special issue of the *Journal* of the Institute, one copy to be supplied free to members and additional copies to be available at a small charge.

Council Meeting of the Institute

At the May meeting of the Council on Wednesday, the 18th, at Manchester, there was quite a good attendance. Mr. W. Frost was voted to the chair pending election of Chairman, and Mr. John Crompton was then unanimously re-elected Chairman and warmly thanked for his past services. It was agreed that the election of Vice-chairman be placed on the agenda for next meeting, the Chairman expressing the view than when the election takes place it shall be with a view to the elected member taking up the chairmanship for the following year. A list of nominations in respect of membership of the various standing committees was submitted, the list having been considered by a Committee of Chairmen of Committees. The names of the members of Committees, as newly elected, appear in this issue. The constitution of the Section Committees was approved in accordance with the nominations arrived at by voting on the part of the Yorkshire and the London Sections. The Irish Section Committee, owing to the recency of its election, was re-elected. Mr. W. Frost was re-elected Hon. Secretary and Mr. T. Fletcher Robinson, Hon. Treasurer of the Institute. The next meeting of Council was fixed to take place at 2.45 p.m. on Wednesday, 22nd June, and members of Council are asked to note this date.

British Cotton Industry Research Association

Appointment of Dr. R. H. Pickard, F.R.S.

The appointment of Dr. R. H. Pickard to succeed the late Dr. A. W. Crossley as Director of Research for the British Cotton Industry Research Association has been recently made. The new director has had a close connection with Lancashire, having been first head of the Chemical Department and then Principal of Blackburn Municipal Technical College. This post he held for 15 years, leaving it to become Principal of the Battersea Polytechnic in 1920. He has since been Director of Research for the British Leather Manufacturers' Research Association. At a dinner in Dr. Pickard's honour, Mr. Kenneth Lee, Chairman of the Cotton Research Association, expressed the confidence of the Council of that Association in the appointment it had made. This expression of confidence will, throughout the industry, be willingly reiterated. Dr. Pickard has had a distinguished connection with the Chemical Society, the Institute of Chemistry, and the Research Associations of the Laundry, and the Boot and Shoe Trades. He was at one time a member of the Council of this Institute; it may not be inopportune to express the wish that his renewal of interest therein may not now be long delayed.

Development of Institute Library

Following upon the alterations and improvement of accommodation at the Institute's headquarters premises, a movement has already been initiated with the object of advancing the Library facilities. Mr. John Read (Salford) has kindly undertaken to act in the capacity of Honorary Librarian, and the Council has approved the appointment and also a recommendation of the Publications Committee that Dr. Withers, Mr. W. E. Baker (representing Research, Testing, and Inventions Advisory Committee), Mr. F. W. Barwick (Selection Committee), with the Editor of the *Journal*, form a sub-committee to report on the whole matter.

Textile Institute Diplomas

Election to Fellowships and Associateships of the Institute have been completed as follows since the publication of the previous list—

FELLOWSHIPS

BARNES, George Alfred (Heaton, Bolton).
CHAMBERLAIN, John (Leicester).
CLAY, Joseph (Long Preston).
ILLINGWORTH, Sydney Ewart (Great Horton, Bradford).
KING, Percival Edgar (Leeds).
PRIESTLEY, Sir William Edwin Briggs (Bradford).
RICHARDSON, William Boyes (Rivington, Bolton).
WHITEHEAD, Sir Henry (Shipley).
WHITTAKER, William Coulthourst (Wimbledon, London).

ASSOCIATESHIPS

PICKLES, Foster (Leeds).
ROBERTSON, Herbert Duncan (Bangalore City, India).

Institute Membership

At the April meeting of the Council of the Institute, the following were elected to membership—Harold Bedford, 12 Rushton Road, Thornbury, Bradford, Yorks (Assistant Manager, Worsted Spinning); John S. Heuthwaite, 14 Gerard Street, Derby (Chemist-Dye Research); Harold Haigh, 63 Wrose Road, Bradford, Yorks (Assistant Cashier); John Heaps, "Briardene," Belmont Grove, Rawdon, Yorks (Textile Designer); H. C. Barnes, 26 Constable Avenue, Burnley (Lecturer on Textile Subjects); W. H. Bell, 39 Crosby Road, Bolton (Spinning Master); Frank Crossley, 339 Leigh Road, Leigh (Spinning Overlooker and Teacher); Eric J. Freeman, c/o Samuel Salter & Co. Ltd., Trowbridge, Wilts (Works Chemist); Daniel Grogan, 3 Glen Avenue, Deane, Bolton (Spinning Master—Cotton); William Hardman, Ellersdene, Oaks Avenue, Bradshaw, Bolton (Textile Draughtsman); Robert H. Kay, Oak House, Barrington Road, Altrincham (Textile and Analytical Chemist); Wilfrid Lord, 289 Blackpool Road, Preston (Designer); Kenneth Moller, c/o Jos. Bancroft & Sons Co., Wilmington, Delaware, U.S.A. (Textile Executive, Vice-president and Director); Arnold Parker, 12 Calderbrook Terrace, Littleborough (Cloth Tester); Alan S. Sanders, 3 Alpha Street, Darwen (Silk Overlooker); Rex Smith, 132 Buckley Lane, Farnworth, nr. Bolton (Head Carder, Cotton Spinning Mill); Matthew Taylor, 37 York Street, Lower Broughton, Manchester (Assistant Weaving Manager); Harry L. Tydeman, Adelaide House, King William St., London, E C 4

REVIEWS

The Dyeing of Textile Fibres. By R. S. Horsfall, M.Sc., and L. G. Lawrie, A.I.C., Published by Ernest Benn, Ltd., London (398 pp. and Indices, 28s. nett).

"Most text-books attach more importance to dyestuffs than to the materials to be dyed, and therefore approach the subject of dyeing the various fibres through descriptions of the various classes of colouring matters. . . . . We feel that (this method) affords little explanation of the uses, relative importance, and *raison d'être* of the two thousand dyestuffs at present on the market. We have approached the subject from a different angle, namely, from that of the material to be dyed; and by describing either the manufacturing processes which such material still has to undergo, or the final uses to which the dyed material is to be put, we think that a complex matter has been greatly simplified." The foregoing extract from the authors' preface indicates the scope of this book. Some limitations have been imposed by the authors or their publishers—there are no diagrams or illustrations of any kind of dyeing machinery, and the unexperienced student may find some difficulty in visualising works processes from the short descriptions of typical machines, excellent as these are.

The textile materials dealt with are cotton, linen, hemp, ramie, jute, the artificial silks, wool, silk, and the principal unions. The authors, who admit "the inclusion of some known with the unknown sins of omission," have succeeded admirably in setting out in a most interesting and lucid manner the principles underlying the applications of colouring matters to textile fibres. The mode of presentation is new, and the matter is largely original in that it is obviously the subject of personal and intimate experience; the practical dyer and the textile manufacturer as well as the student will find advice and information on, for example, the selection of dyestuffs for particular purposes which must be of real value. This experience is obviously not confined to this country; and a valuable feature of the book is the comparisons frequently made between British and American or Continental practice. Possibly the authors occasionally do less than justice to this country; for example, in discussing the application of vat colours to the production of striped shirtings by bleaching in the piece, they remark (page 69), ". . . . In the United States of America it meant that mills hitherto manufacturing grey goods were able to enter the coloured field by the purchase of a little coloured yarn." No doubt it did mean that in the United States; but one remarkable feature of the textile industry in Lancashire during the early post-war years was the way in which manufacturers hitherto solely occupied with the production of grey goods turned to the weaving of coloured striped shirtings and poplins in the grey, by methods involving little departure from their usual practice, and which gave them an advantage in cost of production over the coloured goods manufacturer with his higher weaving wages.

The constant and rapid advance which has characterised the science and art of dyeing during the last fifty years is strikingly evident from a perusal of this book; that this progress is being maintained is equally strikingly shown by the fact that the book, published at the end of April 1927, can only refer to the new lcyl dyes of the B.D.C. for viscose in a footnote, whilst the new Indocarbon CL, a sulphur black unique in its fastness to chlorine, and the new Fast Red AL Salt, giving red shades with certain of the Naphthol AS group which possess fastness to light comparable with that of Turkey Red, have evidently been introduced since the book went to press. The book is very even in treatment, maintaining a high standard throughout. Perhaps the chapters on water and on chemicals used in the dyeing industry, together with the tables (the latter readily available elsewhere), might have been omitted, and some space devoted to the identification of dyestuffs on the fibre.

The book is excellently written in clear, fluent, and attractive English, and not devoid of humour. It is well produced, contains few errors or misprints so far as the reviewer could find, and is well indexed. Authors and publisher are to be congratulated on a thoroughly good text-book, which seems likely to be a standard for some years. F.S.

The Knitting Trade Directory. Compiled by A. H. Hard. Published by John Heywood, Ltd., Manchester (160 pp., 2/- nett).

Criticism of a Directory upon its first appearance must of necessity be made with little experience of its value from actual daily use; such criticism which should, as far as ever possible, be constructive, can be made upon the next edition. Here and now it can be said that, with one point excepted, which will be raised later, this Directory possesses many admirable points. First of all it is small in size and can be rapidly and easily searched; a marked contrast to some Directories, which tax a grown man's strength to lift. Such smallness in size can be welcomed provided the field covered is carefully defined, as well as completely and accurately recorded. The compiler appears to have had these points in view, and time will show how far he has succeeded in his attempt "to produce an accurate directory of the firms engaged in machine knitting in the British Isles." The printing is clear, and the arrangement and the preface promises to include in the next edition "an alphabetical list of firms." This is the one "exception" mentioned above. The Buyers' Guide is to be extended also, and a plea is made for information of the unusual character—this is always being asked for, whilst that which "everybody knows" is usually supplied. Again, this must await a second edition for criticism; what is now provided seems to be an excellent start. On final consideration it is suggested that the black type entry for certain firms—those advertisers again, no doubt—should not be so included as to be more prominent than section headings, town names, or buyers' guide headings. They appear so in some cases, and are frankly annoying. But this Directory certainly seems to meet a need, and is given a cordial welcome by the reviewer who has constant "need of these things." H.L.R.

GENERAL ITEMS AND REPORTS

Annual Report of the Work of the West Riding Section of the Society of Dyers and Colourists for Session 1926-7

The following report was made to the annual meeting of the West Riding Section of the Society, held at the Midland Hotel, Bradford, on Thursday, 7th April 1927, Mr. H. Jennings being in the chair.

The work of the past session has come up to the best standards of previous years, and the Committee thank the members of the Section for the support that has been given. The lectures that have been read, though not numerous, have been of excellent quality, and the attendance has averaged over 100 members per lecture. The subjects dealt with have covered a good range, both of commercial and technical interest.

The opening address was kindly given by Mr. W. J. U. Woolcock, C.B.E., President of the Association of B.C.M., who dealt in a most interesting manner with the subject of "The International Outlook of Dyestuffs." This address, synchronising with large and important developments at the time, created great interest throughout the country. Other subjects dealt with during the session have included original work on two new classes of dyestuffs, namely, "Soledon

Colours and their Development on Cotton and Wool," by Dr. F. M. Rowe, D.Sc., F.I.C., and the "Azoic Colours," by Dr. E. B. Higgins. A paper on "Economics in the Dyeing Industry," given by Mr. W. Leach, of the British Cotton and Wool Dyers' Association, Ltd., from the yarn and warp dyeing standpoint, followed a similar interesting address given in the previous session by Mr. T. M. Buttercase (B.D.A.).

An innovation which proved highly successful was the holding of a luncheon address on 10th December 1926, at the Victorial Hotel, Bradford, which was very largely attended; the address being very ably given by Mr. C. G. Candlish, of the British Celanese, Ltd. Unfortunately, a second luncheon address during February, which it was hoped Sir Alfred Mond would address, was not possible, but it is hoped that during the next session this very successful experiment will be developed.

The Committee were pleased to welcome again Professor E. C. C. Baly, F.R.S., who gave an extremely interesting address on the "New Synthetic Glass." Another extremely important address was delivered by Professor Dr. Paul Krais, Secretary of the German Commission on "Standardisation of Colour Fastness." This address was all the more important in view of the work which the Society is doing in connection with the standardisation of fastness, which is of such moment to the textile industry at the present time.

A very successful works visit and social week-end took place in June of last year, when a party of 25 members visited the works of Messrs. Reckitt & Sons, Ltd., Hull, and through the kindness of the directors of this firm were shown round these works and entertained to tea afterwards. Subsequently the party motored to Scarborough, where a very pleasant week-end was spent. It was decided to make this an annual event. The Committee feel that by limiting the number of papers to be given before the Section, and endeavouring to improve their quality, larger attendance has been obtained, and this, the Committee feel, has been of great advantage.

The Silk Industry of Cyprus: Revival of an Ancient Art Under British Administration

On 12th July 1878, Vice-Admiral Lord John Hay hoisted the British flag at Nicosia, the capital of Cyprus; ten days afterwards Sir Garnet Wolseley landed at Larnaka, and as the first High Commissioner took over the administration of the island from Bessim Pasha, the last Turkish Governor. The new administration early turned its attention to the encouragement of the local silk industry.

Agriculture in Cyprus is still largely in the hands of peasant proprietors, each holding a small tract of land, and selling their produce to merchants. All the implements used in the island are of the most primitive description—or were until our administration introduced new specimens. The soil is tilled by oxen, with the wooden plough used in the days of Abraham; the crops are reaped with the sickle; the ox still treads out the corn on the threshing floor, and it is winnowed by spreading with wooden shovels in the evening breeze. The Department of Agriculture is trying to improve this. Its inspectors, overseers, and demonstrators give advice and instruction to farmers, and deliver lectures on every branch of agriculture, including the rearing of silkworms and the cultivation of the mulberry tree. An important adjunct of the department is an Agricultural School, with hostel, for the training of young Cypriots. At the Government Stock Farm, at Athalassa, are facilities for the teaching of farming, with laboratories for the study of, *inter alia*, sericulture and entomology. The native smallholder, essentially conservative, cherishes his primitive methods, and it took the department a long time to eradicate the primitive methods of incubating the silkworms' eggs by taking them to bed and by carrying them on the person. Possibly these intimate methods still survive in outlying districts. To-day, the department has several experts in sericulture, who throughout the country demonstrate, with proper apparatus, the correct methods of breeding and feeding the worms, of treating the cocoons, winding the silk, and making the cloth.

The silkworm was introduced into Cyprus during the Byzantine *regime*, and the island was, in the Middle Ages, widely famed for its silk and silk-containing fabrics. The climate is particularly favourable to the silkworm, and for many centuries the eggs raised were free from the scourges which attacked them elsewhere. In modern times disease made its appearance, though the application of Pasteur's aseptic methods to egg-raising, and, later, the stringent control exercised by the department resulted in its elimination. The importation of inferior silkworm eggs, however, and the ignorance of the rearers, still militated against the success of the industry, and in 1897 a law was passed prohibiting their importation except under certain conditions; licenses to rear eggs were granted only to such persons as were duly qualified by examination to handle them properly. In 1922 an important law was passed "to encourage development and improvement of the (Cyprus) silk industry." This Act prohibited the importation of silkworms absolutely, and of silkworm eggs, unless with the written permission of the Director of Agriculture, and unless imported between October and January in receptacles sealed with the mark of the Government of the country of export, and accompanied by a certificate of quality from the vendor. This law continued the provisions of that of 1897 so far as it related to the licensing of silkworm egg-riasers, and enacted that eggs locally raised must also be placed in sealed receptacles. By the "Silkworm Industry Protection Rules of 1923" silkworm egg-raisers were required to be proficient in the use of a microscope and to examine microscopically all eggs raised by them.

A small portion of the silk cocoons is reeled locally by primitive wooden machinery, but most of the crop is exported raw to France, where up-to-date filatures deal with it. The reeled silk mainly goes to Great Britain. The establishment of a proper filature in Cyprus would be an enormous boon to the farmer, who suffers considerable losses in freight charges on the cocoons and by waste in reeling. This, in turn, would stimulate and improve local weaving, which, even as it is, turns out extremely creditable silks and mixed cloths, for which there is a limited foreign market. It is therefore satisfactory to know that after considerable negotiations a filature has recently been established in the island, by the firm of Henckell du Buison & Co., of London. The site is at Yeros Kipos, in the Paphos district. The building is admirably suited to its purposes, and is well equipped with up-to-date reeling plant; it is said to be capable of dealing with the whole of the Cyprus cocoon crop. Much interest in its work is being shown by those engaged in rearing cocoons, and others interested in the production of silk; and it is confidently hoped that the filature will greatly benefit the industry, and be a source of prosperity to the island.

The export duty on silk, of 8d. per pound of silk, was last year removed. Cyprus will now be on a more equal footing in competing in Continental markets, and will be able to take full advantage of the Imperial preference in the United Kingdom market. Whereas a few years ago villagers were beginning to uproot their mulberry trees in disgust, they are now, thanks to the fillip already given by the filature, extending their mulberry plantations. Much more educational work might, with advantage, be carried out by the Agricultural Department, by means of lantern lectures describing the proper methods of pruning the mulberry trees, and the different processes in raising eggs, rearing the cocoons, and on reeling, &c. A good deal of this valuable educational work, both by the department and the filature, may now be looked for as a natural corollary to the establishment of the latter.

One of the most serious defects in the Cyprus silk industry is the low yield of cocoons, obtained per ounce of eggs. This may be put at an average of 30 kilos. per ounce box; this is perhaps an outside figure, whereas the average yield in Italy is 52 kilos. This is a matter which will now receive careful attention. In any case it seems clear that a far larger output of cocoons could be obtained from the same quantity of eggs raised, than has hitherto been the case. Whether this is due to inferior eggs raised locally, or imported, or to imperfect feeding and care, or to a combination of all three causes, remains to be investigated. The condition of the rooms in which silkworm raising is generally carried on leaves much to be desired. For the most part, they are so constructed as to defy proper cleansing and disinfection. This is probably the most serious obstacle to overcome, as the work is conducted by the peasantry who can afford only to utilise their native dwellings. Still, the Cyprus silk industry is steadily progressing, and with all the trouble to encourage it now being taken by the Administration, it should speedily recover something of its former reputation and output.

E.W.R.

14—THE SPECIFIC VOLUME OF COTTON CELLULOSE

By GEORGE FORREST DAVIDSON, B.Sc.
(The British Cotton Industry Research Association)

INTRODUCTION AND SUMMARY

It is well known that the specific volume of many colloids, as measured by the usual method involving the displacement of a liquid, varies with the immersion medium, and the data to be found on the specific volume of cotton cellulose show that this material also exhibits this peculiarity. Charcoal has received most attention in this connection, and the variation of its specific volume with the liquid employed has been attributed to two factors, (1) the compression of the liquid in the film on the surface of the colloid under the influence of the attractive forces, (2) the different degrees of accessibility of the small pores to the various liquids. Williams[10] and Harkins and Ewing,[5] while recognising the possibility of the second effect, have laid stress on the compression factor, whereas Howard and Hulett,[6] who first measured the true specific volume of charcoal by using helium as their immersion medium, showed that the values of the apparent specific volume in various liquids were all such that they could be explained by the second hypothesis alone.

The data on the specific volume of cotton cellulose have been summarised by Collins.[3] The figures given fall into groups, those obtained with water as the immersion medium, and those obtained in organic liquids. Thus de Mosenthal[7] gives 0·621–0·623 as the specific volume in water and 0·633–0·641 as the value in benzene or alcohol. Cross and Dorée[4] quote the results of S. J. Lewis, who in a systematic investigation of the specific volume of cellulose and its modifications, found for purified cotton the mean values of 0·623 and 0·639 in water and toluene respectively. Lewis also measured the variation with temperature of the apparent specific volume of cotton cellulose in the two liquids, and obtained most abnormal zig-zag curves. No reliable measurements in a gas have been recorded.

The present research was begun with the object of determining the specific volume of cotton in water, some organic liquids and helium, in the hope that the results obtained might throw some light on the conditions obtaining at the internal surfaces of cotton when it adsorbs a vapour or liquid, and on the structure of the cotton itself. Later, the work was extended to include the determination of the effect on the specific volume of such processes as mercerisation and regeneration from the xanthate, from nitrocellulose and from cuprammonium solution. The variation with temperature of the apparent specific volume in water and toluene of one cotton was also measured.

The specific volumes in helium, water, and toluene of American Upland, Sea Island, and Sakellarides cottons, in both the soda-boiled and mercerised states, and of samples of "viscose," "cuprammonium," and "nitro" artificial silks have been measured. In every case the helium value is about 1 per cent. lower, and the water value 3-5 per cent. lower, than the toluene value.

The specific volume varies with the variety of cotton, and mercerised cottons and artificial silks have a larger specific volume than soda-boiled cotton.

In order that the helium value of the specific volume may be taken as the true specific volume of the cotton, it is necessary to prove that helium is not adsorbed by cotton. Unfortunately it is extremely difficult to prove the absence of the small amount of adsorption which would be sufficient to account for the difference between the helium and the toluene values. Although the apparatus used was not sufficiently delicate to prove this, the fact that helium is not adsorbed at room temperature by so active an adsorbent as charcoal[6] renders it extremely probable that there is no adsorption of helium by cotton. If the helium value be taken as the true specific volume, the fact that the water and toluene values lie on opposite sides of it can only be interpreted by assuming that both the factors of compression of the surface film and non-accessibility of pores are effective. In water, the compression factor is predominant, while in toluene this effect, though probably present in a small degree, is masked by the incomplete penetration of the pores in the cellulose by the liquid. In all the materials examined, the minimum values found for the effective compressive force when water is adsorbed are of the order of 2,000 atmospheres.

In both water and toluene, the apparent specific volume of a soda-boiled cotton was found to increase linearly with the temperature, although the slopes of the lines are different in the two cases. The figures for water, in conjunction with adsorption data, yield a swelling curve which shows a minimum about 45° C.

EXPERIMENTAL METHODS

(a) Determination of the Specific Volume of Cotton in Helium

The apparatus is shown diagrammatically in Fig. 1. The gas burette was of 50 c.c. capacity and was calibrated before the apparatus was assembled. Temperature control was obtained by means of a water jacket surrounding the gas burette, the water being stirred by a current of air. The bulb containing the cotton was kept at a known temperature by immersion in water contained in a large Dewar flask. A small, known volume in the capillary tube, always at room temperature, was allowed for by applying the necessary correction. The pressures were measured by means of a cathetometer reading to 0·01 mm.

The volume of the bulb was obtained by allowing a quantity of dry air, whose volume, pressure, and temperature were measured in the burette, to expand into the evacuated bulb. The temperatures of bulb and burette, the volume still remaining in the burette, and the resulting pressure having been measured, the volume of the bulb could readily be calculated.

In performing an actual measurement of specific volume, the weighed bulb was filled with plugs of cotton and dried at 110° C. The bulb was then attached to the apparatus and evacuated by the Töpler pump to a pressure of about 0·001 mm. of mercury, while immersed in water at about 70° C. It was then filled with dry air, detached, stoppered and weighed, and again attached to the apparatus and evacuated. The helium, purified by passing over coconut charcoal at the temperature of liquid air, was introduced into the burette by means of the pipette attached. After its volume, pressure, and temperature had been measured, the gas was allowed to expand into the evacuated bulb, and readings of pressure, volume in burette, and temperature of bulb, burette, and room taken.

In order that helium may be used as "filling" medium in the determination of the true specific volume of cotton, it is necessary to prove that there is no adsorption of the gas by the cotton. It is impossible to prove this with certainty, but a criterion may be established, which, if satisfied, renders the probability of there being no adsorption very great.

A quantity of gas contained in a burette and having volume v_1, pressure p_1, absolute temperature T_1, is allowed to expand into an evacuated bulb of volume v at temperature T_2, containing m grams of cotton of specific volume v_c. Let the volume still remaining in the burette be v_2, the resulting pressure p_2, α the number of mols. of gas adsorbed per gram of cotton, and v_a the molar volume of the adsorbed gas. Then evidently—

$$\frac{p_1v_1}{RT_1}=\frac{p_2v_2}{RT_1}+\frac{p_2(v-mv_c-m\alpha v_a)}{RT_2}+m\alpha \text{ or}$$

$$\frac{m\alpha RT_2}{p_2}-mv_c-m\alpha v_a=\left(\frac{p_1v_1}{p_2T_1}-\frac{v_2}{T_1}\right)T_2-v \quad (1)$$

Now mv_c, the volume of the cotton, may be assumed constant over a small range of temperature and $m\alpha v_a$, the volume of the adsorbate, is negligible, so that if the right-hand side of equation (1) is found to be constant when p_2 and T_2 vary, then

$$\frac{m\alpha RT_2}{p_2}=K \text{ or } \alpha=\frac{Kp_2}{mRT_2}$$

i.e. either $\alpha=0$, or it is at once directly proportional to the pressure and inversely proportional to the absolute temperature. As the latter alternative is very unlikely, it may reasonably be assumed that there is no adsorption. On this assumption the volume of the cotton is given by the expression—

$$v-\left(\frac{p_1v_1}{p_2T_1}-\frac{v_2}{T_1}\right)T_2$$

If there is adsorption, this expression divided by the weight of cotton will give the apparent, instead of the true, specific volume.

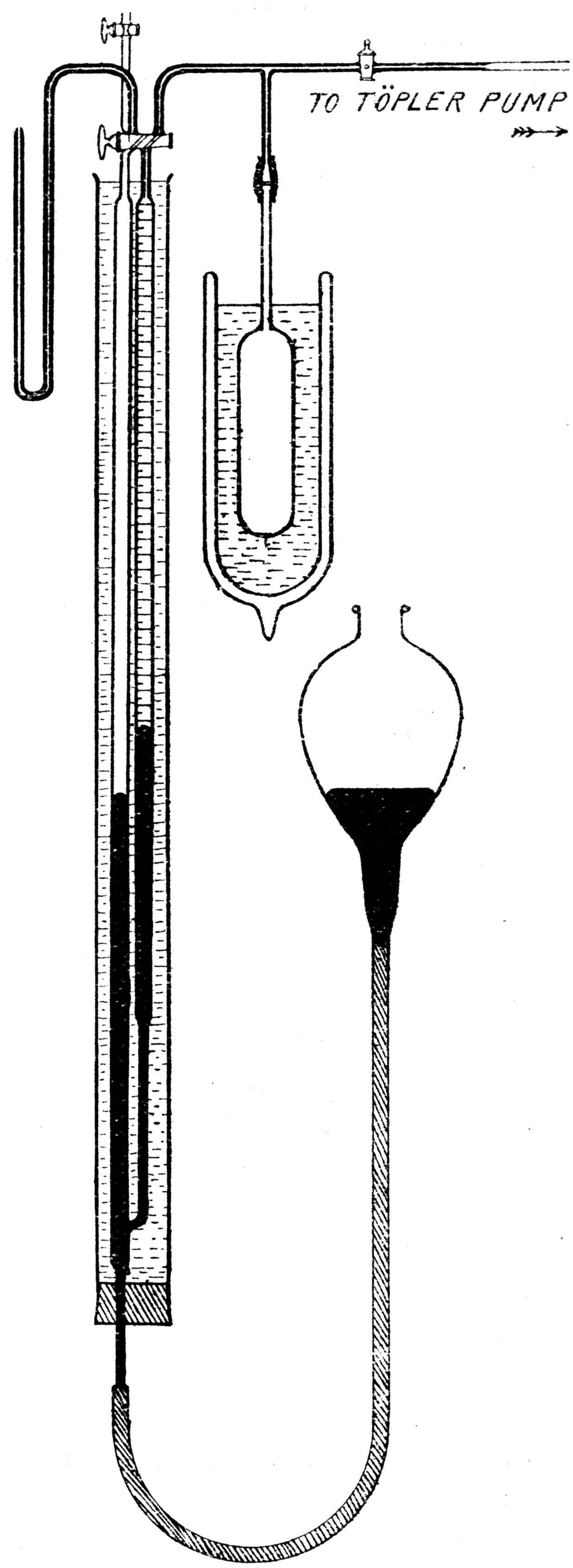

FIG. 1

The main drawback to any method involving the use of a gas in measuring the volume of cotton is that loose cotton is very bulky, and consequently only a small weight can be employed. This difficulty was overcome by using cotton which had been compressed into plugs by means of a tabloid press, the "block" specific volume of these being about 0·7. The bulb employed was of about 90 c.c. capacity, and whereas it was impossible to pack in more than 14 grams of loose cotton, more than 50 grams of the plugs could be introduced into it. The gain in accuracy was thus considerable.

In order to find whether, with the apparatus employed, any adsorption of helium could be detected, observations at various pressures at each of the temperatures 20° and 30° C. were made.

(b) Determination of the Apparent Specific Volume of Cotton in Water and Organic Liquids at 20° C.

The cotton was dried in an ordinary specific gravity bottle at 110° C., weighed, covered with liquid at about 50° C., and the air removed by boiling the liquid under reduced pressure. After filling up with liquid, the bottle was placed up to the neck in a thermostat at 20° C. and left for a sufficient time to allow that temperature to be attained. The stopper was then inserted, the bottle wiped and weighed. The procedure of boiling out under reduced pressure and weighing was repeated until constancy of weight was obtained. The weight of the bottle when full of liquid, and the specific volume of the liquid being known, the apparent specific volume of the cotton could be readily calculated. The artificial silks were dried over phosphorus pentoxide *in vacuo* at room temperature instead of at 110° C.

It was found that the method was not capable of great precision, especially with organic liquids where the coefficient of expansion and the loss by evaporation are high compared with those of water. The determination is rapid, however, and yields results which are sufficiently accurate for the present purpose.

(c) Determination of the Variation with Temperature of the Apparent Specific Volume of Cotton in Water and Toluene

The cotton employed was an American Upland 85R, which had been soda-boiled and could be regarded as a very pure cellulose, and a dilatometric method was adopted. A bulb of about 10 c.c. capacity was filled with plugs of cotton, evacuated with a Töpler pump at 100° C. to remove moisture, sealed off and weighed. The weight of the glass and the approximate dead space in the bulb being known, the weight of the dry cotton could be calculated. The neck of the bulb was then cut off and a previously calibrated capillary, graduated in thousandths of a c.c. sealed on. The bulb was again evacuated at 100° C., sealed off and weighed. The tip of the capillary was then broken under the air-free liquid to be used, and when the amount of liquid appropriate for the temperature range under investigation was obtained in the dilatometer, this was sealed off and weighed. When it was required to investigate a higher range of temperatures, the tip of the capillary was cut off, some of the liquid forced out by warming the bulb, and the capillary again sealed off. All glass cut off was carefully collected and weighed. Observations of the height of the meniscus were now made at different temperatures, the dilatometer being read to 0·0001 c.c. by means of a lens.

The temperature variation was obtained by placing the dilatometer in a large Dewar flask containing water, immersing it as nearly as possible to the meniscus. After observations had been completed, the liquid in the bulb was sucked out by means of a filter pump and concentrated sulphuric acid introduced. This rapidly decomposed the cotton, and by sucking out the resulting liquid before it got too viscous and introducing fresh acid alternately, the whole of the cotton could be removed.

The volume of the bulb and the coefficient of expansion of the glass were then determined by filling the bulb to the zero mark at different temperatures and weighing. Rosetti's data for the specific volume of water were employed, but the specific volume of toluene was determined in the dilatometer. Thus, knowing the mass of the cotton, the volume and expansion of the glass bulb, the mass and expansion of the liquid, and the apparent expansion observed, the specific volume of the cotton at the various temperatures could be calculated.

The variation of the apparent specific volume of cotton in water was also measured up to 50° C. by weighing in water a bulb containing cotton.

EXPERIMENTAL RESULTS

Specific Volume in Helium at 20° C.

An attempt to use air as the immersion medium showed that the value of the expression—

$$v - \left(\frac{p_1 v_1}{p_2 T} - \frac{v_2}{T_1}\right) T_2$$

the constancy of which, as discussed above, is the criterion of no adsorption, gradually fell to a constant value. The initial value was 25·7, but after 24 hours it had fallen to 24·6, at which figure it remained after 50 hours. An experiment with the same cotton using helium as "filling" medium gave a value of 25·7±0·1 at 20° C., which was found to be unchanged after 24 hours. This value was further found to be independent of pressure between the limits of 420 and 510 mm. of mercury it was possible to use, and to hold for a similar range of pressures at 30° C. It was therefore concluded that the adsorption of helium was at least less than could be detected by the apparatus employed, and that the fall in the value when air was used was due to adsorption and not merely to gradual seepage into pores. The question of the adsorption of air was not further pursued, however. Howard and Hulett[6] have recorded a distinct drift with time of the value obtained for the specific volume of charcoal in helium, a result which they attribute to slow penetration of the gas into fine capillaries. Such a drift cannot be definitely asserted to exist with cotton, although in some instances indications of a similar but much smaller effect were observed.

As the volume of cotton employed was usually about 30 c.c. and the volume as determined varied by ±0·1 c.c. the specific volumes are only correct to 1 in 300. An experiment with loose cotton where, however, the accuracy was less, gave a mean value for the specific volume identical with that obtained by using plugs, showing that compression into plugs has no effect on the observed specific volume.

The data for a typical experiment are set out in Table I. The pressures were all corrected to 0° C.

The specific volumes in helium of the various celluloses examined are given in Table II. The mercerised cottons were mercerised with 15 per cent. caustic soda, without tension.

Apparent Specific Volumes in Water and Organic Liquids at 20° C.

The values obtained in water and toluene are given in Table II., each figure being the mean of two closely concordant determinations.

The apparent specific volume of one cotton, American Upland 85R, soda-boiled, was also determined in chloroform, acetone, benzene, and carbon tetrachloride, yielding the results shown in Table III.

Table I.

Weight of cotton (in vacuo) = 55·394 grams. Volume of bulb = 93·46 c.c.

Room Temperature °C.	Burette Temperature °C.	Bulb Temperature °C.	Burette Reading (c.c.)	Corrected Burette Reading (c.c.)	1st Pressure Reading (mm. Hg)	2nd Pressure Reading mm. Hg)	Difference (mm. Hg)	Corrected Difference (mm. Hg)	Barometric Pressure (mm. Hg)	Barometer Temperature °C.	Corrected Barometric Pressure (mm. Hg)	Total Pressure (mm. Hg)	$\frac{PV}{T}$	Volume of Cotton (c.c.)	Specific Volume of Cotton
	14·8		49·79	49·99	127·10	215·38	88·28	88·1	745·9	17·8	743·5	831·6	144·5		
	14·8		46·13	46·31	167·28	322·06	154·78	154·4				897·9	144·5		
	14·8		43·96	44·13	191·42	391·19	199·77	199·2				942·7	144·5		
15·2	14·9	20·1	33·21	33·30	312·03	29·29	−282·74	−281·9	745·8	17·3	743·5	461·6		35·61	·643
15·5	14·9	20·1	33·20	33·29	312·10	29·31	−282·79	−282·0	745·8	17·6	743·5	461·5		35·60	·643
14·7	14·6	19·9	33·17	33·26	312·31	29·18	−283·13	−282·4	745·9	18·1	743·4	461·0		35·56	·642
15·5	14·4	20·0	28·43	28·51	366·47	108·85	−257·62	−256·9	746·0	18·5	743·5	486·6		35·56	·642
14·8	14·5	19·7	28·39	28·47	367·02	108·92	−258·10	−257·4	746·5	18·2	744·0	486·6		35·56	·642
18·7	17·8	20·0	20·96	20·99	453·55	244·25	−209·30	−208·6	747·2	18·6	744·7	536·1		35·61	·643
19·1	17·9	20·0	20·95	20·98	453·82	244·25	−209·57	−208·9	747·3	17·4	744·9	536·0		35·58	·643
19·2	18·1	20·0	28·00	28·08	371·30	116·46	−254·84	−254·0	747·4	17·0	745·1	491·1		35·51	·641

Table II.

Cellulose	Specific volume (c.c per gram) at 20° C. In helium	In water	In toluene
American Upland (85R), soda-boiled ...	0·638±·002	0·6213±·0003	0·645±·0005
,, ,, mercerised ...	·645	·6224	·651
Sea Island, soda-boiled	·642	·6235	·646
,, mercerised	·647	·6243	·653
Sakel, soda-boiled	·640	·6226	·645
,, mercerised	·645	·6234	·651
"Viscose" artificial silk	·646	·6217	·652
"Cuprammonium" artificial silk	·653	·6248	·657
"Nitro" artificial silk	·648	·6192	·654

Table III.

Liquid	Apparent Specific Volume of 85R (soda-boiled) Cotton at 20° C.
Water	0·621
Acetone	·642
Chloroform	·644
Benzene	·644
Carbon tetrachloride	·644
Nitrobenzene	·644
Toluene	·645

Variation of Apparent Specific Volume in Water and Toluene with Temperature

The results obtained, using soda-boiled American Upland cotton, are given in Table IV., and shown graphically in Figure 2. For water, the results of two dilatometric determinations between the temperatures 0–50° and 30°–80° C. respectively are given, as well as the figures obtained by the method of weighing in water. The variation of the apparent specific volume of cotton in water and toluene may be expressed by the equations—

$$V_t=0{\cdot}6190\ (1+0{\cdot}000198t)\ \text{and}$$
$$V_t=0{\cdot}6449\ (1+0{\cdot}000085t)\ \text{respectively.}$$

Table IV.

Toluene		Water					
		Dilatometer Expt. 1		Dilatometer Expt. 2		"Weighing in water" Method	
Temperature °C.	Apparent Specific Vol.	Temperature °C.	Apparent Specific Vol.	Temperature °C.	Apparent Specific Vol.	Temperature °C.	Apparent Specific Vol.
0·0	0·6449	0·0	0·6188	30·0	0·6227	1·2	0·6195
8·5	·6455	10·0	·6203	35·5	·6234	15·2	·6208
13·7	·6458	12·3	·6206	39·4	·6239	22·8	·6216
19·4	·6460	15·6	·6211	43·0	·6243	24·9	·6221
24·7	·6462	20·0	·6215	45·7	·6247	29·5	·6225
31·7	·6464	30·0	·6227	47·7	·6250	33·8	·6234
35·0	·6465	40·0	·6240	50·5	·6254	40·7	·6239
39·9	·6466	50·0	·6247	54·4	·6257	50·0	·6245
44·3	·6470			57·4	·6261		
50·8	·6473			59·5	·6263		
60·3	·6482			62·1	·6266		
64·2	·6485			64·2	·6269		
75·8	·6492			66·0	·6272		
79·4	·6494			69·6	·6274		
				72·6	·6277		
				74·3	·6280		
				77·5	·6282		
				80·2	·6283		

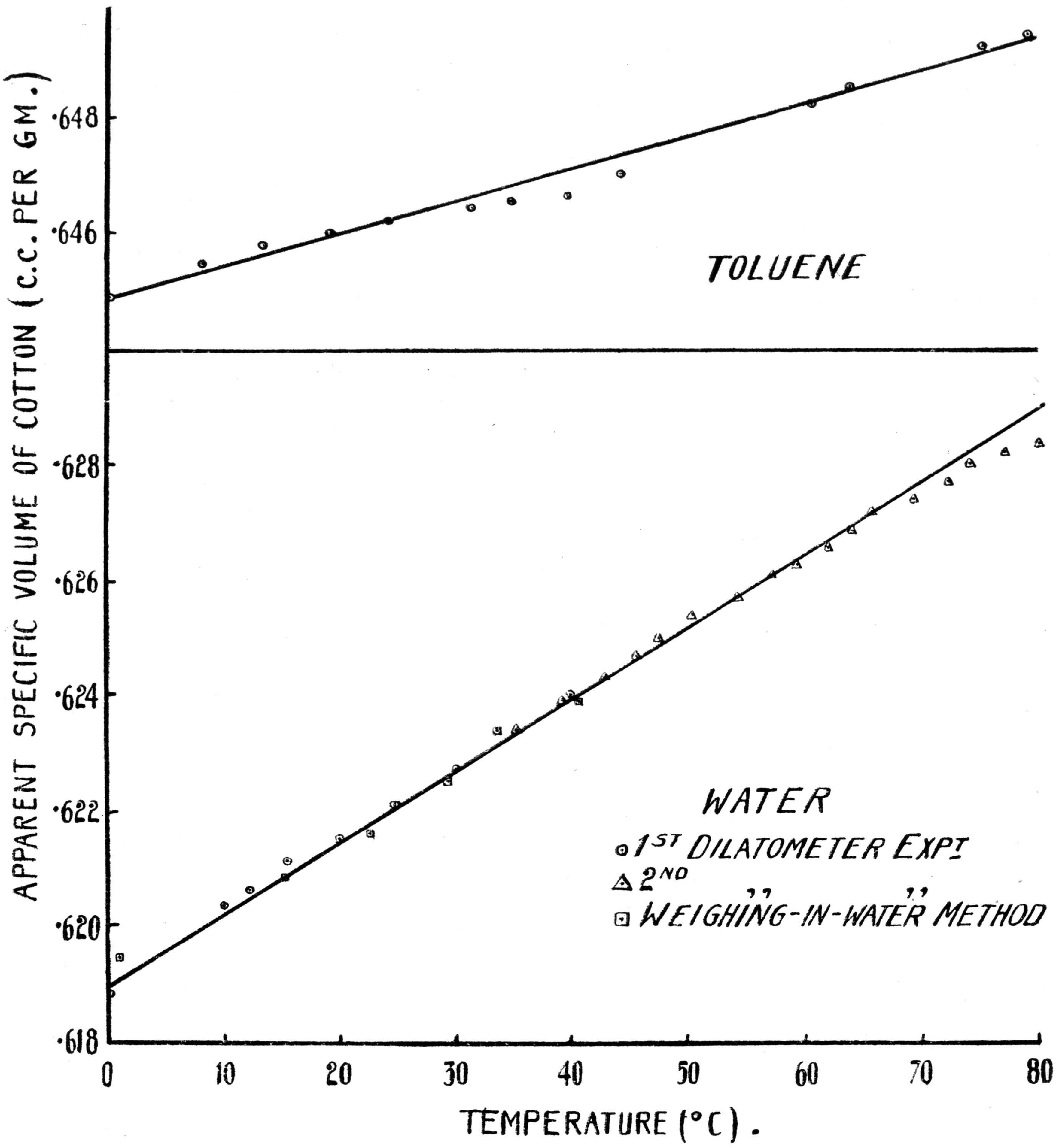

FIG. 2

DISCUSSION OF RESULTS

When a liquid is adsorbed by a colloid, it is a reasonable supposition that there is a compression of the liquid adsorbed under the influence of the attractive forces between the liquid and the adsorbing surface, the layer of liquid next to the adsorbent being most highly compressed, and the compression falling off rapidly to zero as the distance from the attracting surface increases. On the other hand, there may be pores in the adsorbent which are accessible to molecules of some liquids but not to those of others. For instance, pores accessible to water (Van der Waals $b=13{\cdot}6\times10^{-4}$) might not be accessible to toluene ($b=65{\cdot}3\times10^{-4}$). Helium has the smallest value of b ($10{\cdot}5\times10^{-4}$) so that pores which are inaccessible to helium would be inaccessible to any immersion medium and might therefore be considered to form part of the volume of the adsorbent. These two factors obviously affect the apparent specific volume of a colloid in a liquid, and act in opposite directions. The compression of the surface film makes the apparent specific volume smaller, while the incomplete penetration tends to make it larger, than the true specific volume.

The relation between the apparent specific volume in a liquid, calculated on the usual assumptions that no change of density of any part of the liquid takes place and that the surface of the solid is wholly accessible to the liquid, and the true specific volume can be established as follows. Let the true specific volume of the solid be v, the apparent specific volume in the liquid v_0, and the mean specific volume of the liquid in the surface film v_2 instead of v_1, the specific volume of the liquid in bulk. If the amount of liquid adsorbed per gram of the solid is α gram and the volume of the pores inaccessible to the liquid is δ c.c. per gram, then it is seen that the volume occupied by 1 gram of adsorbent and its film is $v+\delta+\alpha v_2$. Now the apparent specific volume v_0 is equal to the true volume of the solid and its film $v+\delta+\alpha v_2$, less the volume of the film considered as having the normal specific volume of the liquid, i.e.

$$v_0=v+\delta+\alpha v_2-\alpha v_1$$

$$\text{or } v+\delta=v_0+\alpha(v_1-v_2) \qquad (1)$$

A direct determination of the amount adsorbed from a liquid cannot be carried out, but there is good reason to suppose that this is the same as the amount adsorbed from the saturated vapour. An approximation to this quantity may be obtained by extrapolation on adsorption isotherms.

A comparison of the specific volumes of the various celluloses examined shows that the specific volume in helium is intermediate between the values obtained with water and toluene, being about 0·006 less than the specific volume in toluene. This difference could be accounted for by an adsorption of 0·006 c.c. helium per gram of cotton, an adsorption which it is obviously quite impossible to detect with the apparatus employed and the method described above. Consequently, there is some uncertainty as to whether the helium value of the specific volume is the true specific volume in the case of cotton. If it be assumed that, as with active charcoal at room temperature, there is no adsorption of helium, and the helium value of the specific volume is regarded as the true specific volume of cotton, then the higher values obtained for all the celluloses in toluene, and for American Upland cotton in acetone, benzene, carbon tetrachloride, chloroform, and nitrobenzene, must be attributed to the presence of pores not accessible to these liquids. Even with these liquids, however, it is found that there is some adsorption from the saturated vapour,[2] so that it is reasonable to suppose that there exists a compressed film on the surface of the cotton, although its effect on the apparent specific volume is masked by the other factor. With acetone, which, according to Brimley[2] is more adsorbed by bleached cotton than benzene or nitrobenzene, the effect of this compressed film is shown in a smaller apparent specific volume.

The values of the apparent specific volume in water are in all cases considerably less than the helium and toluene values. Here the adsorption is very considerable and the compression of the adsorbed film completely masks any effect which may be due to the existence of pores into which water has not access.

If δ were known, the equation (1) would enable the mean specific volume of the surface film, and hence the effective compressive force, to be calculated. For toluene, an approximation to the value of δ may be obtained by taking the difference between the helium and toluene values of the specific volume, since the compression of the small amount of toluene adsorbed by cotton cannot have much effect on the apparent specific volume in this liquid.

The mean value obtained from the results in Table II. is 0·006 c.c per gram cotton, and on the theory suggested the value of δ for water would be less than this. By neglecting δ, it is possible in the case of water to arrive at a maximum value for this specific volume, and hence a minimum value for the compressive force. This has been done in Table V.

Table V.

Cellulose	True Specific Volume at 20° C.	Apparent Specific Volume in Water at 20° C.	Water adsorbed per gram	Specific Vol. of Water in Surface Film	Effective Compressive Force Kgm/cm²
American Upland 85R, soda-boiled	0·638	·6213	0·23	0·929	2130
,, ,, mercerised	·645	·6224	·36	·939	1780
Sea Island, soda-boiled	·642	·6235	·23	·921	2420
,, ,, mercerised	·647	·6243	·32	·931	2050
Sakel, soda-boiled	·640	·6226	·23	·926	2230
,, mercerised	·645	·6234	·30	·930	2100
Artificial silks—"Viscose"	·646	·6217	·45	·948	1480
"Cuprammonium"	·653	·6248	·43	·936	1890
"Nitro"	·648	·6192	·44	·936	1890

The values of α for the cottons were found by extrapolation or calculation from the data of Urquhart and Williams[8,9] while those for the artificial silks were obtained by calculation from values found at 95 per cent. relative humidity, on the assumption that the ratio of the regain of artificial silk to that of unchanged cotton is independent of the relative humidity, as has been found for mercerised cotton.[9] The values of the effective pressures are taken from the data of Bridgman[1] on the compressibility of water. It is seen that the effective compressive forces for the various materials considered are all of the order of 2,000 kgm./cm².

The linear relation between temperature and apparent specific volume of cotton in water and toluene is not in agreement with the results of Lewis.[4] The latter obtained zig-zag curves which in the case of water showed a general increase of specific volume with rise of temperature, while in toluene there was a corresponding decrease up to 45° C., followed by an increase.

From the apparent specific volume of cotton in water at various temperatures and the water adsorption data for the same temperatures, the swelling of cotton in water can be calculated. The total volume embraced by a gram of cotton and its adsorbed film is $v+\delta+\alpha v_2$, which from equation (1) is equal to $v_0+\alpha v_1$. Table VI. shows the change in volume with temperature expressed as a percentage of the volume of the dry cotton at 15° C., and of the volume of the swollen cotton at the same temperature. As the true coefficient of expansion of cotton is not known, it has been assumed to be equal to the temperature coefficient of the apparent specific volume in toluene.

The calculated percentage swelling for mercerised Sea Island cotton at 20° C. is

$$\frac{100\,(v_0+\alpha v_1-v)}{v} = \frac{100\,(0{\cdot}6243 + 0{\cdot}32\times 1{\cdot}0017 - 0{\cdot}647)}{0{\cdot}647} = 46 \text{ per cent.}$$

Mr. G. E. Collins, of this Institute, has observed a swelling of 44·5 per cent. with mercerised Sea Island hairs.

It is now widely held that mercerised cotton and artificial silks, the so-called "cellulose hydrates," are merely cellulose in a more highly dispersed form. Urquhart and Williams[9] have pointed out that if the effective pressure, the "intensity factor," is constant, the increased adsorptive power of

Table VI.
American Upland Cotton 85R, Soda-boiled

Temp. °C	True Specific Volume v	Apparent Specific Volume in Water v_0	Water Adsorbed per gram Cotton a	Specific Volume of Water v_1	av_1	v_0+av_1	Swelling v_0+av_1-v	Per cent. Swelling $\frac{100(v_0+av_1-v)}{v}$	Per cent. of Volume of Swollen Cotton at 15° C.
15	0·638	0·6209	0·238	1·0008	0·2381	0·8590	0·221	34·6	100
20	—	·6215	·230	1·0017	·2304	·8519	·214	33·5	99·2
25	—	·6221	·211	1·0029	·2116	·8337	·196	30·7	97·1
30	—	·6227	·202	1·0043	·2028	·8255	·187	29·4	96·1
40	·639	·6239	·190	1·0077	·1914	·8513	·176	27·6	94·9
50	—	·6250	·188	1·0120	·1902	·8152	·176	27·6	94·9
60	·640	·6262	·205	1·0169	·2084	·8346	·195	30·5	97·2
70	—	·6274	·216	1·0226	·2208	·8482	·208	32·5	98·7
80	·641	·6286	·219	1·0289	.2253	·8539	·213	33·2	99·4

mercerised cotton for water must be due to an increase of the "capacity factor," the specific surface. A similar argument would hold for the three artificial silks examined, which absorb even more moisture than mercerised cotton. A comparison of the mean specific volumes of the water adsorbed by three soda-boiled cottons, the same cottons mercerised, and three artificial silks, shows that for all these materials the specific volume of the adsorbed water is very nearly the same. The figures vary from 0·92 to 0·95, and there is less contraction in the volume of the water with the mercerised cottons and artificial silks, than with ordinary cotton materials, although the former adsorb considerably more moisture than the latter. This approximate constancy of the specific volume of the adsorbed water indicates a corresponding constancy of the attractive forces between cotton and water and between "cellulose hydrates" and water and lends strong support to the view that mercerised cotton and artificial silk are chemically identical with cotton cellulose, but differ from it in being in a more highly dispersed state.

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15—THE WEIGHT PER CENTIMETRE OF THE ULTIMATE FIBRE OF FLAX

By G. F. NEW and S. ALTY

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A considerable amount of work has been carried out in recent years in the attempt to correlate spinning behaviour and yarn properties with the physical characteristics of the flax fibre. Up to the present, attention has been given mainly to the fibre strand[1, 2, 3], and it has been possible to relate many variations in preparing, spinning, and yarn properties to variations in the dimensions of the fibre-strands concerned. The examination of the ultimate fibres composing the strands has not proceeded far on systematic lines, probably because of the difficulties of preparation and section cutting of the necessary samples.

It has been discovered recently, however, that by gently stroking with a glass rod fibre-strands wetted with dilute caustic soda solution, the ultimate fibres may be separated laterally and counted under the microscope without difficulty. If a pencil of fibre-strands cut, for instance, to a length of 5 centimetres, is weighed and then examined by this method, the effective length, the weight, and the number of the ultimate fibres present are known, and the weight of one centimetre length of one ultimate fibre can be found. In carrying out the determination, the 5 cm. pencil is cut across at the centre, and the number of fibres crossing this section is counted after softening. Counts can also be made at other distances along the pencil of strands, but the results agree very closely, and one count is usually sufficient.

In this paper is recorded a wide range of results obtained in this way.

Table I. contains particulars of the variation in the weight per cm. of the ultimate fibre both from the root end to the top and also from straw to straw in Irish scutched flax.

Table I

		333F All from One Ribbon	333F from One Ribbon	333F from One Ribbon	333F from One Ribbon
Root	Wt., mgms. ...	5·45	5·10	5·98	5·84
	... Number ...	352	348	303	360
	Wt., cm. ...	0·00309	0·00293	0·00395	0·00324
Middle ...	Wt., mgms. ...	6·07	3·10	6·13	5·14
	... Number ...	419	279	396	383
	... Wt., cm. ...	0·00242	0·00222	0·00310	0·00268
Top	Wt., mgms. ...	4·96	2·64	5·43	5·25
	... Number ...	417	247	356	343
	Wt., cm. ...	0·00238	0·00214	0·00305	0·00306

Table I—*continued*

		333F from One Ribbon	333F from Five Ribbons	333F Totals and Means	J.W.S. FY. 5 Ribbons
Root	Wt., mgms. ...	4·65	10·04	37·06	8·43
	Number ...	243	619	2,225	459
	Wt., cm. ...	0·00383	0·00325	0·00333	0·00367
Middle	Wt., mgms. ...	3·78	8·05	31·27	9·07
	Number ...	282	560	2,319	520
	Wt., cm. ...	0·00268	0·00287	0·00270	0·00349
Top	Wt., mgms. ...	3·30	8·63	30·21	8·39
	Number ...	289	613	2,265	540
	Wt., cm. ...	0·00229	0·00283	0·00266	0·00277

In each vertical column the results are derived from the same ribbon of fibre, extending from the root to the top end of the strick, one such ribbon being used in each of the first five determinations, and a composite sample made up from five separate ribbons for the sixth column and for the J.W.S. flax. As is the case with other characteristics of scutched flax, considerable variations are to be found between material drawn from different straws. A fairly good average result is obtained, however, by using material drawn from several different places in the piece or pieces. Other experiments have shown that stricks may differ from each other almost as much as do the individual ribbons of fibre in any one strick. When dealing with flax in the form of pieces, either before or after hackling, it is essential therefore to draw the samples from a large bulk of material.

It will be seen that in all the above tests the weight per centimetre of the ultimate fibre was greatest at the root end, and was at the top approximately 20% less. That this variation is not due to the non-cellulosic matter adhering to the fibres is shown by the following values for the percentage weight of such matter in Sample FY—Root, 11·9%; middle, 14·6%; and top, 14·9%.

In Table II. are given the results obtained from fibre-strands of different lengths removed from various slivers. All are taken from the end of the preparing process, Sample 167F being from the 5th drawing and the rest from roves. Each sample was sorted on the sorting machine, and various length groups were taken for the examination of the ultimate fibres. In all the samples the shortest strands are composed of ultimate fibres whose weight per centimetre is considerably greater than that of the fibre in the longer strands. Since it is to be expected that the shortest strands produced during the drastic folding, rubbing, and pressing actions met with during preparing will be the weakest, there are grounds for concluding that the thickest ultimate fibres are associated with the greatest weakness. It appears therefore that if the short strands were removed from a sliver near

Table II

Sample	Material	Strand Length	Wt./cm. Ult. Fibre	Strand Length	Wt./cm. Ult. Fibre	Strand Length	Wt./cm. Ult. Fibre
66F	3½ lb. Hemp Line Rove	6 in.	0·00567	11 in.	0·00339	16 in.	0·00371
55F	5 lb. Flax Tow Rove ...	3 in.	0·00542	5½ in.	0·00388	8 in.	0·00323
76F	30 lea Courtrai Tow Rove	1 in.	0·00560	3½ in.	0·00274	5 in.	0·00304
167F	200 lea Courtrai Line Sliver...	2 in.	0·00399	6 in.	0·00235	8 in.	0·00284

the end of the preparing process, a better spin might result. In default of this, some improvement might be looked for if the root ends of the stricks of scutched flax were cut off before hackling. However, the whole of the thick fibres would not be removed by this since, as Searle has shown,[4] relatively thick fibres are to be found on the outer edge of the fibre bundles up the whole length of the stem.

A series of determinations was made on flaxes differing as widely as possible in spinning quality.

Table III

Sample	Material	Stage	Wt./cm. of Ult. Fibre Mgms.
276F	4 lb. Flax Tow	Yarn	0·00297
274F	3 lb. Flax Tow	Yarn	0·00315
270F	3 lb. Flax Line	Yarn	0·00282
268F	2 lb. Flax Line	Yarn	0·00284
346F	Russian PK	Scutched	0·00333
342F	Russian R	Scutched	0·00344
340F	45 lea Courtrai Tow	3 and 4 Hackle Root	0·00392
341F	45 lea Courtrai Tow	3 and 4 Hackle Top	0·00273
203F	40 lea Irish Line	Rove	0·00339
308F	J.W.S. ex Thick Straws	Rove	0·00550
311F	J.W.S. ex Medium Straws	Rove	0·00418
314F	J.W.S. ex Thin Straws	Rove	0·00321
219F	60 lea Courtrai Tow	Rove	0·00314
218F	80 lea Courtrai Line	Rove	0·00302
281F	80 lea Courtrai Weft Line	Rove	0·00282
282F	80 lea Courtrai Warp Line	Rove	0·00271
167F	200 lea Courtrai Line	5 D.F.	0·00286

In most of these flaxes the material was taken from a sliver, so that both the length and the quality variations in the fibre strands were represented correctly in the actual fibres counted. Where this could be done, the test sample was made up from as many sources as possible in the bulk, and in the case of line flax it was cut from the middle of the fibre strands. The results obtained are shown in Table III. It is found that over the whole range of material examined the weight per centimetre of ultimate fibre is of the same order. Thus, in this respect, the finest yarn, 167F, and the coarsest, 276F and 270F, are almost identical. It is evident therefore that factors other than the weight per centimetre of the ultimate fibre normally control the spinning quality of a flax. These controlling factors are associated with the weight per centimetre of the fibre-strand[1, 2, 3], and for the present this characteristic is the most useful criterion of spinning quality available. The features controlling the size of the strand may depend on the growth and structure of the plant, on the degree of subdivision brought about by retting, hackling, and preparing, and on the physical properties and distribution of the non-cellulosic binding materials, which again will depend on growth and retting influences.

A definite difference is shown between samples 340F and 341F, the root and top tow respectively from 45 lea Courtrai flax. This was to be expected from the previously ascertained thickness of the ultimate fibres at the root end of scutched flax. It is known that top tow spins to a finer lea than root tow, but it is not certain that this is due to the lighter ultimate fibres in top tow. Other factors certainly differ in the two tows. Samples 308F, 311F, and 314F show a well-defined graduation in fineness of ultimate fibre with the fineness of the straw from which the flax is obtained. Although a parallel variation was found in the fineness of the yarns which could be spun from these three flaxes, it must not be assumed that this was attributable to the character of the ultimate fibre. Other factors showed a similar variation, in particular the weight per cm. of the fibre strand, and as is indicated by other experiments, these are more likely to be the controlling factors. Therefore the present results give no evidence as to the possible influence of the weight per cm. of the ultimate fibre on the spinning quality of a flax. On the other hand, the mean weight per cm. of the ultimate fibre has been found to be identical in flaxes differing very widely in spinning quality. Allowing 14% for the weight of adherent non-cellulosic matter, and taking the weight per cm. of an average flax fibre as 0·0030 mgms., the diameter will be 0·0016 cms., or 0·00063 in. The density is assumed to be 1·5 and the shape a solid cylinder.

SUMMARY AND CONCLUSION

By treatment with dilute caustic soda solution it is possible to separate the ultimate fibres in flax and similar fibre-strands. In this state the ultimate fibres may be easily counted, and if a short pencil of material of known length and weight is examined, the weight per centimetre of the ultimate fibres can be determined.

Ultimate fibres having the greatest weight per cm. are to be found in the root end of scutched and hackled flax, in root tow as opposed to top tow from the hackle, and in the shortest strands in a sliver.

Spinning quality in ordinary flaxes does not appear to depend on the weight per cm. of the ultimate fibre, since this feature showed no significant variation throughout a range of materials extending from 12 lea (4 lb.) to 200 lea.

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19*th March* 1927

16—ABSENCE OF UNIFORMITY IN GROWTH OF THE MERINO FLEECE

By J. E. Duerden, Ph.D., M.Sc., and V. Bosman, M.Sc.
(Rhodes University College, Grahamstown, South Africa)

[Communicated by the British Research Association for the Woollen and Worsted Industries]

The fleece of the merino grows continuously from start to finish without any shedding. By calculation this can be shown to be at an average rate of about a hundredth part of an inch each day; but the question often arises whether the growth proceeds at the same rate, and with the same vigour, during the whole of the twelve months required for the clip. It is frequently asserted that it is more rapid shortly after shearing than later, but no definite proof in support can be brought forward. When the many changes to which sheep are subject in the course of the year, such as seasonal,

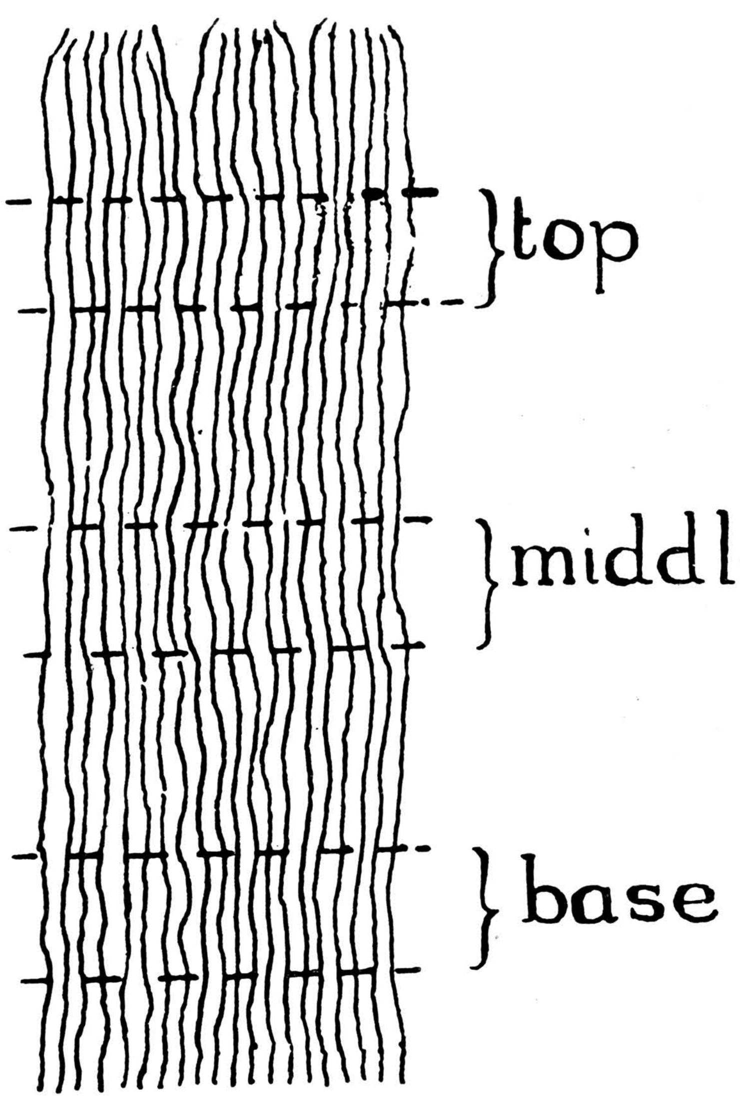


Fig. 1

Diagram of a wool staple showing the three regions, top, middle, and base, from which parts of fibres were cut to determine any variations in the average thickness, due to changes in the vigour of growth of the fleece.

and climatic differences, food supply and sexual condition, are considered, it would indeed be surprising if the sensitive wool fibres, as products of the epidermis, did not show some corresponding response.

It may be presumed that in any individual sheep changes in the vigour of growth will be represented both by more rapid increase in length as well as by increase in the thickness of the fibre. In a general way it is known that a sheep under high conditions of nutrition produces a thicker, more robust fibre than when poorly fed. Conclusive methods of determining variations in the rate of growth are not yet forthcoming, but we can in some measure determine changes in the vigour of growth by measurements of the thickness of the fibres. We are not now concerned with the obvious "breaks" in wool, due to serious drought or illness.

The method adopted has been to measure the diameter of a short length of a large number of fibres taken from three different levels of a staple. These are cut from near the base, middle, and top of the staple, as shown in Fig. 1, and each series mounted separately for examination under the microscope, the ocular divisions representing $2 \cdot 5\mu$. More than three levels could be taken, but it is presumed the number will serve for most purposes. Five hundred measurements in all are made, one hundred and sixty-seven from each of the levels, one being omitted. As a preliminary test seven samples of wool have been taken, and numbered I. to VII. They are represented in Fig. 2. The mean of the measurements from each of the three levels is given in the accompanying table. Other details, such as the length of the staple, the number of crimps to the inch, and the estimated quality counts, are also added.

Table Showing the Mean Diameter of Parts of the Fibres taken from Seven Samples of Merino Wool, at the Top, Middle, and Base of the Staple ; also the Average of the Three Measurements, the Length of the Staple, the Number of Crimps to the Inch, and the Quality Counts.

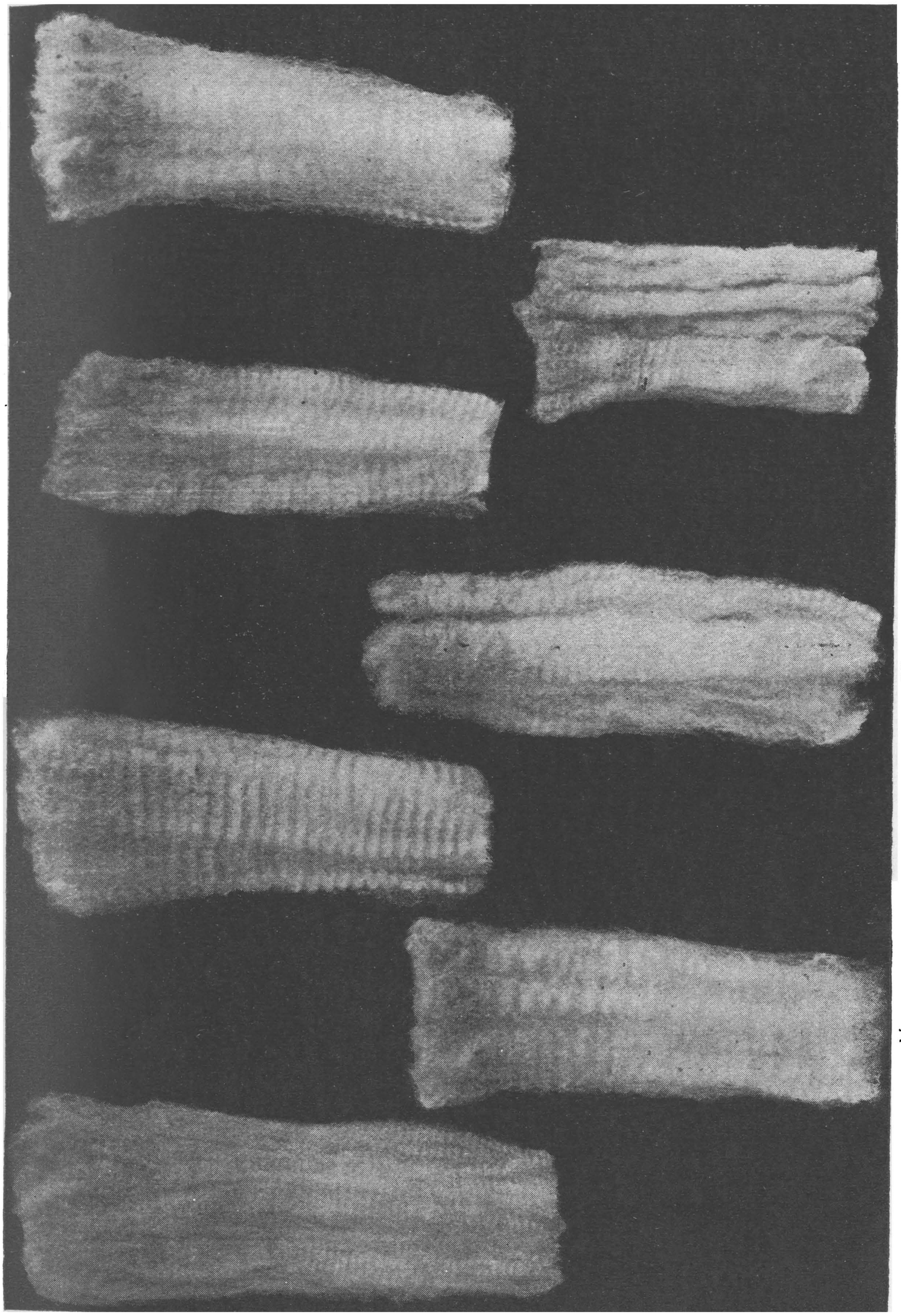
Sample	I.	II.	III.	IV.	V.	VI.	VII.
Top	21·5	24·6	21·7	22·3	24·1	14·6	14·5
Middle	20·6	23·3	21·6	25·2	27·6	14·9	14·1
Base	21·2	21·3	21·4	21·2	19·1	13·2	13·1
Average	21·1	23·1	21·6	22·9	23·6	14·2	13·9
Length of Staple ...	4 in.	3·5 in.	4·5 in.	3·5 in.	3·5 in.	4 in.	2·75 in.
Crimps	15	11	11	9	9	12	13
Quality Counts ...	64's	60's	64's	60's	60's	60's	80's

The seven samples suffice to show that *the fleece of the merino rarely grows uniformly throughout the twelve months.* As represented by the diameter of the fibres at different heights, the vigour varies from time to time, presumably as a result of variations in the conditions. In addition, the figures justify certain conclusions. In Sample III. the measurements are practically the same at the three levels, namely, 21·7, 21·6, and 21·4 microns. It may be presumed that in this case the vigour of growth was uniform throughout the whole of the twelve months. Samples I., II. and VII. are slightly thicker at the first stage of their growth, the top, than later; while Samples IV., V., and VI. show the strongest growth in the middle, most marked in Sample V. A result of some fundamental importance also emerges, namely, that with the exception of Sample I. the figures show that *in all cases the thickness at the base is the least.* In other words, *the growth of the fleece is less vigorous towards the end of the season than at any other period. The wool towards the bottom of the fleece is the finest.* In a previous paper we have already shown that single fibres differ in diameter at different levels, and therefore that single measurements are only an approximation to the diameter as a whole.[1]

It is manifest that the method of examination given above can supply valuable information as to the vigour of growth of the fleece at different periods and under different conditions. Unfortunately, however, little or nothing is known of the conditions under which the particular samples were grown, and therefore how far the variations in thickness correspond with changes undergone by the sheep. Thus, in the case of Sample III., it is desirable to know if the sheep was grazed under fairly uniform conditions throughout the year, such as is possible under the paddock system;

FIG. 2

I II III IV V VI VII



The seven staples of wool from which the samples were taken for examination. Numbers arranged from left to right. No. I., from Mr. S. Rubidge, Wellwood, Graaff Reinet. Tasmanian stud ewe.—Nos. II. to V., from Messrs. Hinton and Bell, Sydney; II., Australian stud ewe; III., Coonamble Experiment Station, ewe; IV., stud ewe from Bundemar; V., stud ram from Triangle Experiment Farm (Australia); Nos. VI. and VII. from Mr. A. Wright, Highlands, South Africa; VI., imported stud ram; VII., finest Highlands wool.

or whether, in the case of Samples IV. and V., the veld improved about the middle of the period of growth, and went off again towards the finish. The finer growth towards the base in all the samples but one unquestionably represents a less vigour towards the end of the season, before shearing takes place, probably associated with winter conditions.

It is clear that the method can be of great practical service to the farmer in comparing the fleece under different conditions, say as regards the supply of food, the nature of the veld, the district or elevation, the period of the year. Sheep are changed from one set of conditions to another, or are moved from one district to another; the farmer would like to know whether the character of the wool undergoes a corresponding change, and to what degree. Not too much importance can be attached to results founded upon such a small number of samples; but sufficient is disclosed to encourage further studies. Endeavours will now be made to procure samples from fleeces grown under well authenticated differences of condition.

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ABSTRACTS

1—FIBRES AND THEIR PRODUCTION

(B)—Animal

Ryeland Sheep and Wool. W. H. Woodcock. *Wool Record*, 1927, **31**, 793.
A short summary of the history of the Ryeland sheep in England is given. The original Ryeland was a small sheep with fleece of a few pounds of exceedingly good, fine, silky wool. The fleece is remarkably free from black wool, and has been regarded as one of the finest products of the British Isles. It is deep in staple, thickly set on the skin, firm in the hand, lustre and character being exceedingly good. Herefordshire is the aboriginal home of the Ryeland. In New Zealand and Australia the breed is in great demand, not only for its carcase, but for its wool. Ryeland crossbreds are considered profit-earning stock, and have been exported to New Zealand since 1901, being bred and reared very successfully there.
—B.R.A.W. & W.I.

Effect of Sunlight on Wool. *Text. Rec.*, 1927, **44**, No. 528, 67.
Sun bleaches the colour out of the wool, and when examined under the microscope it is seen that the characteristic scaly structure has been destroyed. When wool ends, either those which are found as such in nature, or which are produced by exposure of wool to light, are subjected to the action of a tenth normal sodium hydroxide solution, they swell up at once, begin to curl and form all sorts of figures. Hairs which have been subjected to polarised light exhibit normal double refraction, while those which have been under the action of sunlight have lost this property entirely. Method of determining the difference between solubilities of light-exposed and non-light-exposed wool is described. Natural colouring matter protects the wool from the action of the sun, as is shown by tests on three samples, brown, grey, and white. The sun's rays have to decompose the colouring matter before they have any action on the wool itself. The effect of chemicals on wool during the time that the sunlight is exerting its action is interesting and important, and is dealt with in this article. Tests were also made to determine effect of sun's rays on wool that is exposed under a glass plate, and also how light-exposed and non-light-exposed wool dyes.
—B.R.A.W. & W.I.

Utilisation of Anapha Silks. *Silk* (N.Y.), 1926, **19**, No. 9, p. 47 (from *Lyons Bulletin*).
A great deal of research has been carried out on the wild silk moths, Anaphæ, found in Africa, especially in French Congo. Experimental stations are being established, and the position has a favourable outlook.
—F.G.P.

South African Lambs' Wool. *Wool Record*, 1927, **31**, 595.
Merino lambs' wool is very suitable for blending with mungo, shoddy, or cotton for woollen manufacturing purposes. Its "springy" nature persists through each process. Cape lambs' wool is very different from Australian in style and character, though the quality is about the same. Complete absence of burr and shiv is one reason why the superior West Victorian lambs command such excellent prices. Samples of lambs' wool from Natal have been examined with great interest; some are bright and more attractive than others, but they will all come a good colour. Samples of lots 180, 181, 182, 183, 184 have been examined, and conclusions drawn from this examination are given.
—B.R.A.W & .W.I.

Wool: Chemical Decomposition of, at 100° C. J. L. Raynes. *J. Text. Inst.*, 1927, **18**, T46-T47.

Wool and Fleece; New Method for Determination of Fineness of——. J. A. F. Roberts, *J. Text. Inst.*, 1927, **18**, T48-T54.

Wool Fibre; Gel Structure of——. (C) S. A. Shorter and J. B. Speakman. *J. Text. Inst.*, 1927, **18**, T78-T81.

Wools; South American. H. Kenningham, *J. Text. Inst.*, 1927, **18**, T81-T98.

(C) Vegetable

Pima × Acala Cotton Hybrid: Shedding Factors. T. H. Kearney and R. H. Peebles. *J. Agric. Research*, 1926, **33**, 651-661.
An interspecific cotton hybrid Pima Egyptian x Acala Upland, was studied for the purpose of ascertaining whether genetic factors are involved in the shedding of the flower buds and the young bolls (abscission before and after anthesis). Comparisons of populations representing the parental types showed practically no difference in the mean percentage of bud shedding, but a consistently much higher rate of boll shedding in Acala than in Pima. In both the first and second generations the hybrid gave a much lower mean percentage of bud shedding than either parental population, while the mean percentage of boll shedding in the hybrid of both generations was between the mean percentages of the parental types. Comparing the two generations of the hybrid, the mean shedding percentage, both of buds and of bolls, was about twice as great in F_2 as in F_1, and the differences were very significant. The work affords evidence that there are genetic factors for shedding which segregate and recombine in the usual manner.
—B.C.I.R.A.

Cotton Plant: Correlations of Characters. T. H. Kearney. *J. Agric. Research*, 1926, **33**, 781-796.

The paper brings together in a convenient form all available information regarding the correlations existing among the characters of the bolls, seeds, and hair of cotton. Recent work carried out in Arizona includes the computation of the coefficients of correlation on 224 individual bolls borne by 50 plants of Pima Egyptian cotton in 1925 for all possible combinations of the characters, seed-cotton weight per boll, hair weight per boll, lint percentage, lint index, number of seeds per boll, mean weight of the individual seeds, boll length, boll diameter, and boll index, a total of 36 pairs of characters. —B.C.I.R.A.

Cotton Worm: Occurrence in West Indies. *Tropical Agric.*, 1926, **3**, 246.

The larvæ of the moth *Alabama argillacea* has been unusually abundant during the closing cotton season. In St. Kitts and Montserrat, where cotton was planted in March, the young plants were attacked from April onwards; in Antigua and in St. Vincent, July planted cotton was attacked in August. It is believed that the attacks of each season are the result of invasion of the moths by flight from South America, a known impulse of the particular moth being to fly north.

—B.C.I.R.A.

Cotton Hair and Yarn: Breaking Load. S. C. Harland. *Tropical Agric.*, 1927, **4**, 8-9.

In criticising a recent paper, the author states that, given careful sampling and adequate standardisation of working conditions, the mean breaking load of a sample of cotton can be determined, and in spite of variations in the proportion of abnormal or weakened hairs the value can be obtained as many times as is necessary by repetition. The author sees no reason to change from 1 cm. pieces to whole hairs in the determination of breaking load, and he criticises the conclusion that the relation between breaking load and wall thickness is "not very definite," stating that the diagram is a typical correlation surface exhibiting high positive correlation.

—B.C.I.R.A.

Swollen Ramie Fibres: X-Ray Structure. J. R. Katz. *Z. Physikal Chem.*, 1926, **124**, 352-358.

Röntgen spectra are reproduced for ramie fibres after swelling in caustic soda solutions (14% and 16%), after swelling and extraction with alcohol (Gladstone's alkali-cellulose compound), after mercerisation, and after swelling with solutions of zinc chloride and of potassium thiocyanate. The experimental method is described and the X-ray readings given in detail; the results will be discussed in a later communication. —B.C.I.R.A.

(D)—Artificial

Alkali-Cellulose: Ripening. D. Krüger. *Cellulosechem.*, 1927, **8**, 1-3.

The viscose "pre-ripening" process, i.e., the change undergone by the mercerised cellulose on standing before treatment with carbon disulphide, was examined by a method based on the knowledge that during "pre-ripening" the cellulose particles diminish in size, and on the discovery that, on careful nitration, the particle size of the solution of nitrocellulose in acetone is determined by the particle size of the cellulose. It is shown how the viscosity of the nitrocellulose solution decreases with increasing time of ripening of the alkali-cellulose used, and that the viscosity corresponding to a definite stage of ripening depends only on the conditions of nitration. A standard method of preparing the nitrocellulose from the mercerised sample and determining its viscosity in acetone solution is described, the viscosity reading giving an empirical numerical expression for the degree of ripeness of the alkali-cellulose.

—B.C.I.R.A.

Alkali-Cellulose: Composition. E. Heuser and R. Bartunek. *Cellulosechem.*, 1926, **7**, 169.

In reply to Hess, the authors maintain that there is no evidence of the existence of a compound $C_6H_{10}O_5 \cdot NaOH$ resulting from the absorption by cellulose of caustic soda from concentrated solutions (35-50 per cent. NaOH). A microscopic examination of the swelling of cotton hairs in alcoholic caustic soda solutions of 20 per cent. NaOH concentration and 0, 5, 10, 15, and 20 per cent. alcohol content led to the conclusion that de-swelling of the hair in the presence of alcohol is not what occurs. Active swelling, and therefore according to Hess a loosening of the micellæ, takes place, which, in low alcohol concentrations is favourable to chemical reaction. At low alcohol concentrations the compound $(C_6H_{10}O_5)_2$ NaOH is formed. The swelling is certainly less than in pure aqueous caustic soda solutions, and that because addition of alcohol diminishes the ion hydration which determines the degree of swelling. The formation of the compound named is only hindered when the alcohol has so far repressed the dissociation of the sodium hydroxide that insufficient ions are present for the formation of the compound.

—B.C.I.R.A.

[Cellulose] Acetate Silk. *Text. Argus*, 1927, **3**, No. 133, p. 6.

A survey of its technical properties.

—A.J.H.

Cellulose Acetate Artificial Silk: Manufacture and Dyeing. R. O. Herzog. *Papier-Fabr.*, 1927, **25**, 17-18 (Verein Zellstoff Ingenieure Section).

The author discusses briefly the individual steps in the production and dyeing of cellulose acetate artificial silk filaments from cotton or wood cellulose, basing his views on the experimental work of Wolff and von Frank, on particle size determinations by Fr. Krüger, and on X-ray measurements made by Jancke. —B.C.I.R.A.

Cellulose Acetate Solvents. A. Noll. *Papier-Fabr.*, 1927, **25**, 65-73 (Verein Zellstoff Ingenieur Section).

Structural formulæ, trade names, and physical properties are given for a number of the high boiling esters, acid amides and anilides which are replacing acetone and amyl acetate as solvents and plasticising agents for cellulose acetate, celluloid, &c. —B.C.I.R.A.

Viscose Ripening. O. Faust, E. Graumann, and E. Fischer. *Cellulosechem.*, 1926, **7**, 165-166.

The authors have worked out a modified Jentgen method for determining the degree of ripeness of viscose. The special features are the rapid addition of acetic acid to the very dilute viscose solution, care being taken to avoid more than the slightest excess; the immediate addition of iodine solution in a time of 5-10 seconds; and a fixed reaction time of 30 minutes before titration with sodium thiosulphate. The difference between this decomposition with acetic acid and that obtained with sulphuric acid gives the degree of ripeness of the viscose. The method is claimed to give consistent results; to permit of the determination of both degree of ripening and trithiocarbonate content, and to be suitable for works control. Experiments in which acetic acid was replaced by acids of lower dissociation, such as nitrophenols, which might attack the thiocarbonate but not the xanthate, gave negative results. —B.C.I.R.A.

Viscose Silk Manufacture. —. Bayer. *Melliand's Textilber.*, 1927, **8**, 82-83 and 153-157.

A critical survey of the literature, considering especially the patent literature of the last 10 years, relating to the subsequent treatment of freshly spun viscose silk. The processes include washing, drying, desulphurising, bleaching, sizing, treatments to confer special properties, such as increasing the wet strength, fireproofing, &c., and the production of staple fibre. —B.C.I.R.A.

Artificial Silk Filaments: Swelling and Extensibility. W. Weltzien. *Melliand Textilber.*, 1926, **7**, 1034-1039.

The connection between swelling in the direction of the axis in artificial silk filaments and their extensibility in the dry state is discussed in detail, and its validity within wide limits shown. The principal differences between reversible (water) and irreversible (caustic soda) swelling processes are indicated anew. It is shown that the conditions in the substantive and basic dyebaths correspond to those of reversible swelling. Mechanical pre-treatment (extension) effects changes in the extensibility and swelling in the direction of the axis, which are, however, eliminated to a large extent by subsequent swelling in water and drying without tension. In particular the original extensibility is almost entirely reattained. There remains, however, a certain lengthening of the filament which is not large if the filament has been originally extended in the dry state, but which increases considerably if the filament has been subjected to tension while wet. There is thus a fundamental difference between extension in the dry and wet conditions. It is shown how all the observations described can be satisfactorily explained by the modern conception of the fibre as an inhomogeneous substance composed of crystallites or primitive fibres. The utility of the results in connection with the manufacture and working of artificial silk is discussed. —B.C.I.R.A.

Artificial Silk: Strength and Elasticity. A. Rosenzweig. *Melliand Textilber.*, 1927, **8**, 114-115 and 201-202.

The strength, elastic properties, and resistance to rubbing of artificial silk are discussed and briefly compared with those of cotton, wool, and silk, and it is shown that the problem of the future is to increase the resistance to rubbing, not the tensile strength, of artificial silk, and to make it less extensible but more elastic, and more flexible. —B.C.I.R.A.

Artificial Silk: Swelling. O. Faust and K. Littmann. *Cellulosechem.*, 1926, **7**, 166-168.

The swelling curves of Weltzien have been utilised to examine and rectify artificial silk goods returned to the manufacturer as faulty. Curve (1) shows the course of swelling which a Travis yarn has undergone in the cycle: dry$>$water$>$caustic soda$>$water$>$dry. The cycle was performed twice in each case, giving two curves. Curve (2) shows the swelling effect obtained with a yarn which has been loaded when dry with 100 grams. The swelling in the first treatment was abnormally low but was normal in the second treatment, showing that a swelling treatment may rectify yarns giving dyeing or lustre faults due to abnormal tension. Curve (3) shows the swelling effects obtained with yarns which have been treated with acids, alkalis, or salts of known concentration. Curve (4) shows the swelling effects obtained with highly bleached yarns. —B.C.I.R.A.

Acetate Silk: Recent Progress [in its Treatment]. A. J. Hall. *Times Trade and Engineering Suppl.* (Artificial Silk Number), 1927, **20**, 2nd April, p. 9.

A summary of recent processes for modifying or preserving the lustre of cellulose acetate silk. Cellulose acetate silk present in natural silk materials is not adversely affected during degumming with boiling soap solutions provided that relatively large quantities of potassium salts are present. —A.J.H.

Artificial Silk Manufacture. F. W. Sturtevant. *Text. World*, 1927, **71**, 319.
Recent technical developments in the manufacture of artificial silk are reviewed. —B.C.I.R.A.

PATENTS

Cotton Linters Cellulose: Preparation. F. Olsen. U.S.P.1,615,343. (From *Chem. Abs.*, 1927, **21**, 822.)
Cellulosic material such as cotton linters is steeped in an acid bath such as a 5-10 per cent. hydrochloric acid or sulphuric acid solution and the bath is heated and the steeping continued at a raised temperature, which may be about 40-60°, until optimum physical disintegration of the fibre and minimum hydrolysis have been effected. The product is suitable for producing cellulose solutions and derivatives. —B.C.I.R.A.

Cellulose Acetate: Manufacture. L. A. Levy, Cricklewood, and O. Silberrad, Buckhurst Hill, Essex. E.P.265,267.
Cellulose, preferably air-dried to contain 6-7 per cent. moisture, is treated with acetic anhydride and acetic acid in the presence of a compound of chromium but without the employment of a condensing agent. The chromium compound may be added as the acetate, sulphate, nitrate, butyrate, benzene sulphonate, naphthalene sulphonate, chloroacetate, carbonate or hydrated oxide. In an example, chromium acetate is used as the catalyst, and the cellulose is in the form of air-dried tissue paper prepared from pure cotton; the mixture is heated under a reflux apparatus. The product is soluble in chloroform, but it may be subjected to processes for varying the solubility. If carried out at 100° C. the acetylation has necessarily to be prolonged. —B.C.I.R.A.

Cellulose Benzoate: Purification. W. Carpmael (I. G. Farbenindustrie A.-G., Frankfort-on-Main). E.P.265,491.
Crude cellulose benzoate is purified by mixing or malaxating with a water-soluble salt such as common salt or other alkali or alkaline earth salt, so as to convert the original gummy material to a moist friable mass; the benzyl alcohol and benzyl chloride are extracted by a suitable solvent and the extracted products are washed with water. —B.C.I.R.A.

Artificial Silk Spinning Apparatus: Description. Syntheta A.-G., Zurich. E.P. 265,577.
The solvent is recovered in spinning artificial silk by passing the threads into a chamber heated to a temperature above the boiling point of the solvent and enclosing a heated atmosphere consisting of the vapours of the solvent evaporated from the threads. The threads are projected from nozzles arranged in the roof of a chamber heated by steam pipes and are collected on spools. The concentration of the solvent in the atmosphere of the chamber is maintained constant by withdrawing vapour from the latter and passing it through a condenser, uncondensed vapour being returned to the chamber. The withdrawal and return of the vapour is effected through perforated pipes. —B.C.I.R.A.

2—CONVERSION OF FIBRES INTO FINISHED YARNS

(A)—PREPARATORY PROCESSES

Preparation of Skin Wool: Modern Fellmongering Processes. A. W. Lawrence. *Wool Record*, 1927, **31**, 662.
For the process of detaching the wool from the skin, slaked lime was employed and later a mixture of lime and arsenic, but both these have a destructive effect on the wool. Sulphate of sodium has for many years been used, and was at one time thought to be an ideal substance, but this also penetrates into the wool and is harmful in the scouring and dyeing processes. The old method of drying also caused many defects, but the modern steam-drying machine, which is generally used now, has remedied many of these. The fellmonger must consider whether the pelt or the wool has the most value and work accordingly. The skins are first soaked in clean, cold water for 24 hours. The hard brittle skins and the wool become soft and all that adheres to it is in part dissolved. In order to clean the wool, the skin is passed through a burring machine, with the object of freeing them from burrs and vegetable matters; the earth and other impurities being washed out at the same time by a stream of water. The burring machine and its use is described. The skins are then sorted and the wool separated from them. The skins are then treated to bring them as nearly as possible to their normal softness. —B.R.A.W. & W.I.

Oil and Wool. W. F. Vickers. *Wool Record*, 1927, **31**, 222.
The following items were discussed—(1) Question of the sulphur contained in the wool; (2) The firing risks of greasy wool; (3) Difficulties occurring with skin and carbonised wool. The history of various types of wool lubricants, and the oils at present available, referring to certain tests for their selection for use on wool, was dealt with. Examination of the question of the effect of fatty acids on wool was made. The ideal wool lubricant was suggested as one which would combine the richness and fatness of olive oil, with certain of the good scouring qualities of distilled cloth oil. Theory of scouring was dealt with, reference being made to the necessity of continually watching the strength of the scouring liquors. —B.R.A.W. & W.I.

Satisfactory Wool Mixing. C. Eder. *Text. World*, 1927, **71**, 1584.
Proctor and Schwartz ceiling suction condenser which was originally designed

for removing dust from cotton waste, and which in many mills has replaced the blow room, has made wool mixing a satisfactory process. The condenser for use in woollen mills is described in detail and illustrated in this article. How it is used and the results obtained are also given.
—B.R.A.W. & W.I.

Fine Roving: Advantages. M. Dilling (Arkwrights Inc.). *Text. World*, 1927, **71**, 339.
In a test made to determine the effect of three or four processes of roving in spinning a 60's combed yarn from 1⅛ in. cotton, it was found to be an advantage to spin from fine roving instead of jack roving, irrespective of the omission of one process of roving.
—B.C.I.R.A.

Rectilinear Combing. "Brompton." *Text. Rec.*, 1927, **44**, No. 528, 51.
This form of combing is used largely on the Continent, although in England there seems to be much hesitancy on the part of the woolcombers to adopt it. Both have, however, an explanation: the one for using it, and the other for not using it. In England combing is done in order that the tops may be processed on English drawing and spinning machines, and the combs used have no rival for this specific purpose. On the Continent they comb for porcupine drawing and mule spinning. and the rectilinear is the only comb which will convert into tops some of the wools used. The machine is described with illustrations, also its method of use and the results obtained are given. B.R.A.W. & W.I.

Carding Engines and Condensers. —. Reed. *Scotch Tweed*, March 1927, p. 197.
The basic principle of the wool carding engine is the same, but its development has given the greatest variety. Different combinations with their feeders and condensers can be regarded as distinct, and are so well defined geographically that a textile machinist can almost invariably select a specification acceptable to his clients. Various qualities of wool and nature of goods to be produced require different treatment, which must be taken into account. In this article the Continental system is described in detail, mention being made where it differs from the German and English systems. B.R.A.W. & W.I.

Carding Engine; Theory of——. A. Haussner. *Melliand Textilber.*, 1926, **7**, 662-664, 823-825, 907-908, and 997-999.
The author develops his theory of the working of the carding engine, in greater detail than in his previous publication.
—B.C.I.R.A.

Combined Ring Spinning and Carding Machine. W. Heinrich. *Melliand Textilber.*, 1927, **8**, 11-12.
The machine, which is designed for very small works, comprises a card with feed table, feed cylinders, licker-in with stripping knife, iron cylinder with three pairs of workers and clearers, doffer, doffing comb, web divider with rubber and roving guide, and the ring spinning frame with intermittent working, revolving or stationary drafting rollers between which are arranged revolving tubes for obtaining false twist and attaining a higher draft. The output of the machine varies according to the count of the yarn from 2·0 to 0·15 kg. per spindle for 8 hours working for metric counts of 2 to 25. The machine may be driven by a one or one and a half horse-power motor. The manufacturers are the Norddeutsche Textilmaschinenfabrik, Pollnow. Larger combination machines have been designed. —B.C.I.R.A.

Wool Lubrication Problems. W. F. Vickers. *Text. Merc.*, 1927, **76**, 246.
Summary of a lecture on "Wool Oils" given at the Dewsbury Technical College, which stressed the necessity of the wool fibre being thoroughly cleaned before carding and spinning, but as it would be difficult to work in that condition, oil is applied for lubrication. It is essential that the oil be scoured out of the wool, but scouring is secondary to lubricating. Details of various oils and the trouble that might arise in carding from the use of unsuitable oil was explained. The history of wool lubrication was traced and a description of methods of testing oils and of applying oils to wool was given.
B.R.A.W. & W.I.

Oiling of Wool. G. F. Pickering. *Scotch Tweed.* March 1927, p. 206.
On both physical and chemical grounds the oiling of wool is a subject which will have to receive much more attention than has yet been given to it, if the many questions have to be solved which at present have no answer. Oil used for oiling wool must not be considered merely as a lubricant (it has to be scoured out later), although lubrication is an essential part of wool preparation. In the old days olive oil was considered to be above reproach, but now a better oil than this is asked for. In this article oiling is considered from the physical point of view only.
B.R.A.W. & W.I.

Blow Room Pneumatic Conveyor System. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 8-9.
A description of convenient blow room conveyor mixing and dust removing installations suitable for treating short, middling, and long staple cottons is contributed from the author's practical experience. —B.C.I.R.A.

Inter-roving Frame. John Hetherington and Sons Ltd. *Text. Mfr.*, 1927, **53**, 20-21.
The machine described does the work of both the intermediate and roving frames. The improvements embodied in the frame can be classified broadly in two categories: (1) a patent double or duplicated arrangement of drawing rollers by which the frame

has as much drawing capacity as would be obtained in the usual manner of using an intermediate followed by a roving frame; (2) a series of detailed improvements which increase the spindle speed by at least 30 per cent. Actually the frames in use in several mills are being run at 1,650 r.p.m., instead of the 1,100 r.p.m., usual with roving machines. —B.C.I.R.A.

Self-lubricating Spindle for Worsted Roving Frames. *Text. Mfr.*, 1927, **53**, 54.

It has long been a desire amongst worsted spinners to increase the somewhat low spindle speeds, with a view to effecting some reduction in cost of yarn production. There is therefore considerable interest in the recently patented method of mounting and lubricating the spindle; which has permitted a large increase in the speed at which the roving spindle can now be run. A general view of the worsted roving frame together with description and method of working is given.

B.R.A.W. & W.I.

Wool Preparation; English System of——. A. Poncelet. *Text. Merc.*, 1927, **76**, (1) 210, (2) 267, (3) 348, and (4) 408.

(1) The English system of preparation is suitable for working successfully all wools from about 4 in. in length to the longest wool. In order to obtain a roving suitable for spinning certain counts of yarn, the tops must be passed through a number of machines generally known as "a set of drawing," which varies in number of operations according to the fineness of wool, and weight or thickness of roving required. The machines used in "open" or English system of drawing are of three types—gill boxes, drawing boxes, and roving frames. The aims of gilling, description of two kinds of gill boxes and their work, are given; also the principle of drawing boxes and roving frames.

(2) During recent years the ring roving frame has again come into use; a description of this type of frame and its work is given in this article. Drag and twist are important and there is a direct relationship between them, because the more twist the sliver possesses the harder the drag can be. Two items must be taken into account for dragging, namely, the distance from the twizzle at the bottom of the flyer arm to the barrel of the empty bobbin, and the diameter and weight of the bobbin, both of which increase as the sliver is wound on the bobbin. If the twist is too slack and the drag is too hard there will be difficulties at the two points mentioned above. If the drag is too light the bobbins would not be filled to their full capacity. The reason for putting twist into the sliver is not only to enable the latter to be wound on to a bobbin, but also to control the fibres during drafting. Method of inserting twist in the sliver and a system of checking the weight of the various slivers (this enables a roving of fixed weight to be obtained) is given.

(3) Spinning has for its aims to reduce the roving diameter to the required thickness of yarn; to apply suitable twist to drafted roving and to wind the yarn in a suitable form for further use. There are three types of spinning frames used in the English system of wool preparation—(1) Flyer spinning frame. (2) Ring spinning frame. (3) Cap spinning frame, all of which are described in this article. Drafting on these three machines is described in detail, also the doffing motion. Individual drive is used in modern mills and gill boxes and roving frames can also be driven by an individual electric motor, although this has not found as much favour as the driving of a set of drawing by one or two motors by means of line shafts. Four distinct types of twisting frames, the first of which is described in detail in this article, are—(*a*) Twofold twisting frame. (*b*) Universal twisting frame. (*c*) Roller twisting frame. (*d*) Twisting frame for producing fancy yarns.

(4) Four distinct types of twisting frames are in general use, namely (*a*) Twofold twisting frame, (*b*) Universal twisting frame, (*c*) Roller twisting frame, (*d*) Twisting frame for producing fancy yarn, were mentioned in the last article. A description of the first was started and is finished in this article together with a detailed description of the other three. The particular branch of the spinning trade will naturally control the type of machine the spinner will require, as different types of wool need different types of machines, and so a spinning plant can vary considerably in types of machines used, and in the details of the same. The sets of drawings, however, can be divided into four different classes, namely—(*a*) Botany set of drawing. (*b*) Fine crossbred set of drawing. (*c*) Low crossbred set of drawing. (*d*) Set of drawing for long wools, all of which are described in this article. —B.R.A.W. & W.I.

Drafting; Experiments in Wool——. S. Kershaw. *J. Text. Inst.*, 1927, **18**, T128-T134.

(B)—Spinning and Doubling

High Draft Mechanism. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 408-409.

The top middle roller consists of a metal core surrounded with a highly elastic casing. The flexibility of the casing is the essential feature of the system for under the influence of the weight of the roller and a supplementary weight it is compressed and presses on the lower roller for a large part of its circumference. By this means a "nipping line" is formed, the distance between the end of which, adjacent to the front rollers, and the front rollers is less than in any other system; it can be less than the mean staple length of the cotton. Further, the roving is controlled for a good length and the pressure on it is low due to the elasticity of the casing. A stop at both sides of the casing limits this pressure. Experiments with the system have shown that the best draft for a cotton of 28-29 mms. staple is between 18 and 20.—B.C.I.R.A.

Asch-Solveen High Draft System. F. Engelmann. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 451-453.
The defects of the early Asch-Solveen three-cylinder drafting system and the methods by which they were rectified are described. The author maintains that the perfected system is the best of all three-cylinder (drawing as opposed to nipping) drafting systems but admits that it cannot compete with three-cylinder (nipping) systems, with four-cylinder systems with weighting saddles nor with leather-covered drafting members. —B.C.I.R.A.

High Draft Systems: Spinning Data. J. Kuster. *Rev. Text.*, 1924, **22**, 849-857 and 1169-1183.
The author reviews the theory of high drafting in cotton spinning, and describes the Casablancas, Heuser-Staub, Oscar Gibello Palazzo, and Jannink systems. The paper is of interest for the section dealing with practical applications of high drafting, in which numerous statistical data are supplied to show the superiority of high draft over ordinary systems of drafting. —B.C.I.R.A.

Woollen Spinning on the Mule. J. Burns. *Text. Mfr.*, 1927, **53**, 79.
Spinning on the self-actor woollen mule is a compound process of drafting and twisting, the aim being to reduce the condensed sliver to fine counts and impart sufficient twist to make a compact thread suitable for weaving. On account of the complex nature of the machinery, the great variety of wools employed, and also yarns of similar counts being made from wools of totally different characteristics, hard and fast rules cannot be laid down. The process may be placed under two headings—(1) Direct spinning—condensed to about five-eighths of the required count and drafted out to the actual count from condenser bobbins. (2) Condensed to about seven-sixteenths of the actual count and drafted out in two stages on the mule. First stage, drawing or slubbing; second stage, spinning. Reasons for drawing and spinning are given and the processes are described. Five important factors which have a direct bearing on the draft and twist are discussed. —B.R.A.W. & W.I.

Mule Quadrant: Theory. F. Engelmann and A. Baumann. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 409-410 and 453-455.
The function of the mule quadrant, and the effect of incorrect quadrant adjustment on the form of the cop are discussed. —B.C.I.R.A.

Mule Copping Plates: Curvature. O. Thiering. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 31-32.
The functioning of the copping plates of the mule in relation to the guide rail and thread guide is discussed and the correct shape of the plates deduced theoretically. —B.C.I.R.A.

Mixed Fibre Yarns: Doubling. W. Mayr. *Melliand's Textilber.*, 1926, **7**, 999-1000.
Simple formulæ are established connecting (1) the percentage amount of cotton and other textile fibre in a mixed doubled yarn with the count of the component yarns; (2) the permissible moisture content of a mixed double yarn with the specific regain of the component fibres and the counts of the component yarns. —B.C.I.R.A.

Lace Yarns: Doubling. H. Ankers. *Text. Merc.*, 1926, **75**, 670-671, &c.
In a paper on cotton doubling as applied to the lace trade, the author dealt with the character, twist, breaking load, &c., of doubled yarns required for warp and bobbin threads in the three main branches of lace making, namely the valenciennes, the lace curtain, and the plain net sections. Subjects especially needing investigation are (1) the preparing of yarn without putting it into hank or the adoption of a thread which obviated the necessity of this process; (2) a new method of warping; and (3) a spool thread that would not slip when used as a throw thread. —B.C.I.R.A.

"Bryolt" Yarn Guide. Premier Spindle and Flyer Co. Ltd. *Text. Merc.*, 1927, **76**, 42.
The complete fitting consists of a set of simple yarn guides fitted with very easy running porcelain rollers, and is intended to be fixed to the ordinary twisting or doubling frame instead of the usual pot eyes, &c. The running guides do not become grooved or cut so that the yarns are not roughened or broken. —B.C.I.R.A.

Slub Catcher for Silks and Rayon. *Silk* (N.Y.), 1926, **19**, No. 9. p. 42.
An improved device is described which is small and easily attached to any machine. Graduated plates are quickly inserted, two being used instead of one with adjustable jaws. This also prevents tampering. —F.G.P.

Rubbers and Rubbing Motions: Prevention of Faulty Yarn. *Wool. Record*, 1927, **31**, 608.
Tandem rubbers are generally used for ring doffer condensers, dealing with Cheviot and crossbred wools which require to be well rubbed. They may, however, be used for all ring doffers whether for fine, medium, or coarse wools. The newer type of eccentric motion admits of a much quicker speed stroke than is possible with the older methods of driving; this of course cannot be increased above a certain point without causing excessive vibration and depreciation. Rubbing of fine wools is very important, as it influences the spinning properties to a great extent, but as only slight rubbing is required, the single rubber arrangement is used. More difficulty is experienced in rubbing lofty and

springy wools, and when carding heavy counts of Cheviot it is often necessary to have a maximum amount of rubbing on both pairs of rollers. The setting of the rubbers to each other also influences the amount of rubbing given to the material. The actual setting varies for different qualities so no definite rule can be given. With tape condensers the method of dividing the material is entirely different from that of the ring doffer, and care must be taken not to set the stripping rubber too close to the tape, as it tends to stretch the tape and so does not improve the stripping. Method of driving the rubbers of the single rubber tape condenser is the same as for the single rubber ring doffer condenser, except the pulley on the eccentric shaft is double rimmed. Method of cleaning the leathers when they become coated with grease is given.

B.R.A.W. & W.I.

Rubbers and Rubbing Motions. *Wool Record*, 1927, **31**, 224.

In the process of condensing for woollen yarns, it is necessary to bind the fibre together, to take the form of round threads: for this purpose rubber leathers are employed. The threads should be rubbed sufficiently to withstand any slight tension to which they are subjected, but if overrubbed the fibres will set too quickly when twist is being inserted during drawing out operation at the mule. This prevents the yarn being drawn out evenly and faulty yarn results. This, however, can be remedied to a certain extent by the spinner if the mule is altered. There are two types of rubbers which are described, also the method of driving them. The selection of rubbers depends on the character of the material for which it is required. New modern methods of driving are also given.

—B.R.A.W. & W.I.

Spinning Frame Winding Mechanism: Effect on Strength. (1) F. G. Cobb. (2) J. A. Chapman. (Arkwrights Inc., Research Organisation, Charlotte, N.C.). *Text. World*, 1927, **71**, 321.

(1) In comparative breaking load tests on 30's warp yarn spun with a combination warp and weft traverse and with the regular warp traverse, a higher breaking load was given by the combination traverse. The yarn was tested after it had been spooled.

(2) From comparative tests of the breaking load of warp yarns spun respectively with warp wind, combination wind and weft wind, the author concludes that the only advantage in the combination wind is that it is possible to get more yarn on a bobbin than with either of the other winds. There is no significant difference in the breaking loads after spooling, though any slight difference is in favour of the combination and weft winds which give practically the same breaking load.

—B.C.I.R.A.

Fly Frame Rollers: Settings and Yarn Strength. C. R. Harris (Arkwrights Inc.). *Text. World*, 1927, **71**, 321.

Tests were made to determine the end breakage and breaking load in spinning 30's warp yarn and setting the slubber, intermediate and speeder rollers at—staple length of cotton plus $\frac{1}{32}$, $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, and $\frac{3}{16}$ in. A small table shows the differences in settings, and the best lay-out as deduced from the results is indicated.

—B.C.I.R.A.

Ring Spinning and Carding Machine. See Section 2A.

Wool Spinning. See under **Wool Preparation** in Section 2A.

(C)—Subsequent Processes

Coil Spindle for Cones. *Text. Mfr.*, 1927, **53**, 56.

Large fully-wound cones are difficult to detach from their support, especially when they are hard wound or when they contain strong yarn. In order to eliminate this, a patent cone spindle, for use on the cone winding machine, has been constructed. The coil spindle is illustrated and method of working is given. —B.R.A.W. & W.I.

(D)—Yarns and Cords

Yarns: Breaking Load Irregularity. H. Rudolph. *Melliand Textilber.*, 1926, **7**, 843-844 and 1016.

In a criticism of Schlömer's articles the author shows by examples how the application of proposed formulæ leads to fallacious results as to the spinning quality of yarns. —B.C.I.R.A.

Combed Yarns: Identification. W. Bauer. *Melliand Textilber.*, 1926, **7**, 1015-1016.

The author criticises Pichler's method of determining whether a yarn or fabric is made from combed cotton or not. The different process through which the cotton passes, including those in which waste may be added, renders the problem of distinguishing combed from uncombed cotton in a fabric too difficult. —B.C.I.R.A.

Cotton Yarns: Twist Data. P. Luc. *Rev. Text.*, 1924, **22**, 733-771.

From the ordinary spinning formula the author has prepared tables which give direct readings for the twist per metre of cotton yarns of French counts 1 to 120, and for yarn coefficients 1 to 350. To allow for irregularity in the general applicability of the formula, eleven additional tables are given for the theoretical twist with coefficients of certain yarns including (1) yarns made up of cotton or waste of hair length less than 10 m.m. for French counts 0·5 to 5, (2) yarns made up of combed cotton 46/50 m.m. (American) for counts 100 to 200, and intermediate yarns. In each case seven different applications of the yarn are considered, including different classes of warp from slack to extra strong.

—B.C.I.R.A.

Celanese Yarns: Properties. *Text. Merc.*, 1926, **75**, 634.
A pamphlet has been issued by the American Cellulose and Chemical Manufacturing Company specifying some twenty characteristics of Celanese yarns which make them specially useful for all kinds of textile purposes. —B.C.I.R.A.

Artificial Silk Yarns: Mechanical Properties. *Nat. Assoc. Cotton Mfrs., Bulletin* No. 80, Dec., 1926.
A table giving the results of mechanical tests carried out on cuprammonium, nitrocellulose and cellulose acetate artificial silk and including tests of strength, count, structure, and moisture regain. —B.C.I.R.A.

"Sase" Yarn: Properties. Fitchburg Yarn Co. *Text. World*, 1926, **70**, 2912.
The yarn is spun from a synthetic fibre of viscose base and approximates closely in lustre to long-spun silk and in strength, evenness, and elasticity to a combed or high grade carded cotton yarn. Pending the completion of practical tests on the bleaching, dyeing, and finishing of Sase it is stated that it is being warp-dyed successfully. —B.C.I.R.A.

Patents

New Spinning Device. G. Bettini, F.P. 604,873.
This patent refers to a disposal for twisting and winding on to a bobbin. The winding is controlled by the speed of feeding the yarn from the feed source. The speed of rotation of the bobbin being reduced by the action of the air on a device bearing two flyers; the deposit of yarn upon the bobbin is reduced by a rotating yarn-guide, so that the winding on takes place without perceptible tension of the yarn. —Bur. Text.

Reversing Motion for Spindles. I. Riera. F.P.605,251.
This motion is characterised by the use of a group of helicoidal pinions combined with toothed gearings. The mechanism is confined in an oil box provided with a level for ensuring correct engagement and disengagement. There is a group on either side of the frame. —Bur. Text.

Reversing Apparatus for Self-acting Mule. Etablissements Ch. Tiberghien, Tourcoing. F.P.605,562.
This apparatus is fixed on the carriage of the self-acting mule on either side of the winding stock upon the shaft driving the tin rollers. The change in the rotation of the spindles is obtained by means of a pinion with an alternate motion. The driving gears are disposed in a case containing oil with ball bearings for easier running of the driving shafts.—Bur. Text.

Mule Spinning Frame: Driving. Soc. Anon. des Etablissements J. et C. Mommers, Liseux, Calvados, France. E.P.265,198.
In an arrangement for stopping the rotation of the spindles for a period during the commencement of the outward, run a double drive is provided from the countershaft to the rim shaft, one belt controlling the drawing-out of the carriage and the driving of the rollers, and the other belt controlling the driving of the tin roller. The belts are independently movable. —B.C.I.R.A.

Carding Engine Grid. J. Scholes, Oldham. E.P.265,327.
The grid for the taker-in comprises thin steel bars of rectangular cross-section clamped at the ends between notched members and supported along their length by slotted members, which will allow lateral displacement owing to the vibration of the bars. The lower member is displacable to adjust the inclination of the bars. The upper member, which is provided with rectangular notches, is secured by screws over the gap in the side support. The lower member, which is provided with curved notches, is secured by screws passing through curved slots. The grid bars are bevelled at their upper edges and the spacing is controlled by omitting bars from some of the notches. The central supporting member is suspended from the cross supports and is adjustable similarly to the lower member. An upper notched member may be provided to co-operate with the central supporting member. —B.C.I.R.A.

Spinning Frame Roller Drawing Head. J. Marshall, Oldham, A. Fitton, Royton, and G. H. Lawton, Oldham. E.P. 265,335.
The second top roller of the drawing apparatus of mules and ring frames is of smaller diameter than the bottom roller, for example, $\frac{5}{8}$ of an inch and its centre is advanced relatively to the centre of the lower roller, the front top roller being substantially of the same size as the front lower roller. In existing machines the trunnions of the second top rollers are reduced so that there is considerable play in the bearing slots and the rollers are drawn forward into the required position by the fibres, but in new machines the slots are suitably arranged in the top brackets and are so dimensioned that the trunnions fit therein without play. The second top roller is uncovered and is of metal; it may be unweighted or, when drawing very short staple cotton, it may be weighted by a saddle. —B.C.I.R.A.

Yarn Swifts. W. H. Price, Loughborough. E.P.265,502.
The wire yarn-bearing members are slidable in hollowed guide-ways formed lengthwise in the arms and have combined spring and frictional gripping engagement therewith. A small leaf spring may be provided. In a modification, flat arms are grooved on either the inner or outer face and the members are held therein by spring action. In a further modification, the members having yarn-carrying portions are formed with

spring extensions to grip the tubular arms. In each form the members may be completely detached from the arms.
—B.C.I.R.A.

The following is a list of patents of which abridgements have recently appeared in the *Illustrated Official Journal (Patents)*—

Preparatory Processes—

265,329. R. Brook. Combing machines, gill boxes, &c.: arrangements for applying pressure.

265,438. Le Blan et Cie. and M. A. Roth. Preparing fibres for spinning: drawing frames, lap-forming apparatus, stop motions, &c.

265,501. H.Haas. Drying fibres, &c.

Subsequent Processes—

265,211. M. Bellingeri. Warping and beaming yarns.

3—CONVERSION OF YARNS INTO FABRICS

(A)—Preparatory Processes

Beam Lowering Device. H. Francis (Furthergate Engineering Works, Blackburn). *Text. Merc.*, 1926, **75**, 771.
A device for lowering the weaver's beam from the sizing room into the weaving shed below, in connection with overhead runways for mills, is described. The tackler trucks the beam to the carriage, putting one end on to the sling while it is on the truck. He then lifts the other end round on to the sling, and pushes the carriage and beam to the lowering apparatus. To lower, the brake chain is pulled to ease the brake, and the beam slides down on the movable rail to a given position to join up with the rail that goes to the weaving shed. To return the carriage and the empty beam the brake is eased and the loose rail returns automatically. No power is required, all the work being done by counterbalance.
—B.C.I.R.A.

Viscose: Tension and Shiners. *Text. Colorist*, 1926, **48**, 584.
As viscose stretches rather readily and does not fully regain, it is essential that there be no irregularities in tension. Those used to handling more elastic yarns are liable to overlook this and the result is the appearance of shiners in the woven fabric, either as single picks or as bars. Bobbins should be completely wound the same day in order to avoid differences of humidity that might change the stretch of the yarn. —F.G.P.

Rayon and Silk Spooler. *Silk* (N.Y.), 1926 **19**, No. 9, p. 42.
A very flexible machine is described having very light band-driven bobbins which require oiling once a month. Continued even tension is assured, and all adjustments are readily made. —F.G.P.

(B)—Sizing

Artificial Silk: Sizing. —. Fleming. *Text. Merc.*, 1927, **76**, 64 (from *Deutsche Färber Ztg.*).
The preparation of suitable sizes for artificial silk yarns is described.
—B.C.I.R.A.

Artificial Silk Sizing Machine. T. Ryder and Son, Ltd. *Text. Merc.*, 1926, **75**, 642.
In a new machine the yarn is passed from the warper's beam for some distance without coming into contact with any object and dried by means of hot air blown upwards through a perforated steel plate. In this way the yarn is practically dry before being supported by a steel rod with a glass coating, the hot air still operating on the yarn before it reaches the weaver's beam. The only point of real contact is that of a copper plate before it is wound on the beam. The machine draws the yarn from one or more beams in the creel over a copper sizing roller which is partially immersed in the size trough. The size is heated by means of steam pipes running from end to end of the trough. The roller lays on the yarn a sufficient amount of size by contact, the positively driven roller reducing the strain on the yarn to a minimum. The yarn travels over the perforated sheeting under which is a six tier radiator.
—B.C.I.R.A.

Size Antiseptics; Properties of——. F. Summers. *Text. Merc.*, 1926, **75**, 674.
A report of a lecture before the Blackburn Textile Society. —B.C.I.R.A.

Sizing of Ribbons. I. Ginsberg. *Silk* (N.Y.), 1926, **19**, No. 8, p. 44.
Ribbons being now dyed flat and usually in one shade only, sizing is more easily done. It is better to size damp, as when dry, hollow spots sometimes appear, spoiling the look of the goods. A sizing mixture is—Tragasol 20 l., potato starch mixture 5 l., vegetable glue 2 l., drosin 1 l., glycerine ¼ l. The quantity of water and the description of drosin are not given in the article. Another mixture contains 500 gr. of gum drammer and 125 gr. gum mastic, melted together and dissolved in ¾ l. benzol and ¼ l. alcohol and poured into 10 l. benzol; 75 gr. coconut oil dissolved in ¼ l. of benzol is added. After ageing for 5 days, the solution is filtered; ½ l. in 4 l. of benzol is a suitable sizing bath. A solution of amber is recommended for improving elasticity and lasting qualities. A number of other mixtures are given.
—F.G.P.

Biolase; Properties of——. —. Haller. *Melliand Textilber.*, 1927, **8**, 166.
A private communication from the manufacturers claims more favourable viscosities for starch paste treated with biolase than those quoted by the present author. Two samples, described as Liquid Biolase C3 and a powder, Biolase N extra, were

sent for further tests and the claim is substantiated. It is probable that the sample used in the first tests had been stored for some time and was less active than the samples supplied by the manufacturers.
—B.C.I.R.A.

Artificial Silk Sizing Preparation. W. Tusch. *Melliand Textilber.*, 1927, **8**, 74.
A preparation for treating artificial silk yarns has been put on the market in powder form by Schürmann of Barmen; it is said to possess advantages over liquid preparations in that it does not mildew or become acid. It penetrates the yarn without leaving a residue and treatment with 3-5 per cent. of the weight of the yarn is sufficient. It is claimed to be specially useful for treating weft yarns enabling them to be employed as warp.
—B.C.I.R.A.

Egyptian Cotton Yarn: Sizing. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 22-23.
Opinions differ as to whether Egyptian yarn can be sized in the same way as ordinary cotton yarns and as to whether Japan wax is an essential constituent of the size. Size preparations recommended are "Sichel" cold size and sizes containing "Senegalin." —B.C.I.R.A.

"Rabic" Size: Properties. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 23.
"Rabic" is recommended for sizing 30's to 40's yarn in hank form. It combines extreme fluidity with maximum adhesive power, is very economical and simple to use. Good results have been obtained on 36's yarn with a 5 per cent. solution.
—B.C.I.R.A.

Farina Size: Preservation. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 23-24.
The addition of small quantities of activin, copper sulphate, and alum or zinc chloride as disinfectants is recommended for preventing the decomposition of potato starch. In cold weather decomposition of a well cooked farina paste is more probably due to dirty containers. —B.C.I.R.A.

Warp Yarns: Sizing. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 24.
Recipes are given for sizes for 10's-24's, 36's-44's, and 80's-120's yarns; it is recommended that the liquefaction of the starch (with activin) should be the greater the lower the count of the yarn. One recipe mentions "Terpolhydrat."
—B.C.I.R.A.

Dyed Fine Zephyr Warp Yarns: Sizing. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 24.
A mixing consisting of farina and activin is suitable for coloured warp yarns of high counts. —B.C.I.R.A.

Heavy Sized Yarn: Disadvantages. E. Rüf. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 48-49.
The author severely criticises English practice of heavy sizing, pointing out the loss of extensibility in the yarn due to too heavy loading with inorganic substances, the waste of materials and the loss of time, &c., incurred on desizing. —B.C.I.R.A.

Activin: Starch Liquefying Properties. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 54.
Activin is said to possess advantages as a starch liquefying agent over other steeping agents including enzymes, in that the starch is not degraded beyond the soluble starch stage, the process requires little control as regards temperature and time and the resulting liquor is neutral. Other advantages of activin are enumerated.
—B.C.I.R.A.

Ring Warp Yarns: Sizing. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 22.
Five size preparations recommended for sizing ring warp yarns are described. Good penetration is aimed at. —B.C.I.R.A.

Watery Size: Causes. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 21.
A correspondent complained that his size mixing containing farina, Diastafor, coco-butter, and Japan wax becomes "watery" overnight. The explanations of other correspondents reveal the following divergent opinions. (1) The trouble is due to the hardness of the water, and alum would overcome the difficulty. (2) The size in the sow box should not be boiled but merely kept at 50° C. The beck and sow box should be scrubbed out with soda once a week to prevent acidity. (3) The proportion of Diastafor was much too great. (4) The development of acidity should be avoided and the Diastafor replaced by alum. —B.C.I.R.A.

Sizing. R. Hünlich. *Leipziger. Monats. Text.-Ind.*, 1926, **41**, 411, 455-456.
The author discusses the properties of a good size, the purpose and method of hank sizing, and the sizing of warps on the beam. The use of several recently introduced size liquefying and softening agents is shown. —B.C.I.R.A.

Starch Grain: Swelling and Staining. R. Haller. *Kolloid Z.*, 1927, **41**, 81-87.
Observations on the swelling of the starch-iodine complex in solutions of calcium nitrate, sodium iodide, sodium hypochlorite, dilute hydrochloric acid, &c., and an analogy drawn between this swelling and the swelling of the cotton hair in cuprammonium solution. The iodine-starch complex is viewed as an absorption compound in which the iodine is adsorbed in the peripheral layer of the grain; a parallel is drawn with the dyeing of the cotton hair. —B.C.I.R.A.

Maize Starch: Zymolysis. J. H. Walton and H. R. Dittmar. *J. Biol. Chem.*, 1926, **70**, 713-728.

Potato starch is hydrolysed more rapidly than maize starch by pancreatin, this being due to a difference in the chemical nature of the starches, for the maize starch was found to contain a material of a hemicellulose nature which was very slowly hydrolysed by pancreatin. The enzymatic action was found to stop when the maltose content was 85 per cent. of the total weight of the starch, a fact which is in accord with the results of Sherman and his coworkers. The rate of conversion of maize starch was not increased after the starch had been rendered soluble according to Lintner, autoclaved dry, autoclaved in solution, frozen or ether-extracted. In an attempt to increase the speed of conversion of maize starch by substituting other salts besides the disodium phosphate and sodium chloride, it was found that potassium and ammonium chlorides would act as well as sodium chloride, whilst sodium citrate, sodium succinate, and sodium ammonium hydrogen phosphate could be used in place of the disodium phosphate. None of these salts increased the rate of hydrolysis more than the sodium chloride and phosphate except sodium citrate which, when used with the sodium chloride, showed a slightly more favourable effect. —B.C.I.R.A.

Starch: Zymolysis. H. L. Hind and N. C. Beetlestone. *J. Inst. Brewing*, 1926, **33**, 540-551.

A table is given showing the influence of a number of salts on diastatic activity and the conversion of soluble starch. Potassium metabisulphite (K.M.S.) gave the best results and was the only salt leading to a definite reduction of *p*H to 4·8. The influence of reaction on proteolysis in the mash tun is discussed and data are given to show the influence of reaction on the amount of extract obtained and also the effect of different waters. The buffer action of numerous substances present or produced in wort during fermentation is discussed in some detail. —B.C.I.R.A.

Amylase Co-enzymes: Properties. H. Pringsheim. *Z. angew. Chem.*, 1926, **39**, 1454-1457.

The author reviews the present state of knowledge (mainly his own work) of enzyme activators and co-enzymes, particularly the complements of amylases in the fermentative degradation of starch. —B.C.I.R.A.

Size Beck Temperature Regulator: Application. *Text. World*, 1927, **71**, 313.

The importance of automatic temperature control is emphasised. The number of southern mills (U.S.A.) in which automatic control apparatus has been adopted is considerable. —B.C.I.R.A.

Sizing and Finishing Materials; Antiseptics and the Growth of Mould Fungi on——. L. E. Morris. *J. Text. Inst.*, 1927, **18**, T99-T127.

(C)—Weaving

Looms: Automatic Electric Stop Motion. *Text. Argus*, 1927, **3**, No. 132, p. 6.

This device is exceedingly simple but absolutely certain in its action, and possesses the advantage of requiring no additional labour. The weaver's attention is at once attracted when an end breaks as the machine stops automatically and cannot be again set in motion until the thread is mended. In this device "droppers" are not attached to each thread in the warp, and the initial cost is very moderate compared with other types; the whole of the automatic arrangement being controlled by a small dry battery, which lasts for months before requiring attention. B.R.A.W. & W.I.

Looms: Adjustment of Leverage in Various Mechanisms. *Text. Argus*, 1927, **3**, No. 134, p. 6.

A discussion of the various mechanisms in looms depending on principles of leverage for their action. —A.J.H.

Looms: Gauge Points in Positive Taking-up Motions. *Text. Argus*, 1927, **3**, No. 135, p. 6.

A full description of numerous adjustments necessary during weaving to the ratchet wheel, brake wheel, and worm and wheel positive taking-up motions on looms. The ratchet wheel motion is the most widely used method of taking-up fabric in weaving worsted. —A.J.H.

Looms; Suitability of Various Woods and Metals for——. *Text. Argus*, 1927, **3**, No. 136, p. 6.

A summary of the properties of various materials which render them particularly suitable for parts of looms. —A.J.H.

Figured Ribbed Shirtings: Weaving. E. Gienger. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 411-412.

Point paper diagrams are given for eight figured, ribbed shirtings to be woven without the use of change boxes. The Hodgson double lift dobby is used for the production of the fabrics. —B.C.I.R.A.

Weft Velvet: Weaving. R. Hünlich. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 14-15.

The fabric comes from the loom with floating pile wefts necessitating a specially good binding near the cutting points. Two weft systems are employed with one warp of thin singles twist. The ground weft gives the fabric the necessary stability while the pile weft gives the pile effect. The floating pile wefts are longer or shorter according to the weave and the pile depth and are evenly distributed over the surface or may be arranged to give stripes or figures. In the point paper diagram given for a plain weft velvet one ground weft follows three pile wefts. The ground weave is linen weave and the pile weft weave consists of three threads of 6-shaft satin weave. For average qualities of velvet the warp threads number 24-38 threads per cm. of 2/50's to 2/60's yarn, and the weft 120-200 threads per cm. of 70's to 100's cotton yarn. The processes of preparing the fabric for cutting, brushing, finishing the back and waxing the pile are described. —B.C.I.R.A.

Looms: Shuttle Changing Mechanisms. E. Frotscher. *Melliand Textilber.*, 1926, **7**, 589-590, 669-670, 747-749, 834-835, 911-912, and 1005-1006.

The author traces the development in the design of loom shuttle changing mechanisms during recent years. The principal types of earlier and most recently invented mechanisms are described in detail with illustrations. —B.C.I.R.A.

Weaving. W. Schmitz. *Melliand Textilber.*, 1926, **7**, 921-922 and 1007-1009.

The "meshing" of threads to form fabrics is treated geometrically, in an attempt to formulate a scientific theory and nomenclature of interweaving threads to meet the requirements of advancing weaving technique. —B.C.I.R.A.

Looms: Reed Wire Manufacture. H. Hofer. *Melliand Textilber.*, 1927, **8**, 25-26 and 134-135.

An account of the processes of manufacture and making up. The individual operations require considerable precision, especially in the preparation of fine wires. —B.C.I.R.A.

Looms: Dobbies and Dobby Cards, Proposed Standard Measurements. *Melliand Textilber.*, 1927, **8**, 193.

The standard measurements proposed by the technical standards committee for the textile industry and textile machines, for Hodgson and double lift (Hattersley) dobbies and the cards for use with them, are put forward for comment.—B.C.I.R.A.

Looms: Jacquards and Dobbies; Standardisation. K. Hentschel. *Melliand Textilber.*, 1927, **8**, 193-198.

Difficulties in standardising jacquards and dobbies are discussed, and proposals, some of which have not yet been discussed by the standards committee (see above) are put forward. —B.C.I.R.A.

Looms: Automatic Cross Border Jacquard. Messrs. J. T. Hardaker Ltd. *Text. Merc.*, 1927, **76**, 214.

The object of this machine is to eliminate the danger of wrong sizes of cloth being made, and to increase the output of each loom. The disadvantage of the old type of machine was the loss of time entailed in having to stop the loom each time a change was made, and also the danger of overrunning which resulted in wrong sizes, and which very often happened when one weaver had to watch several looms. The new Jacquard is illustrated and described in detail. —B.R.A.W. & W.I.

Looms: Heald Stopping Motion. *Text. Merc.*, 1927, **76**, 443.

An improved method for automatically stopping a loom when breakage of a warp thread occurs is described in detail, and depends on an electric device which operates with the lowering of the heald as produced by breakage of the yarn passing through it. The method avoids the use of droppers on the warp threads and thereby saves much time in the taking up of threads. —A.J.H.

White's Patent Poplin Dobby. W. B. White and Sons Ltd. *Text. Mfr.*, 1926, **52**, 413.

A dobby for weaving figured poplins and other fabrics with a large number of ends per inch has been specially designed to actuate the healds at a variable speed, and gives the same advantages as the special tappets previously used for working the plain ends in avoiding the massed crossing of the threads when the shed changes. Four draw knives are introduced instead of two and these are actuated at variable speeds by a four-arm rocker connected with the treading rod or driving lever. One of the knives of each upper and lower pair begins to move before its companion and the knife that starts first in lifting the heald starts last in the reverse direction, so that the movement of the warp threads and the heald eyes past each other is facilitated. The threads controlled by one heald begin to move a little before those in the healds contiguous to it, thus eliminating the massed crossing of the ends that causes much end breakage when crowded warps are being woven. —B.C.I.R.A.

Sliding Two-box Weft Mixing Motion. W. B. White & Sons Ltd. *Text. Mfr.*, 1927, **53**, 19.

A new sliding two-box motion which is worked from the dobby, or from a card cylinder, at the normal speed of a dobby loom is described. The novel feature is the provision of two shuttle boxes which lie side by side in the same horizontal plane, and in action are slid backwards and forwards. The essential use is for weft mixing in weaving, for example, crêpe cloths and others in which the weft alternates in pairs of left and right-hand twist. —B.C.I.R.A.

Looms: Double Jack Dobby Swivelling Knife-end Rod. Lupton & Place Ltd. *Text. Mfr.*, 1926, **53**, 21-22.

The defects of the knife-end rod connection in dobbies of the Keighley type driven by means of a ⊣ lever have been overcome by the invention of a swivelling knive-end rod and the consequent prevention of oblique stresses on the mechanism. The new device can be readily applied to existing dobbies. —B.C.I.R.A.

Some Difficulties in Popular Weaves. D. Kinnear. *Wool Record*, 1927, **31**, 537.

More faulty pieces are caused through excessive stopping than from anything else. Every time the loom is stopped to take up a broken end, an uneven place in the cloth results. The ideal loom is one where the weft runs to the end of a warp, and stoppage is reduced to a minimum. Popular fancy weaves present many difficulties; repp is a hard weave in construction and so requires a yarn to give maximum amount of softness when finished. However, it does not follow that same twist applies to all repps. It is important to shed and time a loom in light and heavy weave, to give the best possible cover to the cloth; very often the warp won't weave because the shed is out of proportion to the quality and weave required. In dobbies, worn levers may give a large shed at one side and hardly room for the shuttle to go through at the other. Warp tension is also most important and requires constant attention. Properly tensioned warp brings up a design, gives body to the cloth, and makes even a bad warp weave properly. Unevenly conditioned weft is an endless source of trouble by causing varying widths when finished. Another source of trouble is fogginess in yarn and impurities caused in this way are made fast by crabbing. Thus the finisher of dress cloth cannot alter what is given him in the grey, but he can make structural faults more pronounced. —B.R.A.W. & W.I.

Elimination of Faults in Weaving. J. W. Hutchinson. *Wool Record*, 1927, **31**, 736.

In order to eliminate faults in weaving, the loom has to be readjusted for different thicknesses of yarn. When one part has been adjusted it is often necessary to adjust all the parts before a correct weave is obtained. This "tuning" of the looms is dealt with in detail in this article in connection with the Hattersley box loom; the Hattersley under pick motion; the Hodgson and Sowden dobbies, and the Dobson under pick motion.—B.R.A.W. & W.I.

Some Intrinsic Weaving Factors. Selvage Utility, i. "Technicist." *Wool Record*, 1927, **31**, (1) 800; (2) 864.

(1) The main advantages of a satisfactory selvage may be summarised as follows—

(*a*) Where the list is well woven it will considerably enhance the value and general appearance of the finished piece.

(*b*) While the cloth is being woven in the loom a reasonably broad, stout selvage is of material assistance to both the loom tuner and weaver.

(*c*) For purposes of finishing the fabric a sound serviceable selvage is essential.

The main purpose of temples, which the loom tuner has to apply, is to overcome the draw and weft, as it constantly tends to contrast the cloth during weaving in a weft way direction. To build a good serviceable selvage such factors as strength, counts of yarn, width, and nature of the body of the cloth, have to be taken into account. When weaving cloth of woollen and worsted warp together with artificial silk, or artificial silk with wool or cotton, an important factor is to maintain the warp in correct alignment and obtain a broad sound selvage. Method of weaving a selvage for this purpose is described. In jacquard weaving special selvage harness cords are provided and these pass through special comber board pieces which can be adjusted on the front of the main comberboard according to the width of the cloth in the loom. Means for operating these selvage harness cords are found on the short rows at the end of the needle board. Recent development in regard to selvages is their use for advertising purposes; for by the use of the Hardaker "Goodwill" selvage jacquard, the firm's name can be woven in with the selvage.

(2) In woollen and worsted fabrics narrow width cloths are often woven. When this is being done two widths are woven together side by side; therefore a centre selvage is needed; method for weaving this is described. The following special factors which give rise to defective selvages are discussed. Unsatisfactory shedding of the warp. Defects caused by weft. Defective templing. Faults in the loom. Care in beaming is necessary in those cases where the selvage is on the same beam as the warp. Balance and proportion must exist between the selvage yarn and that composing the warp and weft of the body of the fabric. A pick mistimed may be the cause of selvage trouble, and the final obstacle may be in the reed: any movement of the reed, wrong drafting of the ends in the mails, or improper denting of them in the reed, should be watched for and remedied immediately. From cloth finishers' standpoint the main difficulty arises in connection with rolling of the selvage. Reasons for this and method of avoiding faults which may be caused by this rolling of the selvage is given.

B.R.A.W. & W.I.

(D)—Knitting

Vertical Stripe Embroidery on Hosiery; Machinery for Producing——. W. Davis. *Text. Mfr.*, 1927, **53**, 121-122.

A detailed description of the construction of an embroidery machine by which the ornamental threads are added in the intervals of plain knitting whilst the hosiery itself is being manufactured.

—A.J.H.

Merits of the Milanese Knitted Fabric. W. Davis. *Text. Amer.*, 1926, **46**, No. 4, p. 44.

This cloth is most successful for women's underwear and has also been used for outer garments. It is almost ladderproof and is warm to wear. The face and back loops must both be severed before a hole begins. Each stitchpoint has two threads, one each back and front, the face stitches moving upward from right to left in a plain knit loop, the corresponding stitch moving up from left to right. The Milanese warp loom is fully described. —F.G.P.

Knitting Machine: Plating Patterning Mechanism. R. Fabian. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 373-374 and 413-414.
The mechanism is discussed with reference to zigzag, pineapple, and other designs. —B.C.I.R.A.

Hosiery: Length Specification. E. M. Schenke. *Text. World*, 1927, **71**, 79.
A standard method of determining the length of children's $\frac{7}{8}$ length hosiery is described and proposed standards and tolerances for such hosiery recommended. —B.C.I.R.A.

(F)—Subsequent Processes

Desizing Enzymes: Application. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 430.
Diastafor is recommended for coloured zephyrs. For ordinary bleached cloth Novo-Fermasol may be used, common salt being added, but attention is drawn to the formation of black stains in the presence of iron. Degomma, an animal enzyme mixed with sawdust, is less favourable, forms a residue which does not, however, cause stains, and gives an unpleasant odour in summer. —B.C.I.R.A.

(G)—Fabrics

Artificial Silk Fabrics: Manufacture and Designing. T. Brough (for Courtaulds Ltd.). *J. Roy. Soc. Arts*, 1926, **75**, 97-115.
The lecturer described the viscose box-spinning process, and defined other types of artificial silk fibres. The following fabrics were described—(1) An all viscose damask hanging dyed in contrasting colours; (2) artificial silk and cotton dress goods novelties, one a striped fabric with highly twisted cotton in the ground and acetate artificial silk in the stripe; (3) a ribbed dress fabric with artificial silk in the warp and right and reversed twisted worsted in the weft; (4) a cross-dyed figured dress fabric with viscose artificial silk and single botany worsted in both warp and weft; (5) a brocaded dress fabric with natural silk in the warp, twisted natural silk for the ground weft and viscose artificial silk for the figuring weft, cross-dyed in two colours in the piece; (6) brocaded velvet panel or scarf with "Georgette" ground of highly twisted natural silk, and a velvet pile figure of viscose artificial silk, dyed in two contrasting colours in the piece. —B.C.I.R.A.

Rayon-filled Radium Taffeta. J. Chittick. *Silk* (N.Y.), 1926, **19**, No. 9, p. 72.
A typical warp is reeded 55/3/3, the silk being high quality 16/18 denier, and the shoot a three-thread tram of fair white Japan of 13/15, picking at 104. When rayon is used, the warp may be reeded 60/2/3 (360 threads per inch) using crack double extra white Japan of 20/20. The rayon shoot is 72 picks of 150 denier or more if finer yarn is used. The rayon should have as little lustre as possible, and be very pliable. Irregular tension of the loom will produce shiners or puckers. Yarns should never be mixed, and two-shuttle weaving helps to prevent irregular patches. The cloth may run up in length as much as ·4 per cent. —F.G.P.

Fabrics of the Day: Habutæ. J. Chittick. *Silk* (N.Y.), 1926, **19**, No. 9, B 36.
This is the common form of Japanese washing silk, made of untwisted raw warp and weft. It is made in mills and in cottages, and is sold by weight under Government inspection in order to prevent sophistication with hygroscopic dressings, rice powders, &c. The weight is expressed in momme, say 2/15 oz. per $1\frac{1}{2}$ in. length. It is difficult to make habutæ sufficiently cheaply to compete with the Japanese manufacture. —F.G.P.

Staple Fibre: Application. W. H. Canning. *Text. Merc.*, 1927, **76**, 131.
Staple fibre fabrics have the soft lustre at present in demand and are warmer and drape better than ordinary artificial silk goods. It is used in pile fabrics, knitted fabrics and all decorative fabrics. —B.C.I.R.A.

Manufacture of Hat Bands. L. Schlesinger. *Silk* (N.Y.), 1926, **19**, No. 9, p. 31.
Hat bands are generally gros grains with silk warp and a shoot of either three or four-thread Japan tram of 13/15 denier or cotton yarn of 24-2, 40-3, 50-4, and 80-3, thread finished. When silk yarn is used, for softer bands, the tram is often doubled three or four. As the selvages are very important only skilled operators should be employed; designs of selvage weaves are given. Equally important are the binders; details concerning them are included. Typical weaves are—Reed 58/4, 60 picks of 25/2 C.P. cotton; reed 70/4, 48 picks of 3-end 3-thread Jap tram, two short gros grain with tubular edge. The common method of expressing sizes of hat bands is in French lignes of ·0889 in. The loom harnesses are made of twisted cotton or twine which wear out quickly and are expensive; the use of flat steel healds does not seem to be popular. This fabric is always yarn dyed and there is usually no finishing except singeing when cotton is used. —F.G.P.

Crepe Meteore. J. Chittick. *Silk* (N.Y.), 1926, **19**, No. 8, p. 35.
Another of the fabrics originated by Bianchini several years ago. It has a good lustre but not brilliant, soft, smooth feel, drapes well, and has a fine diagonal appearance. A typical cloth has a warp of 450

ends, three doubles passed through a 75-dent reed; silk of 20/22 denier high-grade Japan is used. Six harnesses of 37½ healds per inch are required. High quality silk is needed because 2/3 of the warp is on the face, and with such fine weaving imperfections will show up very distinctly. Weft of 96 picks to the inch is a good average to give the closeness and firmness required. A close twisted three-thread tram of 13/15 denier best extra is necessary with 65-70 turns with no slack twist, to avoid wrinkling. Extreme care must be taken in the let-off of the warp; too much tension gives bad cross bars, owing to the twill weave. Bad take-up will cause similar defects. Milling is normal. —F.G.P.

Cotton Cloth: Strength-Humidity Relation. P. E. Morrill. *Text. World,* 1926, **70**, 3481-3482.

The author describes tensile strength measurements of cotton sheetings and osnaburgs at varying relative humidities, which enabled him to obtain a relationship between the observed tensile strength of samples at the atmospheric humidity at the time of test and the tensile strength at the standard atmospheric conditions of 70° F. and 65 per cent. relative humidity. A table of factors for converting the observed breaking strength (Scott power tester) to the breaking strength under standard conditions is given. —B.C.I.R.A.

Fabrics: Thermal Properties. I. D. Foos. *Text. World,* 1926, **70**, 3151.

The author discusses the properties of a fabric upon which its heat insulation depends, and outlines a test for the thermal transmission of fabrics. The test is in three independent parts—(1) The rate of escape of heat through the specimen under definite temperature conditions into still air having a prescribed humidity; (2) the rate of flow of conditioned air through the specimen under definite pressure difference and at a definite temperature; and (3) the rate of escape of saturated water vapour through the specimen from water maintained at 100° F. (blood heat) to conditioned still air outside. Detailed descriptions of the apparatus are obtainable from U.S. Bureau of Standards. —B.C.I.R.A.

Cotton Poplin; Manufacture of——. *Text. Mfr.,* 1927, **53**, 77-78.

Manufacturing details are given of a high quality poplin fabric consisting of 2/100's Egyptian cotton yarn, and particularly suitable for shirting or dress materials. A fuller handle and better covering power is obtained by using (doubled) warp yarns containing 20 turns per inch instead of the usual 24 turns; the twist is inserted twist way in the single yarn and weft way during doubling. The double weft yarn contains the usual number (24) of turns, but the twist in the doubled yarn is the same direction as the twist in the single yarns, since this prevents "bedding-down" of the warp and weft yarns in the resulting fabric. Shrinkage in the width of the fabric during weaving is small, being about 1 in. in a 40 in. fabric. —A.J.H.

Velour Cloths; Factors Involved in the Production of——. H. Hartley. *J. Text. Inst.,* 1927 **18**, T73-T77.

Patents

Looms: Warp Stop Motion. Société anonyme des anciens établissements Guillaume Fisher. F.P.604,456.

This motion is rectilinear and alternates from right to left. The droppers are formed by detectors in U-shaped iron wire or by a single hair pin, laying on the warp yarns. In the case of a breaking yarn, the detector falls and is taken between the blade on which it is hung and an iron corner sliding above the blade. This jamming causes the instantaneous stop of the loom. —Bur. Text.

Looms: Double-Lift Fine-Pitch Jacquard Harness. S. M. Zentzytzki. D.R.P. 411,440. (From *Melliand Textilber.,* 1926, **7**, 1005).

A harness arrangement for fine pitch jacquards is described in which the space taken up by the neck cord supports is much narrowed. The hooks below the bottom board are replaced by clasps which are staggered and can rise and fall without rubbing against one another. —B.C.I.R.A.

Bobbin Changing Mechanism: Description. Maschinenfabrik Rauschenbach A.-G., Schaffhausen, Switzerland. E.P.265,209

In order that bobbins of different sizes may be employed, the magazine is provided with an adjustable plate for guiding the heads of the upper bobbins, while the lowermost bobbins are guided by a plate adjustable in the axial direction of the bobbins. —B.C.I.R.A.

Towel Fabrics: Weaving. K. Webb, Knock, Belfast. E.P.265,321.

Towel fabric for drying purposes is made with the warp and weft each comprising cotton and linen threads so woven that the cotton threads are brought wholly or mainly to both surfaces of the fabric, while the linen threads are kept away or mainly away from both sides. The Provisional Specification also describes fabrics made of a number of different materials, one or more being brought to the surface on one or both sides of the fabric, whilst other materials are kept below the surface on one or both sides. —B.C.I.R.A.

The following is a list of patents of which abridgements have recently appeared in the *Illustrated Official Journal (Patents)*—

Weaving—

265,194. Maschinenfabrik Ruti vorm. C. Honegger. Letting-off warps.

4—CHEMICAL AND OTHER PROCESSES

(A)—Boiling

Special Procedures with Silk. *Text. Colorist*, 1926, **48**, 616.

Describes the boiling-off, partial and complete, of silk for various uses. It is said that a special lustre may be obtained by soaking for 2-12 hrs. in a lukewarm bath of 20-30 per cent. soap. After wringing, the silk is stretched for two minutes and then boiled-off as usual. The importance of a good quality neutral soap is mentioned.
—F.G.P.

(B)—Scouring and Degumming

Tar Marks on Wool. *Text. Rec.*, 1927, **44**, No. 529, p. 59.

A well-known source of trouble in the wool trade arises from the marking of sheep with tar, paint, &c. The presence of substantial quantities of tar on wool can easily be detected in the sorting, but it is impossible to detect small specks which get on to the wool, and which become large dark coloured stains in the finished cloth. For many years attempts have been made to devise a satisfactory marking agent, and a marking fluid, the result of attempts made by the Brit. Res. Ass. for the Woollen and Worsted Industries, is now undergoing practical tests on the sheep in Australia. Hitherto the difficulty has been to obtain a fluid which would withstand atmospheric conditions and yet be easily removed by ordinary textile scouring methods. A chemist in Dunedin, New Zealand, who has been carrying out experiments for this purpose, claims to have invented a fluid which meets both these requirements. B.R.A.W. & W.I.

Faults in Scouring and Milling. H. R. Hirst. *Text. Argus*, 1927, **3**, No. 131, p. 5.

Wool can be spoiled in several ways during the scouring process: most common is danger arising from presence of iron in the oils, which have been used in the earlier processes. A very little iron goes a long way and has the unpleasant habit of asserting itself, causing stains to appear on the cloth. The colour of the cloth can also be spoiled in several ways in scouring. Slight excess of alkali may lead to faults such as turning brown on heating, and the mere passage through the tentering machine is sufficient to damage the colour of white wool, and to change the colour of fancy cloths. Amount of damage due to bacteria on wool is enormous: if the action is only slight and at a low temperature the damage is hardly visible, but has a profound influence on the dyeing properties of the wool. If the action takes place at a high temperature, the wool is rendered so tender as to be useless. This bacteria only attacks wool when in an alkaline condition, and very often occurs with pieces which have been stored damp after scouring. Faults from limy skin wool blended before scouring, most of the lime is still present in the cloth after scouring and the only remedy is to treat the pieces with weak hydrochloric acid, wash and then scour. Important factors in soap selection—(1) fatty acid of such a nature that when deposited on the fibre it will not dry or become oxidised and form a film over the wool fibres, (2) fatty acid to form an easily soluble soap, (3) proper alkali to combine with the fatty acid. B.R.A.W. & W.I.

Cotton Yarns and Linen Yarns: Scouring and Bleaching. W. Kind and H. Korte. *Melliand Textilber.*, 1926, **7**, 1027-1031.

Curves and diagrams are given showing (1) the difference in chlorine consumption by tow and linen yarns bleached (*a*) in the normal way, and (*b*) in an apparatus in which the liquor circulates through the yarns; (2) the difference in the chlorine consumption for tow and linen yarns of different counts; (3) the effect of the reaction of the liquor on the chlorine consumption of linen yarns; (4) the effect on cotton of scouring with different proportions of caustic soda and sodium carbonate, and (5) the effect of the scours considered on the chlorine consumption in the bleaching process; (6) the rates of chlorine consumption by scoured and raw cotton yarns. A number of examples from actual works practice afford further information as to the effect of the scour on the chlorine consumption in the bleach.
—B.C.I.R.A.

(C)—Washing

Practical Utilisation of Suint. *Text. Merc.*, 1927, **76**, 406.

Wool, unlike cotton, cannot be spun without first being washed or desuinted. The fat thus removed is a mixture and the suint is generally sold below cost of production because a rational use has not been found for it. Suint cannot be used in a similar manner to the fats and waxes, because it differs from them in properties. It has been considered difficult to separate suint into its constituents, but Dr. Lifschuetz claims to have found a method and utilises the products in two different ways, firstly, in the manufacture of ointment, cosmetics, &c., secondly as an addition to fats. The method of preparing both these is described; the latter being more difficult, is described in greater detail.
—B.R.A.W. & W.I.

Wetting-out of Textile Fabrics. F. Robinson. *Wool Record*, 1927, **31**, 544.

Several of the operations carried out in the conversion of textile fibres into fabrics are wet processes, and in all these operations the common difficulty is that textile materials, owing to the fact that they usually contain fatty, waxy, or resinous substances, are not readily wetted by water or aqueous solutions, thus wasting much time and material. Wetting-out agents are therefore needed and have been recently discovered. The essentials of a good wetting-out agent are—(1) Capable of reducing the surface tension of water and so diminishing the tendency which water exhibits of forming stable drops; (2) capable of dissolving or emulsifying fatty, waxy or resinous substances present and thus removing barrier for intimate contact of fibre and solution; and (3) should be unaffected by other chemical reagents which may be present in the solution. Most wetting-out agents now manufactured conform to the first two claims, but only a few to all three. Two methods of wetting-out due to Kind and Auerbach are described. —B.R.A.W. & W.I.

Nekal and Leonil: Wetting Agents. J. Nüsslein. *Melliand Textilber.*, 1927, **8**, 66-67.

The applications of Nekal and Leonil as wetting and emulsifying agents for cotton and wool respectively are described from the point of view of showing their nature, function, and value as "catalysts" for promoting the various processes in which they are used. They differ essentially from soap and turkey red oil in having their accelerating energy stored in a substance which, unlike soap, &c., is unaffected by acids, lime, magnesia, &c. —B.C.I.R.A.

"Flerhenol" Wetting Agents: Application. M. Nopitsch. *Melliand Textilber.*, 1927, **8**, 48-50.

The properties of the wetting agent "Flerhenol M" and its applications in bleaching, mercerising, cotton dyeing and printing are described. In examples it is shown (1) that the yarn scour preliminary to bleaching may be replaced by a steep in a flerhenol bath containing 2·5 grams per litre, and further that this steep may be dispensed with and flerhenol added directly to the hypochlorite bleach without loss of chlorine; (2) that flerhenol effects a saving in the open kier of half the caustic soda and half the time of the boil; (3) that the preliminary boil before mercerisation can be replaced by a wetting out in a bath containing 3 grams of flerhenol per litre. The flerhenol products are made by the Farb-und Gerbstoffwerke Carl Flesch, jr. —B.C.I.R.A.

Wetting Agents: Testing. H. Kafa. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 426-427 and 468-471.

Methods of determining the wetting power of textile soap and oil preparations are surveyed, and comparative experimental results of wetting power determinations by Herbig's (standard) method and by a stalagmometer method are given for Marseilles soap, new universal soap-oil B, tetracarnite, isomerpin, perfectol EM, and others. The results show that Herbig's method cannot be entirely replaced by an indirect method, but that the stalagmometer method is suitable for checking supplies of a given product. The curves show the effect of the solvent power of the wetting agent for the cotton wax and pectin. Given that good wetting power denotes high capillarity, there is considerable difference between the various products. The greater this difference the greater is the solvent power (e.g., perfectol EM). Such a product is very suitable as a steeping agent. The difference in the form of the curves between, for example, monopol brilliant oil and perfectol is ascribed to the difference in dispersity of the two systems. Accordingly the effectiveness of a product should be determined at different concentrations. —B.C.I.R.A.

Wetting Agents: Testing. W. Herbig and H. Seyferth. *Melliand Textilber.*, 1927, **8**, 45-46 and 149-150.

A critical review of 16 methods which have been described for determining wetting power. To meet the objection to Herbig's method that a chemical balance and a laboratory centrifuge are required, a modification is suggested in which a number of hanks of cotton yarn are weighed on a tare balance, immersed and centrifuged for one minute at full speed in a centrifuge such as is found in dyehouses. If a chemical balance is available but not a laboratory centrifuge, a small test skein of yarn may be immersed for 1 sec. then placed between filter paper, pressed, and weighed. The pressure is uniform if the same load (200 g.) is applied for the same length of time. The results are, however, less uniform by this method. It is pointed out that in the majority of methods no comparative experiments are made using water as wetting agent. Only by employing the wetting power of water as a unit can comparative values for judging the wetting power of wetting agents be obtained. —B.C.I.R.A.

Wetting Agents: Wetting Power and Capillarity. H. Pomeranz. *Leipziger Monats., Text-Ind.*, 1927, **42**, 42-43.

A criticism of the work of Krais and Gensel. —B.C.I.R.A.

Washing, Cleaning, and otherwise Treating Wool, &c. *J. Soc. Chem. Ind.*, 1927, **46**, 70.

Material to be washed or cleaned is first treated with hot relatively concentrated suint liquor for a considerable time before entering the first of a series of washing bowls containing concentrated suint liquor. Description of apparatus used for this purpose is given. B.R.A.W. & W.I.

(D)—Milling

Action of the Wool Fibre in Fulling. *Text. World*, 1927, **71**, 1421.

On the process of fulling, as carried on in the finishing of woollen goods, depends very largely the character of the fabric and the excellence of the finish secured. A careful study of the principles that govern this process and particularly the action of the individual fibres during the operations, is most interesting and instructive and is dealt with in detail in this article. The results obtained are not so much due to what is done to the cloth, as upon its natural tendency to felt when brought under proper conditions of moisture, heat and active pressure required to promote the work. As a result of experiments, it has been found that fulling always begins at the pelt end of the fibre; this is true even if the pelt end is cut or attached to another fibre.

B.R.A.W. & W.I.

Faults in Milling. See Section 4B.

(E)—Drying and Conditioning

Fabric Drying Apparatus. A. Lambrette. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 47.

A drying apparatus is described which is suitable for velvet or other materials in that the right side of the material does not come into contact with rollers, &c. The material is hung on rolls actuated by two chains. The main novelty is the blower apparatus for introducing the material, which prevents any damage to the material in the wet state by stretching over rollers. The particular heating arrangement permits of the machine being worked intermittently. A fabric requiring 30 minutes for drying can be introduced in 6 minutes and left for 24 minutes. A further economy is effected if the drying machine is in connection with a suction apparatus. —B.C.I.R.A.

New Silk Conditioning House of the Japanese Government. *Silk* (N.Y.), 1926, **19**, No. 8, p. 36.

A new building costing Y5,000,000 was inaugurated early in the year. There are a number of illustrations and the measurements are given in Japanese. —F.G.P.

Compressed Cotton Bowl: "Moisture Springing." P. Bean. *Text. Merc.*, 1927, **76**, 34.

Cotton containing 5·78 per cent. moisture was put under pressure in the process of making a cotton bowl and a sample of cotton subsequently plucked from the surface of the bowl. This showed 9·20 per cent. of moisture. —B.C.I.R.A.

Sjostrom Cloth Cooling and Conditioning Machine. *Text. Mfr.*, 1927, **53**, 90.

The question of restoring textile materials to their normal condition after they have been deprived of all or a portion of their natural moisture content by finishing processes, involving heat, pressure, or both, is very important. Apart from any harshness of handle that may be caused by a deficiency in moisture, the matter is important from the standpoint of weight alone. For many years the normal moisture content has been restored to the fabrics by spraying them directly with water or steam; this method, however, cannot give satisfactory results, as drops of water remain on the material. A patent cooling and conditioning machine has therefore been designed, and is based upon the operation of natural laws, whereby the fabric absorbs water from a contingent wet surface without touching it or having water directly sprayed on to it. This machine, known as the Sjostrom Cloth Cooling and Conditioning Machine, is illustrated and described in this article, also method of usage. B.R.A.W. & W.I.

(F)—Carbonising

Carbonising Process. W. A. Lawrence. *Text. World*, 1927, **31**, 733.

The object of carbonising is to utterly destroy the burrs, seeds, and other vegetable matter contained in the wool. This article deals with the cleansing of more faulty and very burry wool, locks, &c. The wool is first sorted and then passed through an opening machine in which process a large quantity of dirt and sand is extracted by the centrifugal force of the drum of the machine. The wool now opened and practically free from dirt is fed into a funnel or chimney to undergo the process of dessuintage; after which it is passed through rollers which press out part of the water and dirt which it contains, and so into the first scouring bowl. The scoured wool containing burrs and vegetable matter is now ready for carbonising; for this process it is plunged into wooden tanks, and subjected to sulphuric acid, which destroys the vegetable matter: then it is drained and then carried to the hydro-extractor to extract as much of the remaining acid water as possible. From the carbonising machine the wool is passed automatically between pairs of grooved crushing rollers, which crush the burrs to powder. In the beating machine which follows, the heavier charcoal is driven out and falls into the receiving pit; the lighter dust rises and is driven away by two small ventilating fans. The wool is now free from all vegetable matter, but still contains a slight quantity of dust and sulphuric acid, which is removed by the final process of disacidising or neutralising.

B.R.A.W. & W.I.

Wool: Special Carbonising Process and Machine. *Text. Rec.*, 1927, **44**, No. 529, p. 61.

Quite a number of processes have been introduced which do not employ sulphuric acid. With one of these the woollen fabrics, after a thorough scouring with soap and soda, are treated from 1 to 2 hours with cold solution of zinc chloride in concentrated hydrochloric acid. The material is then centrifuged for 15 minutes in a 15 per cent. aqueous solution of sodium bisulphite, and afterwards completely freed from acid by washing with cold water. The material, after suitable finish, acquires a silky handle, besides increased affinity for dyestuffs. The simplest plant consists of an ordinary wooden steeping vat, a special hydro-extractor and a full width rinsing apparatus. The hydro-extractor is illustrated and described in detail. With this plant, however, the production would not be large. There is no doubt that the process could be essayed by treating with the zinc chloride and hydrochloric acid, very slowly in a continuous plant, which is illustrated and described, where the material is pressed between squeezing rollers. The working of this plant would require a certain amount of practice before yielding maximum results, but it possesses several advantages, some of which are indicated under six headings in this article. When the fabrics are to be dyed brilliant colours, they are often carbonised with a bath containing aluminium chloride between 12° and 18° Tw., being dried at temperatures which are somewhat higher than those used with sulphuric acid.

—B.R.A.W. & W.I.

Principles and Practice of Carbonising. *Text. Rec.*, 1927, **44**, No. 527, p. 54.

After carbonising, some means are needed by which the carbonised matter may be crushed or powdered, and so removed from the fibre. For this purpose the burr crushing and extracting machine, described in this article, is used. Free from all burry and vegetable matter, there remains all trace of sulphuric acid to be removed; the wool, therefore, is usually neutralised and then conditioned. The results of carbonising will then be seen or most of them, for owing to the action of acid on the fibre, carbonised wool invariably has a greater affinity for colouring matter than untreated wool. This cannot always be seen in undyed wool, but as soon as the wool is dyed it is very clear. In order to obtain good results, however, the wool should be thoroughly cleansed prior to carbonising.

—B.R.A.W. & W.I.

The Principle and Practice of Carbonising (ii.). *Text. Rec.*, 1927, **44**, No. 528, p. 59.

Perborate of soda has much to recommend it as a means of making the peroxide bath. It is essentially ordinary borax to which oxygen has been added. The oxygen is loosely combined, and if equal parts of perborate and commercial acetic acid are added together, the loose oxgyen in the perborate is converted into hydrogen peroxide. Thus hydrogen peroxide and not perborate is really used, and in this way the peroxide can be made as required and some of its drawbacks avoided. A burr dust-treating machine is illustrated and described. It is for the purpose of extracting the short fibres from the dust or refuse from the burr crushing and extracting machines. These fibres can be returned to the wool from which they have been extracted, or can be used as flock. An automatic feeding machine is also described. This machine is very useful in a carbonising plant working in conjunction with the washing, acidising, carbonising, and drying machine, as it assists in opening the wool in readiness for each process, maintains an even feed, and secures the highest output. The process of carbonising is very important in the shoddy industry, and the essential apparatus is known as the dry carbonising process, which is described in this article. In cases where the fabric has been dyed with dyes not fast to sulphuric acid, aluminium chloride is used instead. This method is described.

—B.R.A.W. & W.I.

(G)—Bleaching

Bleaching Wool with Sulphur Dioxide and Sulphurous Acid. *Dyer and Cal. Printer*, 1927, **57**, 140.

Two distinct components of wool combine with sulphur dioxide. One of these, in nearly all dry wool, yields a pale yellow unstable product in the presence of sulphur dioxide of high concentration. The other component combines with sulphur dioxide only in the presence of water and may be a coloured carbonyl compound, which gives colourless additive product with sulphurous acid; this slowly decomposes in the presence of light and air, or by washing in water. Various practical problems in the bleaching of wool with sulphur dioxide have been considered and the results obtained are as follows—

(1) Superior bleach is obtained with wool containing free alkali or soap, but the permanency is not increased.
(2) Different methods of scouring have no important effect on the amount of sulphur dioxide absorbed by the wool.
(3) Best results are obtained by using sulphur dioxide in the store in as high state of concentration as possible.
(4) Wool previously treated with sulphuric acid gives inferior results on bleaching.
(5) Neutral salts have no action.
(6) Rate of bleaching is increased by rise of temperature, but quality of bleaching is not improved.

—B.R.A.W. & W.I.

Mohr Cold Bleach Process: Application. A. Schmidt. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 41-42.

The author criticises some of the information contained in replies to the questionnaire relating to the results of working the Mohr cold bleach process.—B.C.I.R.A.

Bleach Liquor: Control. —. Angele. *Leipziger. Monats. Text.-Ind.*, 1926, **41**, 474-476.

The hypochlorite bleaching process may be conveniently controlled by titrating at intervals a sample of the bleach liquor with standard arsenious acid solutions. Tables are given showing directly the amount of available chlorine equivalent to burette arsenious acid readings and showing the amount of chlorine required at any stage to replenish the liquor.

—B.C.I.R.A.

Mohr Cold Bleach Process: Application. A. Grünert. *Leipziger Monats. Text. Ind.*, 1926, **41**, 431-432.

In reply to a questionnaire submitted to firms using the Mohr cold bleach process it was ascertained that the process is suitable for white goods in general and can satisfactorily replace hot bleach processes. The white obtained is better and does not yellow on storing, oxycellulose is absent, faults and irregularities are no more numerous, the decrease in strength of the fabric is not greater and spotting is not more extensive than in a hot bleach process. The simultaneous handling of several classes of goods affords no difficulties, mercerised and unmercerised cloths can be bleached together, steam consumption is less and personal demands are less. The process is superior to all other processes for bleaching coloured goods and can be applied to goods which are subsequently to be printed. —B.C.I.R.A.

Sodium Perborate Antichlor: Application. E. O. Drathen. *Melliand Textilber.*, 1927, **8**, 73-74.

Experiments on the action of sodium perborate as an antichlor show (1) that chemically equivalent quantities of perborate and hypochlorite react mutually and completely with evolution of oxygen, (2) that with excess of perborate all the hypochlorite is decomposed leaving a residue of perborate, (3) that with a deficiency in perborate, the perborate is all decomposed leaving a residue of hypochlorite, and (4) that the rate of reaction is a maximum at 10° C. —B.C.I.R.A.

Sulphite Cellulose: Bleaching. G. K. Bergman. *Papier-Fabr.*, 1926, **24**, 742-746 (Verein Zellstoff Ingenieure Section).

The course of chlorine consumption during the bleaching of a sample of sulphite pulp under works conditions in a hollander in the Kan-gas works is recorded for half-hour periods; readings are also given for the hollander contents in pulp and bleaching powder, the percentage of available chlorine, the alkalinity, the chlorine consumption and percentage consumption calculated on the dry weight of the pulp. Comparative tests were made on six samples of easily bleached sulphite and sulphate celluloses of different cookings, the chlorine consumptions being tabulated. Determinations of the degree of liquefaction and bleaching capacity were made by standard methods on the size samples before bleaching. Data given include the Roschier Number, the Enso Chlorine Number, the Tingle Chlorine Factor, and the Bergman Chlorine Consumption Number. The Bergman number gives the results nearest to those obtained in the technical Kangas bleach. Data for the tensile strength, ash content, viscosity, whiteness, copper number, and α-cellulose content are given and indicate that bleaching is complete without over-bleaching. From some 300 determinations of the Enso Number and the Bergman Number, the author is able to deduce a formula giving the Bergman Number in terms of the Enso Number, which is the number commonly determined in the industry. —B.C.I.R.A.

Liquid Chlorine: Application. W. Schacht. *Papier-Fabr.*, 1927, **25**, 44 (Verein Zellstoff Ingenieure Section).

Safety precautions to be observed in the use of liquid chlorine or chlorine gas, suggested by the German Paper Makers' Association, are given. —B.C.I.R.A.

Bleaching of Wool. *Text. Merc.*, 1927, **76**, 346.

In dealing with the use of hydrogen peroxide in the bleaching of wool, ***Woollen and Leinen Industrie*** mention a method by which considerable economy of reagent is effected. Instead of the usual method of leaving wool overnight in the bleaching liquor, the wool is steeped for 1 or 2 hours, then lightly wrung out and spread in a room at normal temperature. Through the slow drying, concentration of peroxide is produced on the fibre, which increases oxidation and has strong bleaching effect. B.R.A.W. & W.I.

Bleaching Powder and Calcium Hypochlorite: Stability. H. Kast and L. Metz. *Z. Elektrochem.*, 1927, **33**, 21-39.

A detailed investigation of the instability and explosion risk of different grades of bleaching powder and of technically pure calcium hypochlorite ("perchloron") under varying conditions and in admixture with numerous organic and other substances is described. The results show that neither high grade bleaching powder nor perchloron are themselves explosive, but that they may act as oxygen carriers in the same way as potassium or barium nitrate. They are considerably less active than ammonium nitrate or potassium chlorate. There is less danger in transport with perchloron than with bleaching powder, which undergoes continuous decomposition at ordinary temperatures, and perchloron can be more safely stored in contact with organic matter than bleaching powder. —B.C.I.R.A.

Bleaching Vegetable Fibres (i). J. Ferguson. *Text. Rec.*, 1927, **44**, No. 528, 61.

The first essential for a bleaching works is a plentiful supply of good pure water, which is seldom, if ever, found naturally. The immediate sources from which water for industrial use may be derived can be divided into six groups—(1) Upland surface water, (2) stream or river water, (3) lake water, (4) spring water, (5) shallow well water, (6) deep well water. These waters differ according to the nature of the earth or rock over or through which they pass. Commonly dissolved impurities in these waters are calcium and magnesium carbonates and bicarbonates, sodium, calcium and magnesium sulphates, potassium sulphate and chloride, &c., all of which must be removed before the water is pure. Two methods, purification by filtration and purification by softening are described, with illustrations of the apparatus used in each case.

B.R.A.W. & W.I.

Bleaching Cotton and Linen Yarns. See Section 4B.

Wetting Agents in Bleaching. See Section 4C.

(H)—MERCERISATION

Mercerisation. P. Weyrich. *Melliand Textilber.*, 1927, **8**, 51-52.
The author investigates the cause of the experience that some mercerised yarn-dyed fabrics show irregularities in dyeing whereas fabrics dyed in the piece and made from hank mercerised yarns are quite uniform, although the same yarn, mercerised under exactly the same conditions, has been used. It is shown that a necessary condition for uniform dyeing is to conduct the mercerisation in such a way that yarn entirely regular as regards internal colloidal fibre structure is obtained and this state preserved until the end of the dyeing process. Precautions to be taken in the various stages of the mercerisation process to secure such regularity are discussed. —B.C.I.R.A.

Mycock Loose-Warp Mercerisation Machine. O. Frischknecht. *Melliand Textilber.* 1926, **7**, 1026-1027.
The author discusses defects of machines for mercerisation under tension, and claims that a satisfactory loose warp mercerising apparatus has been found in the Mycock rollers. The Mycock loose warp machine as now built by a Swiss firm has driven rollers, the individual roller elements running in ball bearings. Uniform spreading out of the fabric over its whole width and uniform lye absorption are assured. The running is so smooth that no damage is done to the finest fabrics. The machine requires less power than the tension machine and takes up much less space in the length direction. Certain other particulars are given. —B.C.I.R.A.

Cotton Yarn: Mercerisation. W. F. A. Ermen and S. H. Jenkins. *J. Soc. Dyers and Cols.*, 1927, **43**, 9-12.
The absorption of caustic soda by a sample of a well bleached single yarn of Egyptian cotton was determined by a simple weighing method. The curve obtained shows a level course between the points corresponding to caustic soda concentrations of 35° to 50°. The proportion of caustic soda absorbed over this range corresponds to a formula $C_6H_{10}O_5$, 0·6 NaOH for the cellulose-alkali complex. The discussion on the paper is reported. —B.C.I.R.A.

Cotton Mercerised With and Without Tension; Absorption of Water by——. A. R. Urquhart. *J. Text. Inst.*, 1927, **18**, T55-T72.

(I)—DYEING

Dyeing of Felt. L. N. Putnam. *Text. Rec.*, 1927, **44**, No. 529, 65.
Felt is an isolated member of the textile family, though the first part of its manufacture is very similar to that of wool. Up to the doffing process it is exactly the same, but from then onwards the process varies. Methods of doffing for two types of felt are given. The next process known as "platting" or "hardening" consists of steaming by moist steam until the fibres are warm and damp, then passed through a weighted platter; this presses and tangles the fibres together. After two runs on this machine the felt has now enough tensile strength to be handled, but not enough to stand a rotary fulling mill. It is therefore soaped first. When proper length and width has been obtained, the goods are strong enough again to handle as a piece of woollen or worsted is handled. After scouring it is ready for dyeing. The dyeing of felt taken as a whole may be considered a piece dyeing proposition, using mostly acid and union dyes. In cotton mixed felts, which are dyed a solid shade, considerable difficulty is experienced, as cotton and wool when dyed together, do not always take the dye the same way, and so appear different shades. Method of dyeing ordinary wool felt and cotton mixed felt is given. One feature in connection with dyeing some cotton-mixed blacks, is the uncommon method of dyeing used. It is known as one-dip Logwood Black and is given in this article. Ordinarily the finishing of felt consists of shearing and pressing, which is not very difficult. There are, however, exceptions; certain felts have to be sanded and have a fancy finish. —B.R.A.W. & W.I.

Standardisation of Dyestuffs. *Text. Rec.*, 1927, **44**, No. 527, p. 77.
Summary of a lecture delivered by Dr. S. G. Barker at Nottingham, dealing with the work of the British Research Association for the Woollen and Worsted Industries, in connection with the standardisation of dyestuffs. The apparatus at the disposal of the Association for this purpose is mentioned. As a result of the knowledge obtained from previous researches, by the Association, an alternative method has been suggested, by which light y dyed fabrics could be exposed and the results definitely related to fabrics dyed with a larger percentage of the same dyestuffs. —B.R.A.W. & W.I.

New Intermediates for Vat Dye Production. I. D. Foos. *Text. World*, 1927, **71**, 987.
Achievement of the Color Laboratory of the U.S. Bureau of Chemistry, Canada, in adapting to vat dye manufacture, a cheap and plentiful material, not previously used, as an intermediate and the probable creation of a new series of vat dyes. Air oxidation process for making one of these new intermediates, phthatic anhydride, was discovered in the Color Laboratory, and is described in this article; also a new use of naphthalene, as a possible source of vat dyes.—B.R.A.W. & W.I.

Dyeing Wool-Silk Mixtures. A. Flemming. *Dyer and Cal. Printer*, 1927, **57**, 128.
Wool-silk mixtures consist of two main groups, those that contain degummed silk,

and those in which the silk is raw and must be degummed in the fabric. Method of degumming in the latter case is given. Wool-silk mixtures are mostly dyed so that both the silk and wool is dyed but in different shades. Generally, all colours that will dye silk will dye wool; but not all colours that will dye wool will dye silk, so the wool part is dyed first. The silk portion will dye at ordinary temperatures while wool needs boiling dye liquors. Dyes used are members of the basic and acid series, but basic dyestuffs are more often employed to obtain two colour effects, as acid colours have great affinity for both wool and silk. Method for dyeing with basic colours, so that wool is deeper than the silk, is given, also method for obtaining very effective and weather resisting black, with the aid of logwood in combination with alizarine and acid colours. Sometimes it is required that the silk be left white. In pale shades this presents no difficulty, but in deep shades the silk sometimes becomes slightly tinted. A method for removing this colour from the silk is described. —B.R.A.W. & W.I.

Dyeing Acetate Silk. *Text. Argus*, 1927, **3**, No. 135, p. 4.
A summary of methods for applying various types of dyes (Duranol, Dispersal, Ionamines, Azonine, Setacyl, Cellit, Celatene, S.R.A., and basic dyes) to cellulose acetate silk. —A.J.H.

Sulphur Black Dyes and Indocarbons. *Text. Argus*, 1927, **3**, No. 136, p. 7.
Two recently introduced sulphur black dyes—Indocarbon SN and CL—have much greater fastness to chlorine than hitherto available sulphur dyes, and are not susceptible to aftertendering. The CL brand has the greater fastness to chlorine and may be used for yarns which have subsequently to be woven into piece goods and bleached. —A.J.H.

Dyeing Process for Wool. *J. Soc. Chem. Ind.*, 1927, **46**, B71.
Sulphuric acids of propylated or butylated aromatic hydrocarbons, particularly naphthalene derivatives, are added to dye liquors for the purpose of assisting wetting out of the textile (wool) material and level dyeing. B.R.A.W. & W.I.

Vat Dyes: Application. G. O. Mitchell. *J. Soc. Dyers and Col.*, 1926, **42**, 374-376.
A practical description of the ordinary methods of dyeing yarn and piece-goods with vat colours, with brief notes on the properties of certain dyes of the anthraquinone series. —B.C.I.R.A.

Synthetic Digallic Acid: Mordanting Properties. P. P. Victoroff. *J. Soc. Dyers and Col.*, 1927, **43**, 12-17.
In an investigation of the identity of digallic acid with tannin the author prepared synthetic digallic acid and showed that it possesses the characteristic properties of natural tannins. It gives precipitates with solutions of gelatin, and quinine acetate; it gives a dark blue colour with ferric chloride solution; is precipitated by tartar emetic solution, and forms precipitates with basic dyes, which are soluble in excess. Digallic acid is absorbed by cotton, and after fixation with tartar emetic, the cotton may be dyed with basic dyes. In mordanting cotton with tannin, the tannin molecule decomposes, and only the digallic acid takes an active part in forming the tannin-antimony compound, and dyeing the fibre. The above considerations establish the suitability of the synthetic product for mordanting and dyeing. Literature relating to the structure of the different natural tannins used in dyeing and to the absorption of tannin by cotton is referred to. —B.C.I.R.A.

Indanthrene Dyes: Analysis and Application. G. Durst and H. Roth. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 392 and 435-437.
Tables are given showing the reactions of Indanthrene Yellow G, Indanthrene Yellow GK, Indanthrene Grey K, Indanthrene Orange RRTS, Indanthrene Brilliant Violet BBK, and Indanthrene Brilliant Green GG, on diluting with water, with 30 per cent. acetic acid, common salt, formaldehyde, and ammonium acetate, both hot and cold. The results indicate how sensitive many vats are. —B.C.I.R.A.

Dyes: Estimation. G. Weissenberger and S. Fränkel. *Kolloid Z.*, 1927, **41**, 26-27.
Dyes may be titrated with permanganate in boiling sulphuric acid solutions containing about 20 per cent. H_2SO_4 on the total volume. The end point is reached when the permanganate colour persists for one minute. Dyes in concentrations of 0·04 to 21 millimoles per litre gave results with a maximum error for the substances listed of 1·2 per cent. —B.C.I.R.A.

Fibres: Adsorption and Dyeing. (1) N. P. Peskow and (2) M. Iljinsky. *Kolloid-Z.*, 1927, **41**, 91-92 (abstracts of papers read before the IVth Mendelejeff Congress, Moscow, 1925).
Two contributions to the theory of dyeing are reported: (1) it is shown that the dyeing power of a dyestuff depends not only on the dispersity of its solution, but on the stability of the system; (2) the laws of adsorption by the fibre of the solid phase from coarse suspensions are discussed. —B.C.I.R.A.

Dyeing. H. Pomeranz. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 476-478.
The author suggests that the azo or vat dyestuff on the fibre is of different chemical composition, or in a different state of aggregation in the colloid sense, from that of the dyestuff as formed by the appropriate chemical reactions. The theory is illustrated by application to indigo. —B.C.I.R.A.

Amidated Cotton: Preparation; Amine Yarn: Dyeing. P. Karrer and W. Wehrli. *Z. angew. Chem.*, 1926, **39**, 1509-1514.
An extended account of work previously described. The subject is treated historically with 31 references to the literature.
—B.C.I.R.A.

Dyes: Fastness. H. Pomeranz. *Melliand Textilber.*, 1927, **8**, 162-164.
The author explains the fastness of applied dyes to washing, soap, and rubbing by the formation of labile compounds between the fibre and one component of the dye employed. For example, in dyeing cotton with lead chromate, the dye does not adhere to the fibre if the cotton is first treated with bichromate and then with the lead salt, but a fast dye is obtained if the processes are reversed, due to the formation of a labile compound between the cotton fibre and the lead salt which becomes a fast dye when the bichromate is applied. Other examples are discussed, among them the fastness of indigo to washing and rubbing. —B.C.I.R.A.

Indigo Dyed Cloth: Fastness to Rubbing. H. Pomeranz. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 437-438.
The lack of fastness to rubbing of artificial indigo on cotton cloth may be combated to some extent by dyeing from dilute vats. Experience with para-red and aniline black indicates that acids and alkalis promote intimate combination of the dye with the cotton; in indigo dyeing this means is only available in the use of soda vats, the solubility of lime being so low. The lack of fastness can be reduced to a minimum, however, by thoroughly washing the dyed cloth, most conveniently in rope form in tubs so that there is no danger to white reserves from rubbing. A wet calender can be used to prepare the cloth for drying. —B.C.I.R.A.

Fast Dyeings on Wool. *J. Soc. Dyers and Col.*, 1927, **43**, 62.
By impregnating wool with a dyestuff component containing hydroxyl or amino groups and then developing on the fibre with a diazo-compound, valuable fast dyeing may be produced. Component used for impregnation may be either aromatic or aliphatic, or may be ready formed dyestuff, such as chrome dyestuffs containing an amino or hydroxyl group.
—B.R.A.W. & W.I.

Investigation of Certain Pyrazolone Dyes. E. C. Jennings. *Text. Colorist*, 1926, **48**, 524.
Some of these dyes have good fastness to light when developed on acetate cellulose and wool. A series of dyeings of 0·75 per cent. sodium dioxytartrate and 1·3 per cent. phenylhydrazine with hydrochloric acid ranging from 1-5 per cent., showed that the best results were obtained with 2·5 per cent., when dyed 10 mins. cold and 20 mins. at 50° C. This gave a yellow similar to tartrazine. A great amount of research is recorded both of varied dyeings and fastness tests. —F.G.P.

Dyeing of Viscose Silk Materials. A. J. Hall. *Text. Colorist*, 1926, **48**, 534.
It is not quite clear whether the author is dealing with a mixture of silk and viscose rayon or with fabrics of viscose rayon only as the terms "silk" and "artificial silk" are mingled. A long list of direct dyes suitable for the fabrics, yielding even shades, is given. A temperature of 95°-100° C. is recommended even for viscose. Sodium chloride and Glauber's salt tend to unevenness, but soap helps levelling. A suitable dyebath is soap 2½ lb. or Turkey red oil 1¼ qts. with ammonia (0·92), 1 pint; begin at 50° C., continue to 100° C. It is preferable to leave the bath unexhausted to risk causing unevenness by addition of salts. All-viscose fabrics may be prepared for dyeing in soap 4 lb., sod. carb. ½ lb., or ammonia (0·92) 1 pint, scouring for ½ hour at 90° C. This same bath may be diluted for dyeing. Curves are given showing the great fall in tensile strength of viscose compared with cotton and linen when wetted. Notes are given concerning basic and vat dyes. —F.G.P.

Dyeing of Natural Silk Fabrics. R. Sansone. *Text. Colorist*, 1926, **48**, 595.
Illustrated descriptions of dyeing machinery suited for silk. The advantages claimed are—that one man can watch several machines, controlling all the time; there is no danger of damage to the fabric; two lengths are treated with the same dyebath without interfering with each other; the fabric is always plaited into the baths; the perforated bottom assists penetration; varied drive can be suited to different sorts of material; the quantity of dye solution is not large; the old liquor may be used over again; swatches can be taken without stopping the operations, and the bath can be completely emptied. —F.G.P.

Special Matters in Dyeing Silk/Cotton Mixtures. *Text. Colorist*, 1926, **48**, 62.
Often the cotton warp is dyed before weaving. The remarks apply mainly to blacks. Sulphur colours are recommended. Acid colours are used for the silk and direct colours at low temperature for the cotton.
—F.G.P.

Precautions in Dyeing Sulphur Colours on Artificial Silk. *Text. Colorist*, 1926, **48**, 703.
As a rule the method is as for cotton, except that the baths should not be above 140° F. and less soda and Glauber's used. A small quantity of Monopol soap is an advantage. —F.G.P.

Dyeing of Acetate Silk. C. E. Mullin. *Text. Colorist*, 1927, **49**, 173-179.
A discussion of the solution theory of dyeing cellulose acetate silk and some of the factors which influence the affinity of

this silk for dyestuffs, numerous references being made to contemporary literature.
—A.J.H.

Logwood and Fustic: Application. H. O. Richardson. *Text. Mfr.*, 1927, **53**, 23-24.
The preparation of commercial extracts from the natural dyewoods is described and the principal shades obtainable with different mordants stated. —B.C.I.R.A.

Artificial Silk-Cotton Piece Goods: Dyeing and Finishing. G. Parker. *Text. Merc.*, 1926, **75**, 609, &c.
A report of a paper on the bleaching, dyeing, and finishing of mixtures of cotton and artificial silk (viscose and Celanese) in piece goods. —B.C.I.R.A.

Vat Colours on Wool. *Text. Merc.*, 1927, **76**, 230.
The vogue for pale and bright shades in wool materials has revealed a weakness in colours which hitherto have been considered of sufficient fastness. The possibility has suggested itself of using certain vat colours on wool, which have already obtained a world-wide renown for use on cotton goods. The British Dyestuffs Corporation have therefore prepared a pattern card showing vat colours on wool. A description of some of these vat dyes, together with their method of use is given.
—B.R.A.W.& W.I.

Dyeing Cellulose Acetate Silk. See Section 1D.

(J)—PRINTING

Calico Printing. J. R. Hannay. *J. Soc. Dyers and Col.*, 1926, **42**, 369-374.
Some problems confronting the calico printer using fast vat dyes are discussed. The use of grey back cloth for printing guaranteed shirtings has had to be superseded by the use of "bump greys," the cost of which is prohibitive, or of rubber-faced or proofed blankets which are not entirely satisfactory for printing in fine patterns. Vat dyes which are individually fast may lose this property when mixed together; detailed information regarding the heat generated in the course of the production of the leuco compound is desirable. The desirability of printing fast discharge colours on fast grounds is complicated by the difficulty of discharging the fast colour at the given points. The question of the desirability of issuing an unlimited guarantee with printing colours is discussed. Further work is needed on the effect of oil finishes on the light fastness of the vat dyes most widely employed in guaranteed styles. Numerous points were raised in the discussion as to fastness testing, laundering, &c. —B.C.I.R.A.

Alizarine Lake Thickeners: Application. P. P. Sazanoff. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 44-46.
An experimental study of the effect of various thickeners on the dissociation of the aluminium acetate present in an alizarine printing paste and the resulting properties of the lake is described, and a more economical method of introducing the aluminium suggested. —B.C.I.R.A.

Indanthrene Reserves: Printing. R. Otto. *Melliand Textilber.*, 1926, **7**, 1034.
Directions are given for dyeing by a continuous process with indanthrene colours reserved with white paste reserve. The reserve consists as a rule of excess of a lead salt such as the nitrate, sulphate or acetate with a small quantity of copper sulphate. Should brown discoloration develop on the white places due to the formation of sulphides, this may be removed by oxidation with potassium dichromate acidified with oxalic acid. A treatment with hydrosulphite restores the original shade if the indanthrene colour is affected by the dichromate. To avoid the trouble it would be preferable to reserve with lead chloride which can be completely removed by washing, if dye vats constructed of suitable material are available. —B.C.I.R.A.

Calico Printing. H. Russina. *Melliand Textilber.*, 1927, **8**, 54-56.
The author seeks to show in what direction advances could be made in dyeing technique in hand printing, and points out some of the problems awaiting solution by the colourist. Progress in dyeing methods could equally be applied to hand and machine printing. —B.C.I.R.A.

Mordant Dye Printing Colours: Application. W. Sieber. *Melliand Textilber.*, 1927, **8**, 62-64 and 151-152.
The behaviour of chrome mordants containing borax has been studied and it is shown that if the right proportions between chromic salt and borax and glycerol are maintained printed colours are obtained which are adequately fixed by a simple passage of 5-7 minutes at a steam temperature of 100-102° C. through a Mather-Platt steamer. The chromic salt, borax, and glycerol together must be completely in solution. Chrome alum was originally used and green chromium acetate and chromium sulphate were later also used. A similar short steaming is sufficient for mordant dye printing pastes prepared with aluminium citrate, zinc oxalate, and calcium acetate. Details of the preparation of the printing paste and quantitative directions for about 40 colours are given.
—B.C.I.R.A.

Viscose Finished Fabrics: Printing. E. H. Morse. *Text. World*, 1926, **70**, 3739-3740.
Fabrics with a viscose finish as described above may be printed in colours in the same way that prints on ordinary cotton goods are made. Four printed different patterned fabrics are illustrated. The edges of the pattern are clear and clean-cut and the colours are free from any

tendency to blend or any tinge of muddiness. The weft threads show a wrinkled appearance due to shrinkage in the threads during the drying of the viscose, which is the cause of some irregularity in the width of the fabric. The fabrics described were sold in America under the trade name "Kotolin." —B.C.I.R.A.

(K)—Finishing

Chlorination of Wool. J. B. Speakman and A. C. Goodings. *J. Soc. Chem. Ind.*, 1927, **46**, B191.
Summary of a paper delivered to the Yorkshire Section of the Society of Chemical Industry. The paper was divided into two parts, the first of which was concerned with the cause of unshrinkability, and the second with the amounts of chlorine required to produce that condition with wools known to possess widely different milling properties.
B.R.A.W. & W.I.

Chlorination of Wool. *J. Soc. Dyers and Col.*, 1927, **43**, 64.
Different technical processes for chlorination of wool, and the properties of various products obtained, are surveyed critically. Processes involved in the production of the chlorine and hypochlorous acid used are also discussed. With chlorine water it appears that absorption of chlorine as well as oxidation occurs, for chlorine does not bleach wool but turns it yellow. It is suggested that the degree of chlorination should be determined by the quantity of active chlorine absorbed.
B.R.A.W. & W.I.

Unshrinkable Finish for Wool. A. J. Hall. *Text. Merc.*, 1927, **76**, 275.
Chlorination of wool is largely carried out for the purpose of producing an unshrinkable finish, but very little is known of the chemical and physical changes which are produced in the wool fibres by this treatment. It is very difficult to state exactly why shrinkage occurs during washing, and why chlorinated wool is practically unshrinkable. Recent research shows that the cortex, as well as the epithelial scales of the fibre plays an important part in the unshrinkable finish. Chlorination of wool is difficult, as insufficiently chlorinated wool is shrinkable, and over-chlorinated wool, though unshrinkable, has inferior handle and decreased resistance to washing and ordinary "wear and tear." The process usually adopted is described and results given. Over-chlorinated wool has increased affinity for dyes, retains moisture more readily, and is more easily wetted-out when immersed in water; also owing to removal of protective epithelial scales, over-chlorinated wool has lower tensile strength. Result of Speakman's research is given, and is of considerable importance, since it suggests the possibility of being able to treat over-chlorinated wool for restoration of its normal wearing qualities.
B.R.A.W. & W.I

Production of Uni- or Multi-coloured Effects on Textiles, &c. *J. Soc. Chem. Ind.*, 1927, **46**, B105.
Solutions of nitrocellulose in organic solvents and coloured by an addition of inorganic pigments, &c., are poured on to water, thus causing a very thin coloured film to form on the surface; textile materials are then drawn through the water and afterwards dried to remove the organic solvent, the coloured film adhering to the material being treated. The resultant shades are fast to water and to moderate soaping. A satisfactory solvent for producing a coloured film is given.
B.R.A.W. & W.I.

Cotton Stockings: Finishing. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 55-56.
Four methods are outlined for imparting to cotton stockings a wool-like "feel." In each case the preparation of the finish and the method of calendering are described. —B.C.I.R.A.

Raised Cotton Shirtings: Finishing. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 55.
Recipes for the finishing preparation and directions for the calendering and brushing treatment of cotton fabrics having a raised surface on both sides are given, showing how a too harsh or too soft feel in the finished material may be avoided.
—B.C.I.R.A.

Wool-effect Finishing Machine. J. Klütgens. *Melliand Textilber.*, 1927, **8**, 29.
A finishing machine for giving cotton fabrics a woollen feel is described. The material is subjected to a continuous kneading action between a series of spiked rollers under pressure, through which the fabric is drawn tangentially. The spikes penetrate and loosen the threads and make the fabric softer and more voluminous. The corresponding upper and lower roller pairs are spring pressed together and can be released by a lever arrangement for inserting the fabric, &c. —B.C.I.R.A.

Jaconets and Twilled Linings: Finishing. —. Oesterreicher. *Melliand Textilber.*, 1927, **8**, 53-54.
Formulæ for suitable finishes for applying to coloured and black jaconet and twilled linings are given and the methods of calendering described. Two samples are attached. —B.C.I.R.A.

Formula for Softening Rayon. *Silk* (N.Y.), 1926, **19**, No. 8, p. 92.
After dyeing, treat the yarn with a 2-3 per cent. neatsfoot oil of best quality and ½ per cent. olive oil soap for 15 mins. in a lukewarm bath. Kerosene or paraffin should be avoided. —F.G.P.

Finishing of Worsted Serges. *Text. Merc.*, 1927, **76**, 145.
Summary of an address given by Mr. Schofield, B.Sc., to members of the Huddersfield Textile Society. The merits of the finished fabric depend primarily on the quality of the wool used; but the main problem

which arises early in the finishing of worsted serges, is that of "setting" the cloth. This is particularly necessary, to-day, owing to the increased use of lower qualities of wool, and the frequent presence of crimped creased, and cockled pieces. In order to remove existing distortions "crabbing" should take place at the beginning of the finishing process. The nature of the lubricants on worsted yarns indicates that scouring must be of the emulsification type, as distinct from the saponification scour practiced on woollens oiled with a large percentage of free fatty acid oleins. Blowing is very important and should never be omitted. The old fashioned method of pressing is still the best, but the ordinary steaming-off machine has now been replaced by a new design, with improved arrangements for diffusing steam and ensuring clean working.—B.R.A.W. & W.I.

Cotton Cloth: Finishing. L. G. Larmuth. *Text. Merc.*, 1927, **76**, 77.
A report of a lecture dealing briefly with methods of finishing, including ingraining, in which the cloth is heavily calendered then put through a filling. This is then broken down and a finish applied in another way. —B.C.I.R.A.

Fabric Filling: Weighting of Silks and Cotton. *Text. Argus*, 1927, **3**, No. 134, p. 7.
A general discussion of technical processes. —A.J.H.

Weighting Silk by the Tin-Phosphate Method. *Text. Colorist*, 1926, **48**, 543.
A method is described of following the stannic chloride with sodium carbonate whereby silk may be so loaded that it will crumble to pieces if exposed to sunlight for a few hours. It is therefore recommended that a new method be tried, which is to replace the carbonate with disodium phosphate. This treatment, it is said, not only protects the fibre much better than the old method, but also increases its characteristic lustre considerably, so that the method is a great improvement on the former one. —F.G.P.

Considerations Applying to the Weighting of Silk. M. J. McKinney. *Text. Colorist*, 1926, **48**, 673.
Weighted silk should have a better appearance and weight than silk at the same price. One object of weighting is to restore the loss of degumming, but it has passed far beyond that. The article appears to be written from books, the information on both tannin and tin weighting being given very differently —F.G.P.

Delustering and Weighting of Rayon. *Silk* (N.Y.), 1926, **19**, No. 9, p. 76.
The precipitation of barium sulphate in the rayon fibre produces a dulling effect and adds considerably to the weight, leaving a yarn that dyes well. Glauber salt must not be used in the dyebath as this dissolves the weighting. The tin-phosphate-silicate method is also used. This reduces the lustre and adds even more to the weight than to silk. There have been no difficulties in the processes. —F.G.P.

Securing a Correct Melton Finish. "Textus." *Text. World*, 1927, **71**, 2032.
In order to secure a correct Melton finish, three essential points must be taken into account; they are as follows—
(1) The fulling soap must have a firm body and not be watery. A suitable soap is described and the method of preparation given.
(2) The soap should be applied cold, as heat causes sudden shrinkage; also when the cloth is passing through the fulling mill, the temperature should be regulated, as overheating will again cause shrinkage.
(3) Laying brushes should be used so that the shearing will be satisfactory, and the appearance at the end will not be thready. —B.R.A.W. & W.I.

Rayon Filled Bolivia: Finishing. *Text. World*, 1926, **70**, 3156.
The finishing of a fabric constructed with a cotton warp, a face filling of viscose rayon waste spun on the woollen system and a binder filling of wool or merino is described. The fabric is washed, crabbed to remove wrinkles, dyed, hydro-extracted and passed through a napping machine, after which it is run through a brush and finally to the dryer. The cloth is subsequently sheared to the desired length of the pile and then perched. —B.C.I.R.A.

Viscose-finished Fabrics: Preparation. E. H. Morse. *Text. World*, 1926, **70**, 3155-3156.
The various methods of applying viscose solutions to cloths for finishing purposes by padding, dipping, and knife coating are described. The processes are not yet commercial, but the author predicts the marketing of viscose filled fabrics in the near future. —B.C.I.R.A.

Finishing Worsted Serges. —. Schofield. *Text. Rec.*, 1927, **44**, No. 529, 63.
The term serge is generally applied to a cloth made from two-fold worsted yarns, woven in simple twills and usually having a clear cut finish. The nature of the oil used for lubricating the yarn is of primary importance. Wool creams and second or lower grade olive oils are generally used for this purpose. The light lubrication of the yarn and the comparative cleanliness of the wool makes the scouring of serges an easy matter. The final merits of the fabric depends firstly on the quality of the wool; it is often necessary to carbonise to get rid of all the vegetable matter. The wool is then thoroughly washed and neutralised to get rid of the acid before scouring. Crabbing or setting is the first process in the finishing of worsted serges; this process straightens out all crimped and creased

places and sets the twill parallel. After crabbing the piece is scoured and is now ready for dyeing. Tentering or drying then follows, and cutting or shearing, which is the final process before pressing, is done very gradually to obtain good results. B.R.A.W. & W.I.

Finishing Artificial Silk/Cotton Piece Goods. See Section 4I.

PATENTS

"Hecova" Linenised Cotton; Production of——. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 179.
A process for finishing cotton fabrics with a linen effect which is not affected by washing is the subject of D.R.P.292,213, taken out by the Heberlein Company. —B.C.I.R.A.

Treatment of Wool for Purpose of Diminishing its Affinity for Acid and Neutral Dyeing Wool Dyes. *J. Soc. Chem. Ind.*, 1927, **46**, B214 (from D.R.P.432,111).
Clear two-colour effects are obtained on half-wool materials by pre-treating the wool with sulphurised phenol products, with or without the addition of tin salts (cf. Ger. Pat. 409,782, B., 1925, 627), so that it has less affinity for acid and neutral dyeing wool dyes, or by the addition of sulphurised phenols to the dyebath. B.R.A.W. & W.I.

Fast Colours and Prints with Vat Dyestuffs. D.R.P.433,146, Durand & Huguenin. S.A. Basle (supplement to D.R.P. 418,487). (From *Text. Merc.*, 1927, **76**, 260.)
The fibre is steeped in the solution of an ester of the leuco compound of a vat dyestuff, which has been mixed with an oxidising agent, and then steamed. For the production of prints the solution is thickened in the usual manner. For the production of white or coloured resists, the cloth after being blocked with the above solution, is printed with alkaline salts or reducing agents and then steamed. B.R.A.W. & W.I.

Production of Wool-like Effects on Cotton Fabrics. B214 (from U.S.Pat.1,616,749). (From *J. Soc. Chem. Ind.*, 1927, **46**.)
The unmercerised material is first treated with sulphuric acid of d 1·547-1·580, washed, dried, and afterwards treated with sodium hydroxide solution of d 1·116-1·180 at 30-35°, with subsequent washing. B.R.A.W. & W.I.

Finishing Machine. S. Walker & Sons, Ltd., G. E. Walker, and J. Mace, Radcliffe, Manchester. E.P.265,332.
An apparatus for lustring and finishing silk, &c., comprises a fixed or axially reciprocated semi-cylindrical heated cell with a polished surface, and an endless blanket passing over the cell and rollers which can be separately or simultaneously adjusted by screws, chain, and bevel bearing, and clutches. The fabric passes from a roll past a damping spray, over expanding rollers, and between the cell and the blanket to the batch roller which is friction driven. —B.C.I.R.A.

Peroxide and Per-salt Bleaching Baths: Stabilisation. T. Benckiser, A. & A. Reimann (trading as J. A. Benckiser), and F. Draisbach, Ludwigshafen-on-Rhine. E.P.265,417.
The stabilisation of peroxide and per-salt bleaching baths is effected by the addition of alkali acid pyrophosphates. In examples given, 0·4 to 2 grams of acid pyrophosphate are added to a solution of 2 grams of perborate in 150 c.c. of water. —B.C.I.R.A.

5—LAUNDERING AND DRY CLEANING

Cleaning Wool Fabric, &c. *J. Soc. Chem. Ind.*, 1927, **46**, B70.
Bentonite is agitated with water, the mixture kept for maximum hydration, and the supernatant colloidal solution used for washing textile materials. —B.R.A.W. & W.I.

Textile Oils and Soaps: Properties. J. Davidsohn. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 386-390, 428-430, and 472-473.
A summary of some 26 contributions by authors during 1925 and 1926 to the subject of textile oils, fats, and soaps from various aspects. —B.C.I.R.A.

PATENTS

Enzymic Detergents: Preparation. H. Fischer, Darmstadt, Germany. E.P. 265,024.
Cleansing compositions such as soap, sodium carbonate, borax, &c., or mixtures thereof, include tryptic enzymes or enzymes in which tryptic enzymes naturally predominate dehydrated to at least 10 per cent of water. Water softeners, e.g., sodium oxalate or bile salts or other substance reducing surface tension, or alkali or salts such as sodium chloride increasing enzyme activity may be added. In an example pancreatic extracts or finely divided pancreas glands containing 60-70 per cent. of water, are dehydrated in vacuo at about 45° C. to a water content of 10 per cent. 8-20 lb. are mixed with 92-80 lb. of calcined soda and packed in hermetically closed packages. According to the Provisional Specification any enzymes may be thus dehydrated and used. —B.C.I.R.A.

6—ANALYSIS, TESTING, GRADING, AND DEFECTS

Wool; Ascertaining the Moisture Content of——. S. G. Barker and J. J. Hedges. *Dyer and Cal. Printer*, 1927, **57**, 152.
The object of the improved balance is to provide a simple form of balance instrument without the necessity of weights, for use with textile conditioning ovens, for the purpose of readily determining

regain. The instrument is described in detail and illustrated. Method of usage and equation for obtaining regain per cent. is given. —B.R.A.W. & W.I.

Action of Formaldehyde on Wool. —. Bell. *J. Soc. Dyers and Col.*, 1927, **43**, 76.

Formaldehyde is extensively used in the textile and dyeing industry and has the following properties which are dealt with in this article. (1) Qualitative reactions; (2) determination of formaldehyde; and (3) uses of formaldehyde. The author carried out various experiments with formaldehyde in order to determine—(1) Maximum percentage of formaldehyde taken up; (2) what portion of this is (i.) combined, (ii.) absorbed; and (3) the effects of varying conditions. These and the results obtained from them are described in detail. —B.R.A.W. & W.I.

Memorandum to Tsatlee Merchants on Improved Native Rereeled Silk. *Silk* (N.Y.), 1926, **19**, No. 9, p. 34.

The reports of the Shanghai International Testing House points out very clearly the principal defects, amongst which are the great variations in size. Even in medium chops there is variation of seven deniers, whilst in the poorer grades there may be 40. The presence of hard gum spots is commented on and also coarse and fine ends. The silk schools are discussed at length. —F.G.P.

China Clay Particle and Soapstone Particle: Dimensions. *Zellstoff. ü. Papier*, 1926, **6**, 517-519.

The author gives the results of particle size determinations carried out on samples of Cornish China clay and of soapstone (Talcum "Ox" from Norway) in an apparatus similar to a cement analysis elutriator. A method of testing the relative amounts of these different fillings in the presence of rosin and alum is described. The results show that maximum absorption of Talcum "Ox" occurs with a particle size of about 25μ for sulphite and soda celluloses. The maximum absorption of China clay by soda cellulose occurs with a particle size of $8\text{-}15\mu$. —B.C.I.R.A.

Thread Counting Micrometer. *Text. World*, 1927, **71**, 1439.

Improvements in the Lowinson thread counting micrometer, have recently been announced by Charles Lowinson, sole agent. The accuracy of the instrument is greatly increased by allowing for finer focusing of a microscope and adjustment of the scale so that the first thread may be counted in full. The focusing of the microscope is accomplished by a new improved model device, which is described. —B.R.A.W. &W.I.

Yarn Testing Machine. Tensile Strength and Elongation: Stress/Strain Graph. H. L. Scott Co., Providence R.I. *Text. World*, 1927, **71**, 1213.

The machine incorporates many new ideas in junction with other features of design, which have for many years been a success in the standard machines for these purposes. The new tester has a double capacity head with two sets of dial graduations, one reading from 0 to 25 lb. in $\frac{1}{8}$ lb., and the other from 0 to 50 lb. in $\frac{1}{4}$ lb. Description of the construction of the machine is given. The recording device is designed to draw a line on a ruled card of standard letter size, which line is graphically descriptive of both stretch and strength of the material. As a machine for research or practical investigation of material, it has much to recommend it. B.R.A.W. & W.I.

Artificial Silk Weft Fabrics: Faults. J. Chittick. *Text. World*, 1927, **71**, 311 and 313.

A frequent fault is non-level dyeing due to the use of old and new lots of artificial silk; the newer-made material will have a fuller and better colour than the older lots. In this connection a case submitted to arbitration is discussed, the author urging a change in that clause of the contract between buyer and seller which states that the goods are subject to imperfections caused by the artificial silk over which the selling company and their mills have no control. Other faults of a general character are indicated. —B.C.I.R.A.

Scott Serigraph Wet-strength Testing Device for Artificial Silk. R. A. van Amburg. *Text. World*, 1926, **70**, 3627-3628.

An attachment to the Scott serigraph is described which allows the breaking load of artificial silk to be determined in the wet condition. The ends of the test strip are attached to the upper jaw, the strip forming a loop round a spool carried by the attachment, which occupies the position of the lower jaw. The loop is immersed in the required liquid in a container supported by the attachment. —B.C.I.R.A.

Faulty Knitted Fabric. *Text. World*, 1926, **70**, 3033.

A fabric knitted from a single cotton yarn showed a mottled effect, in some places so regular as to make a diagonal line in the fabric. Examination of the yarn showed thin places occurring at rather regular intervals of about 3 inches. The defect in the yarn is attributed to trouble at the front roll of the spinning frame, probably to a bent or damaged bottom front roll. —B.C.I.R.A.

Prevention of Mildew. *Text. Rec.*, 1927, **44**, No. 529, p. 69.

The following are details of experiments carried out with reference to the prevention of mildew. From observations made in the manufacture of a certain salt, and its effect upon the media of filtrations, it was noted there was entire absence of bacteria formation. After considerable period the disused filter cloths showed no signs of mildew, and the wooden vessels used to receive the filtrates were equally free.

Experiments were made to see the effect of a solution of this colourless and odourless salt on dyed materials. Wool, silk and cotton, and various combinations of them, were immersed and exposed under conditions which would bring about mildew formation. Numerous dyes were used and the solution was added to various dyebaths. Raw materials were also subjected to the same treatment, and after several months there have been no developments, and the dyes remain perfectly sound.
B.R.A.W. & W.I.

Twist Testing and Twist-testing Appliances. *Text. Rec.*, 1927, **44**, No. 528, p. 53.
In some yarns it is possible to ascertain the twist without the aid of a twist-testing machine; and the principle upon which the machine is constructed is the same. The yarn is untwisted and provision is made to ascertain and indicate the number of turns required to untwist a certain unit length. The machines differ in arrangement of various parts, in methods by which revolutions are indicated, and in the mechanical details furnished by different makers. In most respects the machines strongly resemble one another, and in this article six machines are illustrated and compared.
B.R.A.W. & W.I.

Cellulose: X-ray Structure. R. O. Herzog. *Cellulose Symposium Rept., Dominion Convention of Chemists, Montreal*, 1926, 26-31.
In a review of his recent work on the X-ray structure of cellulose and related materials the author gives certain experimental data and shows to what extent experiment and theory agree. A full discussion is reported.
—B.C.I.R.A.

Cellulose Particles: Dimensions. R. O. Herzog. *Cellulose Symposium Rept., Dominion Convention of Chemists, Montreal*, 1926, 33-38.
A review of the author's work on the particle size in colloidal solutions of cellulose, as determined by diffusion experiments of which data are given. The change of form and size undergone by the particle in the viscose ripening process is described and the theory of the scission of cellulose, on swelling, to secondary particles and then to primary particles (crystallites) discussed. A full discussion is reported. —B.C.I.R.A.

Cotton Staple Tester. E. E. Chandler (Clemson College, S. Carolina). *Text. Rec.*, 1926, **44**, No. 524, p. 40.
A middle portion is cut from several pulls of cotton and the ratio by weight of the two ends to the middle is determined. The necessary device consists of a simple wallpaper cutter and a double straight-edged bar accurately machined to known width, hinged at one end to a block of about equal length. At the other end it is fastened after the cotton is in place by a wing nut, hinged to the opposite end of the block. The bar is sufficiently rigid to withstand considerable pressure when screwed down and thus holds the cotton securely in place. Between the block and the straight-edged bar is a brass plate which is left movable so that the wallpaper cutter will not always run in the same place. Ratios approaching 1 are declared desirable from the standpoint of accuracy and convenience and a straight-edge $\frac{3}{8}$ in. wide (or 1 cm.) gives a ratio approaching unity for the greater part of the cotton crop. For convenience in weighing a balance was obtained so constructed that this weight could be taken care of by a chain. · The method is not suited to everyday commercial uses but serves as a check on manual stapling. —B.C.I.R.A.

Steam Pipe: Heat Loss Testing. E. Griffiths and C. Jakeman. *Engineering*, 1927, **123**, 1-4.
Two electrically heated pipes suitable for determining the loss of heat from the external surface of a pipe in air are described. The first pipe was designed primarily for testing the efficiency of steam pipe coverings, the other for determining the heat loss from the bare pipe alone.
—B.C.I.R.A.

Tanahashi's Evenness-graph. K. Tanahashi. *Silk J.*, 1926, **3**, No. 27, p. 46.
A fully illustrated description of a machine for ascertaining the evenness of silk by recording its breaking strengths graphically. The strength of silk is proportionate to the denier. The instrument breaks 1,000 metres at every 10th metres and records the figures on a chart, from which the evenness is readily seen. —F.G.P.

Elimination of Waste: Simplified Practice: What it is and What it offers. Bureau of Standards, U.S. Dept. of Comm., Washington, 1924.
In the introduction to this publication it is pointed out that in order to maintain a high-wage level it is necessary that all processes of manufacture and distribution be reduced to the lowest cost. This can be done through the elimination of those wastes arising out of too high a degree of diversification in certain basic products. To-day, dozens of different sizes, styles, types, and patterns of the most commonplace articles are placed on the market by manufacturers who must possess special equipment and skill to produce these endless variations. It is agreed that the reduction of variety, the simplifying of industrial and commercial practice in any line will secure numerous advantages and to this end the Division of Simplified Practice was established in 1921 to serve as a centralising agency in bringing producers, distributors and users together. Any group in any branch can secure the services of the Division upon request. The seven ways in which the service is of value are enumerated and a list of commodities showing reduction in variation is given. Some concrete cases where simplification

has been applied to individual concerns are also given, for example, a food products manufacturer made a reduction of 89 per cent. in the varieties of products with a corresponding reduction of 73 per cent. in the cost of sales, 78 per cent. in the cost of advertising, and 80 per cent. in overhead expenses, and his sales volume was increased approximately 600 per cent. A shoe producer simplified his line from three grades and 2,500 styles to one grade and 100 styles. His turnover was increased 50 per cent. The Malleable Chain Manufacturers' Institute of Chicago effected a 40 per cent. reduction in its varieties. The Department of Manufacture of the United States Chamber of Commerce is closely co-operating with the Division of Simplified Practice and has published a "Summary of Gains" which are certain to accrue to the manufacturer, wholesaler, retailer and consumer through standardisation of products. The pamphlet concludes by emphasising the fact that the success of all simplification depends to a large degree upon the data collected through a survey conducted by the association or industries interested. Some typical suggestions for surveys are given and the method adopted by the Division of Simplified Practice in dealing with them. A bibliography is appended. —L.I.R.A.

Pigment Particle: Size Estimation. J. H. Calbeck and H. R. Harner. *Ind. Eng. Chem.*, 1927, **19**, 58-61.
The estimation of particle size and distribution in pigments by determining gravimetrically the rate of sedimentation in a suitable medium is described. The preparation and interpretation of sedimentation curves and the preparation and use of histograms are treated.
—B.C.I.R.A.

Cotton Cloth: Mildewing. P. Bean. *Text. Merc.*, 1926, **75**, 694.
The author considers that the increase in complaints during the last three years of mildew in pure sized cotton cloth shipped to India is due to an increase in the amount of pressure put on the bales by the packers in order to reduce shipping charges. Six main causes of mildew in pure sized cotton cloth are enumerated. —B.C.I.R.A.

Cotton Cloth: Mildewing. G. Smith. *Text. Merc.*, 1926, **75**, 722.
In a reply to Bean (above) the author discounts the statements regarding the cause of mildew in pure sized cotton cloth and emphasises the gravity of the mildew problem. —B.C.I.R.A.

Inspection of Silk Piece Goods. *Silk* (N.Y.), 1926, **19**, No. 9, p. 40.
The machine described may be set against the wall, so saving floor space, as it is not necessary to have room behind for a man to put a beam of silk in place. It measures the silk accurately by two Veeder clocks and the cork-covered rollers are said to prevent all slipping. The machine is motor-driven and hand and foot controlled.
—F.G.P.

Testing Silk at Kobe. *Silk* (N.Y.), 1926, **19**, No. 9, p. 42.
As the establishment built just after the earthquake was far too small to deal with the amount of business a new testing house is planned at a cost of Y800,000, which will be able to cope with 40 per cent. of the national output. —F.G.P.

Identifying Artificial Silks. *Text. Amer.*, 1926, **46**, No. 2, p. 3.
A repetition of the usual burning and chemical tests which appear monthly in the American journals. —F.G.P.

Rayon Weight Percentages in Knitted Fabrics. W. Davis. *Text. Amer.*, 1926, **46**, No. 2, p. 60.
A great number of calculations are given for determining percentage weights and costs in knitted goods. —F.G.P.

Indanthrene Yellow as a Reagent. C. F. Green. *Text. Colorist*, 1926, **48**, 540.
This dye may be used as a test for oxycellulose by warming the suspected fabric with a "vat" made by boiling 0·03 grm. of the dye with dilute sodium hydroxide and hydrosulphite. The colour is developed by exposure and then boiled with 2N sodium hydroxide. The colour is reduced to blue at a rate proportional to the amount of oxycellulose present. —F.G.P.

Microscopic Test for Wool Fibre Faults. *Text. Merc.*, 1927, **76**, 406.
In the microscopic examination of wool for mechanical and chemical damage to the fibre, the method of Dr. H. Mark, Berlin, has not proved satisfactory. Consequently Dr. W. Sieber, of the Reichenberg Text. Res. Dept. has attempted to substitute the reagent used by Dr. Mark by a more stable one. He tried to diazotise azo dyestuffs which still contain free amino groups, and to use the resultant diazo compound; this, however, was not altogether satisfactory. The author then tried to diazotise Cotton Red 10B, as substantive cotton azo dyestuffs do not, as a rule, show special affinity for wool fibres, so that undamaged wool fibres should not dye in a neutral solution. Wool which had been damaged by soda and well washed out, when treated with Cotton Red 10B dyed in parts blue, in parts reddish to dark red. The following tests were then carried out—The woollen fibres were boiled for a few minutes in a 1 per thous. aqueous sol. of Cotton Red 10B without any other addition and washed in water until the latter was clear, then examined under the microscope, giving the following results.

(1) Raw woollen fibres previously degreased and then washed with water, showed in mechanically damaged places a deep red, according to the extent of the fault.

(2) Wool fibres which, for instance, had been treated in 5 per cent. soda sol. ¼ to ½ hr. at 50°-60°, then well washed, were coloured all shades from pink to dark red according to the extent of the damage.
(3) Wool fibres which had been immersed in 5 per cent. acqueous sulphuric acid sol. squeezed out and dried for 1 hr. at 80°, assumed the same colours as above.

This method is very sensitive and a detailed report is to be issued later on this simple method of ascertaining damage to wool fibre by alkali or acid. —B.R.A.W. & W.I.

Overflow Viscometer and Viscose Solutions: Viscosity. (1) W. Ostwald and R. Auerbach. (2) T. Mukoyama. *Kolloid-Z.*, 1927, **41**, 56-62, and 62-71.

(1) A new form of viscometer suitable for viscous fluids consists of an upright graduated tube from which the liquid flows under its own hydrostatic pressure through a vertical capillary and out through a U-tube connected to an overflow. The theory and working of the viscometer are demonstrated by measurements with Cotton Yellow sols.

(2) The overflow viscometer was standardised with glycerol and the absolute viscosity value calculated. The viscosity of viscose solutions of different degrees of ripeness was determined. All the samples showed structure viscosity; with a moderate degree of ripeness structure turbulence was evident. The absolute value of the critical rate of flow for the appearance of this structure turbulence decreases with increasing age of the solutions.—B.C.I.R.A.

Surface Tension Hydrometer. F. E. Poindexter. *Phys. Rev.*, 1927, **29**, 221.

The downward pull on the stem of a hydrometer due to the surface tension of the liquid is used to measure this tension. The liquid wets both the inside and outside of the hydrometer stem, the sensitivity of the instrument depending, therefore, upon the wall thickness of the projecting stem and the density of the liquid, i.e. $T=\frac{1}{2}\varrho S(r_2—r_1)g$, where S is the length of the portion of the stem submerged by the pull of the surface tension, and r_1 and r_2 are the inside and outside radii of the stem respectively. The $(r_2—r_1$ (of the one used was ·040 cm. and S=3·57 cm., giving the surface tension of water to be 69·97 dynes per cm. at 27·5° C., in good agreement with the value of 69·50 found by Ramsey and Shields by the capillary tube method. —B.C.I.R.A.

Cotton Yarn: Iron Content. P. Krais. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 34.

The iron content of a number of cottons of different origin was determined in (1) a sample of white yarn, (2) selected yellowed samples of yarns and (3) samples to which portions of seed coat were adherent. Detailed figures showing maximum and minimum iron contents are given for American, Egyptian, Indian, Chinese, and S. American yarns. The average iron content of the white yarn is 0·007 per cent. Fe., calculated on the weight of cotton, or 0·808 per cent. on the ash; for the yellowed samples the respective iron contents are 0·083 per cent. and 2·000 per cent.; and for the cotton with fragments of seed coat, 0·152 and 1·634. Accordingly, there is sufficient iron present in discoloured places to give rise to bleaching faults. —B.C.I.R.A.

Cotton: Valuing. T. Bühler. *Leipziger Monats. Text.-Ind.*, 1927, **42**, 5-7.

Continuing previous work on the accurate evaluation of cottons, the author deduces a formula by which the value of a cotton can be obtained from measurements of staple, purity (per cent. of good fibre), colour and tensile strength. These factors are defined and determined for 12 typical cottons and the method of calculation shown. —B.C.I.R.A.

Cotton Analysis: Rate of Oxycellulose Formation. D. A. Clibbens and B. P. Ridge. *J. Text. Inst.*, 1927, **18**, T135-T167.

Cotton Analysis: Determination of Combined Sulphuric and Hydrochloric Acids in Cotton. D. A. Clibbens and A. Geake. *J. Text. Inst.*, 1927, **18**, T168-T174.

Hydrogen Ion Control and Measurement and its Application to the Textile Industry. A. P. Sacks. *Text. Colorist.*, 1927, **49**, 166-170.

A discussion of the ionic theory in relation to the acidity and alkalinity of aqueous solutions used in treating textile materials. —A.J.H.

H-Ion Activity. (1) L. Ebert. (2) K. Täufel and C. Wagner. (3) A. Lottermoser. *Kolloid Z.*, 1926, **40**, 169-185.

Three papers read before the Hauptversammlung der Kolloid-Gesellschaft, Düsseldorf relating to the group subject—hydrogen-ion concentration, acid activity, buffer action, &c., in pure and applied colloid chemistry.

(1) The paper deals with hydrogen-ion concentration and activity and reviews the newer theories of solution.
(2) Actual acidity, potential acidity, and buffering are discussed.
(3) The experimental methods, notably that of Michaelis, for determining acid concentrations, H-ion concentrations and acid activities are described.

—B.C.I.R.A.

Sulphite Cellulose: Moisture Determination. E. Schlumberger. *Papier-Fabr.*, 1926, **24**, 783-785.

In a modified form of Tausz's apparatus, the author determines the moisture content of sulphite cellulose by direct distillation with acetylene tetrachloride. The quantity of water distilled is read in a simple calibrated tube, and the distillation is complete in 30 minutes. The results for a number of cellulose samples are in good agreement with those obtained by drying methods. A curve showing the water absorption of a dried sample, as determined at intervals by the method, exhibits definite steps whereas the desorption curve similarly obtained is continuous.

—B.C.I.R.A.

Standard Cellulose: Preparation. C. G. Schwalbe. *Papier-Fabr.*, 1926, **24**, 769-775 (Verein Zellstoff Ingenieure Section).

The author discusses the work that has been done on the question of setting up cellulose standards. It is necessary to distinguish between chemically pure standard cellulose and technical standard celluloses; the latter include technical standard cotton cellulose, technical flax, hemp, and jute standards, standard wool cellulose (ester standard wood cellulose and paper-standard wood cellulose) and artificial silk standards. The requirements which have to be met by each, as far as they have worked out, are described. The preparation of chemically pure cellulose and the methods of testing it for purity and chemical reactivity are described in greater detail.

—B.C.I.R.A.

Causes of "Watery" Size. See Section 3B.

Faults in Weaving. See Section 3C.

Testing Wetting Agents. See Section 4C.

Faults in Silk/Cotton Hose. See Section 4I.

7—BUILDING AND POWER

(A)—Construction of Buildings

Handling Materials in Textile Works. *Text. Merc.*, 1927, **76**, 145.

The first of a series of articles on this subject deals with the use of hoists, runways, lifting trucks, and slackers. These are used to cheapen the cost of production of the article, which in these days is of great importance. A detailed description of these mechanical aids is given, together with method of working, use, drawings, and diagrams. —B.R.A.W. & W.I.

New Machinery and Accessories for the Silk Mill. *Silk* (N.Y.), 1926, **19**, No. 8, p. 38.

Steam-jacketed kettles of copper, nickel or monel, either stationary or tilting, are illustrated, varying in size from 5 to 500 gallons. A blower is described, made of aluminium and driven by electricity, one use of which is to free the motors from dust. By means of an attachment it can be converted into a vacuum cleaner. A hydro-extractor for weighting use is fitted with two motors, one to work the basket slowly, the other quickly. It is claimed that 11 h.p. is saved for 90 per cent. of the operating time, also that better control is possible. —F.G.P.

(C)—Power

Saving Steam for the Dyers. *Text. Colorist*, 1926, **48**, 623.

Insulation of boilers and pipes is not sufficiently effective. Even the dyebaths should be insulated to prevent loss of heat, it being calculated that this would save 50 per cent. in the course of a year. Insulation on drying cots was shown to effect a very big saving, yielding 125 per cent. on the cost of the housing. Pressure kiers showed another saving when insulated.

—F.G.P.

"Thermo-Feed" Water Level Indicator [for Boiler Plant]. *Text. Merc.*, 1927, **76**, 417.

A detailed description of the working and construction of a regulator for automatically maintaining a constant water level in boilers. —A.J.H.

Knitting Plant: Power Data. F. S. Root. *Text. World*, 1926, **70**, 3342.

The sheet gives (1) the power required to operate Scott and Williams' tubular knitters and accessory seaming and sewing machines; (2) the power required by a small knitting factory using Stafford and Holt circular knitting machines for producing high-grade men's union suits.

—B.C.I.R.A.

Textile Mills: Power Losses. G. Wrigley. *Text. World*, 1926, **70**, 3334-3335.

Power requirements and distribution in cotton mills are analysed and it is shown in what operations power utilisation losses are greatest. For example, the friction clutch of the ordinary single motor-driven loom is inefficient; the relation between clutch pressure, speed, and power consumption of the loom is shown. In spinning and twisting frames the principal part of their power load is the friction of the machine parts; it is shown how the power consumption in the traveller rings on a heavy twister could be lessened by lubricating the rings, if this could be done by a lubricant that would not stain the yarn.

—B.C.I.R.A.

(F)—Lighting

Better Lighting at Less Cost. *Silk* (N.Y.), 1926, **19**, No. 9, p. 43.

The majority of American silk and rayon mills lose money on the bad system of lighting. Dirty lamps and reflectors are said to cause a loss of 40-60 per cent. of the light bills. Lamps frosted on the inside instead of outside avoid much dirt collection. Lamps specially designed to avoid glare are recommended. —F.G.P.

(H)—Humidification

Aspiration Psychrometer Tables: Accuracy. H. Ebert. *Physikal. Z.*, 1926, **27**, 869-870.

To test the accuracy of psychrometer tables, the author determined relative air humidities between 20 and 90 per cent. at 60° by means of an aspiration psychrometer and by direct absorption in an Obermiller tower. The exact method is described. The results show that at high humidities the ordinary tables drawn up from theory are accurate, but that lower humidity measurements by the psychrometer are too high. This indicates that the theoretical psychrometer difference is not completely attained. The difference between humidity determined from tables and by the absorption method amounted at 60° (dry thermometer) and 20 per cent. humidity to about 5-6 per cent. with an accuracy of 1 per cent. —B.C.I.R.A.

Cold Storage Rooms: Humidification. J. Obermiller. *Z. angew. Chem.*, 1927, **40**, 57.
A method is described by which cold storage chambers may be maintained at the requisite air humidity (75 per cent.) by circulating through them air that has been passed over salts, such as common salt, either in a moist condition or in highly concentrated solution. —B.C.I.R.A.

Prüttmeter. *Leipziger Monats. Text.-Ind.*, 1926, **41**, 422.
The scale of the aspiration wet-bulb thermometer gives directly the thermal content of 1 cu. m. of air in "air-calories," a unit which Prött defined as the quantity of heat necessary to heat 1 cu. m. of dry air at a pressure of 775 mm. of mercury 1° C.; 1 air-cal. is, therefore, 0·306 kg.-cal. A chart is provided with the instrument which gives total thermal content in kg.-cals., saturation in grams per cu. m., and dew point. —B.C.I.R.A.

Continuous-Indicating Hygrometer. A. Romberg and L. W. Blau. *J. Opt. Soc. America*, 1926, **13**, 717-724.
A value of the humidity is obtained by balancing a column of air saturated with water vapour and observing the effect on a suspended vane, of the difference of pressure due to the different densities. The instrument used in the investigation is more sensitive than the Regnault Allnard type of dewpoint hygrometer and can be made a hundred times as sensitive if required. —B.C.I.R.A.

Textile Mills: Humidification and Ventilation. H. Neu. *Rev. Text.*, 1924, **22**, 655-665 and 863-869.
The author reproduces Willkomm's curves showing the relation between breaking load and relative air humidity for cotton, linen, wool and silk, and gives a curve showing the effect of humidity on static electricity. The requisite temperatures and hygrometric conditions for the several cotton preparatory and spinning processes are given for a number of cotton varieties. After discussing the principles of humidification and ventilation, the author describes the Kestner-Neu "ejecto-atomiseur" simultaneous ventilation and humidification system and the Kestner-Neu "autotherme" which is a combined heating, ventilating, and humidifying installation.—B.C.I.R.A.

(I)—VENTILATION

Ventilation of Textile Mills. See Section 7H.

8—DESIGN

Designing Artificial Silk Fabrics. See Section 3G.

9—COMMERCE, ECONOMICS, LABOUR &c.

Value of Wool Standardisation. *Wool Record*, 1927, **31**, 390.
Standardisation is desirable in many branches of the wool trade; it is particularly essential in mechanical details such as thickness of yarn, length of nap on cloth, quality strength, &c. Standardisation of raw material and tops presents difficulties not met with in yarn, but a standard for this purpose has been arrived at. It is important that once a firm has decided upon a certain standard, it must be kept year in and year out.
—B.R.A.W. & W.I.

Cotton Mill in U.S.A.: Production. *Nat. Assoc. Cotton Mfrs., Bull.* No. 79, 1926.
The production of a New England Mill which has been making approximately the same product since 1835 has been analysed with a view to showing the change in productivity with improved methods. A table giving the man-hour production shows that in the last 75 years the production per man has increased almost seven times. Other tables show the decrease in personnel in a weaving shed in 1925 as compared with 1910, a comparison for 88 years of factors entering into the production of cotton cloth and the increase in wages by departments for the last 75 years. —B.C.I.R.A.

Progress on Wool Standardisation. *Text. World.*, 1927, **71**, 793.
Standardisation of wool and top grades has provided a bedrock upon which improved methods for distribution of raw wool and its products may be built. If those co-operating have a common language whereby the quality of wool or its products can be accurately determined, misunderstandings are less likely to occur. Means for determining the quality have been prepared, in the form of official standard sets containing specimens of wool and wool-top grades, some of which are now in the hands of the leading wool organisations in England, Germany, France, Italy, and other countries, and so providing them with a basis for a correlation of nationally known grades with official standards of the United States.
—B.R.A.W. & W.I.

Cotton Industry in China: Statistics. E. A. Mann. *Text. World*, 1926, **70**, 3159-3160, &c.
In a review of the development and present position of the cotton spinning and weaving industry in China the author gives statistics of the number of mills, spindles, and looms, and their distribution as regards ownership and location; the raw cotton consumed and imported, and of wages and costs in Chinese mills. The counts spun are as a rule 6's to 20's, the greatest demand being for 10's to 16's. Chinese import and export trade in piece goods in recent years is shown. —B.C.I.R.A.

Cotton Industry: Statistics. F. Nasmith. *Text. Rec.*, 1927, **44**, No. 526, p. 37-40.
In an analysis of the present world position of the cotton industry, the author presents statistics of crops, and of spindleage development in the main producing countries, and shows the competition to be faced by British manufacturers. A strong plea is made for the collection and interpretation of data relating to all branches of the industry. —B.C.I.R.A.

Silk Waste. *Silk* (N.Y.), 1926, **19**, No. 9, p. 37.
A quantity of silk mill waste sold for about $18 actually cost $2,100. An examination of a bag of waste will often show room for improvement in the organisation. A visit to a large silk waste dealer's premises will do more good than dozens of speeches on business conditions. Waste is often thrown away off the premises by the operatives; much of it could be recovered by a skilled redrawer. In a broken bag of waste was found sufficient recoverable silk to make one piece of crêpe de chine. The rule that a weaver must return empty cops clean, leads to cutting off the residue with a safety razor blade. It is better to take back thrown-out cops without asking questions, and let the redrawer deal with them. A case is mentioned of a waste dealer who kept six looms busy with the crêpe waste he sorted out and redrew. —F.G.P.

Artificial Silk Manufacture in Germany. *Melliand Textilber.*, 1927, **8**, 78-82.
An account of the development and present activities of the various artificial silk producing concerns associated in the Vereinigte Glanzstoff-Fabriken A.-G. Elberfeld. —B.C.I.R.A.

Cotton Machinery in the U.S.A.: Research. J. A. Campbell. *Mech. Eng.*, 1926, **48**, 1425-1426.
In a brief survey of the present position of the textile industry in the United States, the author urges the need for thorough scientific research into mechanical processes leading to the discarding of obsolete procedures. —B.C.I.R.A.

Cost of Establishing a Broad Silk Plant of Moderate Size. *Silk* (N.Y.), 1926, **19**, No. 8, p. 31.
A detailed description by a practical manager of the costs involved. The first vitally important consideration is the engagement of a competent manager. The routing of materials is insisted upon; insurance matters discussed, especially with regard to the lessened premiums when sprinklers are installed. Skilled weavers are paid $40-45 for a 48-hour week. —F.G.P.

Growing Skill and Ability of Labour in Silk Industry. *Silk* (N.Y.), 1926, **19**, No. 8, p. 41.
In 10 years the number of wage earners per unit of production has fallen 30 per cent., production per wage earner increased 42 per cent. and wages 4·5 per cent. per unit. Power per wage earner increased 60 per cent., hours of work fell from 54·6 to 48·8. Higher grades and qualities are produced. Cost of management has gone up 3 per cent., though number of staff has gone down 2 per cent. —F.G.P.

Russian Artificial Silk. *Silk* (N.Y.), 1926, **19**, No. 8, p. 43.
In 1914 the Russian Viscosa factory produced 140,000 kg. of rayon. It did not start work again until 1924. In 1925 it was costing 13 roubles 88 kopeks per kilo. to produce when the selling price of imported rayon was 2 r. 18 k.; rather below that of fine cotton. As the Bolshevik taste is tending more towards rayon, other factories are to be organised. —F.G.P.

Conditioning Law Passed by Japanese House of Representatives. *Silk* (N.Y.), 1926, **19**, No. 8, p. 79.
The rules for 1927 authorise that no raw silk shall be exported unless its weight has been conditioned by the Government. All exporters' premises are to be open to inspection; fines are payable in cases of obstruction or infraction, and the head of the firm cannot hide behind his subordinates. —F.G.P.

Cotton Crop in U.S.A.: Statistics. J. A. Todd. *Text. Merc.*, 1926, **75**, 671.
The author discussed the unexpected increase in acreage under cotton in America in 1925-26 in spite of reduced prices in 1924-25, and showed how previous peaks in boll weevil incidence had been followed by record crops. The future of Empire cotton was briefly considered in prospect of "sixpenny" cotton. —B.C.I.R.A.

Italian Silk Hosiery Industry. *Silk* (N.Y.), 1926, **19**, No. 9, p. 49.
At present about 20,000 workers are employed in the industry who use 1,000,000 kilos. of combed wool, 1,400,000 kilos. of carded wool, 2,000,000 kilos. of cotton and 40,000 kilos. of silk. The output is 1,000,000 dozens for home use and 30,000 dozens for export. —F.G.P.

Artificial Silk Industry; World's Agreements in—— *Text. Merc.*, 1927, **76**, 361.

A detailed account of the agreements which exist between artificial silk producers throughout the world, and the financial position of each producer. —A.J.H.

Cotton Goods in Bulgaria: Manufacturing. *Text. Merc.*, 1926, **75**, 632.

The prospects of developing a cotton industry in Bulgaria are said to be promising. The native cotton, of which there is a production now of only a million kilograms of raw cotton, is said to be of high quality with a staple of 22-26 millimetres. It is all absorbed by the peasant growers in the home weaving industry. There is, however, one spinning mill at Varna, owned by the Tzar Boris concern and founded and equipped in 1899 by a British company, which is producing about 3,000 kilograms of yarn a day, and is contemplating extensions. There is also a weaving establishment at Varna with 600 workers, with a daily output of 15,000 to 18,000 metres of various cotton textiles. The company proposes to erect a spinning mill of its own. A second weaving factory at Gabrovo is equipped with modern machinery.
—B.C.I.R.A.

Costing Knitted Goods. See Section 6.

10—MISCELLANEOUS

Cellulose Acetate Insulating Material, "Lonarit." H. Biel. *Papier-Fabr.*, 1927, **25**, 45 (Verein Zellstoff Ingenieure Section).

Lonarit is an acetylated cellulose in powder form which can be employed for insulating and other purposes. The product can be worked by hot squirting or pressing; in either case pressures of 80 to 250 kg./cm.^{2} and temperatures of 100° to 230° are required. The compressed mass quickly hardens in the mould, and no volume change occurs since no solvent has been used and the product is dry. Lonarit possesses high adhesive power and by moistening with acetone, a large number of individual pieces may be built up into any structure desired. Lonarit is non-hygroscopic and withstands the action of dilute acid and alkalis; it is not attacked by oils, fats, and benzine, and is only sparingly soluble in benzene, petroleum, and alcohol. It is stable towards heat up to 180° C. Its density is 1·45 and its dielectric strength over 20,000 volts.
—B.C.I.R.A.

Thallium Sulphate: Insecticidal Properties. C. H. Popenoe. *Science*, 1926, **64**, 525.

The small red ant has been exterminated in a number of houses within a month by the application of a syrup consisting of 1 pint water, 1 pound sugar, 27 grains thallium sulphate, and 3 ounces honey, the whole being brought to a boil and thoroughly stirred. The thallium appears to act as a slow cumulative poison. The pavement ant is even more readily controlled, while several other species have shown themselves susceptible. The value of this poison on other insects is being tested. —B.C.I.R.A.

"A.F.S." Synthetic Resin Mounting Medium: Application. G. D. Hanna. *Science*, 1927, **65**, 41-42.

The substance is a yellow resin which is a product of aniline, formaldehyde, and sulphur, and can be used in a thick viscous condition or thinned down with aniline or other solvents. A range of refractive index from 1·68 to almost 2·0 has been obtained and it appears to be entirely stable. The index of visibility is considerably greater than that for Canada balsam or liquid amber, and depth of focus is also greater. —B.C.I.R.A.

Hard Rubber Equipment. *Text. Colorist*, 1926, **48**, 556.

Especially in tin weighting plants hard rubber fittings are of great value in pumps, piping, tanks, and centrifuges as it suffers very little from contact with the corrosive stannic chloride. —F.G.P.

Scrapped Textile Machinery: Disposal. *Text. World*, 1927, **71**, 47-49.

A practical system of dealing with the scrap material resulting mainly from obsolete machinery in a textile mill is outlined with a plan of a convenient scrap yard. The pecuniary advantages of systematic analysis and salvage of waste materials are emphasised. —B.C.I.R.A.

Felt-like Materials: Acoustic Properties. A. H. Davis and T. S. Littler. *Phil. Mag.*, 1927 (vii.), **3**, 177-194.

Measurements of the transmission and reflexion of sound by partitions of mahogany (2 in.), eelgrass quilt, cane-fibre board, felt, felt and blanket, and blanket, of the reflexion ratio of the cane-fibre board, felt, blanket, and eelgrass quilt backed by mahogany, and of sound transmission through various thicknesses of hair-felt are described. The partition was clamped over an aperture in the wall between two adjacent sound-proof rooms, in one of which a source of sound, in conjunction with a paraboloidal mirror, directs a fairly uniform beam of sound obliquely on to the partition. Measurements of intensity were made in the transmitted and reflected beams and at various other points within the rooms. The electrical equipment used in the production and measurement of the sound-field is described. The transmission of sound through felt was specially investigated, one, two, three, and four layers, each of 0·58 in. thickness, being employed and frequencies ranging from 250 to 1,600 vibrations per second. A comparison is made between these results and those obtained by Sabine, who used a reverberation method. —B.C.I.R.A.

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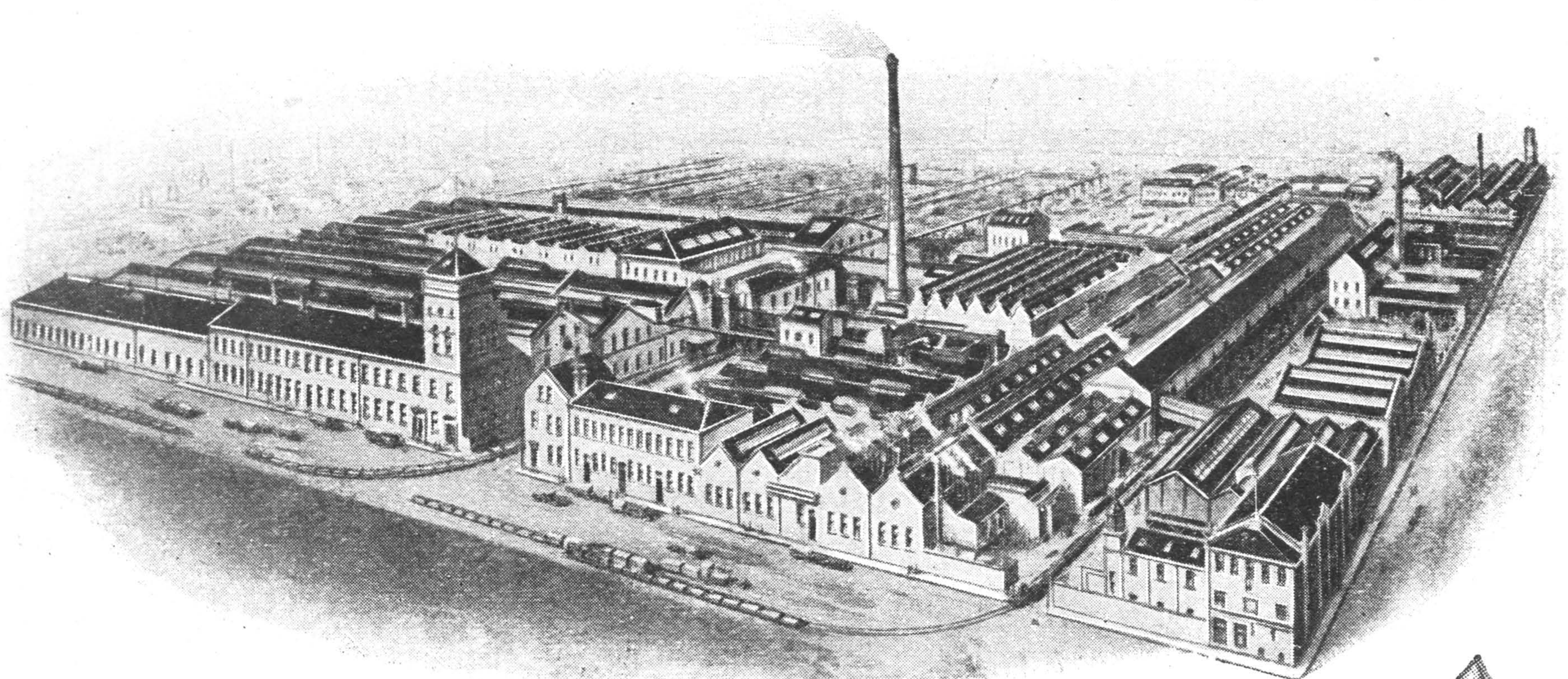

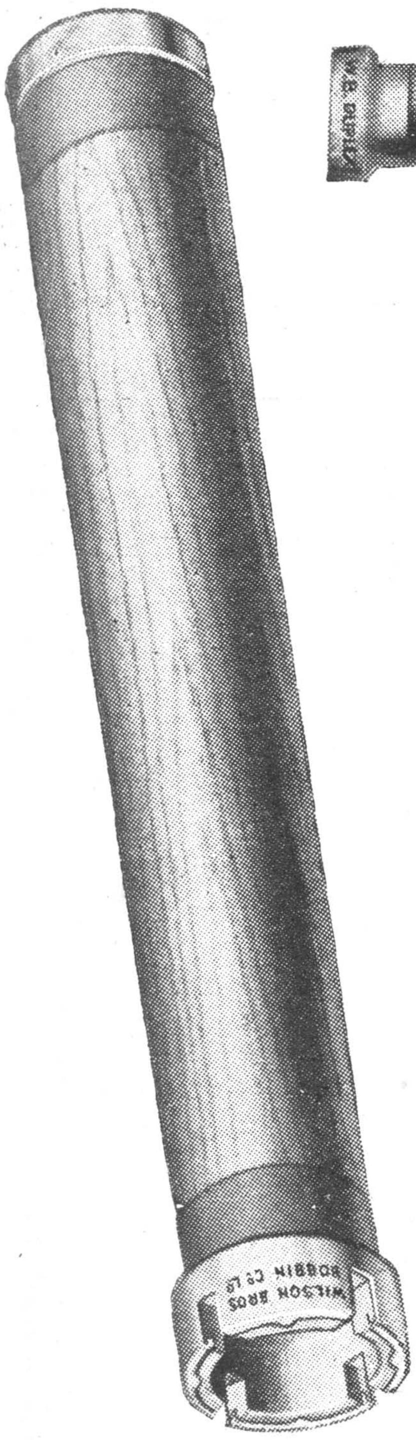

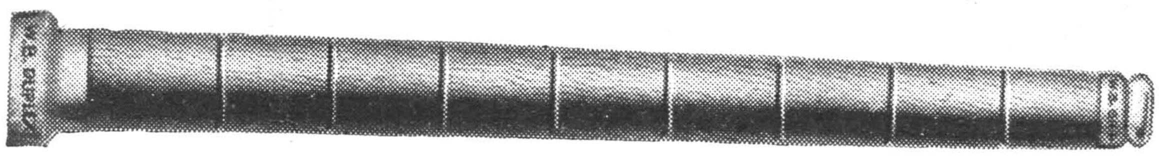

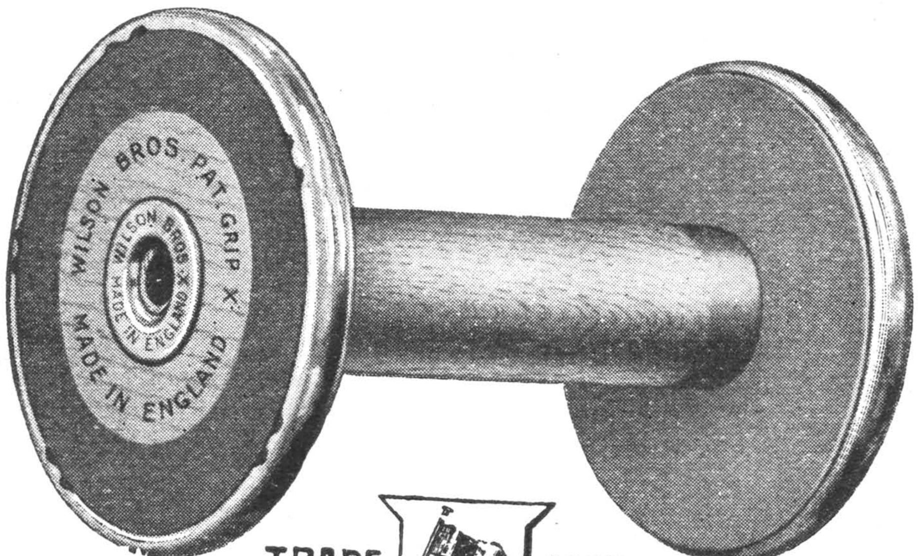

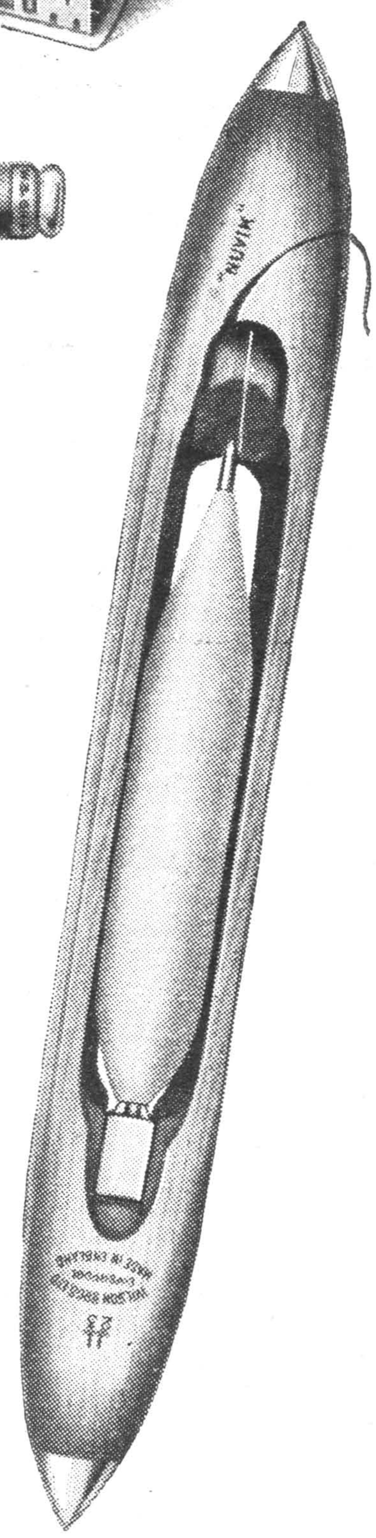

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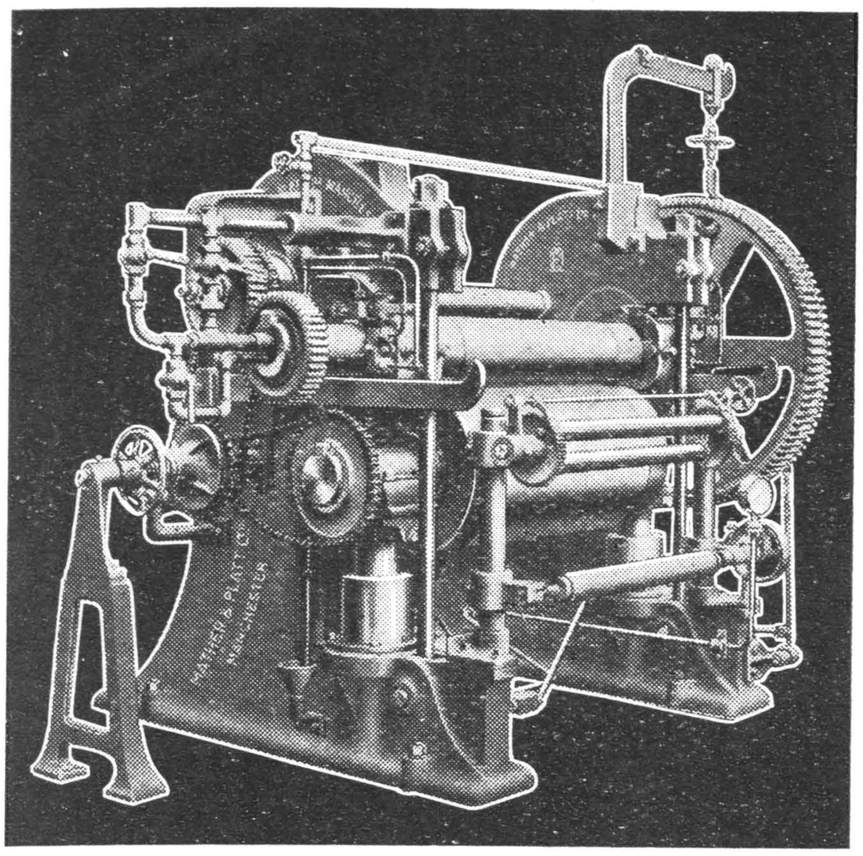

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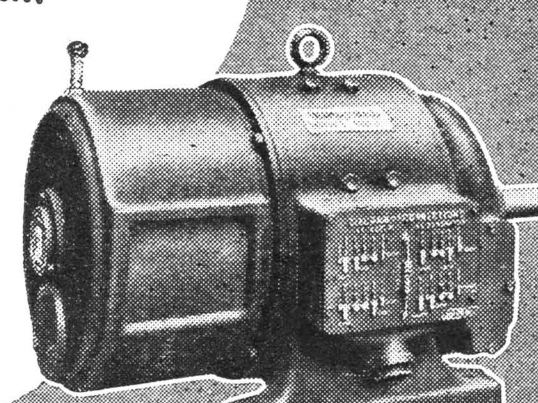

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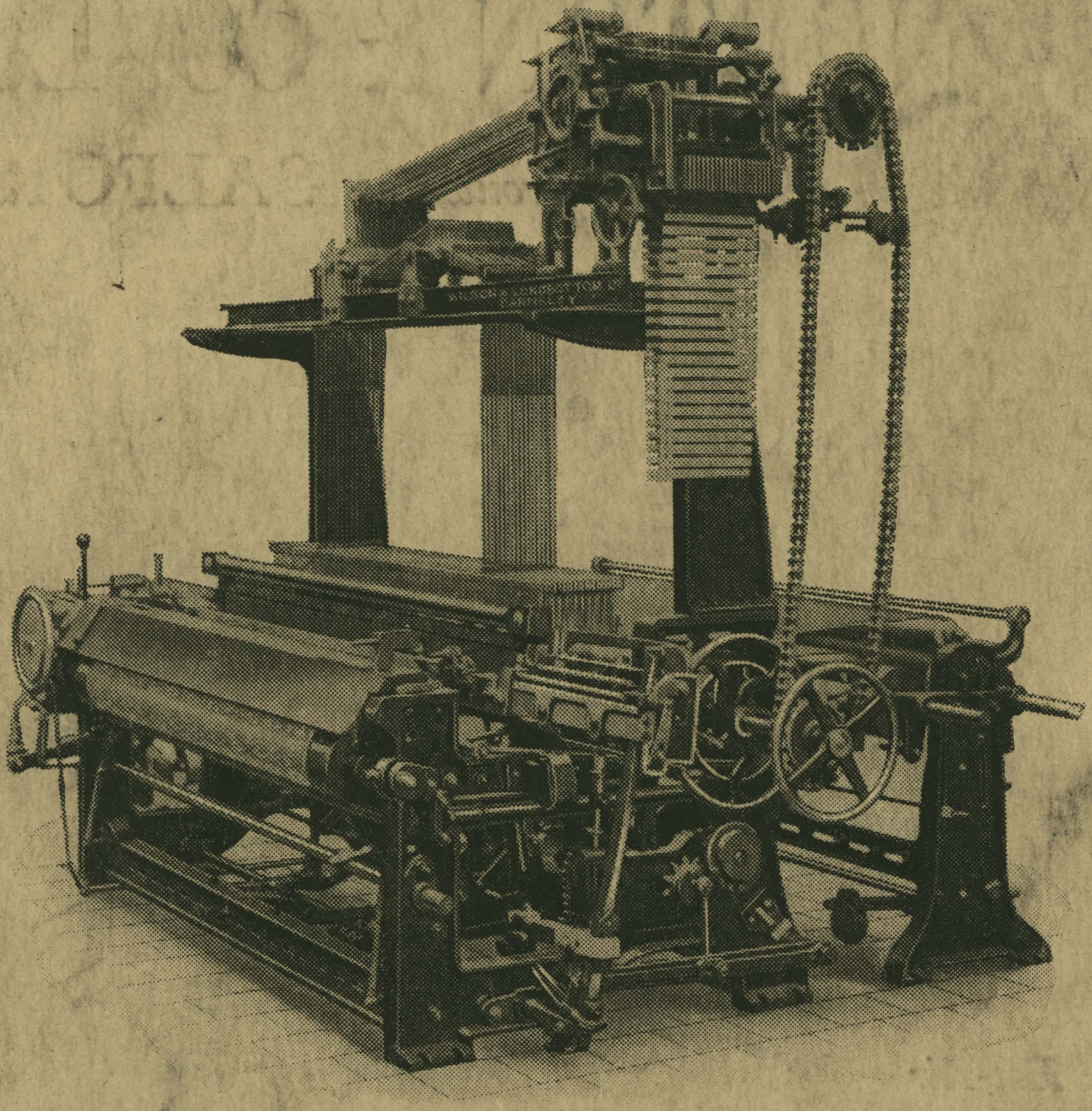

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