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The Journal of the

TEXTILE INSTITUTE

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Annual Conference Announcement *see* **page xii.**

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NOTICES: INSTITUTE MEETINGS

Tuesday 2nd March *Manchester*—3 p.m. Meeting of Publications Committee, at the Institute.

Wednesday 17th March *Manchester*—3 p.m. Meeting of Council, at Institute, preceded by meeting of Finance and General Purposes Committee, at Institute.

Wednesday 24th March *Manchester*—2.45 p.m. Meeting of Selection Committee, at Institute.

Midlands Section

Thursday 11th March *Nottingham*—7.30 p.m. Lecture: "Developments in the Knitting Industry," by Mr. W. E. Boswell, F.T.I., at University College, Nottingham.

Yorkshire Section

Thursday 11th March *Bradford*—7.30 p.m. Lecture: "Textiles on Test in the Customers' Interests" (Illustrated by Cinematograph), by Mr. J. Guilfoyle Williams, B.Sc., A.I.C., A.T.I, at Midland Hotel.

Irish Section

Thursday 18th March *Belfast*—7-45 p.m. Lecture: "Co-operation between the Textile and Laundry Industries," by Mr. F. C. Harwood, B.Sc., F.I.C., at College of Technology.

London Section

Tuesday 2nd March *London*—7-30 p.m. Lecture: (jointly with The Institution of the Rubber Industry: "Cotton Processing" (Illustrated by Cinematograph), by Mr. Fletcher Chadwick, F.T.I., at Hall of The Institution of Mechanical Engineers.

Other Organisations

Ashton-u-Lyne & District Mill Managers Association—

Friday 12th March *Ashton-u-Lyne*—8 p.m. Lecture: "Some New Developments in Opening and Cleaning Machinery," by Mr. T. C. Williams, at Highland Laddie Hotel.

Blackburn & District Managers' Mutual Association—

Friday 5th March *Blackburn*—Lecture: "Some Factors in Weaving High Grade Fabrics." Mr. G. Harris, at Old Bull Hotel.

Continued from Page viii.

Blackburn Textile Society—

Friday	12th March	*Blackburn*—Lecture : " Yarn Testing and Performance," by Mr. H. Pomfret, A.T.I.
Friday	19th March	*Blackburn*—Lecture : " Lubrication," by Mr. N. Helliwell.
Saturday	20th March	Visit to Messrs. Whiteley & Sons, Halifax.

Bolton & District Managers, Carders and Overlookers Association—

Friday	19th March	*Bolton*—8 p.m. Lecture : " Thirsty Cotton," by Mr. A. H. Milnes, at Saddle Hotel.

Bradford Textile Society—

Thursday	4th March	Visit to Messrs. E. R. Halford, Ltd., Bakers, Bradford.
Monday	8th March	*Bradford*—7.30 p.m. Lecture : " Weaving Cotton in conjunction with Wool and Rayon," by Mr. W. Wilkinson, O.B.E., F.T.I., at Midland Hotel.
Wednesday	17th March	Annual Excursion to Birmingham, and Austin Motor Co. Ltd., Longbridge Works.
Monday	22nd March	*Bradford*—7.30 p.m. Lecture : " Employers and the Labour Shortage," by Mr. Alex. Smith, at Midland Hotel.

Burnley Textile Society—

Saturday	6th March	Visit to Messrs. Butterworth & Dickinson Ltd., Burnley.
Tuesday	16th March	*Burnley*—7.30 p.m. Lecture : " The Trend of Modern Improvement in Textile Machinery," by Mr. W. Walton

Bury & District Textile Society—

Friday	5th March	*Bury*—7.45 p.m. Lecture : " Practical Weaving," by Mr. W. Barker, at Technical College.
Friday	19th March	*Bury*—7.45 p.m. Lecture (Lantern illustrated) : " Smoke Abatement," by Mr. A. Marsh, M.Sc., at Clerke Street School.
Saturday	20th March	Visit to Metropolitan-Vickers Electrical Co. Ltd., Trafford Park.

Dewsbury Textile Society—

Thursday	11th March	*Dewsbury*—Lecture : " Rayon used in the construction of Woollen Type Fabrics," by a representative of Messrs. Courtaulds Ltd.
Saturday	20th March	Visit to Messrs. Platt Bros., Hartford Works, Oldham.

Halifax Textile Society—

Monday	8th March	*Halifax*—7.30 p.m. Lecture : " Flax, Hemp, Jute and other Fibres," by Mr. A. Wigglesworth, at White Swan Hotel.
Monday	22nd March	*Halifax*—7.30 p.m. Lecture : " Wool Market Forecasting," by Mr. R. R. Whitaker, at White Swan Hotel

Haslingden District Textile Society—

Thursday	4th March	*Haslingden*—7.45 p.m. Lecture : " Factory Legislation," by Councillor G. F. Kilshaw, at Grammar School.
Saturday	13th March	Visit to The Lancashire & Cheshire Coal Owners Rescue Station, Boothstown, near Manchester.

Huddersfield Textile Society—

Monday	8th March	*Huddersfield*—Lecture : " General Methods for the Examination of Textile Oils," by Mr. J. Barritt, B.Sc., A.R.C.S.

Keighley Textile Society—

Saturday	13th March	Visit to works of Yorkshire Conservative Newspaper Co. Ltd., Leeds.
Monday	15th March	*Keighley*—7.30 p.m. Lecture : " The Further Developments with Fibro Yarns," by Mr. H. Ashton, at Kiosk Café.

Manchester College of Technology Textile Society—

Thursday	4th March	Visit to Messrs. R. Greg & Co. Ltd., South Reddish, Stockport.
Tuesday	9th March	*Manchester*—7.30 p.m. Lecture : " Finishing Machinery," by Mr. Mace, at College.

Nelson Textile Society—

Monday	8th March	*Nelson*—7.30 p.m. Lecture : "Textiles in Russia," by Councillor W. Bannister, at Technical School.

Oldham Technical Association—

Tuesday	16th March	*Oldham*—7.30 p.m. Lecture : " Bakelite, the Material of Infinite Uses," by Bakelite Ltd., at Municipal Technical College.

Rochdale Textile Society—

Wednesday	10th March	*Rochdale*—Lecture : " Textile Machinery," by representative of Messrs. Howard and Bullough Ltd., to be followed by visit to their works.

Shipley Textile Society—

Tuesday	9th March	*Shipley*—7.30 p.m. Lecture : " The Making of Fancy Yarns," by Mr. Watson, at Technical Institute.
Saturday	13th March	Visit to Jowett Cars Ltd., Idle.
Thursday	25th March	*Shipley*—7.30 p.m. Lecture : " Finishing Faults and Remedies," by Mr. J. Schofield, B.Sc., A.R.C.S., F.Inst.P., at Technical Institute.

ANNUAL CONFERENCE, 1937
SOUTHPORT 9th, 10th and 11th JUNE

The General Subject for discussion at this Conference will be :—

THE SERVICEABILITY OF FABRICS FOR CLOTHING

On Thursday, 10th June, the discussion will have special reference to the appearance and handle of fabrics, and on the 11th June the wearing properties of fabrics will be discussed.

An Exhibition of Apparatus specially developed for testing the properties of fabrics is to be held in association with the Conference. Exhibits of samples and specimens illustrating the results of research work in the same field will also be shown.

An invitation is extended to all members to submit offers of apparatus and samples for this Exhibition to the Committee in whose hands the arrangements have been placed. Communications should be addressed to the Textile Institute, 16, St. Mary's Parsonage, Manchester, 3.

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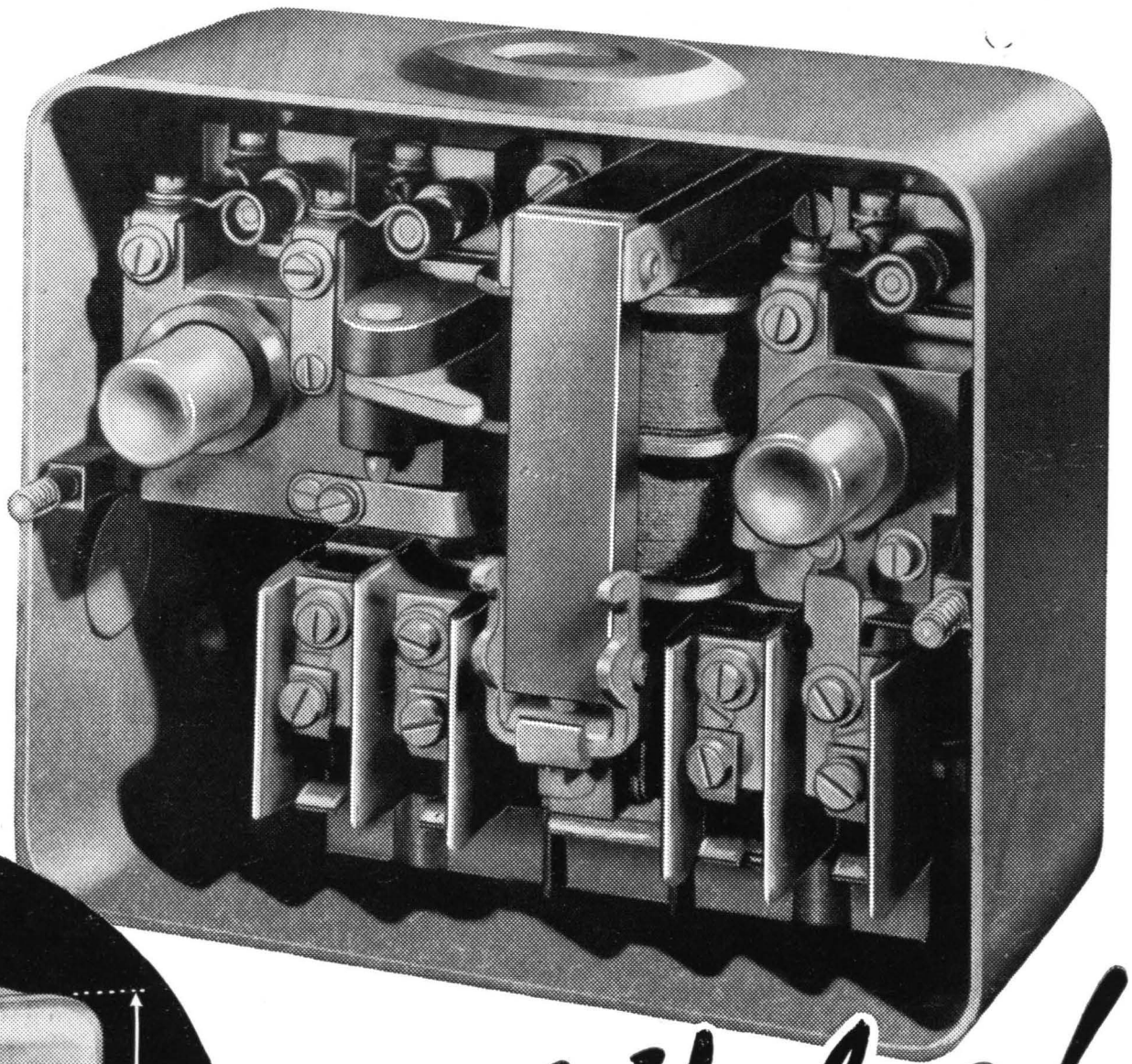

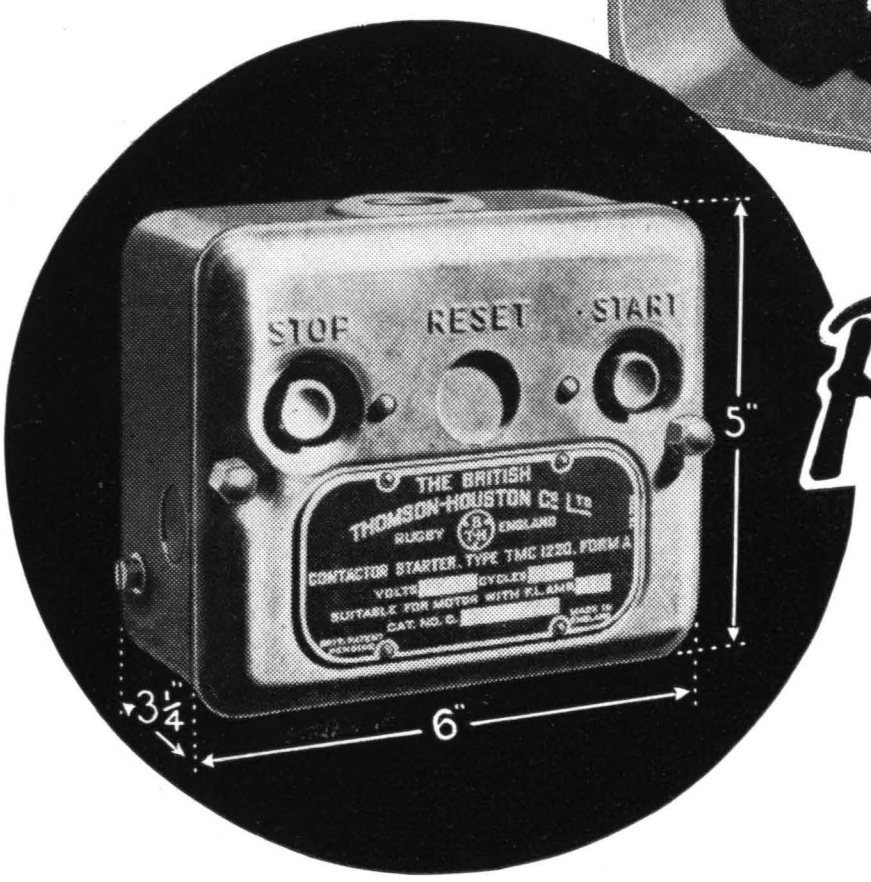

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THE JOURNAL OF THE TEXTILE INSTITUTE

Vol. XXVIII FEBRUARY 1937 No. 2

PROCEEDINGS

NOTES AND ANNOUNCEMENTS

Election of Council of the Institute

A list of vacancies which arise on the Council of the Institute at the end of the current session has been approved for publication in this issue. Ten of the thirty elected members retire annually but are eligible for re-election unless specially disqualified. In this issue, also, forms will be found for the use of members desiring to nominate candidates for the 1937 vacancies. The list of names given below indicates the year in which members of the Council retire :—

1937	1938	1939
Barnes, H. C. (A. T. I.)	Chamberlain, J. (F. T. I.)	Bromiley, H. (F. T. I.)
Chadwick, F. (F. T. I.)	Greg, H. Gair	Crompton, W. B. (F. T. I.)
Davis, Wm.	Haigh, G. (F. T. I.)	Dilks, H. L.
Howarth, Wm.	Lord, R. (F. T. I.)	Gee, N. C. (A. T. I.)
Lishman, W. W. L.	Porter, F. C. (F. T. I.)	Gowie, A.
Nisbet, H. (F. T. I.)	Read, J. (F. T. I.)	Jaques, H.
Stevenson, A. W. (F. T. I.)	Richardson, H.	Kendall, F. (F. T. I.)
Wildt, E. (F. T. I.)	Scott-Taggart, W. (F. T. I.)	Kershaw, S. (F. T. I.)
Wilkinson, W. (F. T. I.)	Speakman, J. B. (F. T. I.)	Slater, F. P. (F. T. I.)
Wood, F. C. (F. T. I.)	Thompson, G. H. (F. T. I.)	Withers, J. C. (F. T. I.)

The Council of the Institute

At the February meeting of the Council, the Annual Report for 1936, Balance Sheet and Accounts were submitted. The Balance Sheet and Accounts were accepted for submission to the members and these will be published in the March issue of the *Journal*. The Annual Report was referred to a small Sub-Committee for final scrutiny and it was decided to include a paragraph referring particularly to the Balance Sheet and Accounts, this also will be published in March.

So far as practicable, details were arranged for the forthcoming Annual Meeting of the Institute which will be held at Headquarters on Wednesday, April 14th. Mr. John Crompton, whose work for the Institute in general, and its Competitions in particular, is well known to all members, is nominated for election to Presidency. Council expressed its hope that as many members as possible would attend the Annual Meeting on this occasion.

As will be seen from the addition-to-members list also published in this issue, over 20 new members from the laundry industry were elected to membership by Council ; in practically every instance these new members were nominated for election by Mr. T. C. Petrie, Chairman of the London Section committee. Council unanimously expressed its appreciation of this effort on the part of a Section Chairman and a special letter of thanks was forwarded to Mr. Petrie. The total number of new members elected—38—constitutes a record for the month of February, and closely approaches the record of membership elections for any month of any year. The next meeting of Council was fixed for Wednesday, 17th March.

The Institute's Examination, 1937

The annual Examination conducted by the Selection Committee in connection with applications for the Associateship Diploma of the Institute, is to be held this year in May, Part I on Wednesday, 19th May, and Part II on Wednesday, 26th May. Part I will be held at headquarters and commences at 9-45 a.m. Part II will be held simultaneously at headquarters, Manchester, in Bradford, in Nottingham, in London, and in India, probably at Bombay and elsewhere. At the February meeting of Council, invigilators for the various centres at which the Examination will be held were appointed.

Annual Competitions for the Institute and of the Lancashire County Council

The establishment of the Institute's Competitions dates back to a donation of £2,000 from Mr. John Crompton, O.B.E., M.Sc., F.T.I., of Ansdell and Manchester, the annual revenue from which was to be applied to the provision of prizes with a view to the encouragement of the Design and Structure of woven Fabrics. The first Competition was held in 1919-1920 and entries were for one album of woven samples only. With varying fortune, but with ever-growing appeal the Competitions have gone on from year to year. Additional Competitions have been instituted and now cover single woven fabrics (novel in character) as well as albums of woven specimens, yarns (single and doubled) knitted fabrics, and designs on paper for printed fabrics. In 1936 the Institute received yet another bequest, £1,000 from the late Mr. R. J. H. Beanland, of Clayton West, Huddersfield, the income from which is to be devoted to the provision of prizes for the encouragement of the Design and Structure of Fabrics, and in particular fabrics in the manufacture of which worsted yarns have been used. Two additional Competitions have therefore been added to those already available and the recently issued Competitions Prospectus contains full particulars of all the Competitions now conducted by the " Textiles and Designs Committee."

The Lancashire Education Committee with the object of encouraging practical design and fabric structure again offer prizes in a Competition for collections of not more than four fabrics submitted under certain prescribed conditions, details of which are now available. Full particulars can be obtained from the County Education Offices, Preston.

Honours List: February, 1937

The first list of Honours conferred by His Majesty King George VI was issued on the 1st February. Of particular interest to the Textile Institute were the following awards :—

BARONET. Sir William Clare Lees.
Managing Director of the Bleachers' Association Ltd. For services to the British cotton and artificial silk industries. Sir William was President of this Institute from 1933-34.

KNIGHT. Colonel Gilbert Tanner.
For political and public services in Yorkshire and Lancashire. Colonel Tanner is a member of the Institute.

At its February meeting the Council affirmed its hearty appreciation of and congratulations upon the awards recorded above.

Representation of the Institute on other Organisations

The Institute is now represented upon several organisations and the following list may be of some interest and use.

Joint Committee of the Board of Education and of the Textile Institute for the Conduct of the National Certificates in Textiles Scheme.

Representatives of the Board : H.M. Inspectors J. E. Dalton, H. Salt, H. J. Shelley, and P. F. Burns.

REPRESENTATIVES OF THE TEXTILE INSTITUTE: Messrs. F. W. Barwick, J. H. Lester, T. H. Robinson, and S. E. Ward.

Empire Cotton Growing Corporation: Administrative Council.
Mr. Frank Wright represents this Institute.

Yorkshire Council for Further Education: County Advisory Committee for Textile Industries.
Mr. E. T. Holdsworth represents this Institute.

British Management Council.
Mr. Frank Nasmith represents this Institute.

Institution of Mechanical Engineers: General Committee to arrange Discussion (October, 1937) on Lubrication and Lubricants.
Mr. W. Scott-Taggart represents this Institute.

Union of Lancashire and Cheshire Institutes: Advisory Committees on Cotton Spinning and Cotton Weaving.
The General Secretary represents this Institute.

Federation of Textile Societies and Kindred Organisations

The Tenth Annual Meeting of the Federation is this year to be held in Huddersfield by invitation of the Huddersfield Textile Society. The date fixed for the event is Saturday, 1st May, and already an attractive programme has been outlined. At a recent meeting of the Committee of Management of the Federation the above arrangements were approved and it was also recorded that the Haslingden Textile Society had accepted the Committee's invitation to nominate a President for the ensuing year. The election of President takes place at the Annual Meeting, together with the election of members of the Committee of Management, four of whom are drawn from Lancashire Societies, three from Yorkshire Societies, and one from the Leicester Textile Society. The Committee is completed by two representatives of the Textile Institute, together with an Hon. Auditor and Hon. Secretary. The Federation two years ago offered a prize of £5 for the best lecture delivered to a Federated Society by one of its members or by a member of an affiliated body. Each Society was invited to select one paper so contributed and all entries thus submitted were adjudicated upon by the Committee of Management. This prize is again offered to cover papers delivered during the Sessions 1935-1936 and 1936-1937; all entries should be sent to the Hon. Secretary, c/o The Textile Institute, on or before the 31st March next. At the close of the Committee meeting referred to above members were entertained to tea by the present President, Professor F. Bradbury, of Belfast.

Second Conference on Industrial Physics

The second Conference on Industrial Physics will be held under the auspices of the Institute of Physics in Birmingham, from 18th to 20th March next. The subject of the Conference is "Optical Devices in Research and Industry." An Exhibition of instruments, apparatus and books cognate to the subject of the Conference is being arranged, and will be held in the Physics Laboratories of the University of Birmingham. A section will be devoted to popular applications of optical devices, including photocells. The Presidential Address on "Spectroscopy in Industry" will be delivered by Prof. A. Fowler, C.B.E., D.Sc., A.R.C.S., F.Inst.P., F.R.S., and in addition lectures and discussions on the following subjects are being arranged: "Colorimetry, Spectrophotometry, and the inspection of manufactured products for 'appearance'," "Polarimeters, Saccharimeters and Refractometers in Sugar, Jam-boiling, and other Industries," "The Application of Electron Diffraction to Industrial Problems," "The Industrial uses of Photocells," "Optical Gauges for Metrology and Engineering." It is intended that the lectures and discussions shall be informal in character;

they will deal particularly with applications of the subject to industrial problems. Visits to local works and research laboratories will be included in the programme and a Conference dinner will be held. There will be no Conference fee and membership is open to all interested. Further particulars may be obtained from the Secretary, The Institute of Physics, 1, Lowther Gardens, Exhibition Road, London, S.W.7.

TEXTILE INSTITUTE DIPLOMAS

Elections to Fellowship and Associateship have been completed as follows, since the appearance of the previous list (January issue of this *Journal*) :—

FELLOWSHIP

KENDALL, Frank (Shipley)
SHACKLETON, George (Bradford)
WILDT, Edwin Mary Hubert (Leicester)

ASSOCIATESHIP

CLARKE, George (Long Eaton, Notts.)
HODGSON, Wilfrid (Baildon)
WILLIAMSON, Edward Geoffrey (Bradford)

Employment Register

The following announcements are taken from entries in our Register of members whose services are on offer. Employers may obtain full particulars on application :—

No. 152—A.T.I. requires position as Assistant Manager, Manager or Works Chemist to Woollen Manufacturers. B.Sc. in Applied Chemistry. Prepared to go abroad. Leeds University Diploma in Dyeing. Age, 34 years.

No. 153—Desires position as Textile Technologist or Technical Adviser to Private Firm or Public Body. 15 years' experience in Hosiery Trade. 5 years' experience at Public Testing House. Knowledge of Costing, Factory Management, Past Examiner. A.T.I. Fellow of Royal Microscopical Society. Age, 34 years.

No. 154—Requires position in Pure Silk dyeing works, or Manufacture Departmental Manager. Nottingham University College Diploma in Textiles. City & Guilds Final Grade Certificate in Hosiery. Age, 24 years.

No. 155—Requires position as Carder, Assistant Manager or Research or Experimental Dept. of Rayon Industry. Full Technical Certificate. Prepared to go abroad. 14 years' experience as Carder and 2 years as Manager. Age, 39 years.

No. 156—A.T.I. requires position as Designer Manager, Designer Salesman or Technical Manager in large concern. City & Guilds 1st Class Final in Woollen Spinning. Leeds University Diploma in Textiles. Nine years' teaching experience in Textile Design and Colour Study, also Textile Finishing and Woollen Spinning. Age, 38 years.

Institute Membership

At the February meeting of Council, the following were elected to Membership of the Institute :—

Ordinary.

H. Adams, Textile Paper Tube Co. Ltd., Percy Road, Aylestone Park, Leicester (Representative).

H. Arnold, 430, Crompton Way, Tonge Moor, Bolton (Full-time Lecturer and Demonstrator in Cotton Manufacture, Bolton Municipal Technical College).

A. C. Bull, Birds Laundries, 1, Claremont Road, Newcastle-on-Tyne (Manager).

Wm. A. Chamberlain, 2, Warwick Gardens, London Road, Thornton Heath, Surrey (Laundry Manager).

F. B. Channon, Watson's Laundry, Abbey Road, Belvedere, Kent (Manager).

J. F. Charlwood, Kingston Regional Laundry, Wolverton Avenue, Kingston-on-Thames (Laundry Manager, Surrey County Council).
V. P. Davies, The Carmarthen Steam Laundry, Priory Street, Carmarthen (Manager).
H. Dorcey, 59, Leadale Road, Stamford Hill, London, N.16 (Laundry Manager).
A. Firth, 28, Jedburgh Street, London, S.W.11 (Inspector of Textiles, India Store Depot, Lambeth).
G. W. Harrison, County Hall, Kingston-on-Thames, Surrey (Chief Laundries Officer, Surrey County Council).
N. V. Haywood, Crown Laundry Co. Ltd., Rigault Road, Fulham, London, S.W.6 (Laundry Director).
R. H. Mitchell, Ivy Dene, Ashurst Wood, E. Grinstead, Sussex (Laundry Manager).
M. P. Monzoni, B.Sc. (Eng.), Rua Argentina 674, Jardin America, S. Paulo, Brazil (Assistant Manager of Cotton Mills and Print Works).
Miss E. G. Murray, Royal Laundry, Ongar Road, Brentwood, Essex (Laundry Manageress).
H. H. Nicoll, 6, Brantwood Avenue, Dundee, Scotland (Clerk, Francis Stevenson and Sons Ltd., Dundee).
O. Pomfret, 213, Bolton Road West, Ramsbottom, Manchester (Manager and Director of Towel Mill).
R. H. Rogers, 88, Bassetts Way, Farnborough, Kent (Cedars Laundry, Farnborough).
J. E. Shaw, 118, Watling Road, Fulwood, Preston (Manager, Dyeing Dept., Horrockses Crewdson & Co. Ltd., Preston).
R. Siegl, 527, Bahnhofstr., Oberleutensdorf, Czechoslovakia (Inside Manager of E. G. Pick, Cotton Mill).
F. Stein, c/o Messrs. E. G. Pick, Oberleutensdorf, Czechoslovakia.
J. T. Strachan, 9, Links Road, West Acton, London, W.3 (Superintendent, Savoy Hotel Laundry, 376, Clapham Road, London, S.W.9.).

Junior.

H. Bagot, 83, Green Lane, Garden Suburbs, Oldham (Student, Manchester College of Technology).
E. G. Bell, The Firs Hotel, Poynders Road, London, S.W.1. (Laundry Student).
G. R. Bide, West End, Havant, Hants (Laundry Manager).
J. Brear, B.Sc.Tech., 173, High Street, Chorlton-on-Medlock, Manchester, 13 (Research Student).
D. W. A. Clarke, " Westland," Great Woodcote Park, Purley, Surrey (Laundry Student).
G. Finlayson, 17, Clare Hill, Huddersfield (Assistant in Designing Dept., Learoyd Bros., Huddersfield).
G. N. Freck, 74, High Street, Wimbledon, London, S.W.19 (Laundry Student).
J. D. R. MacGillivray, 5, Atney Road, Putney, London, S.W.15 (Washouse Man, Crown Laundry, Fulham.)
D. Malcomson, Lune Laundry Ltd., Lawrence Road, Liverpool, 15 (Installing Costing System, Investigating complaints, etc).
K. E. Markham, Edgcombe, Tangier Road, Guildford, Surrey (Launderer).
J. Martin, 164, Downton Avenne, Streatham Hill, London, S.W.2 (Assistant Laundry Manager).
R. A. Selwood, 7, Elsdale Street, Well Street, Hackney, London, E.9 (Assistant Laundry Manager).
A. Shaha, College of Technology, Sackville Street, Manchester (Student of Textiles).
S. C. Smith, 62, Bierley Lane, Bradford (Assistant Designer).
J. G. Whitaker, 1, Lynette Avenue, Clapham Common, London, S.W.4 (Manager, St. George's Hospital Laundry, Wimbledon).
H. Wignall, 4, Bardolph Street, Leicester (Hosiery, Factory Executive).
W. F. Woodward, Slade Road, Ilfracombe, N. Devon.

Yorkshire Section.

At a meeting of the Yorkshire Section of the Textile Institute, at Bradford, on the 10th December, 1936, under the Chairmanship of Mr. G. Haigh, F.T.I., the following lecture on " The Recovery of Wool Grease in the Bradford Trade " was delivered by Mr. F. Brock.

The recovery of Wool Grease and the treatment of the wool scouring effluents has been one of the major problems in the wool combing industry since 1897. Local legislation was introduced forbidding the discharge into the sewers by wool-combers and others, of trade wastes that might interfere with the corporation's treatment of domestic sewage. Numerous problems, which are inseparable from this interesting work, still await solution. They are, however, of relatively small magnitude in comparison with the difficulties which the local sewage authorities had to overcome in the early days of the combing industry.

To-day, wool scouring effluents are either treated according to corporation requirements, or they are turned directly into the sewers under agreement with the sewage authorities on payment of 6d. per thousand gallons. Prior to 1897, it was permissible to run all effluents direct into the sewer. About the middle of the last century, Bradford was rapidly developing. The expansion of Bradford was more rapid than that of any other town in England and was both unforeseen and unprovided for by the local bodies. Prior to the industrial revolution, sanitation and effluent problems were comparatively unknown. It was an easy task to run the sewage into the Bradford Beck, which at that time was an open stream running through the centre of the town. Householders living near the stream had no difficulties with their domestic sewage but those living at a distance from the water-courses had their own primitive methods of disposal, which were often a nuisance to their neighbours. As the industry and the population of Bradford increased, so did the volume of sewage which was finding its way into the Bradford Beck and the River Aire. The sanitary conditions in Bradford were rapidly becoming deplorable and the authorities were compelled to realise that something had to be done. A government officer who visited Bradford in 1843, in connection with the public health acts, declared in one of his reports that bad as he had found most industrial centres, Bradford was the most filthy town that he had ever visited, public sewers being unknown in the place. Ancient private drains served the principal streets, whilst the sewage from the other streets was conducted away in open channels. The canal, which at that time was one of the town's commercial assets, added in no small measure to the insanitary conditions which existed. A branch of the canal had been brought up the valley and had its terminal basin almost on the site of what is now Forster Square. Here, sluice gates intercepted the water from the Bradford Beck, the consequence being that the pool became the recipient of vast quantities of sewage. The water in the basin often became so charged with decaying matter that in hot weather, the atmosphere was heavy with sulphuretted hydrogen. The stench was always objectionable and fevers became accepted as a matter of course. The Rivers Pollution Commission which dealt with these problems in the early sixties, described the canal basin as so corrupt that large volumes of inflammable gases were given off and it was comparatively easy to set the Bradford canal on fire. This was an amusing pastime of the local boys.

A charter of municipal incorporation was secured in 1847, and soon afterwards an outbreak of cholera impressed on the Council the necessity of better sanitation. In 1853 the line was laid for a main trunk sewer, but no progress was made until nine years later. It was 1862 before the first mile of sewer was laid and by 1870 thirty miles had been completed. From that date sewering has never ceased and there are now about 120 miles of sewer in the old borough of Bradford. The Beck was covered in and in 1866 that festering pool of corruption, the canal basin, was dealt with. These measures took it for granted that the river was

the natural place for sewage and the better the drainage the worse became the pollution of the Beck and the River Aire.

Other industrial communities were rapidly appearing on the banks of the Aire and were also using the river as the natural outlet for their sewage. The rapid development of the wool-combing industry in Bradford added considerable difficulties to a problem to which at that time there seemed no solution. A fleece of wool may lose in some cases up to 60 per cent. of its weight during the scouring process, the 60 per cent. consisting of the natural fat, foecal matter and the dirt which accumulates on the fleece during growth. It is easily seen, therefore, that the effluent from wool-scouring can be extremely offensive and objectionable if untreated.

As the industry increased in Bradford, numerous protests were made by the residents who lived near the river against the ever increasing nuisance. Mr. Stansfield of Esholt Hall, took his complaint to the Chancery Court, asking that the corporation should be restrained from discharging sewage or offensive filth of any nature into the Bradford Beck in such a manner that the same would pass into the River Aire and cause him annoyance, and to be restrained from polluting the river in any way prior to its course past Esholt Hall. The corporation found themselves in great difficulties as up to this time all methods of precipitation and deodorisation of sewage had proved lamentable failures completely unworkable on a large scale. The Royal Commissioners' did not know how to deal with such cases and it was argued that if the governments most capable servants were in difficulties over the problem, local boards could hardly be expected to find a solution. One suggestion was to construct a very large sewer which would take the sewage from the entire industrial districts of Yorkshire in the valleys of the Wharfe, Aire and Calder, away down to the sea. The government refused to listen to this suggestion and refused to give any financial assistance. Although the court realised the difficulty with regard to Bradford they attempted to forbid any further intensification of the nuisance. They prohibited, under penalty of £10,000, the opening of any additional main or sewer or any house drain into the outfall sewer. This put a limit to the commercial development of the town and satisfied nobody. It did not make the river any more tolerable to the people who lived on its banks.

A year later the injunction was dissolved and the corporation was ordered to take practical measures for defœcating the sewage, before passing it into the rivers. Bradford then started a series of experiments at Frizinghall, the lowest point in the borough. Certain works were constructed and a private company offered to treat the sewage free of cost provided that the corporation erected a building for them and charged no rent. This company failed in about two years, losing £3,000 in their experiment. They had calculated that their profits would be colossal if they could filter the effluent through peat charcoal and sell the residue to the farmers as manure. The corporation carried out further experiments in purification. They eventually succeeded in turning out an effluent which was almost colourless and practically odourless and this system was quite satisfactory for a few years.

Grease was first extracted in Bradford in 1861, but the extracting was done by private grease extractors and not by the wool-combers. The extractors made arrangements with the combers to have the washing liquors cracked with acid on their premises and the resulting precipitates, known as magma, delivered to their extracting plants. The first plant to work this process was dismantled about 1876, as it did not pay, owing to the low prices obtained for grease. As the combing plants developed and the quantity of wool dealt with increased, the price obtained for the grease declined. This resulted in the comber once again running all his effluent into the sewer in an untreated condition. When this happened the sewage works at Frizinghall found it utterly impossible to deal with the increased volume of effluent. In 1889, the amount of grease which

found its way into the Bradford Beck was estimated between thirty and fifty tons per day according to the state of the trade.

After numerous experiments a method was adopted in which the solids were precipitated with lime and the effluent was further purified by filtration through coke-breeze. This method was kept in operation for a few years, but as only a portion of the sewage could be dealt with, the river once again became the outlet for a large volume of untreated effluent. Eventually the precipitation by lime was replaced by another method in which ferric sulphate was used. This was satisfactory in every way, but it proved far too costly. Very good results were obtained with ferric sulphate for it brought about a practically complete separation and left the water quite transparent.

About 1897, as noted above, local legislation was introduced forbidding wool combers to deliver into the sewers any effluent which might interfere with the normal treatment of domestic sewage. Thirty-two firms were fortunate enough to escape from this prohibition, as they argued that they had no space for the erection of grease extracting plants. There are now five firms only who are still turning their effluents into the waterways in an untreated condition, two or three who are allowed to turn untreated effluents into the sewers, as they still hold prescriptive rights and a few who turn untreated effluents into the sewers with the corporation's permission on payment of 6d. per thousand gallons.

It was 1901 before the Bradford Corporation started to use sulphuric acid as the chemical agent for precipitating the solids from the effluent. Most of the local combers had also adopted acid treatment. This has held its own up to the present time and although it cannot be said to be all that is desirable, it certainly answers its purpose and allows the comber to turn out an effluent which complies with the corporation's requirements.

Wool combers' effluents are the liquors from the wash-bowls containing detergents such as soap and alkali, impurities from the wool consisting chiefly of the wool-grease held in suspension by the detergents, large particles of sand, excrement in small quantities, fine particles of clay in an almost colloidal state, the soluble salts of perspiration known as suint, and vegetable fibres and burrs. The recovery of wool grease from the scouring liquors is accomplished in various ways.

One of the oldest methods of recovery is known as the battage process which may be regarded as the forerunner of some of the modern aeration processes. The oldest and the commonest method employed in the Bradford trade is the Magma process, in which the liquors are subjected to cracking, usually by means of sulphuric acid. In this method, the grease and the fatty acids from the soaps are separated from the liquors and extracted by hot pressing.

Another method is the centrifugal process. Several types of centrifuges and separators have been tried during the last 50 years, but only two are reasonably successful. These are due to Duhamel and Adams respectively.

The solvent process of extraction is usually worked in conjunction with the scouring of wools by solvents, such as benzene or ethyl chloride.

Acid Cracking Process

The acid cracking process is the commonest process employed in England and is likely to remain so as long as our corporations and rivers boards insist on all effluents being in an acid condition. There are degrees of efficiency in this process, for some combers are quite satisfied if they produce one ton of grease for every 30 cwts. of acid used, whilst others consider that a yield of 1 ton of grease per ton of acid should be obtained.

Settling tanks and mechanical agitation undoubtedly play a large part in the results achieved. Some firms pass their liquors through a primary tank in which the heavier mineral matter settles out. The liquors overflow into large tanks and sulphuric acid is added. Mixing is done by means of hand

paddles and a perforated steam pipe. Usually, the same amount of acid is added to each tank irrespective of the alkalinity of the liquors. The men in charge of the cracking rely entirely on the taste of the liquor to determine whether sufficient acid has been added. It is obvious that by this method of treatment some tanks may contain a considerable excess of acid, whilst others may remain slightly alkaline.

The magma is usually run on to a filter where further liquor is drained off. It is then shovelled into canvas wrappers, known as puddings, and the puddings are pressed in screw or hydraulic presses. The labour costs for a process of this type are very heavy for the filters are constantly being renewed and all the magma is moved by hand labour. Sometimes three handlings are required before the magma reaches the presses. When the grease is extracted, each pudding is again handled separately in the operation of emptying the press and removing the sudcake from the cloth. This mode of operation would be utterly impossible in a large mill where the volume of untreated effluent sometimes amounts to over a third of a million gallons per day.

A better method where space permits is to replace the primary tank by a series of vats or tanks with mechanical agitators. When the vat is almost full, the acid can be run into the effluent through a measure marked in gallons. The agitating sticks are kept in motion whilst the acid is running into the effluent and by this means a good separation can be obtained with a definite excess of sulphuric acid, regardless of the strength of the effluents. The treated effluent is then pumped from the cracking vats into large settling tanks (with a capacity of 160,000 gallons). After settling from 8 to 12 hours the magma is completely deposited on the bottom of the tank and the supernatant liquor containing seldom more than 20 to 55 grains of grease per gallon can be run away to the drains with perfect safety. The magma is blown by steam or allowed to run by gravity to a sludge pump which forces it, first into a steam kettle in which the temperature of the magma is rapidly increased and from there into a large upright boiler. Steam is finally applied in the upright boiler and the boiling magma is forced through filter presses. These presses will run from 10 to 14 hours, according to the amount of sand present in the magma, and the grease and water flowing away from them are separated by an overflow, all the water being returned to the tanks containing the untreated effluent. The grease is clarified in order to get rid of any traces of magma, washed and barrelled. A method of this type can be worked much more economically and efficiently than the previous method, as labour costs are reduced to a minimum. The sud cake is hard and contains about 20 per cent. of water and about 14 per cent. of grease. If the effluents are not properly treated in the cracking vats, the uncracked soaps in the magma are a source of trouble in the press house. The filter cloths become clogged with sludge and the presses cease to function after running about half the usual period. The cake is a soft watery mass containing a higher grease content and is very difficult to handle. It is absolutely essential to form this solid cake, in pressing, in order to keep the filter cloths clean for subsequent filtration.

Adams Centrifugal Process

As far back as 1884 one well-known firm of Bradford wool-combers was experimenting with cream separators. The product which they obtained was of an extremely good colour but the scheme was impracticable on account of the tremendous volume of effluent which had to be treated. It was about this time, 1884, that lanoline was first made in Germany by a centrifugal method. In 1900 the Smith Leach process of recovering grease was evolved. In this process the liquor was first passed through an evaporator which reduced it to one-tenth of its volume and the concentrated mass was then passed through a large bulk type separator to remove the solid matter and extract the grease emulsion. This emulsion was purified in another separator whilst the mother liquor was con-

veyed to a calcinator to recover the potash. The failure of this process was due to the separators being unable to remove a sufficient quantity of grease, the grease remaining in the mother liquor causing the products of calcination to be a useless, sticky mass, unfit for conversion.

Further attempts to recover grease centrifugally were made in 1920, as at that time the price of grease was extremely high. The effluent was allowed to stand from 24 to 48 hours when it was found that it could be passed through an ordinary type of separator and the grease recovered. This method became impracticable as soon as grease prices dropped, as it was proved to be uneconomical to allow the liquors such long periods of settlement. The large number of storage tanks required made the expenses of such a plant prohibitive and when the liquors were passed through the separator after allowing to stand for only a few hours the finely divided mud which was held in suspense soon choked the machine.

The Adams machine appeared about seven years ago. If the effluents are first allowed to stand for settlement and are then passed through the Adams machine, the subsequent separators can be run continuously day and night for a full week. The Adams machine is of the ordinary disc type of separator with the exception that the bowl hood has been extended and jets with leads placed in the periphery. It runs at about 6,000 r.p.m. with the result that any divided mud which does not separate out and pass through the jets will not choke up the subsequent separators. The Adams process was fully described in a paper read to the Institution of Chemical Engineers by Mr. B. A. Smith. The following is quoted from his paper :

" The effluents from the scouring plant, both the overflow from the side tanks and the discharge from the bowl bottoms, are passed through settling tanks, where the heavier particles of sand are precipitated. Such settlement may be continuous, the liquor flowing in at one end of the tank and overflowing from the other end. A small double screen filter is interposed to remove all vegetable and animal fibres. This is essential as small pieces of burr may become jammed in a jet while even single animal fibres can do considerable damage by cutting the apertures in the jets."

" From the filter, the liquor is passed into a small tank where it is heated to as high a temperature as possible without frothing, and from this tank is fed at the rate of about 700 gallons per hour into an Adams machine. In the machine the ordinary process of centrifugal separation occurs, while in addition the mud being the densest substance present, is thrown to the walls of the bowl, where it is washed out through the jets at the rate of about 110 gallons per hour. The greasy emulsion after passing through another small warming tank is separated in a standard purifying machine."

The disposal of the mother liquor and the liquor from the jets depends on the type of scouring employed. If the scourer employs suint and at the same time is washing such wools as skin or slipe wools which are very poor in suint, it is necessary to preserve all the suint possible. To do this, the liquor passing through the jets is returned to the original settling tank where the higher mud content upsets the equilibrium and causes further mud to precipitate. If the wool being scoured is rich in suint making materials, a proportion of the suint will have to be thrown out of the cycle and this could be done either by allowing the clean suint storage tank to overflow, or by passing the jet liquor away to waste and not returning it to the precipitation tanks. If the scourer is using a soap scour, it is advisable to freshen the scour periodically. The suggestion is therefore, that the amount of fresh soap solution which is added should balance the amount of liquor passing through the jets of the machine which could be run to waste. The mother liquor from the Adams machine would then be the clean soap solutions which could be returned for re-use. There are combers however who would be prejudiced against re-using the soap solutions. In such cases, both the liquor from the jets of the Adams machine and the mother liquor must be run to waste. Such liquors cannot be passed into the sewers, as the authorities will

not allow any effluent, even after being centrifuged to pass into their mains unless in an acid condition, therefore the only solution is to revert to the acid-cracking process, in order to dispose of the final liquors. It is claimed however by those using this type of centrifugal that the costs in the scouring department have been considerably reduced by the fact that the soap solutions can be returned for re-use.

The battage process and the subsequent aeration processes including the Merten and the Barber jet, are chiefly employed on the continent, where there is no difficulty with the laws controlling the disposal of trade waste. In the battage process, the effluent is kept agitated by continuous beating with hand paddles or bats, and the grease is caused to rise to the surface in a froth. This process has not been employed in England as it has an extremely low efficiency, the recovered grease amounting to about 25 per cent. of that present. The aeration process is somewhat similar to the battage process in that the liquors are subjected to violent agitation by a series of fine streams of air. The greasy foam is then washed, in order to remove as much soap as possible and is finally passed through an auto-clave.

The Merten's Process

This is a method for which great efficiency is claimed. The beater tanks deal with 1,650 gallons of effluent per hour and the paddles are kept in rotation by a small powered motor. The overflowing froth holds about 20 per cent. of grease and the discharged liquor 0·05 per cent. which can be regarded as being quite safe to run away into the drains. The efficiency claimed for this process is greater than either the Adams machine or the Barber jet, both of which claim to remove approximately 50 per cent. There is a difference however in the fact that both the Adams centrifugal and the Barber jet processes are dealing with liquors which probably have an initial grease content in the region of 2 per cent. to 3 per cent., whereas the Mertens beater tanks are dealing with liquors which contain less than 1 per cent. of grease. This remarkable efficiency is explained as being due to the rapid beating, which is accomplished by the power transmitted from the low powered motor. The subsidence and final melting of the grease is as in the Barber jet process, though a specially designed digester obviates much of the intermediate washing of the froth and facilitates the settling and draining off of the impurities. This process claims to produce a very high grade lanoline and is being worked at Verviers by a Belgian Company. It is doubtful though whether the Merten's process would show the same efficiency if working with liquors having a higher grease content.

The Barber Jet

The Barber Jet process claims that a more satisfactory separation of the grease from the effluent is obtained by combined physical and chemical means. In this process the effluent is run through catch pits—in which wool fibres and coarse sand are retained. The liquor is then pumped direct to a Barber Jet machine. The jet consists essentially of two concentric tubes fitting closely enough to allow only a very thin film of fluid to pass through the annulus. Air under pressure is also passed at the same time through another inlet into the inside of the inner tube, which has a number of perforations. The suspension of grease in water passes at a high velocity through the annulus, while five jets of air are forced into this film creating an intimate mixture of grease, water and air, tending to coalesce the particles of grease and so separate it from the water-phase. The emergent film then impinges upon an abutment below the jet boxes. It is found that under these conditions most colloidal materials coagulate to give conglomerate masses. This principle is the basis of the Barber Jet process as applied to the recovery of colloids.

This partially separated grease and water issuing from the jet is forced through a complete battery of jets, when a good separation is obtained. The floating grease is removed from the surface of the water in the last compartment. The

greasc—in the form of a thick foam—is washed with water to remove traces of dirt and soap and conducted to a tank where the foam of grease receives a final water spray and is then boiled with water. The grease and water mixture is then pumped to a battery of continuous autoclaves, where it is maintained at a temperature of 120° C. to 130° C. Separation is assisted by a series of plates (alternate plates being perforated) set in the feed tube which is situated axially in the autoclave. The grease and liquor mixture is fed in at the bottom, being forced to take a zig-zag path through the plates in the feed tube, and overflows into an annulus and up again into the main body of the autoclave where the grease and water are removed separately. The outlets are controlled by automatic valves. By distillation products are obtained which are of great interest to the industries, marketed under the name of " Cebacols," As by-products the distillation plant also produces various grades of pitch ranging from a hard jet black to a medium soft brown.

The Solvent Process

The solvent extraction method is usually worked in conjunction with the scouring of wools by means of solvents. The wool is subjected to the action of an organic solvent which removes the grease, dirt, etc. The solvent liquor is then washed with warm water to remove mineral matter and distilled to recover the solvent, leaving the grease behind.

Methods for cleansing wool by means of solvents have never become popular in England, although various solvents and various different methods have been tried on the continent for the past fifty years. Those using solvents have always claimed that solvent scoured wool gives a much softer handle, and has better spinning properties than wool which has undergone the soap and alkali scour treatment. Opinions on this point however, are by no means unanimous, for the soap scourer argues that the heat required to remove all traces of solvent from the cleaned wool does more harm than the action of soap and alkali in the ordinary wet process of scouring.

Modern methods are very much improved and new types of solvents are being continually tested. One process which is in use at the present time on the continent, employs ethyl chloride. It is claimed that by the use of this solvent, wool can be degreased at half the present cost and that the gain of wool is more than 1 per cent. There is another solvent scouring process which is in use on the continent at the present time in which pure benzene is used. The wool is first de-suinted by water at 25° to 30° C., and after being dried in a vacuum, it is brought into contact with pure benzene at a temperature of 40° to 42° C. After degreasing, the benzene retained by the wool is distilled off under high vacuum by heat while the final purification of the wool is completed by running water at a low tempreature. For this system it is claimed that the wool does not felt so readily, spins to finer counts, and gives less waste in combing. The loss of solvent is said to be not more than 1 per cent. of the weight of wool treated, whilst the danger from explosion is reduced considerably by working at low pressure. The wool is not left harsh or brittle as about 0·6 per cent. of grease is left adhering to the fibres.

The mixture of grease and benzene from the degreasing process is run through a charcoal filter where the dirt, slime and the smell are removed. It is then passed through a calcium chloride filter to remove water and finally the benzene is distilled for further use, leaving a neutral grease of good quality, low acidity and a colour which comes near to that of commercial lanolines. Another big advantage claimed is that there is no effluent, since the solvent is passed direct to the recovery plant and the bulk is regained for further use. The efficiency of such methods is extremely high, being, according to statistics, from 90 to 93 per cent., while the expenses are comparatively low as most of the costs can be charged against the scouring plant and not to the grease recovery plant. Present types of scouring plant would have to be modified considerably but they claim a further

saving in that labour costs for bowl minders and feeders and the costs for motive power would also be reduced by half.

The solvent processes have their drawbacks, for insurance companies' premiums would be higher on account of the added danger from explosion. There is also the harmful effect on the health of the workpeople to be considered; this is often a serious matter where non-inflammable solvents are used. The dangers seem to outweigh the numerous advantages, for very few people in this country have taken any interest in solvent scouring. The solvent process may ultimately prove to be the ideal method of scouring when both its safety and its efficiency can be guaranteed. It would undoubtedly provide a very satisfactory solution to the effluent problem and allow the comber to put on the market a grease far superior to the present brown Yorkshire grease.

In reviewing the different methods of treating wool scouring effluents, it is interesting to know how the products obtained by these varying treatments are absorbed by the different industries. The brown grease from the magma or acid-cracking process varies in character according to its source, Merino wools yielding a much softer grease than the cross-bred types. Knowledge of its chemistry is still far from complete owing to its complex nature. Acids and alcohols are present, but all tests prove the absence of glycerol. Cerotic, stearic, palmitic and myristic acids have been detected in the grease, whilst the non-saponifiable fraction contains cholesterol, iso-cholesterol, cetyl alcohol and ceryl alcohol.

The major portion of the crude grease is destructively distilled, products of great variety being obtained. The stills are heated with free fire until all the moisture has been driven off and super-heated steam is then applied. The first product of this distillation is a light oil known as spirit oil. This is followed by a pale yellow product known as first distilled grease. The next fraction is green oil which is sometimes used for coarse lubricating greases, but is nearly always returned to the still with the next batch of grease. Finally, the distillate comes over as a thick oil. The residue from the still is a pitch, which is used as a lubricant for the necks of hot rollers and as an insulator for electrical cables.

The first distilled grease is usually allowed to seed or crystallise and is then subjected to pressure in order to obtain a liquid oleine and a solid stearine. The oleine that exudes from the crystallised cake before pressing is usually sold as No. 1 Oil. These oleines are chiefly used in the heavy woollen trade though a small amount is used in the manufacture of lubricating greases. It is useless for soap making on account of the large percentage of unsaponifiables that it contains. The stearines are chiefly used in the rubber industry and in the manufacture of polishes whilst the spirit oils, when not returned for redistillation, find a limited use in making dark varnishes and in the manufacture of bricks.

A considerable amount of brown grease from acid cracking is used in the manufacture of lanoline. The soap and fatty acids are separated and the unsaponifiable portion containing the sterols and the alcohols is bleached to give the lanoline of commerce, and the super pharmaceutical grade. The uses of lanoline are increasing every year, for in addition to being used as a base for ointments and salves, the pharmaceutical grades are used in the manufacture of cosmetics and medical plasters. The pharmaceutical lanoline must be of a very pale colour and have a free fatty acid content of not more than 0·2 per cent., whilst the commercial lanoline varies considerably in colour and free fatty acid content, the free fatty acid content sometimes being as high as 2 to 3 per cent. Large quantities of commercial lanoline are used in the manufacture of anti-rust paints and solutions,and leather dressing compounds. It is also used for superfatting toilet soaps, processing rubber, for blending with oils and greases to increase their viscosity and as a foam breaker in the sugar beet industry.

Lanoline is extremely hygroscopic and this characteristic enables the manufacturer of hydrous lanoline to incorporate up to 60 per cent. of water with the commercial anhydrous grades, giving the white creamy lanoline usually sold in tubes.

Not long ago an article appeared in the *Lancet* by Dr. Twort, the pathologist to the Manchester Committee on Cancer Research, on the prevention of cancer and tar dermatitis by the use of a protective composed of lanoline and olive oil. It has been proved that cancer and tar dermatitis are often caused by contact with mineral oils. Dr. Twort has directed his experiments towards finding a means of prevention, and to reducing industrial risks to a minimum. A substantial measure of success has attended his efforts and he has brought them up to date in a report of interest to textile people. He suggests that the more fully hydrogenated an oil, the less is its carcinogenic activity. As a protective measure, it was found that a mixture of anhydrous lanoline and olive oil was remarkably good, numerous experiments having failed to reveal any other ointment of similar efficacy. He recommends the smearing of exposed parts with this mixture of lanoline and olive oil before commencing work. The practical utility of lanoline has been tested by a large oil company during recent years and they gave a very favourable report on its use.

The dark brown fatty acids which are separated from the crude brown grease in the manufacture of lanoline have many uses. From the major portion, oleines and stearines are obtained by distillation, whilst a considerable amount is used in rope batching and for the lubrication of jute, hemp and sisal fibres. It is also used in the manufacture of cheap axle box greases and low grade lubricants.

The neutral greases obtained from the centrifugal processes are applied in various ways in addition to those already mentioned. The centrifuged grease usually contains from 1·5 to 4 per cent. of free fatty acid as against the 15 to 20 per cent. free fatty acid content of the brown grease from the acid cracking processes. The colour is also very much paler than the brown grease, so much so, that it quickly reacts to bleaching agents to give a good grade lanoline. It is used to a large extent in America for the manufacture of lithographic and multigraphic inks, typewriting inks, carbon papers, calico printing inks and ordinary printing inks. It is also used as a special neutral lubricant for valves, taps, wire drawing and steel cutting, as a water proofing material, in shoe polishes and in varnishes for colouring and water proofing electric bulbs. The centrifuged greases are largely employed in the distillation of the higher wool fat alcohols, as they contain a much higher percentage of these bodies.

Barber Jet Distillates

The grease obtained from the Barber Jet process is of a thick, smooth consistency. Most of this grease, particularly in France, is used for the non-destructive distillation of the higher wool fat alcohols which constitute the alcohol components of neutral wool fat and are known as wool waxes. In this method of distillation the fatty acids are left behind in the pitch. Six distinct distillates are obtained. These waxes are not oxidisable and will not go rancid, nor do they become resinous. Wool wax is a very suitable ingredient as a dispersant in the oil blending trade.

Oxy-cholesterine finds a large market in the cosmetic industry as an absorption base, a mixture containing 5 parts of this wax to 95 parts petroleum jelly, will absorb up to 230 parts of water. If mixed with lanoline it will absorb ten times its weight of water to give a fine almost snow-white cream, which is suitable for cold creams and has the soothing and emollient properties of the latter.

Another product of this distillation is a fatty alcohol which can be sulphonated very easily. The sulphonated fatty alcohols are employed in making first-class shaving powders and shampoos and are rapidly being recognised for their remarkable properties in scouring and bleaching of wool and worsted yarns. They possess excellent solvent and lathering properties, stability and lime resisting properties.

The chief problem at the moment appears to be the exploitation of the new products and anxiety as to the capacity of the different industries to absorb these products. One of the arguments in favour of the use of the sulphonated fatty alcohols, is that wool or any other fibre or material can be scoured with better results and that the *p*H safety zone from *p*H5 to *p*H8 is not exceeded. Against this is their present cost which makes their use almost prohibitive.

In the past it has been argued that owing to the limited market, wool grease produced by ordinary methods and that from special processes differed so little in selling prices that the expenditure necessary to modify plant was unjustified. This is chiefly the reason for the lack of progress in extracting process. Happily, the position is being rapidly reversed, partly due to the new markets that have been created during the past few years and partly through the artificial boom caused by the re-arming of Europe. At the present time it is doubtful if there is a comber in Bradford who holds any stock of wool grease.

The sud-cake produced in the acid process by hot pressing, is the only by-product for which there is no market to-day. Prior to devaluation of the franc, most of the sud-cake made in Bradford was sold in France. It proved an ideal way of importing grease and avoiding the tariff. The sud-cake contains from 14 per cent. to 20 per cent. of grease. The cheapness of solvents on the continent permitted the profitable degreasing of the cake. The degreased cake makes an excellent base for artificial manures, owing to its high nitrogen content.

Most combers are now tipping their sud-cake, for it is difficult to dispose of as a manure owing to the amount of grease that it contains. The corporation sewage works have overcome the grease content difficulty by piling the sud-cake, while it is still hot from the presses, in the form of sugar loaves. These sugar loaves are allowed to stand from ten to twelve months, the interior of the loaf retaining its heat and allowing the soft grease slowly to find its way to the base of the loaf. On testing the sud-cake after standing over this period, the grease-content is found to be as low as 4 per cent. The partly degreased cake is then ground and sold as manure, for it is found that the remaining 4 per cent. of grease does not in any way choke the land.

There is still a lot of work to be done towards finding the most efficient and economical method of recovering the grease from the effluent and its subsequent treatment, but there is no doubt that advance has been made. Wool grease recovery will not become a really valuable asset to the wool industries until its chemistry has been more fully investigated and the economical separation of its constituents becomes a financial proposition.

Reviews

Methodik und Anwendungsmoglichkeit der Zeitstudie in der Textilindustrie. By Dr. Ing. P. Bergfeld. Published by VDI-Verlag G.m.b.H., Berlin. (84 pages, Price 4.50 R.M.)

In this book, " The Theory of a Method and its Applications to Time Studies in the Textile Industry," the author gives a detailed report of time studies carried out during the years 1929-33 at the instigation of the German Federation of Plush and Velvet Manufacturers. Shortly after the war the German Government established a Committee " Refa " to make detailed investigations into time studies and costing in the metal industries from (*a*) Technical, (*b*) Organisation, and (*c*) Economic points of view, with a view to standardising prices, methods of production and wages. Dr. Ing. Bergfeld has applied these methods to his own investigations.

Two American systems—the Taylor and Bedaux—have already been used to carry out time studies in the Textile Industries, but the Author, in discussing these and comparing them with his own system based on " Refa," points out that the investigations are not so comprehensive or detailed. By applying the " Refa " system to the Metal industries, an accuracy of 3 to 5 per cent. has been obtained, and very careful and repeated tests are described which have as their object the attainment of the same accuracy in textiles. The studies begin with

winding and are carried through beaming, weaving, dyeing, printing and other finishing processes.

The detail and thoroughness with which these studies are carried out may be gathered from an example on " Winding " where the time is measured under ten different headings as follows :—

Preparing and arranging the Hanks.
Laying the Hanks on the Haspel and tying up the threads.
Changing the full bobbin.
Movement of the operator about the machine.
Attention to the machine itself whilst running.
Piecing broken ends (Sub-divided according to cause).
Bringing material.
Freeing tangled and twisted threads.
Small repairs.
Overlooking, etc.

For measuring the actual times taken, a twelve point recorder is used, a synchronized clockwork moving a chart on which the 12 pens are operated as stop watches. The methods of analysing the results are explained, logs of actual tests in the form of 10 tables being given. By means of these, the author is able to estimate the times required in similar processes for various qualities of material and sizes of machines, and to fix standard working times and costs for the processes under consideration.

It is claimed at the outset that no such minute investigation into production time in the textile industry has yet been made, and a study of the methods so carefully explained by the author should enable anyone interested in this subject to apply the system to his own branch of the Industry. The treatise is concisely written but no point is left unexplained. R.H.F.

Additions to the Library

Handbook of " Amoa " products and " Amoa " Emulsions. Amoa Chemical Co.

This is an attractively printed booklet prefaced by a readable account of the physico-chemical processes of emulsification. Methods of preparing emulsions are appended. Formulæ of interest to dyers, finishers, etc. for wetting agents, dulling agents, proofing agents and so on are given. T.

Dr. H. A. Zwynenberg. Alexander Numan, in het byzonder zyn invloed op de Nederlandsche Schapenfokkery. Utrecht, 1925, 193 pp.

Historical review of the experiments, conducted by Numan between 1830 and 1852 to cross-breed Disley and New-Leicester sheep with the original Dutch races, with reports about the improvement in the spinning properties of the wool. (Presented by Mr. J. F. Straatman.) J.F.S.

General Items and Reports

BRITISH INDUSTRIES FAIR.

Textiles Exhibition at the White City

An Exhibition of Textiles in connection with the British Industries Fair at the White City, Shepherd's Bush, London, opened on 15th February, 1937. Two reports on the fabrics shown have been prepared at the request of the Publications Committee and are hereunder presented. It is to be understood that any opinions expressed are those of the contributors and not necessarily those of this Institute. The reports cover Cotton and Artificial Silk goods, and Woollen and Worsted fabrics.

Cotton, Flax and Artificial Silk Materials.

Comparing this exhibition with the one held twelve months ago, a pleasing feature was the greater interest which the Manchester firms have taken in the display of their many and varied productions. Collectively, the exhibition of Lancashire made fabrics was unique in scope and variety, extending from those fabrics produced essentially for export, to almost every type of cloth used for domestic purposes in this country.

There are no outstandingly new features to record in yarn constructions, nor in the details of the weaves of the fabrics in the exhibition as a whole. There is, however, a notable absence of the rather crude rectangular and severely abstract forms of designs, both printed and woven, which have been popular during recent years. Vigorous applications of colour were exceptional. In this respect the fabrics shown were subdued, though there was no suggestion of dullness. Rayon continues to hold the most prominent place in light dress goods and as effect yarns in soft furnishings. Yet there is evidence of its limitations in many fields of fabric construction and the material seems to be entering on a new phase of its activity in evolving new effects.

Another point of general interest is provided by the furniture trades section where upholstering fabrics can be judged in actual use. There is scope for close co-operation between the primitive designer and the fabric manufacturer. In both design and quality the fabrics appearing on the furniture exhibits were not to be compared with the best examples shown in the textile section.

The high standards attained by the British manufacturers of casement and soft furnishing fabrics have been maintained, though changes in style and design are noticeable. The fabrics appear to group themselves into three fundamental classes. Rayon warps, set end and end in two colours, with cotton wefts of various colours, either in pick and pick order or in the form of bars across the fabric, are the bases on which beautiful tapestries are produced. The second class, and one which has increased in importance, is found to consist of Damask materials with good " period " or historic designs, along with excellent new figure effects. These fabrics are made in all silk, rayon warp and cotton weft, and flax warp and rayon weft. An excellent furniture covering material is made by the clever combination of wool, flax and rayon, the first two providing the required mechanical properties of the cloth and the last the ornamentation. The third class is distinctive in having embossed decorative effects produced either by weaving or by embroidery stitching, using an additional backing fabric for the purpose. Glazed chintz fabrics appear in this class. Many attractive designs in casements consist of relatively small weave effects such as can be produced on dobby looms. A design worthy of special notice is named " Cirrus." It is a striking reproduction of the cirrus cloud formation. Shadow prints woven with cotton knop weft and also with coarse lightly folded cotton yarns produce some very effective fabrics. Cheap cloths, with the appearance of looped pile moquettes, but actually made from low grade cotton yarns have been extensively applied in the furniture on exhibition. The imitation moquette effect is produced by the use of coarse cotton wefts giving a ribbed appearance, together with printed warps or multi-coloured warps of finer cotton counts. These fabrics contrast violently with best examples of upholstery fabrics shown in the fabrics section. There is surely no reason why the furniture manufacturers' taste should be poorer when applied to fabrics than when dealing with wood and other materials.

An unusual application of old designs to new purposes was seen in carpets of Tartan Check. They had the appearance of highly magnified pieces of Scotch plaid or scarf. Another striking design for a carpet consisted of monkeys climbing up the bars of a cage. This idea had come straight from the Zoological Gardens, and it would be difficult to find such a floor covering another home.

The Manchester dress goods section contained both printed and woven effects, using all-cotton, cotton and rayon, full rayon, and spun rayon yarns. Slub and knop yarns were used with discretion to make effective backgrounds on these light textures, many of which were figured by printing. The section provided the brightest colour display of the exhibition, yet the individual fabrics were not in themselves over-coloured. The massed colour effects were the result of splendid grouping of the exhibits. There was an almost complete absence of freak block and line designs, and only a few of the fabrics have a Coronation

background. The joint Committee of Cotton Trades Organisation made a special display of cotton fabrics for the overseas markets. Materials appropriate for Central and South America, Near and Middle East, Africa, India and Far East were shown, together with examples of practically all the standard types of cotton fabrics for our own domestic use. Such a very wide range of goods could well occupy considerably greater space. The Lancashire Indian Cotton Committee gave ample evidence of the variety of uses to which Lancashire spinners and manufacturers are applying this raw material, the consumption of which has increased considerably during the last year or so. The yarns and fabrics were the collective contribution of many individual firms. Pre-shrinking treatment on the finishing of cotton piece goods is evidently becoming standard trade practice for a widening range of fabrics. A novel towel cloth having terry-pile on one side, and huck-a-back weave on the other side, stands out as a new venture in cloth construction. Remarkable developments in the production of all-cotton bed spreads were to be seen. Here, new types of yarns and thread settings have been wedded to the older weave systems. Folk-weave styles of designs on excellent colour schemes and fabric with good weaving qualities, yet soft to handle, are the result. Printed effects on pique weaves show another application of a well-known cotton structure. The small bird's-eye design has been enlarged, and converted from a dress-skirt fabric into a soft-handling summer dress material. The cloque effects for dress goods, chiefly produced from rayon yarns are another application of the same nature.

The leading manufacturers of rayon and artificial silk yarns had special displays of the extensive uses of these materials. In the woven fabrics, hard-twisted yarns for crape effects appear to be giving place to a more liberal use of fancy doubled yarns for obtaining roughened effects. A new development in the use of " fibro " is the introduction of a small percentage in woollen and worsted suitings, the amount being so small as not to affect materially the qualities of the wool fibre for this purpose. The blending is done in the fibre or slubbing state and the fabrics are woven in the material colour of the scoured wool. Later, the material is piece-dyed to any shade required, the fibro resisting the action of the dye bath.

Remarkable effects are obtained, which to all appearances are the products of the standard system of blending dyed fibres or slubbings. Check suitings, etc., can be produced by piece dyeing to any colour or shade the buyer requires.

The demonstration of the " Rigmel " process drew much attention. The machine shown is that in which the effects due to the stretching of the warp, which takes place in the various stages of manufacture, is counteracted by forcing the picks closer together. The cloth put through the machine had received prior treatment as regards shrinkage in the weft direction. A more complicated type of machine is necessary for this purpose.

An exhibit of considerable interest consisted of samples of " ionised " oils with materials to which they are applied. These oils are claimed to be specially suitable for batching and processing flax, giving whiter, softer and less creasable fabrics. They are applicable also to fabrics containing rayon as sizing agents for eliminating or reducing cannage.

The possible applications of oiled silk were shown in one display to be very extensive. Agreeable effects were obtained by the use of these fabrics for casement cloths. Quilting on to light cotton cloth bases results in cloths for which many uses can easily be found.

J. READ.

THE WOOLLEN AND WORSTED SECTION

The outstanding feature this year is the influence of the forthcoming Coronation of their Majesties King George VI and Queen Elizabeth which is apparent throughout the fair and in the case of woollen and worsted cloths this is shown mainly from the point of view of colour and combinations of colour and especially in cloths for men's wear.

Considering only the woollen and worsted sections the exhibits this year are disappointing. Novelties in fabrics for ladies' wear are conspicuous by their absence and the definite influence of the Coronation on men's suitings makes these somewhat monotonous as there is a lack of variety. Judging by the exhibits, greater attention is being given by manufacturers to fabrics for sports wear and there would appear to be no limits to the liberty given to designers in producing cloths for this purpose. Bright coloured grounds in solid colour or in a combination of colours and with bold overchecks are much in evidence.

Men's Wear.

The trend of colour and design in men's worsted suitings is very definite indeed. The most popular styles are shown in yarn dyed mixture grounds for the better qualities and in piece dyed grounds for medium qualities. The ground is 2/2 twill serge either plain twill or plain twill and reverse to give a herringbone effect. The " Coronation Stripes " on these grounds are a development of chalk stripes. They consist of 2, 3 or 4 ends of silk, mercerized cotton or staple fibre and the stripes are usually alternated in colour at intervals of approximately ¾ in. Red and blue, red and gold, blue and gold are the principal striping colours and these are shown in varying degrees of brightness, the richer and fuller colours being in the better qualities. The ground colours are in various shades of Coronation blue, blue grey and grey and a new shade " Petrel " which may be described as a " smokey green blue." A strong feature in yarn dyed worsted suitings is the introduction of line overchecks in red, blue or other rich colours on grey, blue grey and blue grounds.

In yarn dyed mixture flannels in various shades of grey, blue, green and some lovat shades there are both stripe and check designs. The stripes are very neat and in one chosen by His Majesty King George VI the stripes are in silk and consist of black and white striping threads on a grey mixture ground. The principal stripe contains about eight ends of each colour, dressed end and end and is crammed and woven in straight twill ; the secondary features are smaller stripes woven reverse twill. The repeat is about 1½ inches. The check designs are simple line overchecks in red, blue or white and measuring about 2 inches across and 2½ inches in length. Smart mixture suitings are shown in 2/2 twill plain grounds with pin stripes of 1¼ repeat. The stripe consists of one white end, bordered on each side with a black end. Exhibits are again made of suitings made from a blend of wool and staple fibre rayon. When wool dyed, these give the appearance of a mixture suiting and have the advantage that ground colours need not be chosen until the cloth is actually woven.

All wool tartan check linings are shown and these are waterproofed and intended for use as linings in gabardines, coverts and similar waterproof garments.

There is one yarn dyed suiting cloth shown in a variety of colours which consists of end and end colour and colour throughout the warp and gives a low angle chevron design repeating on 1½ inches. Some of the end and end combinations are fawn and black, grey and blue and grey and black.

In overcoatings for men's wear the effects are mainly very bright and designs distinctly bolder. One example is a very coarse cloth woven with thick counts of loosely twisted yarn in a broad herringbone weave and with an overcheck of bright colour twisted with the ground yarn. Green ground with red overcheck and blue ground with red overcheck are outstanding colours and the overchecks are about 4 inches by 5 inches and made with the overcheck colour twisted with the ground shade. Other overcoatings are black and white check grounds 4 by 4, 8 by 8, etc., with bold overchecks 5 inches by 7 inches introduced by increasing the number of ends and picks in each colour and also introducing red, blue, etc., into the overcheck.

For sports wear very bright coloured tweeds are shown in a varied selection of checks and colours. In some cases plain twill grounds are shown in green, blue, natural and lovat shades, but in most cases these have strong contrasting line overchecks about 3 inches by 4 inches. Where grounds are checked the

colours are remarkable in the brightness and clash of contrasting colours such as lemon, red and white, grey, bright blue and brick, and many others too numerous to mention. Ski-wear is featured by a plain 2/2 twill serge in white, bottle green, navy and black, also in a heavy delaine in bold checks in black and white. Flannels for suits are in green with red line overchecks, navy with white overchecks and lovat with red overcheck.

Hosiery.

There is one very interesting feature shown in pullovers for men's wear with golf hose to match and is composed of a variety of multi-coloured yarn effects knitted in an " off stitch." There is a base or ground colour of natural fawns, greys or drabs, etc., and the multi-colour effect is obtained by small knops in a large variety of shades. To give one example only, this is composed of fawn ground with knops in lemon, apricot, gold, brick, violet, black and turquoise and the resultant effect is most pleasing, mainly due to the smallness of the knops and their even distribution. In golf hose there are also pastel shades of green, blue, fawn and grey with boucle yarn containing tone and tone knops.

Scarves.

These are shown in the brightest of colours in plain and check. A scarf made from pure cashmere was shown in Coronation red and Coronation blue, also block checks of these colours divided by white. In saxony scarves a large range of authentic tartans are in evidence.

Ladies' Wear.

As previously mentioned there are very few exhibits of fabrics for ladies' wear in woollen and worsted and these do not show any particularly new features. The whole gamut of possible novelties has been passed through so rapidly during recent years that a return is foreshadowed to plainer types of clothes which have not been in evidence for a long time. A few tweeds are shown but these are similar to previous seasons in knops and slubs, either tone and tone or in multi colour. One effective cloth for dresses was composed of half an inch block check wool, and wool and angora with an overcheck of spiral slub. There are tweed effects made with wool and staple fibre, and in one cloth the fibre was left on the surface to give a kemp effect.

On one stand, a woollen cloth is displayed woven on an orlean ground and an extra weft of thick count is woven in Jacquard effects and then cut on the face of the cloth removing all the long floats and leaving tufted ends. One heavy face cloth for mantlings is shown and this is composed of wool and mohair and is in a drawn finish. An interesting tweed is made with white woollen warp and coloured slub weft. The slubs are irregular in size and shape and the result gives a ripple effect.

For country wear Scotch tweeds are in evidence in grey, soft blues, green greys and blue greys. These are decorated with multi-coloured slubs or knops in bright colours. One example on a grey ground had knops of brick, blue, brown, green, maroon and lavender. Either for men's or women's wear, browns are not in evidence.

Carpets.

In this section there are two new features. One interesting exhibit showed carpets woven in a variety of standard tartans in which are the Gordon, McPherson, Royal Stewart, McDonald, Antique Cameron, Sinclair and McLaughton. As one can imagine they are very striking and colourful and we are not concerned here with their utility or harmonious blending with other furnishings. The other novelty which attracted attention is a show of pale pastel ground shades in fawn, green, blue, rose, etc., and the only decoration was a black line effect in simple design sketched in one corner or across the carpet from corner to corner.

The influence of the Coronation is in evidence with plain carpets which are shown in four rich shades of gold, blue, red and green.

F. HAIGH.

C

REPRINTS

A New Method and Apparatus for Determining the Average Lengths and Fineness of Cotton Hairs	*N. Ahmad, and others*
A Device for Mounting Cotton Hairs for Examination of Fibre Maturity	*N. Ahmad and A. N. Gulati*
The Heat Retaining Properties of Clothing computed on a Physiological Basis. Part I and Part II	*T. C. Angus*
Recent Advances in the X-ray Studies of Protein Fibres	*W. T. Astbury*
Studies in the Variability of Piece Length in Woven Cotton Cloth...	*A. W. Bayes*
Azoic Colours: Their Application to Linen, Technical Control and Properties on the Fibre	*H. Blackshaw*
The Tensile Strength of Manila Yarns and Manila Rope	*C. A. L. de Bruyn and J. M. A. Kruger*
The Technician as a Sales Force	*H. J. Clarke*
Recent Developments in the Methods used to Produce the American Cotton Crop	*A. F. W. Coulson*
The Sorptive Properties of the Silk Fibre	*R. Cuthill*
Temperature of Abrasion in Knitted Fabrics	*W. Davis and G. H. Buckley*
The Bursting Test on Knitted Fabrics	*W. Davis and C. H. Edwards*
Some Physical Properties of Knitted Fabrics. Part I and Part II...	*C. H. Edwards*
Mechanical Testing of the Suitability of Fabrics for Shoe Linings ...	*R. S. Edwards*
Power Transmission by Flat and " V " Belts	*S. B. Hainsworth*
" Fibro " Processing on Standard Worsted Machines	*W. Hardacre*
The Problem of Shrinkage	*F. C. Harwood*
Wood Pulp for the Rayon Industries	*L. Hebbs*
Sulphur in Wool	*A. T. King*
The Influence of Fibre-Length on the Proportion of Fibre-Strength utilised in Cotton yarn	*S. Kohler*
The Chemistry of Coir Fibre. Part I and Part II	*S. R. K. Menon*
A Stress-Extension Dynamometer for Textile Fibres	*D. de Meulemeester and I. Nicoloff*
The Exhibition of Scientific Instruments at the Conference of the Textile Institute, June, 1936	*H. Moore*
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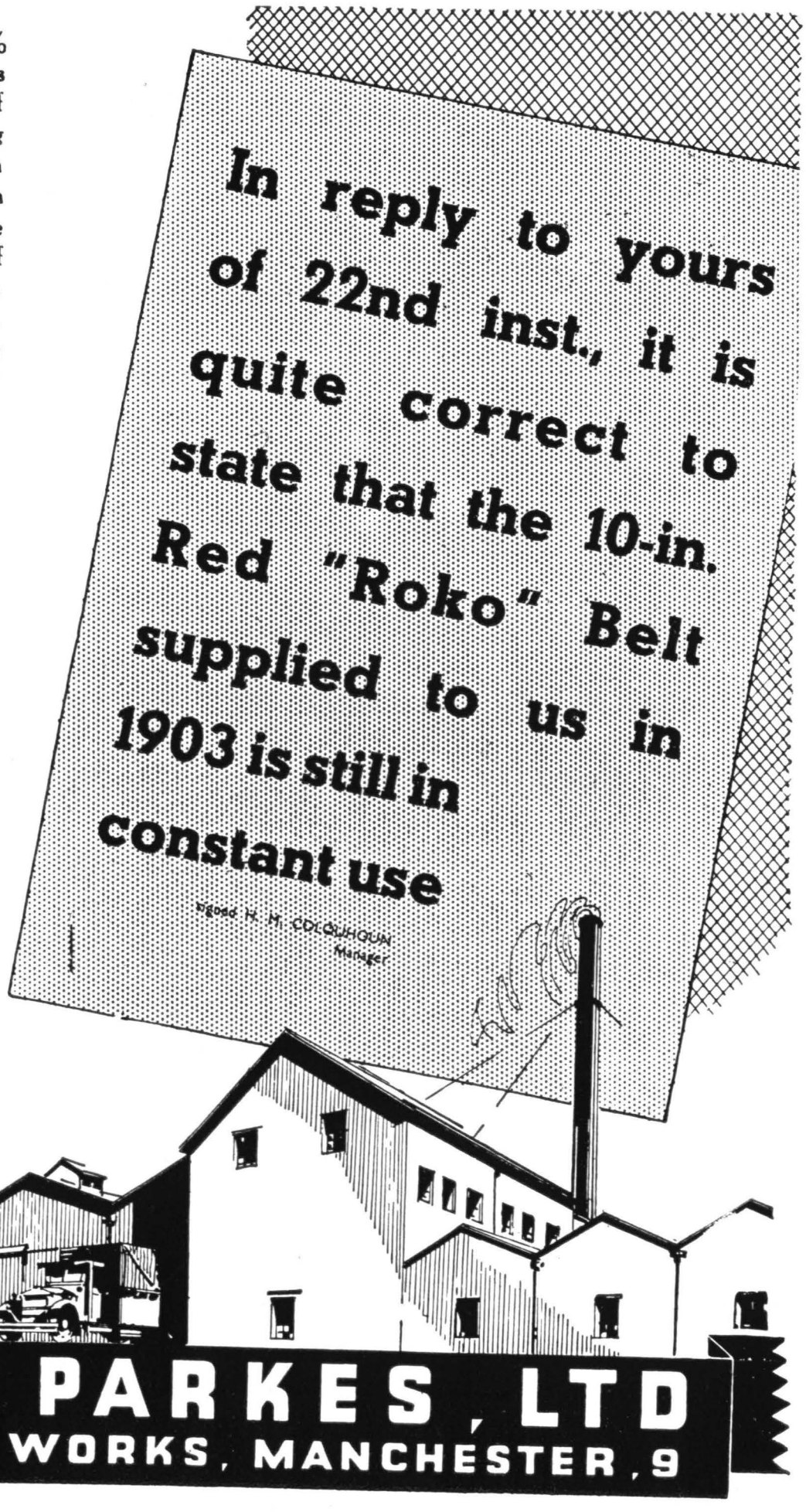

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3.—AN ABBREVIATED METHOD AND A SUGGESTED CHEAP MECHANICAL DEVICE FOR CALCULATING THE STANDARD DEVIATIONS OF OBSERVATIONS.

By J. L. SPENCER-SMITH and H. A. C. TODD.

SUMMARY

A rapid graphical method of calculating the standard deviation of a set of observations, by means of Galton's " ogive " curve, is described. The " ogive " curve is projected into a straight line by plotting on " probability " paper, and is completely determined for normal distributions by the percentage number of observations which are less than two given values. The standard deviation is read off from the straight line joining these two points. A comparison of the results of the method with the root mean square standard deviation is given and the probable error of the method estimated to be 3·5 per cent. The application of the method as an integrator for routine testing machines is discussed.

INTRODUCTION

When the results of a large number of measurements of some physical quantity show a frequency distribution which approaches closely to the normal frequency distribution the results may be expressed sufficiently completely for most practical purposes in terms of the mean and the standard deviation. The present paper describes a simple and rapid method of estimating the standard deviation of a number of observations with sufficient accuracy for most purposes. The method has the further advantage that it can be applied in the form of a cheap integrator to almost any testing machine. It is felt that the method may be of service to those who have not got the resources of a statistical laboratory at their disposal.

In principle the method is very similar to that of Holcomb and Froman,[1] but was arrived at independently. Although it covers much of the same ground as the above mentioned paper, so far as principle is concerned, the method of graphical application is simpler, and application as a mechanical integrator is also discussed.

Theory of Method.

One of the usual methods of illustrating variation graphically is by the " ogive " curve proposed by Galton.[2] In this method the number of observations having values less than any given value is plotted against

3.—*An Abbreviated Method and a suggested cheap Mechanical Device for*

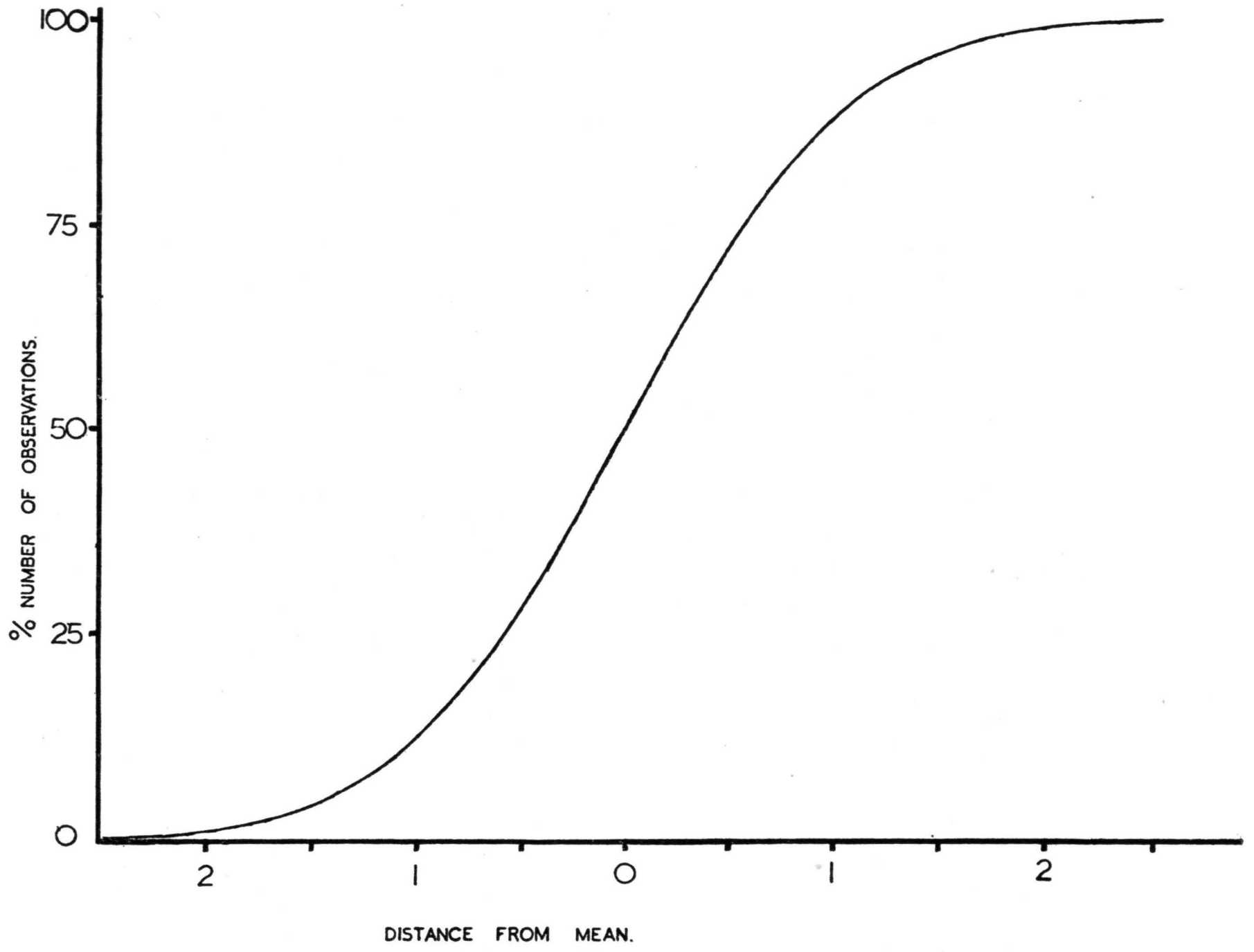

FIG. 1

that value to give an " ogive " curve similar to that shown in Fig. 1. For a normal frequency distribution the shape of the " ogive " curve is given by

$$\frac{\eta_x}{N} = \frac{1}{\sqrt{2\pi}} \cdot \frac{1}{\sigma} \int_0^x e^{-(x-x_0)^2/2\sigma^2} dx$$

where n_x is the number of observations with values less than x.

N is the total number of observations.

σ is the standard deviation.

x_0 is the mean of the observations.

Galton showed that the median, and the quartiles may be read directly from the curve by reading the intercepts of the curve for $\frac{n_x}{N} = 0{\cdot}50$, and $\frac{n_x}{N} = 0{\cdot}25$ and $0{\cdot}75$ respectively, whilst Holcomb and Froman pointed out that when

$$\frac{x-x_0}{\sigma} = \pm 0{\cdot}5\,; \quad \frac{n_x}{N} = 0{\cdot}3082 \text{ and } 0{\cdot}6918$$

$$\frac{x-x_0}{\sigma} = \pm 1{\cdot}0\,; \quad \frac{n_x}{N} = 0{\cdot}1587 \text{ and } 0{\cdot}8413$$

$$\frac{x-x_2}{\sigma} = \pm 1{\cdot}5; \quad \frac{n_x}{N} = 0{\cdot}0668 \text{ and } 0{\cdot}9332$$

Consequently the standard deviation may be read directly from the intercepts on the curve at these points.

Hazen and Whipple[3] showed that the "ogive" curve may be projected into a straight line by plotting it on the so-called "probability" graph paper[4] designed for this purpose. When a normal frequency distribution is plotted on this paper the results lie on a straight line and it can be seen from the above that the slope of the straight line will be inversely proportional to the standard deviation. Provided that the frequency distribution is assumed to be normal, it may be completely determined within the limits of experimental error, from two observations. All that is required to construct the straight line on the probability graph paper is the percentage number of observations having values less than two given values. These provide two points through which the straight line may be drawn.

The method of Hazen and Whipple is generally used to check the normality of frequency distributions by testing the degree to which the observed points fit a straight line.

Actually it appears that when the curve is skew the straight line obtained from two or three values of n_x represents a normal distribution fitted to the results at the appropriate values of x. Consequently the median obtained from the straight line as being the value of x when $n_x = \frac{N}{2}$ does not agree with the actual median but lies between it and the mean. For cases in which the skewness is only slight it is generally sufficiently accurate to take the median obtained from the curve as being equal to the mean.

For many purposes, especially in results of measurements upon textiles the variation is expressed as the "coefficient of variation," being equal to the standard deviation expressed as a percentage of the mean. Although the coefficient of variation has little theoretical significance it serves as a useful measure of the irregularity of the sample, for comparison with other samples, having different means.

Graphical Method.

The abbreviated method of obtaining the standard deviation indicated above is as follows. The percentage number of observations having values less than two or more values of x are obtained from the results. These points are plotted upon the probability graph paper and a straight line is drawn through them. The intercepts of the line on the x axis when $\frac{100n_x}{N} = 84{\cdot}13$ and $15{\cdot}87$ are read off from the graph and the difference between the two values of x gives twice the standard deviation. The median is read off from the graph when $\frac{100n_x}{N} = 50$.

When the curve is skew the value of the median obtained by the above method is not equal to the actual median of the frequency distribution but lies between it and mean.

To obtain the coefficient of variation, where this is required, it is generally a sufficiently close approximation to take it as being the standard deviation divided by the median as read from the curve.

Comparison with Root Mean Square Standard Deviation.

The method has been tried out upon results of measurement of the variation in weight along flax slivers (*i.e.*, continuous ribbon of fibres).

Fig. 2 shows a typical frequency distribution for variations of weight

along a flax sliver plotted upon probability paper. As can be seen the points fit well along a straight line showing that the distribution is closely normal. In a large number of trials very good agreement has been found between the standard deviations of the sliver weight obtained from calculation of the root mean square deviation and by the method described here, provided that the two selected values have $\frac{100n_x}{N}$ lying between 10 and 90 per cent.

The results of a number of measurements on different slivers are drawn graphically in Fig. 3, in which the root mean square standard deviation is

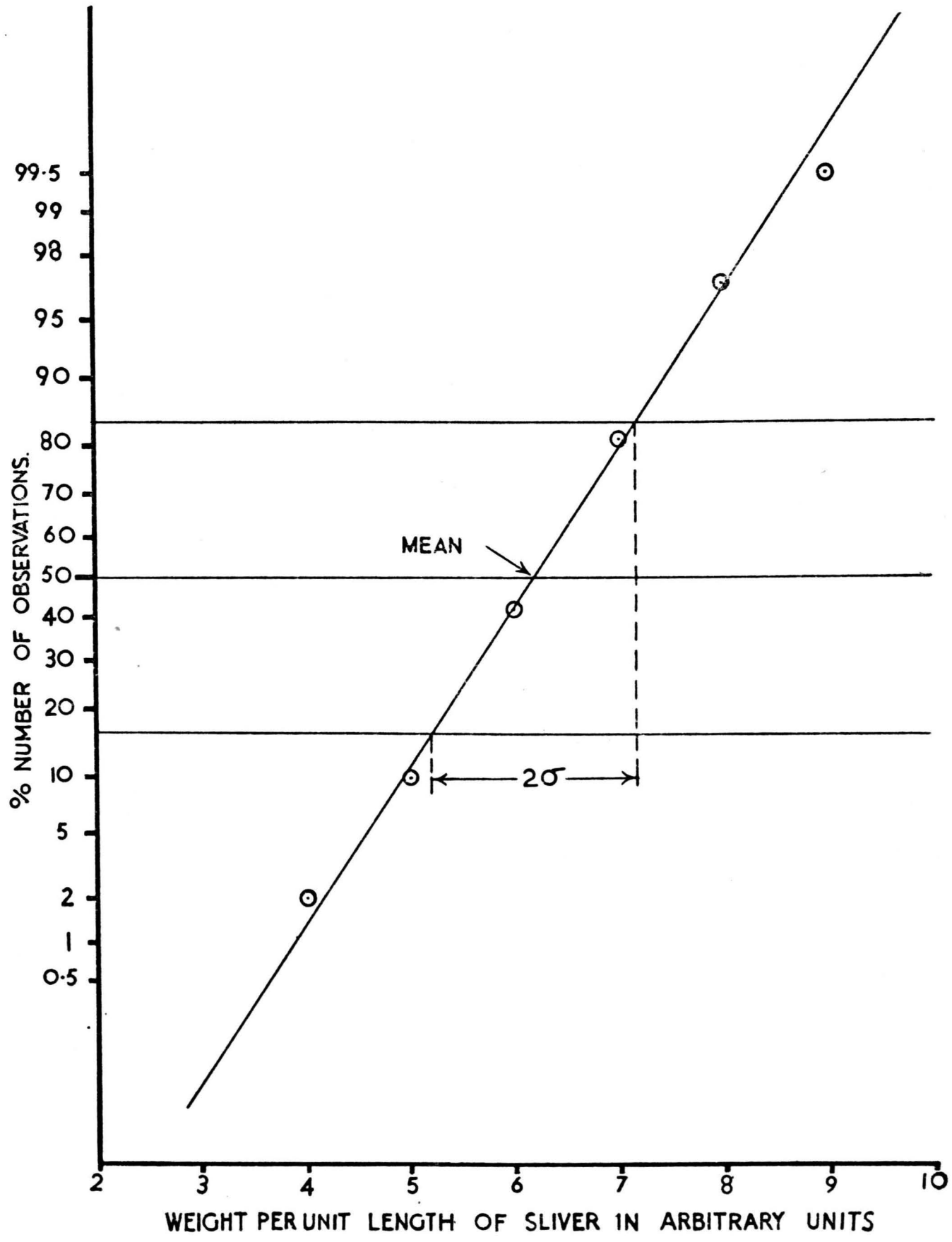

FIG. 2

plotted against the value obtained by the present method using two counters set within the limits prescribed above. The probable error of the results using this method is found to be 3·4 per cent. which is sufficiently close for most purposes.

The probable error of the mean when taken as being the median as calculated by the present method for the present results is found to be 2·5 per cent.

Application of the Method to Integrators operated by Testing Machines.

A number of mechanical integrators have been designed to calculate the mean and standard deviation of the results of routine tests. Most of

these are of a complicated nature and fitting them to a testing machine is frequently a costly operation. Most of them require to be set to an approximate value of the mean and their accuracy may be poor if the difference between the setting and the actual mean is too large. The calculator invented by Matthew and Keig[5] falls into this class. This is designed for attachment to a strength testing machine and calculates the standard deviation via the mean deviation.

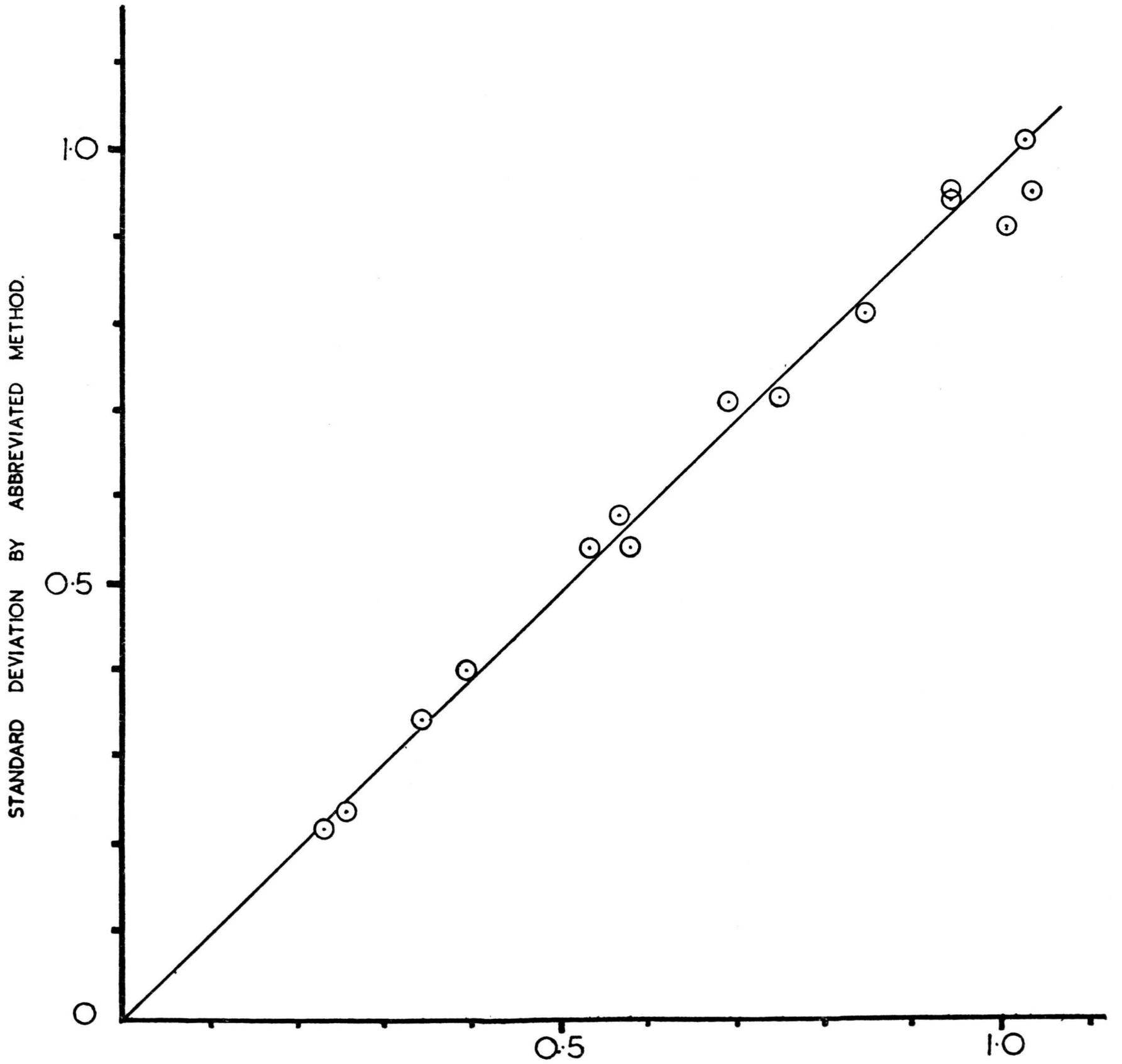

FIG. 3

Several machines that calculate the mean square deviation have been described by Foster[6]; these overcome the above disadvantages to a large extent but they are necessarily more complicated than the simple apparatus suggested below.

The method described above can readily be adapted to form an attachment to testing machines, by which the number of observations less than two selected values can be obtained mechanically. These are used for the graphical treatment described above.

It is only necessary to arrange two or more counters at pre-selected values so that they would be operated by the testing machine when these values of the quantity being measured are exceeded in the various tests. It should be pointed out that when only two counters are used there is a risk

that if a sample occurs with a frequency distribution far from normal, a serious error may result. For accuracy the two pre-selected values should be on either side of the mean.

The exact form of mounting would vary with the testing machine, but in all cases provision would need to be made for varying the position of the counters relative to the machine scale. The counters would be mounted on this scale and operated by the indicator of the machine or two or more counters could be adjustably mounted on the moving part of the machine and be operated by a fixed stop on the scale. In cases where the friction of the counters is undesirable they could be worked by means of relays working from electrical contacts.

It appears likely that different types of mounting would be required to suit the requirements of different types of testing machines, so no attempt is made to describe any particular attachment.

This method appears to be particularly suitable for attachment to a recording drum on which a varying quantity is being continuously or intermittently recorded, to render the calculation of the variability very simple and rapid.

In conclusion we wish to thank the Council of the Linen Industry Research Association for permission to publish these results.

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4.—THE DISSOLUTION OF CHEMICALLY MODIFIED COTTON CELLULOSE IN ALKALINE SOLUTIONS

PART 3—IN SOLUTIONS OF SODIUM AND POTASSIUM HYDROXIDE CONTAINING DISSOLVED ZINC, BERYLLIUM AND ALUMINIUM OXIDES

BY

G. F. DAVIDSON, D.Sc.

(British Cotton Industry Research Association)

I. INTRODUCTION AND SUMMARY.

John Mercer observed that by dissolving zinc oxide in sodium hydroxide solution the swelling action of the solution on cotton was increased,[9] and in 1889 the use of such a solution to produce certain of the effects of mercerisation was included in a patent by Lowe.[7] Recently, Lewis[6] has described the use of a solution of sodium hydroxide containing dissolved zinc oxide as a swelling agent for the detection of chemically damaged cotton by microscopical examination. In Parts I and II of this series[2, 3] it has been shown that there is a close relation between the swelling of cellulose in solutions of strong bases and the solubility (percentage dissolved under standardised conditions) of chemically modified cotton cellulose in similar solutions, and it would thus be expected that the enhanced swelling action of solutions of sodium hydroxide containing dissolved zinc oxide would be accompanied by enhanced solvent action on modified cottons. The solvent action of such solutions of zinc oxide was therefore examined, and when the expected results were found, the investigation was extended to include two other amphoteric oxides—the oxides of beryllium and aluminium. In view of the differences in behaviour previously found between solutions of potassium hydroxide and of the other strong bases examined,[3] the effect of dissolved zinc oxide on the solvent action of potassium hydroxide solutions was also investigated.

In what follows, the solutions of zinc, beryllium and aluminium oxides in solutions of sodium or potassium hydroxide containing caustic alkali considerably in excess of the amphoteric oxide equivalent, will, for the sake of brevity, be referred to as solutions of zincate, beryllate and aluminate, respectively. Their composition will be defined by (1) the concentration (normality) of the total sodium or potassium hydroxide, free and combined, present in the solution, (2) the molar ratio of amphoteric oxide to sodium or potassium hydroxide.

It has been found that the solvent action of sodium zincate solutions on cotton and modified cotton cellulose, like that of solutions of sodium hydroxide, is a maximum at a certain concentration of caustic alkali and that the maximum solubility of a given material is the greater the higher the molar ratio of zinc oxide to sodium hydroxide in the solutions; as this ratio is increased, the position of the maximum shifts towards higher sodium hydroxide concentrations. Thus, with a certain oxycellulose, when the molar ratio ZnO/NaOH was 0, 0·05, 0·10 and 0·178, the maximum solubilities observed at 15° C. were 10·5, 38·9, 77·5, and 97·3 per cent., and these maxima occurred at sodium hydroxide concentrations of 3·0, 3·0, 3·25 and 3·5*N*, respectively. The solvent action is greatly increased by lowering the temperature, and by using a temperature of —5° C. and a zincate solution with a high molar ratio of zinc oxide to sodium hydroxide it is possible to dissolve unmodified cotton to a considerable extent; for example, with a cotton of fluidity 4·1 a solubility of 45 per cent. has been attained.

Solubility measurements have been made on modified cottons treated at 15° C. with zincate solution 5*N* in sodium hydroxide and at 0° and —5° C. with 5*N* sodium hydroxide solution containing no zinc oxide, the solutions then being diluted to a range of lower concentrations at the same temperature. The solubility curves thus obtained, when compared with those found by direct extraction, are displaced towards lower alkali concentrations, but the effect on the maximum solubility depends on the conditions. Thus with sodium zincate at 15° C., or with sodium hydroxide alone at 0° C., the maximum solubilities by the dilution method and by direct extraction are nearly the same, whilst with sodium hydroxide alone at —5° C. the dilution method gives a considerably lower maximum solubility than direct extraction.

The relation between the fluidity of a series of cottons and modified cottons in cuprammonium and their solubility in sodium hydroxide and sodium zincate solution at 15° C. and —5° C. has been investigated.

In order to prepare concentrated, stable solutions of modified cottons in sodium zincate solutions, it is necessary to use zincate solutions with a molar ratio of zinc oxide to sodium hydroxide not much above 0·1 and a sodium hydroxide concentration of about 2·5*N*, and to dissolve the modified cotton at a low temperature. At high sodium hydroxide concentrations, the solutions tend to form gels on standing, and if a high molar ratio ZnO/NaOH is used in a solution 2·5*N* in sodium hydroxide, precipitation of zinc oxide takes place.

The presence of dissolved zinc oxide in potassium hydroxide solutions increases the maximum swelling of regenerated cellulose sheet and the solubility of modified celluloses in the solution. The form of the solubility curve obtained with a modified cellulose in potassium zincate solutions is similar to that of the same material in potassium hydroxide solutions; regenerated cellulose sheet and an oxycellulose prepared from cotton swollen prior to modification give curves with a single maximum, while oxycelluloses prepared from unmercerised cotton give curves with two maxima. For a given molar ratio of zinc oxide to caustic alkali, potassium zincate solutions are much less effective solvents for modified celluloses than sodium zincate solutions.

Solutions of sodium beryllate have a greater solvent action than solutions of sodium hydroxide, and in other respects also behave like solutions of sodium zincate; their solvent action is, however, in general, less than that of zincate solutions. On the other hand, the presence of dissolved aluminium oxide in sodium hydroxide solutions has the effect of depressing the solvent action of the solutions.

II. EXPERIMENTAL

(1) Determination of Solubility of Cotton and Modified Cotton.

The methods used for the determination of solubility were similar to those described in Part I of this series,[2] with the slight modifications introduced in Part II.[3]

(2) Materials.

(a) *Cottons and Modified Cottons.* The cottons and modified cottons used were, for the most part, drawn from those described in Part I.[2] They consisted of (1) scoured cottons, (2) a series of oxycelluloses (OL6/B—OL16/B), prepared from scoured cotton linters by the action of sodium hypochlorite solutions of *p*H 8·4, and subjected to an alkaline boil after modification, (3) an oxycellulose CSO3, prepared by oxidation with gaseous oxygen of a scoured cotton impregnated with 10*N* sodium hydroxide

solution. The fluidity of these materials in cuprammonium (0·5 per cent. solution, 20° C.) is given as a measure of their degree of modification, the fluidities of the scoured cottons and the hypochlorite oxycelluloses being included in Table V.

(b) *Preparation and Analysis of Zincate Solutions.* Sodium zincate solutions are readily prepared by shaking anhydrous zinc oxide with concentrated sodium hydroxide solutions; the solubility relations in this system have been investigated by Goudriaan[5] and Müller.[8] Sodium zincate solutions of known composition were prepared by shaking together weighed quantities of pure zinc oxide and 40 per cent. sodium hydroxide solution, and these were then diluted with water to give a series of solutions with a constant molar ratio of zinc oxide to sodium hydroxide, but with various concentrations of total sodium hydroxide. The highest molar ratio reached was 0·229; this was attained by shaking a 40 per cent. solution of sodium hydroxide with excess of zinc oxide for 24 hours, heating the suspension to boiling, and allowing it to cool. After standing for several days, the solution was separated from the undissolved zinc oxide by centrifuging in stoppered tubes.

Where it was necessary to analyse sodium zincate solutions, the sodium hydroxide was determined by titration with normal hydrochloric acid, and the zinc oxide by precipitation from an acidified solution as basic carbonate, igniting, and weighing as oxide. The validity of the titration method was tested by the titration of solutions of known composition, prepared as described above. Weighed quantities of these solutions were titrated to the phenolphthalein and methyl red end-points, the results being given in Table I.

They show that if the titration to the phenolphthalein end-point is taken as giving the sodium hydroxide concentration, the result is about 0·5 per cent.

Table I
Analyses of Sodium Zincate Solutions
(Milli-equivalents per gm. solution)

	Sodium hydroxide (phenolphthalein)		Total base (methyl red)	
Calculated	8·70	8·97	11·84	11·53
Found	8·75, 8·75, 8·74, 8·75	9·02, 9·01	11·83, 11·83	11·53, 11·54

too high; this is contrary to the findings of Fricke and Humme,[4] who state that too low results are obtained. Titration to the methyl red end-point, which corresponds closely with the re-dissolution of the zinc oxide, gives accurately the concentration of total base, i.e. sodium hydroxide and zinc oxide. The sodium hydroxide concentration is thus more accurately obtained from this result and the gravimetric determination of zinc oxide, but for the purposes of the present work the result obtained by the more rapid titration to the phenolphthalein end-point is sufficiently accurate.

Many of the sodium zincate solutions used were super-saturated, and from those with the highest molar ratios of ZnO/NaOH and the lowest sodium hydroxide concentrations used, a precipitate, which was sometimes crystalline, separated slowly. Solutions were usually prepared immediately before use by dilution of stable stock solutions 5*N* or 6*N* in sodium hydroxide, and only in a few instances was there any precipitation of zinc oxide during the actual measurements of the solubility of modified cellulose.

Zinc oxide is less soluble in potassium hydroxide than in sodium hydroxide solutions,[8] and the highest molar ratio of zinc oxide to potassium hydroxide attained by shaking the anhydrous oxide with 45 per cent. potassium hydroxide solution and then heating the suspension was 0·143. The solutions of potassium zincate employed in solubility measurements had a molar ratio ZnO/KOH of 0·14.

(c) *Preparation and Analysis of Beryllate Solutions.* Unlike zinc oxide, anhydrous beryllium oxide does not dissolve in sodium hydroxide solutions. A preliminary preparation was made by dissolving hydrous beryllium oxide—precipitated from a solution of the chloride with ammonia, washed and partially dehydrated over phosphorus pentoxide—in concentrated sodium hydroxide solution, but most of the work was done with solutions prepared by dissolving metallic beryllium (98 per cent. pure, in the form of flakes) in 35 per cent. sodium hydroxide solution. The solution was freed from the undissolved residue by centrifuging in stoppered tubes. The solutions were analysed by determining the total sodium hydroxide by titration with standard acid to the phenolphthalein end-point, and the beryllium by precipitation from an acid solution with ammonia, washing with a 2 per cent. solution of ammonium acetate containing ammonia, igniting and weighing as oxide.

The highest molar ratio of beryllium oxide to sodium hydroxide used in measurements of the solubility of modified cottons was 0·274 but even solutions 6*N* in sodium hydroxide were unstable ; it was possible to use this molar ratio by centrifuging the stock solution before use and analysing the clear solution used. With molar ratios of 0·2 and 0·1, the solutions were as stable as the zincate solutions.

(d) *Preparation and Analysis of Aluminate Solutions.* Sodium aluminate solutions were prepared by dissolving aluminium turnings in 40 per cent. sodium hydroxide solution, and separated from insoluble matter by centrifuging. The sodium hydroxide concentration was determined by titration with standard acid to the phenolphthalein end-point, and the aluminium gravimetrically as oxide. No precipitation of alumina from any of the aluminate solutions used was observed, but when stock solutions were diluted to a low sodium hydroxide concentration there was a slight precipitation of ferric oxide on standing. It should be noticed that in an aluminate solution a given molar ratio of oxide to sodium hydroxide corresponds to double the atomic ratio of metal to sodium that would be given by the same molar ratio in a zincate or beryllate solution.

(3) The Solvent Action of Sodium Zincate Solutions.

The solvent action of sodium zincate solutions at 15° C. was investigated by determining the solubility of the oxycellulose OL7/B (fluidity, 34·1) in solutions of various sodium hydroxide concentrations and with various molar ratios of zinc oxide to sodium hydroxide. The results obtained are given in Table II and Fig. 1. They show that at low sodium hydroxide

Table II
Solubility of Oxycellulose OL7/B in Sodium Zincate Solutions at 15°C.

ZnO/NaOH (moles)	Percentage dissolved											
	Concentration of sodium hydroxide (normality)											
	2·00	2·25	2·50	2·75	3·00	3·25	3·50	3·75	4·00	4·50	5·00	6·00
0	1·4	2·5	4·4	7·8	10·5	8·6	6·3	—	3·4	—	1·7	—
0·050	1·3	—	4·3	18·8	38·9	33·7	20·7	13·1	8·5	4·3	3·5	—
0·100	1·6	—	5·0	21·0	50·9	77·5	66·2	40·8	26·0	10·2	5·9	—
0·178	1·2	—	3·9	17·2	49·5	87·7	97·3	90·2	57·3	27·3	10·3	3·2

concentrations the presence of dissolved zinc oxide has little effect on the solubility of the oxycellulose, but when the sodium hydroxide concentration reaches about 2·75*N* the solubility in the zincate solutions begins to rise rapidly. The solubility goes through a maximum when the sodium hydroxide concentration is further increased, and this maximum is the higher the

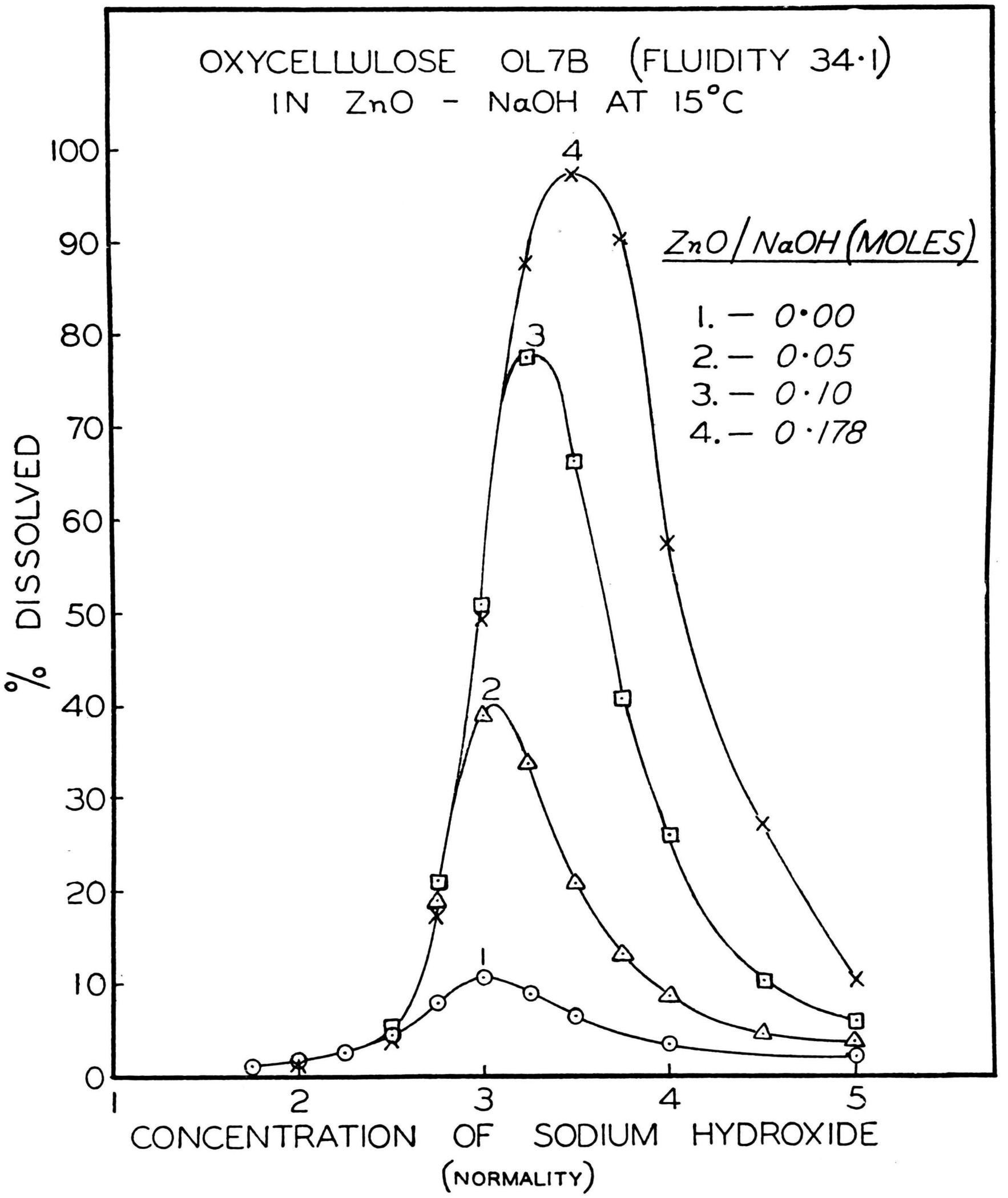

Fig. 1.

greater the molar ratio of zinc oxide to sodium hydroxide. As the molar ratio is increased, the maximum shifts towards higher sodium hydroxide concentrations.

As the oxycellulose OL7/B was practically completely soluble in sodium zincate solution 3·5*N* in sodium hydroxide and having a molar ratio ZnO/NaOH of 0·178, it was necessary to use a less highly modified cotton to investigate the effect of low temperatures with zincate solutions. For this purpose the oxycellulose OL14/B (fluidity 16·1) was employed. Table III

gives the results of solubility measurements at 15° and —5° C. with this material in zincate solutions with molar ratios ZnO/NaOH of 0·10 and 0·178. The results show that, as with sodium hydroxide solutions,[2] lowering

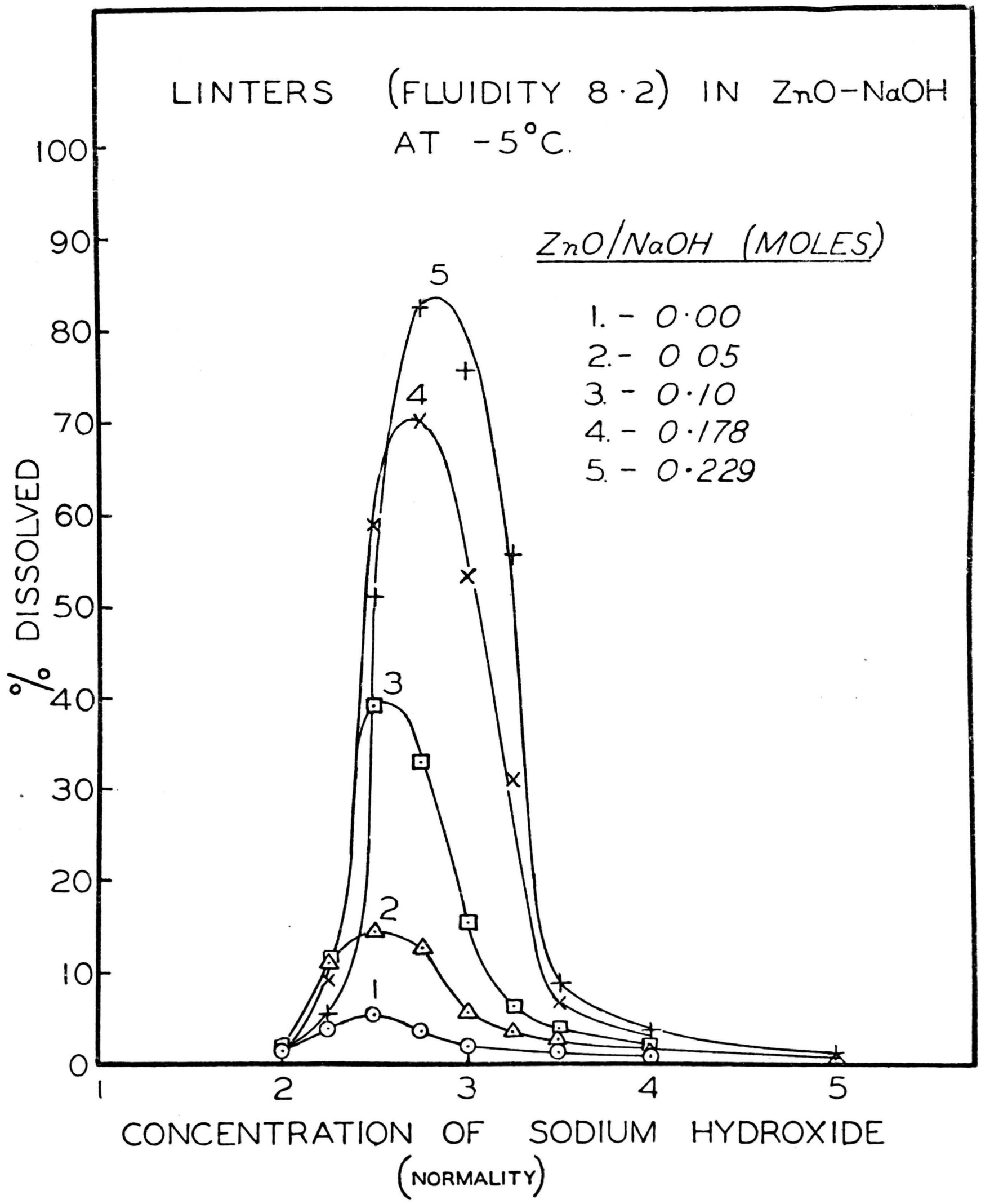

Fig. 2.

Table III
Effect of Temperature on Solubility

ZnO/NaOH (moles)	Temp. (° C.)	Percentage dissolved									
		Concentration of sodium hydroxide (normality at 18° C.)									
		2·00	2·25	2·50	2·75	3·00	3·25	3·50	3·75	4·00	5·00
0·100	15	—	—	1·4	—	6·2	11·6	8·8	6·1	3·6	1·3
0·100	–5	3·2	36·9	82·4	84·9	72·2	53·4	24·8	—	6·1	2·3
0·178	15	—	—	1·3	—	4·6	25·4	40·1	25·5	12·6	2·6
0·178	–5	1·9	26·8	80·5	93·6	94·2	87·7	63·5	38·2	13·0	2·9

the temperature to —5° C. produces a great increase in the maximum solubility, and shifts the maximum to a lower sodium hydroxide concentration.

The effect of the molar ratio ZnO/NaOH on the solvent action of zincate solutions at —5° C. was investigated in greater detail with scoured linters No. 310 (fluidity 8·2) and the results are given in Table IV and Fig. 2. The terms " unmodified cotton " and " modified cotton " are purely relative, but this material would, for textile purposes, be regarded as an unmodified

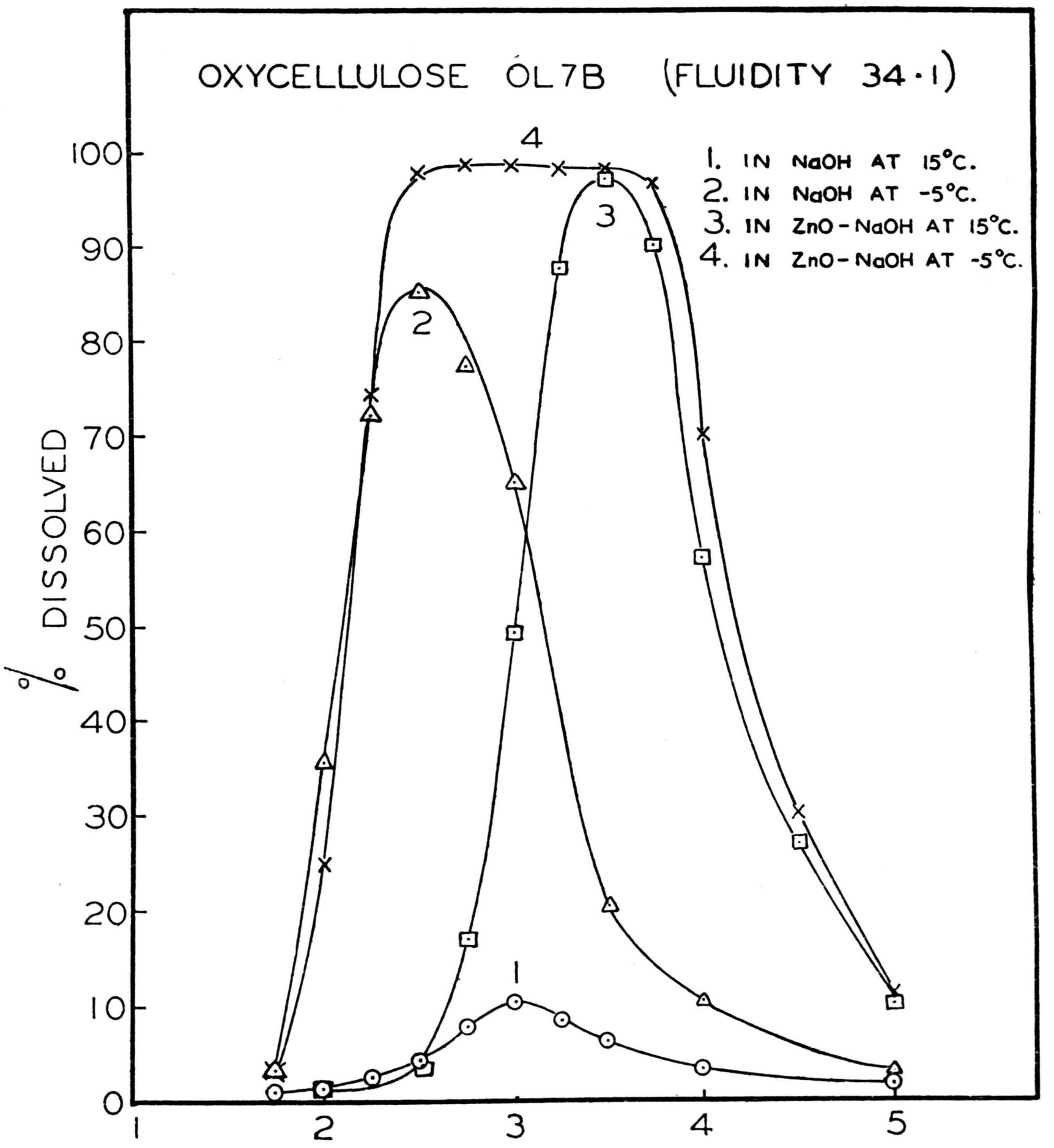

Fig. 3.

cotton, although very near the border-line between the two classes. The results show that, as at 15° C., the maximum solubility increases with increasing molar ratio ZnO/NaOH, while at the same time this maximum solubility occurs at progressively higher sodium hydroxide concentrations. The crossing of the solubility curves at low sodium hydroxide concentrations shows that here increasing zinc oxide concentration eventually lowers the solubility, and this is also shown, although to a less extent, by the results

already given for 15° C. (Table II). The striking feature of the results at —5° C. is that by using a zincate solution with a high ZnO/NaOH ratio, a cotton of fluidity 8·2 may be brought into solution to the extent of 82 per

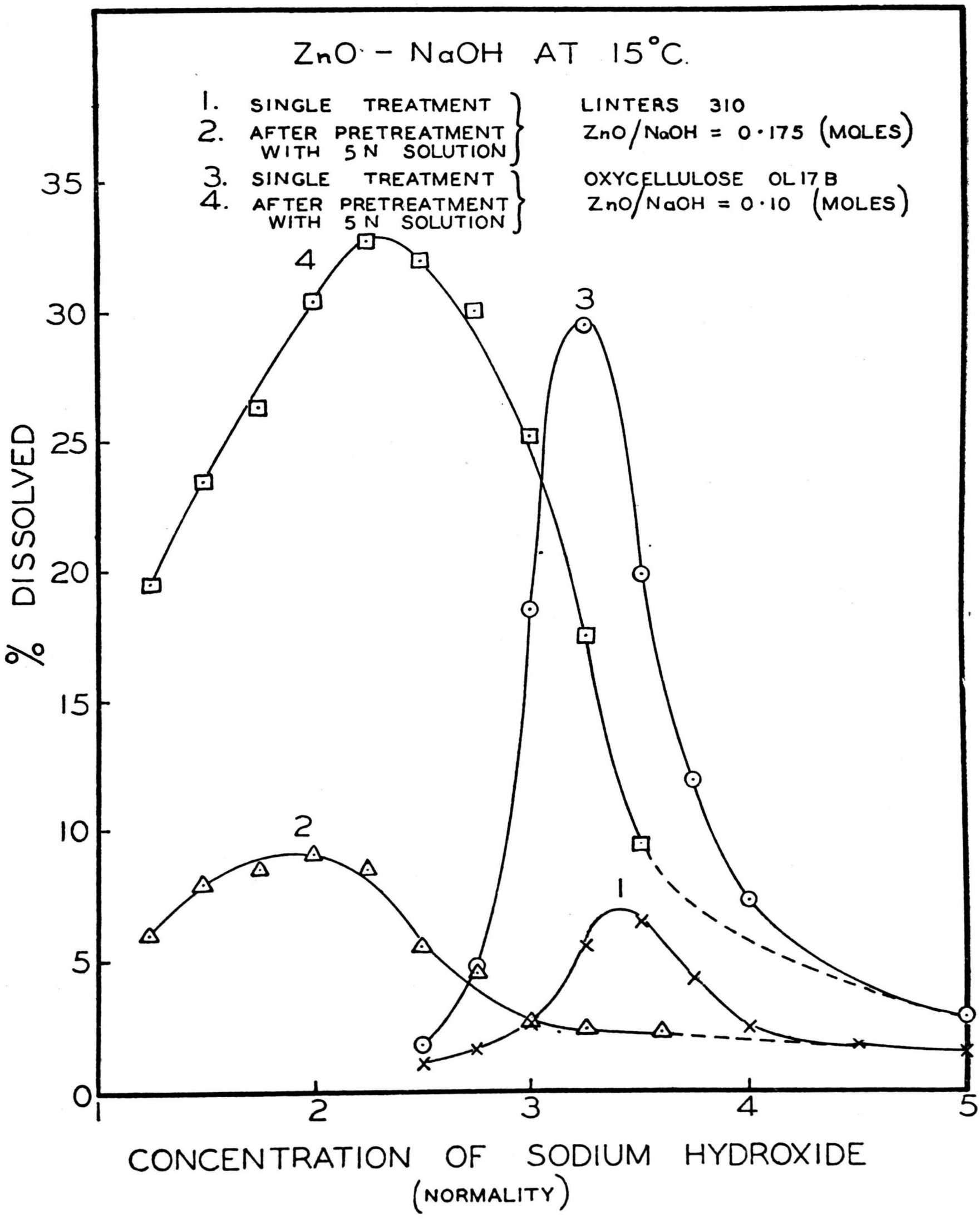

Fig. 4.

Table IV

Solubility of Linters No. 310 in Sodium Zincate at —5° C.

ZnO/NaOH (moles)	Percentage dissolved								
	Concentration of sodium hydroxide (normality at 18° C.)								
	2·00	2·25	2·50	2·75	3·00	3·25	3·50	4·00	5·00
0	1·3	3·8	5·2	3·5	1·9	—	1·1	0·5	—
0·050	1·9	10·1	14·5	12·6	5·5	3·3	2·3	0·8	0·3
0·100	2·0	11·2	39·2	33·0	15·5	6·2	3·6	1·5	—
0·178	1·4	9·1	58·4	70·1	53·3	31·0	6·9	2·5	—
0·229	1·4	5·3	51·2	82·6	75·6	55·6	8·7	3·5	1·0

cent. By lowering the temperature to —10° C. and using a solution with a molar ratio ZnO/NaOH of 0·229 and a sodium hydroxide concentration of 2·75*N*, this figure was increased to 89 per cent.

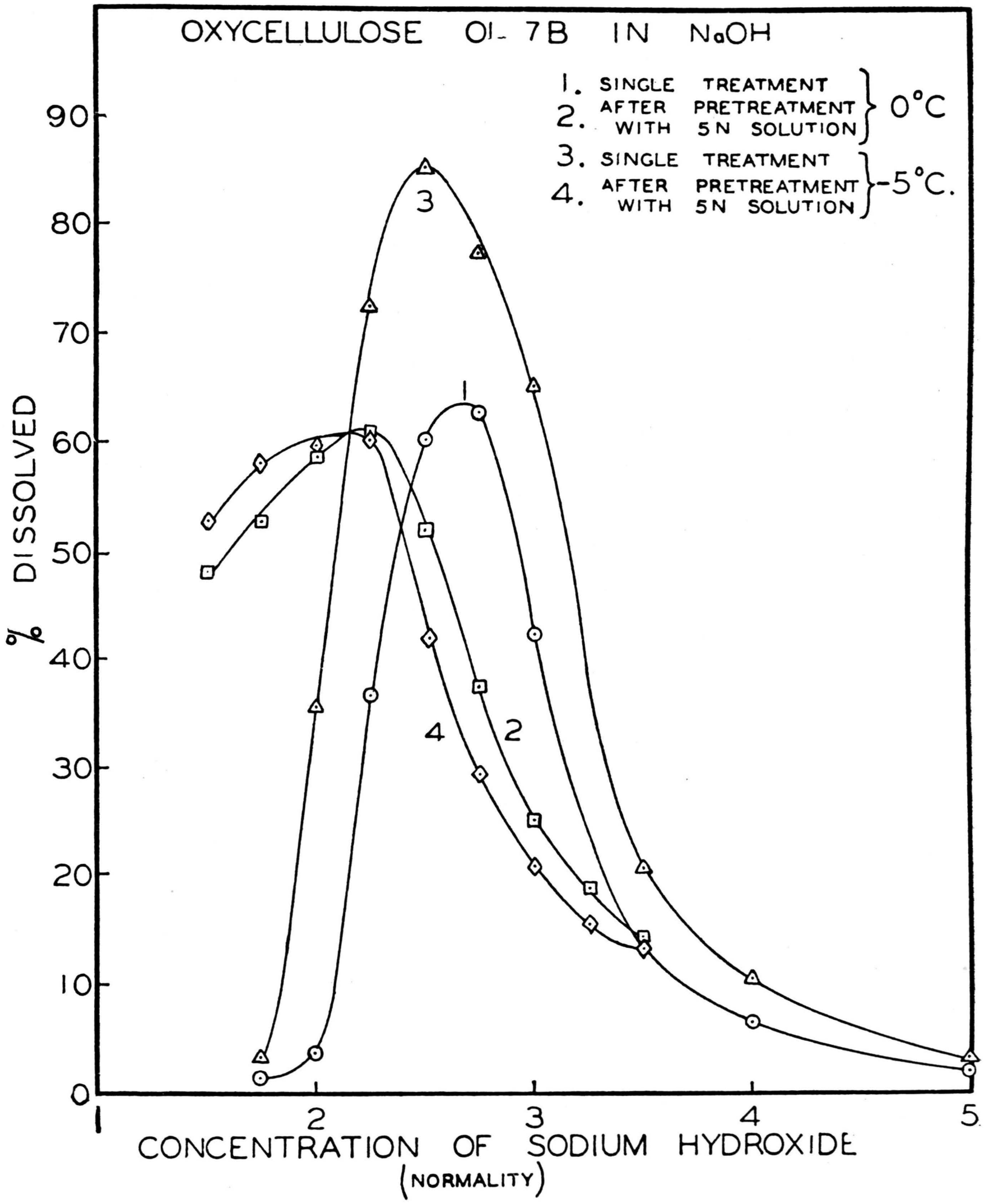

Fig. 5.

The solubility of the oxycellulose OL7/B in sodium hydroxide solutions at 15° C. and —5° C. has already been given in Part I,[2] and by using these data and solubility determinations in zincate solutions at the same temperatures, the separate and combined effects of low temperature and dissolved zinc oxide can be well illustrated. This is done in Fig. 3; the solubility data for zincate solutions refer to solutions with a molar ratio ZnO/NaOH of 0·178. Figure 3 shows that the effects of the two factors are superimposed, with the result that at —5° C. the oxycellulose is practically completely soluble in zincate solutions over a sodium hydroxide concentration range of from 2·5*N* to 3·75*N*.

(4) The Solubility of Cottons and Modified Cottons after Pre-treatment with 5N Sodium Hydroxide Solution, and with Zincate Solution 5N in Sodium Hydroxide, followed by Dilution to Lower Concentrations.

Birtwell, Clibbens and Geake[1] found that by treating a modified cotton at 15° C. with sodium hydroxide solutions from 5 to 10*N* and then diluting the alkali to various lower concentrations a maximum solubility was obtained that was greater than that found in a single solution of any concentration. It was therefore of interest to examine the behaviour of sodium zincate solutions in this respect. Half a gram of cotton or modified cotton was treated at 15°C with x cc. of a zincate solution 5*N* in sodium hydroxide and the solution then rapidly diluted with $(50-x)$ cc. of water at 15° C., thus obtaining a series of final sodium hydroxide concentrations. This was done with the linters No. 310, a zincate solution with a molar ratio ZnO/NaOH of 0·175 being used, and with an oxycellulose OL17/B (fluidity 23·1) at a molar ratio of 0·10. The results are shown graphically in Fig. 4, and are compared with the solubilities measured in solutions of various concentrations without pre-treatment with 5*N* solution.

The most general feature of the solubility curve obtained by the dilution method is that, by comparison with results obtained in extraction at constant concentration, the whole curve is displaced in the direction of lower alkali concentrations. This displacement is immediately obvious in its effect on the position of the maximum. Thus, Fig. 4 shows that with sodium zincate solutions at 15° C. the position of the maximum is displaced from the

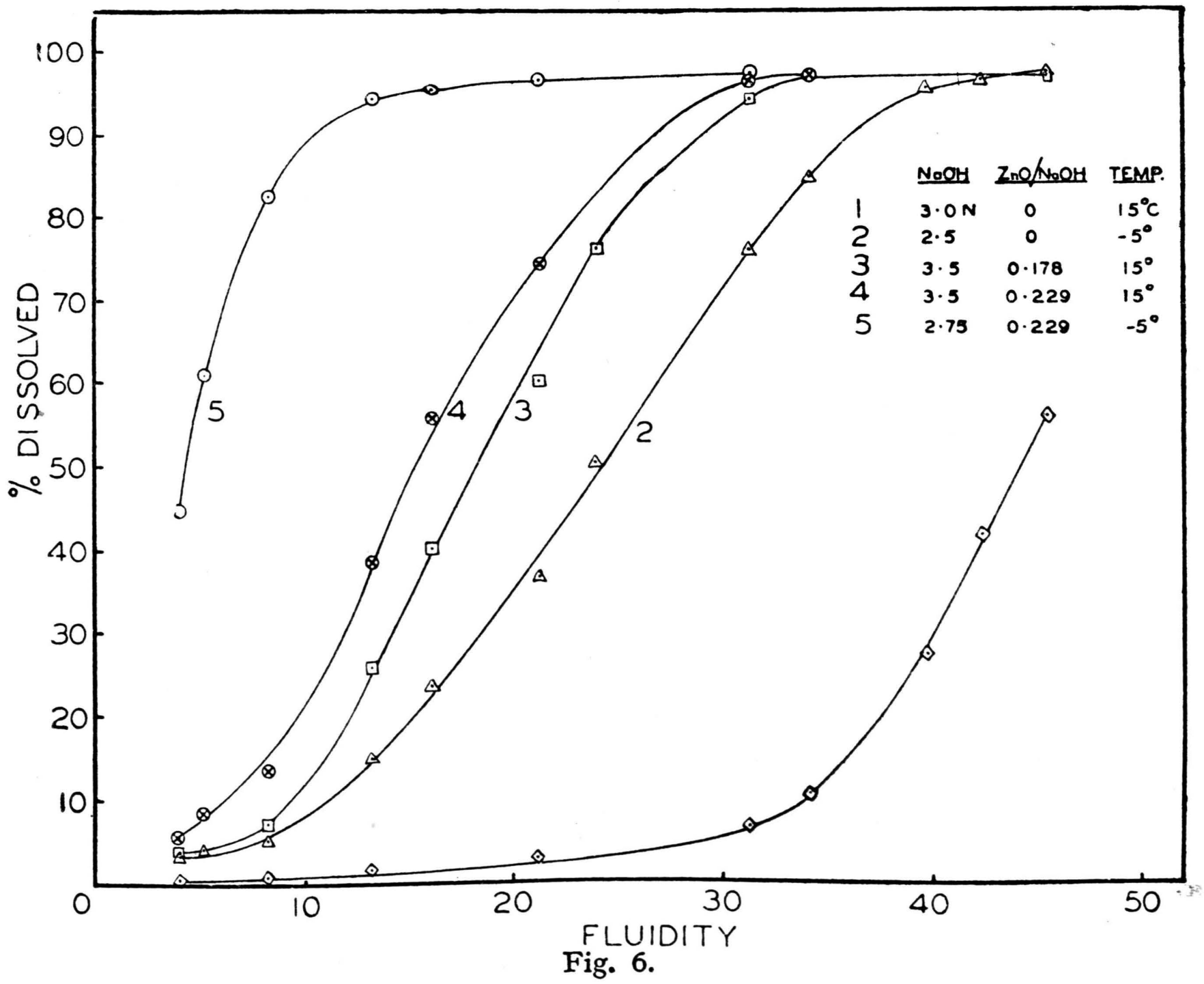

Fig. 6.

neighbourhood of 3·25*N* (direct extraction) to that of 2*N* (dilution), and a similar displacement was observed in the earlier work[1, 2] with solutions of sodium hydroxide at 15° C. A previous paper[2] included a few isolated measurements of the solubility of modified cottons in sodium hydroxide

solutions by the dilution method at 0° and —5° C., and, in the hope of arriving at a more systematic classification of the results obtained by the dilution method under a variety of conditions, these measurements have now been extended to include a series of final concentrations.

Experiments were made in which 0·5 gm. of the oxycellulose OL7/B was added to x cc. of 5N sodium hydroxide solution, the mixture cooled to 0° or —5° C., and then diluted by the rapid addition of (50—x) cc. of water at 0·5° C.; the mixture was then shaken and again cooled to 0° or —5° C.; the results are compared in Fig. 5 with those obtained by direct extraction with single solutions at these temperatures.

At both temperatures the maximum occurs at a lower alkali concentration in the dilution method than in the direct extraction, so that the rule found to hold for sodium hydroxide and sodium zincate solutions at 15° C. also applies here. The effect on the maximum solubility, however, varies greatly with the conditions. With sodium hydroxide solutions at 15° C. a much greater maximum solubility is realised by the dilution method than by direct extraction.[1, 2] With zincate solutions at 15° C. and with sodium hydroxide solutions at 0° C. the maximum solubility is not very different by the two methods; whilst with sodium hydroxide solutions at —5° C. the dilution method gives a much lower maximum solubility than the direct extraction method.

(5) The Relation between the Fluidity of Cotton Materials and their Solubility in Sodium Hydroxide and Sodium Zincate Solutions.

In Part I of this series[2] the relation between the fluidity and the solubility in 2·5N sodium hydroxide solution at —5° C. was given for a series of hypochlorite oxycelluloses. The solubilities of the same series of oxycelluloses, supplemented by a few scoured cottons of low fluidity, were determined in sodium hydroxide solution at 15° C. and in sodium zincate solutions at 15° C. and —5° C. at the sodium hydroxide concentration that gives maximum solubility. The results are given in Table V, and the relations between fluidity and solubility are shown graphically in Fig. 6.

Table V
Fluidity and Solubility Relationships

Material	Fluidity	Percentage dissolved				
		15° C.			−5° C.	
		NaOH, 3·0N	Zincate. NaOH, 3·5N ZnO/NaOH = 0·178	Zincate. NaOH, 3·5N ZnO/NaOH = 0·229	NaOH, 2·5N	Zincate. NaOH, 2·75N ZnO/NaOH = 0·229
Scoured cotton						
103R	4·1	0·6	3·7	5·6	3·4	44·9
85R	5·2	—	—	8·6	4·2	60·9
310	8·2	0·9	7·2	13·7	5·2	82·6
Oxycellulose						
OL13/B	13·2	1·7	25·7	38·6	15·0	94·5
OL14/B	16·1	—	40·1	55·8	23·5	96·0
OL15/B	21·2	2·8	60·2	74·7	36·7	97·2
OL16/B	23·9	—	76·5	—	50·5	—
OL11/B	31·2	6·7	94·6	96·6	76·4	97·6
OL7/B	34·1	10·5	97·3	97·4	85·2	—
OL12/B	39·7	27·2	—	—	95·7	—
OL9/B	42·3	41·9	—	—	96·8	—
OL6/B	45·4	57·6	97·4	—	97·6	—

The powerful solvent action of zincate solutions at —5° C. is shown by the fact that cotton No. 103R, a material more typical of unmodified cotton than No. 310, can be dissolved to the extent of 45 per cent. Fig. 6 suggests that, as a measure of chemical degradation of cellulose, solubility in zincate solution at 15° C. is much more suitable than solubility in sodium hydroxide solution at that temperature, since the former measurement is much more sensitive than the latter in the region of slight chemical attack.

(6) The Stability of Concentrated Solutions of Modified Cellulose in Sodium Zincate Solutions.

Concentrated solutions of modified cellulose were prepared by utilising the solvent action of sodium zincate solutions, and the stability of the solutions studied in a qualitative way. The behaviour of such solutions on standing at the room temperature may be illustrated by means of the results obtained with the oxycellulose OL7/B (Table VI). It has already been seen that the optimum conditions for dissolving modified cottons at 15° C. are a high molar ratio of zinc oxide to sodium hydroxide and a sodium hydroxide concentration of 3·5*N*, but the results given in Table VI show that such conditions are unsuitable for preparing concentrated solutions of modified cellulose, since even a 3 per cent. solution of a material of fluidity 34, prepared under such conditions, soon forms a gel. In order to prevent gel formation, it is necessary to reduce the sodium hydroxide concentration, and since this reduces the solvent action at 15° C. it becomes necessary to employ low temperatures for the preparation of the solutions. Table VI also shows that if the molar ratio ZnO/NaOH is high, reduction of the sodium hydroxide concentration tends to produce precipitation of zinc oxide. This necessitates lowering the molar ratio ZnO/NaOH, again at the expense of solvent power. However, as the Table shows, it is possible to produce 5 per cent. solutions of a modified cotton of fluidity 34, stable both with respect to gel formation and precipitation of zinc oxide, by dissolving the material at temperatures of from —5° to —10° C. in zincate solutions 2·5*N* or 2·75*N* in sodium hydroxide and having a molar ratio ZnO/NaOH of 0·1. From such solutions strong, thin films were prepared by coating a glass plate with a thin layer of the solution and immersing it in an acid solution.

(7) The Solvent Action of Potassium Zincate Solutions.

It was shown in Part II[3] that the solvent action of solutions of potassium hydroxide on modified celluloses is very much less than that of solutions of the other strong bases examined, and that with modified celluloses prepared from unmercerised cotton the curves relating solubility and potassium hydroxide concentration have two maxima. It was therefore of interest to investigate the effect of the presence of dissolved zinc oxide in the potassium hydroxide solutions. The solubility of the oxycellulose OL6/B was measured in potassium zincate solutions with a molar ratio ZnO/KOH of 0·14 under the conditions previously used in measurements with potassium hydroxide solutions, viz. (1) at 15° C., (2) at —5° C., adding the oxycellulose to the solution at 15° C., (3) at —5° C., cooling the solution to that temperature before adding the oxycellulose. The results obtained are recorded in Table VII, and in Fig. 7 they are compared with those found at 15° C. in sodium zincate solutions with the same molar ratio of zinc oxide to caustic alkali. Comparison with the results previously found with potassium hydroxide solutions[3] shows that the presence of dissolved zinc oxide increases the solvent action and renders the two maxima in the solubility curves more

Table VI.

Preparation of Concentrated Solutions of Modified Cellulose

ZnO/NaOH (moles)	Concentration of modified cellulose (%)	Concentration of NaOH in zincate solution (normality)	Temperature of preparation of solution (° C.)	Remarks.
0·200	3	2·5	−10	Fluid after 8 days ; precipitate of zinc oxide formed.
		2·75	−5	
		3·0	−5	Gelled in 48 hours.
		3·25	0	Gelled in 2½ hours.
		3·5	15	Gelled in ½-hour.
	5	2·5	−9 (frozen)	Fluid after 8 days ; precipitate of ZnO formed.
		2·75	−5	Gelled in 5 days.
		3·0	−5	Gelled in 5 hours.
	7	2·5	−9 (frozen)	Fluid after 7 days ; precipitate of ZnO formed.
		2·75	−5	Gelled in 96 hours.
		3·0	−5	Gelled in 2½ hours.
0·178	5	2·5	−10	Fluid after 15 days ; precipitate of ZnO formed.
		2·75	−5	Fluid after 15 days ; slight precipitate of ZnO.
		3·0	−5	Gelled in 1 hour.
		3·25	−5	Practically dissolved at 5° C. ; gelled at −5° C.
	7	2·5	−9 (frozen)	Fluid after 14 days, gelled later ; slight precipitate of ZnO.
		2·75	−5	Gelled in 3 days.
		3·0	−5	Gelled on reverting to room temperature.
		3·25	−5	Gelled immediately.
0·100	5	2·5	−10	Fluid after 7 days ; no precipitate of zinc oxide.
		2·75	−5	
		3·0	−5	Gelled in ½-hour.
	7	2·5	−10	Gelled in 3 days.
		2·75	−5	Gelled in 1 hour.

pronounced ; it also makes the maxima occur at higher alkali concentrations, although the effect on the position of the first maximum in each curve is not great. The effect of variation of the temperature at which the modified cotton is added to the alkali solution prior to extraction at —5° C. is even greater with potassium zincate than with potassium hydroxide solutions ; when the addition is made at —5° C. instead of at 15° C. the first maximum is increased from 25 per cent. to 71 per cent. Fig. 7 also shows that, as was found with the hydroxides, potassium zincate solutions are much inferior to sodium zincate solutions as solvents for modified cotton.

In Part II[3] it was found that regenerated cellulose sheet and modified celluloses prepared from cotton previously swollen with concentrated sodium

Table VII
Solubility in Potassium Zincate Solutions

Concentration of potassium hydroxide (normality at 18° C.)	Percentage dissolved				
	Oxycellulose OL6/B			Oxycellulose OL7/B	Oxycellulose CSO3
	15° C.	−5°C, adding oxycellulose to solution at 15° C.	−5°C, adding oxycellulose to solution at −5° C.	−5°C, adding oxycellulose to solution at −5° C.	−5°C, adding oxycellulose to solution at −5° C.
1·75	4·2	10·1	25·4	2·1	2·2
2·00	5·7	16·5	57·1	5·6	3·3
2·25	8·4	23·2	70·8	10·0	—
2·50	12·4	24·8	60·8	9·0	6·5
2·75	16·9	24·4	50·5	6·8	—
3·00	18·6	21·1	39·2	5·8	10·7
3·25	16·6	18·4	33·2	5·4	—
3·50	14·3	15·6	30·1	5·9	15·2
3·75	—	15·3	29·6	—	18·2
4·00	12·2	16·3	30·3	7·1	22·7
4·25	—	20·3	33·4	—	23·3
4·50	12·0	25·4	37·9	10·2	16·8
4·75	—	30·0	41·4	—	—
5·00	11·8	37·4	46·7	12·0	8·4
5·25	—	38·7	46·0	—	—
5·50	9·7	34·8	44·0	11·4	5·4
6·00	7·9	23·3	30·1	8·5	3·5
6·50	—	10·8	23·5	7·1	2·8
7·00	4·7	7·0	20·6	6·2	2·1

hydroxide solution (" mercerised ") differed from modified celluloses prepared from unmercerised cotton in that their solubility curves in potassium hydroxide solutions had only one maximum. The swelling curves of regenerated cellulose sheet in potassium hydroxide solutions were also found to be of the same shape as the solubility curves. Measurements with these materials have also been made in potassium zincate solutions (ZnO/KOH=0·14). The swelling of regenerated cellulose sheet (fluidity 38·5) was measured at 15° C. by the method previously described,[3] except that only the swollen weight was determined, and the solubility of this material was measured at 15° C. and 0° C. (the regenerated cellulose being added to the solution at the temperature of extraction). Table VIII gives a comparison of the swelling and solubility results obtained with potassium hydroxide and zincate solutions respectively, the data for potassium hydroxide solutions being taken from Part II[3] ; the solubility curves obtained with the zincate solutions are included in Fig. 8. The Table shows that the swelling at 15° C. is not very different in the two media at

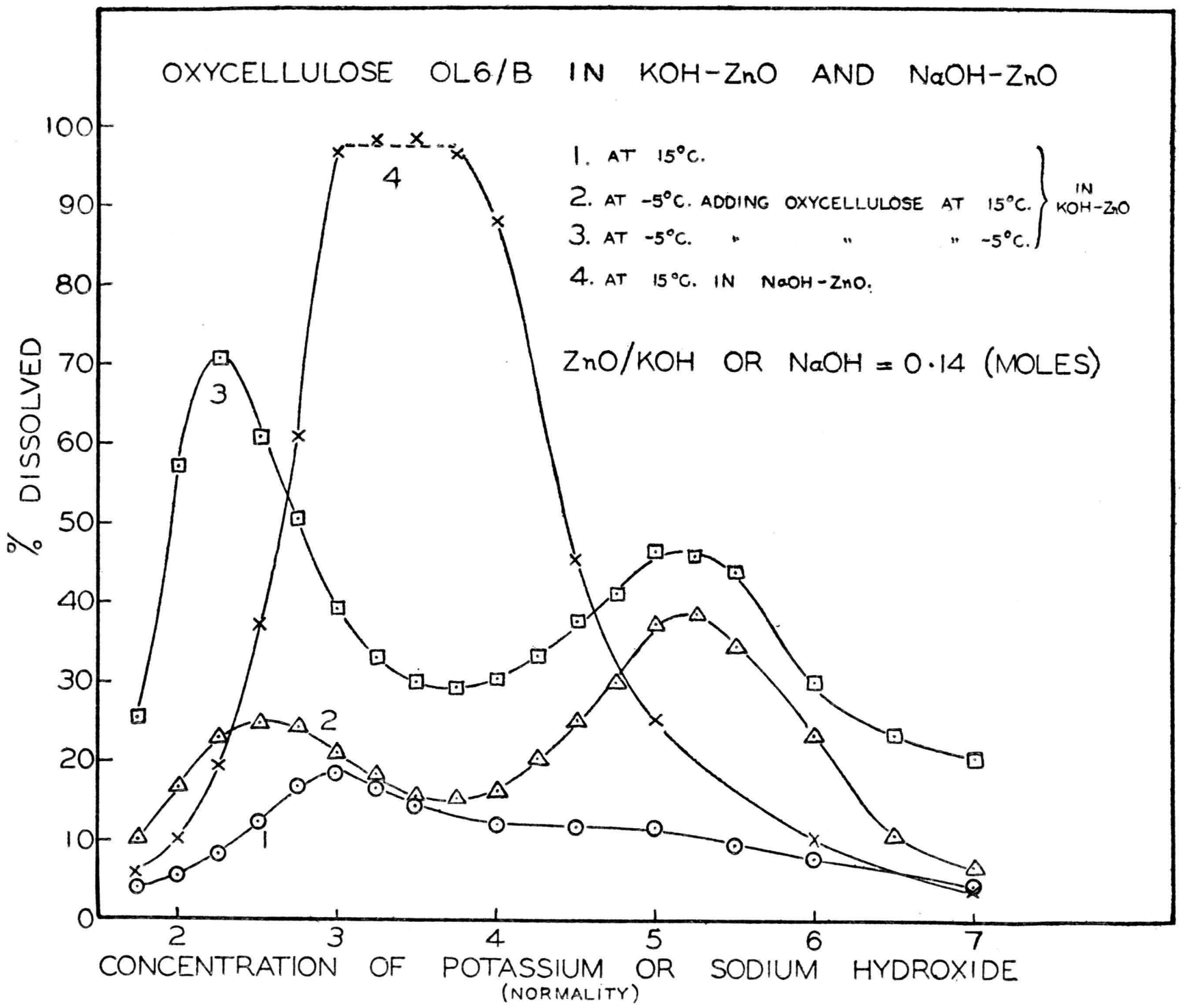
OXYCELLULOSE OL6/B IN KOH-ZnO AND NaOH-ZnO
1. AT 15°C.
2. AT -5°C. ADDING OXYCELLULOSE AT 15°C.
3. AT -5°C. " " " -5°C.
IN KOH-ZnO
4. AT 15°C. IN NaOH-ZnO.
ZnO/KOH OR NaOH = 0·14 (MOLES)
% DISSOLVED
0
10
20
30
40
50
60
70
80
90
100
1
2
3
4
2
3
4
5
6
7
CONCENTRATION OF POTASSIUM OR SODIUM HYDROXIDE
(NORMALITY)

Fig. 7.

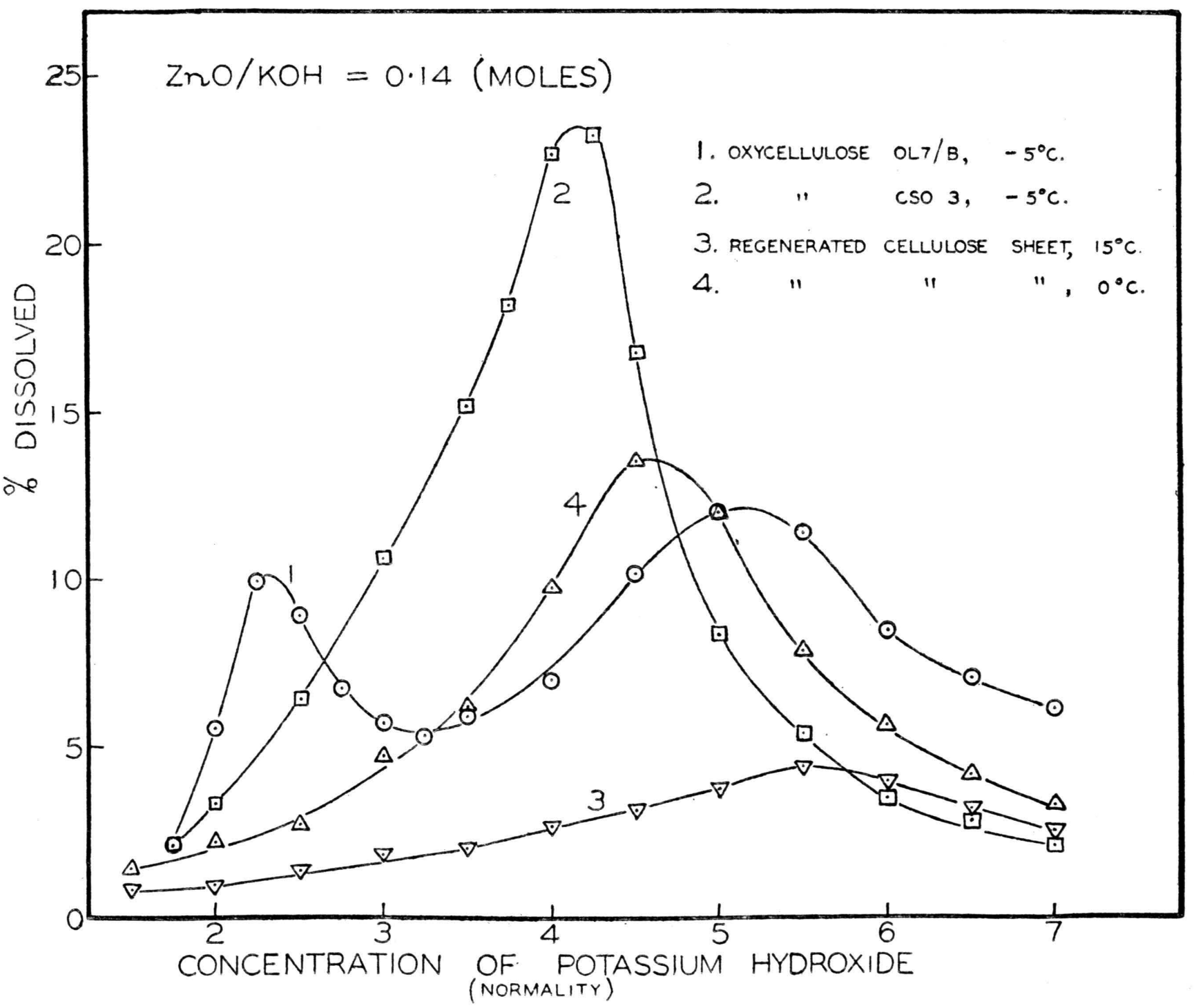
ZnO/KOH = 0·14 (MOLES)
1. OXYCELLULOSE OL7/B, -5°C.
2. " CSO 3, -5°C.
3. REGENERATED CELLULOSE SHEET, 15°C.
4. " " ", 0°C.
% DISSOLVED
0
5
10
15
20
25
1
2
3
4
2
3
4
5
6
7
CONCENTRATION OF POTASSIUM HYDROXIDE
(NORMALITY)

Fig. 8.

concentrations up to 4·5*N*, but beyond this point the swelling is greater in the potassium zincate solutions. The solvent actions on the regenerated cellulose sheet at 15° C. are similarly related, but at 0° C., where no swelling measurements were made in zincate solutions owing to the greater solubility, the solvent action of the zincate solutions is decidedly greater than that of the hydroxide solutions throughout the concentration range used.

Table VIII
Swelling and Solubility of Regenerated Cellulose Sheet in Potassium Hydroxide and Potassium Zincate Solutions

Concentration of potassium hydroxide (normality at 18° C.)	Swollen weight per 100 gm. dry cellulose		Percentage Dissolved			
	15° C.		15° C.		0° C.	
	Hydroxide	Zincate	Hydroxide	Zincate	Hydroxide	Zincate
1·50	277	—	—	0·8	0·9	1·4
1·75	277	280	—	—	—	—
2·00	279	284	0·8	0·9	1·5	2·2
2·50	291	296	1·1	1·3	2·1	2·7
3·00	317	319	1·7	1·8	3·3	4·8
3·50	357	356	2·0	2·0	4·5	6·2
4·00	400	401	2·6	2·7	6·0	9·8
4·50	448	453	3·2	3·2	7·2	13·6
5·00	508	528	3·4	3·8	6·1	12·0
5·50	540	588	4·0	4·4	5·2	7·9
5·75	532	585	—	—	—	—
6·00	507	558	3·7	4·0	4·4	5·6
6·50	426	444	2·9	3·2	3·6	4·2
7·00	385	391	2·5	2·6	3·1	3·3

Table VII includes the solubility of the oxycelluloses OL7/B (fluidity 34·1) and CSO 3 (fluidity 42·0) in potassium zincate solutions at —5° C., the oxycellulose being added to the solutions at that temperature. The solubility curves are also included in Fig. 8, which shows that, like regenerated cellulose sheet, the oxycellulose CSO 3 gives a curve with a single maximum, whereas the oxycellulose OL7/B gives the type of two-peaked curve found with the oxycellulose OL6/B. The oxycellulose CSO 3 was swollen with concentrated sodium hydroxide solution during its preparation, while the oxycelluloses OL7/B and OL6/B were made from unmercerised cotton. Hence the form of the solubility curve of modified celluloses in potassium zincate as in potassium hydroxide solutions depends on the previous swelling history of the modified cellulose.

(8) The Solvent Action of Sodium Beryllate Solutions.

The solubilities of the oxycellulose OL7/B at 15° C. and of the scoured linters No. 310 at —5° C. were determined in sodium beryllate solutions with

Table IX
Solubility of Oxycellulose OL7/B in Sodium Beryllate Solutions at 15° C.

BeO/NaOH (moles)	Percentage dissolved											
	Concentration of sodium hydroxide (normality)											
	2·00	2·25	2·50	2·75	3·00	3·25	3·50	3·75	4·00	4·50	5·00	6·00
0	1·4	2·5	4·4	7·8	10·5	8·6	6·3	—	3·4	—	1·7	—
0·100	1·2	2·0	4·3	21·0	53·5	67·0	53·9	38·8	26·6	14·3	9·0	3·2
0·200	1·2	—	3·1	10·7	44·7	73·6	77·0	63·9	50·6	27·3	13·2	3·9
0·274	0·9	—	2·5	6·2	32·6	68·8	85·1	77·4	63·6	34·6	18·3	—

various molar ratios of beryllium oxide to sodium hydroxide. The results are given in Tables IX and X respectively, and those for the oxycellulose OL7/B are shown graphically in Fig. 9.

The results obtained are qualitatively similar to those obtained with sodium zincate, but for a given molar ratio of amphoteric oxide to sodium

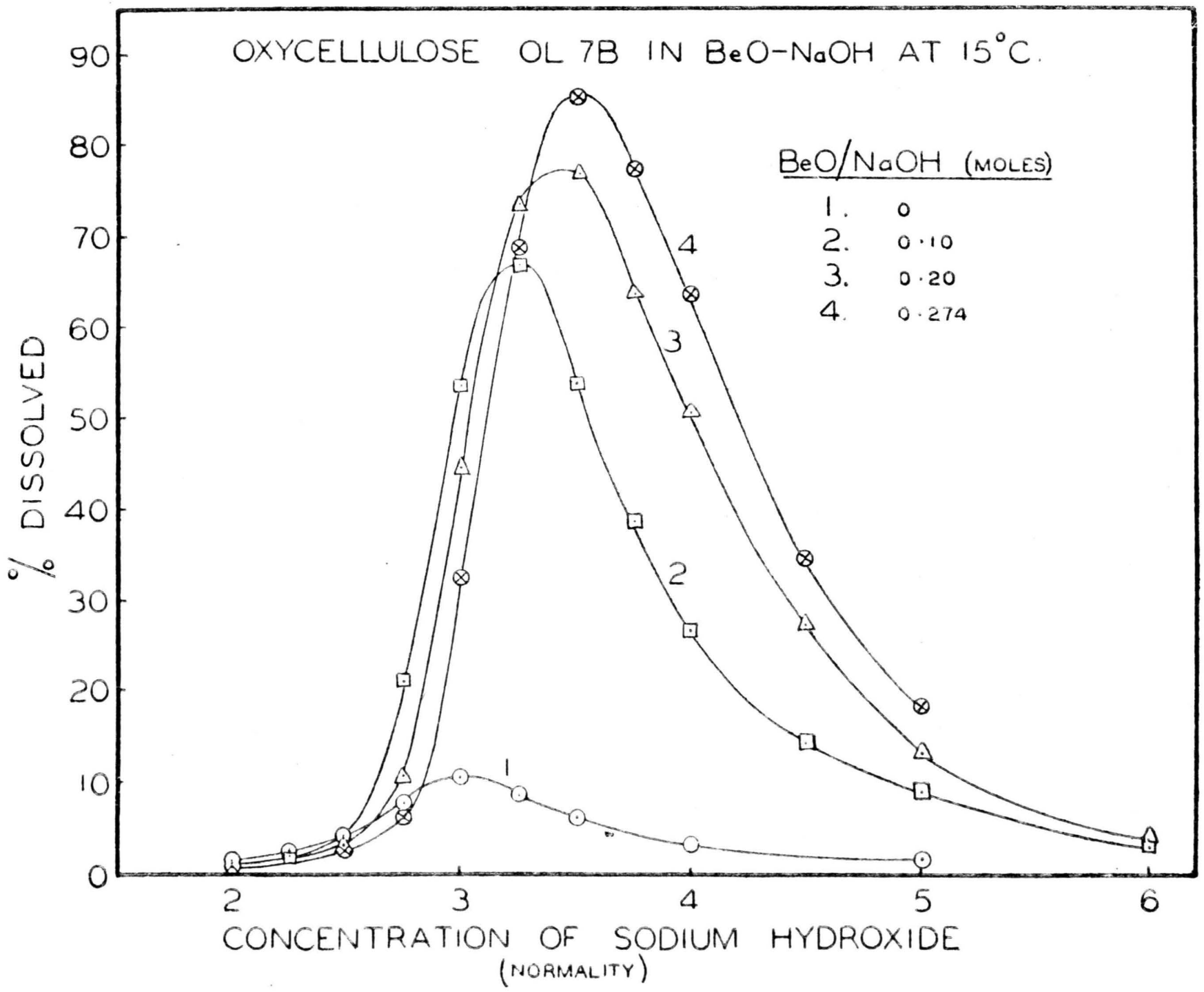

Fig. 9.

hydroxide the beryllate solutions are less effective solvents than the zincate solutions, except at sodium hydroxide concentrations greater than about $4N$. When the molar ratio is low the disparity in the solvent powers at 15° C. is small, but the effect of increasing the molar ratio beyond 0·1 is much less with beryllium than with zinc oxide; at —5° C., the inferiority of the beryllate is pronounced even with a molar ratio of 0·1.

Table X
Solubility of Linters No. 310 in Sodium Beryllate Solutions at —5° C.

BeO/NaOH (moles)	Percentage dissolved								
	Concentration of sodium hydroxide (normality at 18° C.)								
	2·00	2·25	2·50	2·75	3·00	3·25	3·50	4·00	5·00
0	1·3	3·8	5·2	3·5	1·9	—	1·1	0·5	—
0·100	1·1	6·8	18·7	22·9	20·0	6·8	4·3	1·6	0·5
0·200	1·1	2·5	20·8	36·8	33·5	14·6	7·0	3·5	0·5

(9) The Solvent Action of Sodium Aluminate Solutions.

The solubility of the oxycellulose OL7/B was measured at 15° C. and —5° C. in aluminate solutions with molar ratios Al_2O_3/NaOH of 0·025, 0·050

and 0·100, and the results are given in Table XI. Unlike zinc and beryllium oxides, aluminium oxide dissolved in sodium hydroxide solution has the effect of decreasing the solvent action on a modified cotton. As the molar ratio Al_2O_3/NaOH is increased, the maximum solubility of the modified cotton decreases, and the maximum shifts towards higher sodium hydroxide concentrations. This is the kind of effect that would be expected if the solubility of modified cellulose in alkaline solutions depended only on the hydroxyl ion and total electrolyte concentrations. A solution 3·5*N* in total

Table XI

Solubility of Oxycellulose OL7/B in Sodium Aluminate Solutions

Temp. (°C.)	Al_2O_3/NaOH (moles)	Percentage dissolved										
		Concentration of sodium hydroxide (normality at 18° C.)										
		1·75	2·00	2·25	2·50	2·75	3·00	3·25	3·50	3·75	4·0	5·0
15	0	1·0	1·4	2·5	4·4	7·8	**10·5**	8·6	6·3	—	3·4	1·7
	0·025	—	1·3	1·9	2·8	4·7	**7·2**	6·5	5·1	—	3·0	1·7
	0·050	—	1·0	1·5	2·1	2·6	3·8	**4·4**	3·8	—	2·7	1·7
	0·100	—	0·8	1·0	1·4	1·9	2·3	2·6	**2·9**	2·6	2·4	1·5
−5	0	3·3	35·6	72·4	**85·2**	77·4	65·2	—	20·7	—	10·7	3·2
	0·050	1·8	4·8	34·2	68·6	**73·3**	57·5	33·4	21·4	—	10·0	3·2
	0·100	1·5	2·1	4·4	16·0	43·7	**47·0**	29·8	12·6	—	5·5	2·6

(The maximum solubility under each set of conditions is printed in bold type)

sodium hydroxide and containing dissolved amphoteric oxide might have the same hydroxyl ion concentration as a 3·0*N* solution of sodium hydroxide alone, but its total electrolyte content would be greater and hence its solvent power would be less. While this simple explanation would suffice to explain the results obtained with aluminate solutions, the lowering of the solubility of modified cottons produced by zinc and beryllium oxides at low sodium hydroxide concentrations, and the effect of these oxides on the position of the maximum in the solubility curve, it throws no light on the causes of the enhanced solvent action of zincate and beryllate solutions at higher sodium hydroxide concentrations.

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THE JOURNAL OF THE
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ABSTRACTS

LIST OF ABSTRACTORS

The Abstracts in this Section of the "Journal" are supplied by the following Organisations, and the source indicated by the initials hereunder shown.

British Cotton Industry Research Association	C.
Bureau of Hygiene and Tropical Diseases	H.
Cuthill, Dr. R.	S.
Imperial Bureau of Animal Genetics	A.G.
Imperial Bureau of Plant Genetics	P.G.
Linen Industry Research Association	L.
Textile Institute	T.
Water Pollution Research Board	D.
Whitelegg, C. J.	C.J.W.
Wool Industries Research Association	W.

1—FIBRES AND THEIR PRODUCTION

(B)—ANIMAL

Silkworms: Rearing in Kent. Lady Hart Dyke. *Rayon and Silk News*, 1936, **2**, Nos. 29, 30, 31.

A report of a lecture before the Royal Society of Arts describing an experiment in sericulture in Kent. The present output is about 20 lb. per week. C.

Fibroin: Solution in Concentrated Salt Solutions. R. Takahashi. *RUSTA*, 1936, **11**, 571-575, 621-625.

Attempts to obtain threads of regenerated silk by spinning solutions of silk in acid, alkaline, and ammoniacal metal oxide solutions are discussed and various patents are quoted. The work of von Weimarn on the solution of silk fibroin in salt solutions is discussed and the use of such solutions for spinning threads and for the impregnation of textile materials is described. The method of analysing textile mixtures due to Mease and Jessup, in which silk and rayon are dissolved in calcium thiocyanate solutions of densities 1·20 and 1·36 respectively, is described. C.

Fleece Characteristics of Stud Merino Sheep, in Relation to the Degree of Wrinkliness of the Skin of the Breech. I and II. H. G. Belschner and H. B. Carter. *Australian Veterinary J.*, 1936, **12**, 43-54 and 80-89.

Observations were made on merino ewes with plain (A type) and wrinkled (C type) breech conformation. The sheep were taken from two different stations. Each fleece was weighed and examined and the results treated statistically. The C type sheep produced a slightly greater greasy fleece weight, but a slightly smaller yield and a shorter staple length. Differences in estimated clean scoured fleece weight, spinning count and commercial type were small. The direct measurement of fleece density was not undertaken. The results indicate that the general quality and commercial value of the wool produced by the plain breeched sheep is at least equal if not in many instances superior to that produced by the wrinkled type. W.

Seasonal Variations in Lamb-skins, with Special Reference to the Sudoriferous Glands. P. White and F. G. Caughley. *New Zealand J. of Sci. & Technol.*, 1936, **18**, 466-473.

Seasonal weather conditions are correlated with degree of development of the sweat glands. These are dilated during the summer months and impair the leather-producing quality of the skins. W.

Range Bighead of Sheep. W. T. Huffman and A. B. Clawson. *Natl. Wool Grower*, 1936, **26**, No. 2, pp. 29-30.

The causes of bighead disease are discussed, with particular reference to the part played by two species of a fairly common range plant (*tetradymia*). W.

Improved Sheep Dipping Bath. N. L. Jones. *Agric. Gazette of New South Wales*, 1936, **47**, 616.

Plans and specifications are given. W.

Dual-purpose Breeding to Benefit Fat-lamb and Wool Industries. J. R. MacKee. *Agric. Gazette of New South Wales*, 1936, **47**, 481-484 and 619-622.

Dual-purpose breeding mainly refers to the crossing of English longwool rams or Corriedales and merino ewes for the production of crossbred ewes for fat-lamb breeders. In New South Wales breeding has been confined to wool production, with the result that the merino breeder has difficulty in finding a suitable outlet for his surplus breeding stock. Also, fat-lamb production is being retarded on account of the scarcity of suitable breeding ewes. Dual-purpose breeding offers a solution to these problems. Suitable sires are Romney Marsh, Border Leicester and Corriedale. The dual-purpose sheep is of great value in controlling the spread of skeleton weed in the wheat belt. W.

The St. John's Wort Problem in New South Wales. K. G. Carn. *Agric. Gazette of New South Wales*, 1936, **47**, 608-610.

Dark-skinned sheep are being used for grazing, with promising results, as one of the methods of controlling the spread of St. John's Wort in New South Wales. W.

The Romney Sheep in New Zealand. A. L. Wheeler. *New Zealand Farmer*, 1936, **57**, 919-928.

The Romney is the predominating breed in New Zealand (70 per cent. of the sheep population). Competition for the British mutton and lamb market is becoming more severe, particularly from Australia. Fat mutton is found in conjunction with a bad-handling fleece, especially over the hips and rump, and it is suggested that, in describing stock, the term " prime " should be substituted for " fat." The Romney's ability to convert variations of pasture into the highest lamb, wool and mutton production per acre makes the breed the foundation of New Zealand's sheep prosperity. Improvements should not be effected at the expense of the breed's constitution or vitality, but should aim at improving the stance of the animal and the quality (not necessarily the size) of its bone. A detailed analysis is given of the Romney's points. Coarse bone can be detected by its external covering of harsh, chalky-white hairs, inclined to stick out prominently from the surface of the skin, whereas good quality bone can be discerned by its outer covering of fine, silky hair lying smoothly. The fleece is discussed from the point of view of yolk, crimps and hairiness. The benzol test for hairiness is inadequate in assessing the general character of a fleece. W.

Arsenical Poisoning of Live-stock. C. V. Dayus. *New Zealand J. of Agric.*, 1936, **53**, 282-286.

The following notes are given on the arsenical poisoning of live-stock—sources of arsenic on the farm ; toxicity to the horse, sheep, cow and dog ; absorption by the digestive tract and by the skin ; symptoms ; treatment. W.

Treatment of Foot-rot. F. Booth. *Farmer & Stockbreeder*, 1936, **50**, 2854.

Rapid attention is necessary to prevent spreading. The erection of field hurdle pens for use during treatment is recommended. A dressing for unaffected feet consists of one teaspoonful of powdered copper sulphate (bluestone) dissolved in enough boiling water to fill a 12-oz. bottle. A dressing for diseased feet consists of powdered bluestone, mixed with vaseline and Venice turpentine. More than four dressings applied every other day should not be necessary, although the limp may not immediately disappear. W.

Sheep Rugging Trials on Therribri, N.S.W. K. M. Austin. *Pastoral Rev.*, 1936, **46**, 1207-1208.

Satisfactory results with regard to wool production, condition of sheep and fly strike have been obtained by rugging sheep. The rugs were made of 12-oz. duck, and it is anticipated that they will last for two years. A diagram of a rug is given, showing the size and the position of the eyelets for ease of fitting. W.

Blowfly Strike. *Queensland Country Life*, 1936, **2**, No. 11, p. 4.
The blowfly menace has recently increased to alarming proportions in parts of Queensland. The greatest trouble is caused by the " borer," which strikes on any part of the sheep. A form of poisoning is set up which causes death within 24 hours. W.

Blowflies and Sheep. C. E. Barrett. *Pastoral Rev.*, 1936, **46**, 1217-1218.
Compulsory trapping is recommended as the only method of eliminating the blowfly. The primary fly can be trapped by using certain plants as an addition to the animal bait. Another aspect of the problem is the continued depletion of minerals from the soil in the shape of wool, meat, wheat, etc., resulting in in malnutrition, with consequent lessened resistance of the animal to the pest. W.

Blowflies and Sheep. " Mirrabooka." *Pastoral Rev.*, 1936, **46**, 1217.
Emphasis is placed on the importance of complete cleanliness on the wool-grower's property, if blowfly strike is to be kept at a minimum. W.

Growth Stimulation of Blow-fly Larvæ Fed on Fatigued Frog Muscle. II. G. P. Smith. *J. Exptl. Biol.*, 1936, **13**, 249-252 (through *Chem. Abs.*, 1936, **30**, 8331-8332). cf. H. Munroe Fox and G. P. Smith, *Nature*, 1932, **130**, 774.
Blow-fly larvae fed on fatigued frog muscle grow larger than those fed on resting muscle. This growth-stimulating substance is thermolabile and passes into the blood. The bacterial flora is equally dense on both muscles but the distribution of this flora has not been studied. W.

Sheep Blowfly Problem in Australia. I. M. Mackerras. *Council for Sci. and Ind. Res. Pamphlet*, 1936, No. 66, *Australia.*
Blowfly strike is treated as a disease of sheep, and an attempt is made both to give a coherent account of the disease and to show how the Council's investigations have contributed to our knowledge of it. The flies which strike sheep are discussed and their relative importance indicated. Their biology is examined particularly from the point of view of the conditions which influence their activity, fecundity, attraction to the sheep, egg-laying on the sheep, and the life of the maggots on the sheep. Conditions which influence the abundance of the flies are described and the live sheep is compared with carrion as an environment for the maggots. Conditions which influence the susceptibility of the sheep to strike are divided into two groups: those which predispose it to be struck, and those which (acting most easily and rapidly on predisposed sheep) render it immediately susceptible to attack by the fly. Both sets of conditions are discussed and it is shown that persistent free moisture on the fleece and skin is essential for all forms of strike. Other conditions (such as conformation, bacterial activity in the fleece, inflammation of the skin, etc.) are accessory, and act by influencing retention of moisture, attractiveness to the fly, or invasion of the skin by the maggots. These accessory conditions are particularly important in Australia. The course of the disease, its pathology, and its chief complications are described, and a brief account is given of present-day methods of treatment and prevention. W.

(C)—VEGETABLE

Cotton Plant Diseases: Occurrence in Belgian Congo. R. L. Steyaert. *Publ. Inst. nat. Etud. agron. Congo Belge, Ser. sci.*, 1936, No. 9, 32 pp. (through *Rev. appl. Mycol.*, 1936, **15**, 719).
A detailed review is given of studies in the Belgian Congo of the effect of climatic factors on the development of the cotton plant, with particular reference to diseases. C.

Eremothecium Ashbyii Cotton Boll Fungus: Description. A. Guilliermond. *Rev. Mycologie*, 1936, **1**, No. 3, pp. 115-156 (through *Rev. appl. Mycol.*, 1936, **15**, 719).
An expanded account is given of the author's study of a boll fungus isolated by Massey in the Sudan. C.

Texas Root Rot Disease: Control. M. S. Dounin and V. M. Poner. *Gosud. Izdat. kolch.-sovh. Liter. " Selkhozgiz," Leningrad*, 1936, 328 pp. (through *Rev. appl. Mycol.*, 1936, **15**, 718).
An exhaustive review of information about Texas root-rot disease (" ozoniosis ") with special reference to measures for preventing its appearance in the U.S.S.R. C.

American Cotton Linters: Production and Quality. V. R. Fuchs. *U.S. Dept. Agric. Rept.*, July, 1936, 18 pp.

Surveys of the quality of linters produced in the U.S.A. were made in Jan. 1934 and 1935, the official standards being applied. The results for the two seasons are tabulated and discussed, and production data are recorded for each State and for each of the seven grades. The total production (1934-5) was 805,083 bales; 3,550,000 tons of cottonseed were crushed and 142 lb. of linters cut per ton, 19·5 per cent. being "first cut," 32·0 per cent. "mill run," and 48·5 per cent. "second cut." C.

Cotton: Cultivation in Sind. W. J. Jenkins. *Empire Cotton Grow. Rev.*, 1936, 13, 266-276.

The development of cotton cultivation in Sind under the Lloyd Barrage and Canal Systems is described. During the pre-barrage decade, *i.e.*, 1922-32, the average area under cotton was 320,880 acres and the average production was 95,960 bales of 400 lb. In the 1935-36 season the area under cotton was 804,170 acres and the production 323,020 bales. Sind *deshi*, Sind-American, and imported Egyptian and Sea Island types are now being cultivated in the Barrage areas. In 1935-36 the areas under each of these groups were 423,800 acres, 380,300 acres and 2,500 acres. Notes are given on the varieties now being cultivated, and the occurrence of cotton pests and diseases is briefly discussed. There appears to be little doubt that the extension of cotton cultivation in Sind will reach a million acres within the next few years, and that a total production of half a million bales of 400 lb. can be anticipated. The policy of the Agricultural Department is to concentrate on the extension of the cotton area under medium long-stapled ($\frac{7}{8}$ to $1\frac{1}{16}$ inch) varieties of cotton, *i.e.*, Sind-American types. The Agricultural Department intends to encourage the cultivation of Sea Island and Egyptian types in suitable areas. C.

Cotton Plant Leaf Curl Disease: Effect on Yield. F. W. Andrews. *Empire Cotton Grow. Rev.*, 1936, 13, 287-293.

In order to determine the effect of leaf curl disease on the yield of the cotton plant, comparisons were made of healthy and infected plants of the same sowing date and growing either in the same hole or in very close proximity to each other. Sakel cotton sown late when the rate of infection of the plants was falling rapidly was used in the experiment. The results show that leaf curl disease caused a highly significant reduction in the number of green and open bolls. The total buds and flowers in both diseased and healthy plants did not differ significantly. The fresh weights of the healthy plants were very significantly greater than those of the infected plants. The unit weight of the green bolls on the healthy plants was significantly greater than that of the green bolls of the infected plants. For a value of $P = 0{\cdot}01$, the weight of seed cotton for unit open boll of the healthy plant was not significantly greater than that of the infected plants but for $P = 0{\cdot}05$, the open bolls of the diseased plants showed a significant decrease from the weight of seed cotton of unit healthy boll. The weight of the stems and leaves of the healthy plants was very significantly greater than that of the infected plants. The percentage of green and open bolls of the total bolls was the same in both cases for both the healthy and diseased plants. C.

Cotton Wilt and Rust Diseases: Control. (1) V. H. Young, (2) L. E. Miles. *Better Crops with Plant Food*, 1936, **20**, (1) No. 7, (2) No. 9 (through *Exp. Sta. Rec.*, 1936, **75**, 644.

Experiments at the (1) Arkansas and (2) Mississippi Experiment Stations are cited as evidence of the value of potash for checking cotton wilt and rust diseases. C.

Cotton Aphids: Occurrence and Control in China. S. Tseng and C. Tao. *Peking Nat. Hist. Bull.*, 1936, 10, 233 (through *Empire Cotton Grow. Rev.*, 1936, 13, 330-331).

Descriptions are given of the adults of all forms of the cotton aphid, *Aphis gossypii*, Glover, and of the eggs and the nymphs of the wingless and winged parthenogenetic females. Observations of development and reproduction are recorded and a list is given of 43 species of plants on which *A. gossypii* has been found in the vicinity of Tsinan. Parasites attacking the aphids are dis-

cussed. Two sprays proved very effective against the aphids, giving 98 per cent. control. The first consisted of 10 lb. tobacco, 1 lb. pyrethrum powder and 2 lb. soap in 100 gals. of water, and the second of a stock emulsion of 90 lb. cottonseed oil and 23-34 lb. soda (Na_2CO_3 and NaOH) in $4\frac{1}{2}$-5 gals. of water, diluted for spraying at the rate of 1 : 15-20. C.

Cotton Stainer : Food Cycle in Northern Rhodesia. A. G. Bebbington and W. Allan. *Bull. Ent. Res.*, 1936, **27**, Pt. 2 (through *Empire Cotton Grow. Rev.*, 1936, **13**, 335).

The most important host of *Dysdercus fasciatus* in the acacia savannah of Northern Rhodesia is *Thespesia rogersii*, and at certain times a general flighting of stainer takes place from this host plant caused by food shortage or defoliation. Generally, a period of food shortage occurs during the earlier months of the year, owing to rotting of the old crop and extensive destruction of the early new crop by the larvae of a Cossid moth. This causes an early influx into cotton, which leads to the establishment of a large population in the field at a critical period in the development of the bolls. When the early crop is retained on the trees a continuously increasing food supply is provided, and this first movement does not take place. A second movement from *Thespesia*, which is largely due to defoliation, begins generally in June and a second influx into cotton coincides with this later movement. A late influx such as this is of little practical importance since the greater part of the crop is picked in May and June. The movement of *D. fasciatus* into cotton is not due, therefore, to any attraction exercised by the crop but to a forced withdrawal from *Thespesia rogersii*. C.

Pink Bollworm Septicemia. G. F. White and L. W. Noble. *J. Econ. Ent.*, 1936, **29**, 122 (through *Empire Cotton Grow. Rev.*, 1936, **13**, 330).

In the summer of 1932 a disease was observed among pink bollworms used in rearing parasites at the laboratory of the Division of Insect Investigations, Presidio, Texas. The disease was not observed in the field. Only full-grown pink bollworm larvae that had completed feeding were used in the parasite laboratory so that no observations on the disease were made on other instars. The infected mature larvae became sluggish in the early stages of the disease and soon after death their bodies became brown and finally almost black. Microscopic examination of smears made from sick and recently dead worms showed the presence of numerous bacteria. No fungi, protozoa or polyhedral bodies were found. Cultures from these worms revealed the presence of only a few bacterial species, prominent among which were two species of *Bacillus* and one of *Streptococcus*. The three bacterial species were obtained in pure cultures, and healthy pink bollworms were inoculated with them, and also with material direct from diseased worms. The symptoms and the bacteriological findings show that the disease belongs to the septicemia group of insect diseases. The name " pink bollworm septicemia " is given to the disease and the causative bacterium is named *B. pectinophoræ*. C.

Cotton : Marketing. *Spinn. u. Web.*, 1936, **54**, No. 39, 3-5.

A general account is given of the most important types of cotton, methods of packing and marketing and systems of classification. The usual method of purchasing and the use of futures contracts are illustrated by a study of examples. C.

Ramie : Principles of selection methods. P. F. Medwedjew. *Faserforsch*, 1936, **12**, 134-141.

Selection of suitable strains of ramie, having regard to their morphological, biological, and technical characteristics, is effected by the following methods :— (1) selection and cultivation of pedigree varieties, (2) inbreeding (cross-fertilisation), (3) production of hybrids for improvement of fibre quality, by crossing between closely or distantly related varieties. L.

Flax fibre : Reciprocal effect of soil and manuring on——. K-C. Menzel. *Faserforsch*, 1936, **12**, 122-133.

A microscopical examination is made of flax stems grown on different soils with addition of fertilisers. The effect of nitrogen, phosphorus, and potassium, and combinations of these, is studied with respect to each soil. It is shown how the fibre characteristics differ with the same manuring on different soils. L.

Manuring of Winter-flax. F. Tobler. *Faserforsch*, 1936, **12**, 153-157.

Experiments show that the effect on the fibre of fertilisers is more intense with winter-flax than with summer-flax varieties, potassium sulphate being especially beneficial. L.

Growing for fibre and flax seed in England. *Irish Text. J.*, 1936, **2**, No. 9, 15.

Refers to efforts to revive the growing of flax in England. The present international situation and the experiences of the last war have caused many countries to develop an active programme of self-sufficiency in the production of raw materials. Attention is now being paid to the fields for growing flax in England both for fibre and for producing those strains of seed in which the United Kingdom leads the world. The Linen Industry Research Association and the Ministry of Agriculture for Northern Ireland have produced pure strains of flax seed which give growers greatly increased yields of high quality fibre. During the past two years, Liral Monarch has been bulked in Sussex with marked success. Next season 900 acres of Liral Monarch will be sown in England and it is expected that considerable surplus of the seed will be available for shipment to Northern Ireland. Stormont Gossamer will also be bulked in England for shipment to Northern Ireland. In addition to pure strain pedigree seed, 500 acres of Blue Dutch was grown in England this past season. About 2,000 bags of this seed will be shipped to Ulster this winter and in view of its success in England it is expected to give satisfactory results in Ireland. L.

Flax Spinning in Japan. *Irish Text. J.*, 1936, **2**, No. 9, 13.

Refers to extensions taking place, mainly for the production of canvas and duck. In 1935 the area sown with flax was 12,500 acres, while this year the area is to be increased to 22,000 acres. Japan is anxious to reduce imports from abroad, and new plants may be constructed to meet the growing demand. L.

Flax straw-drying machine. *Irish Text. J.*, 1936, **2**, No. 9, 6.

A brattice type machine for drying retted flax has been designed by A. N. Marr, Ltd., Leeds. The wet straw is fed on to the brattice to a depth of six inches and the brattices hold about 0·75 lb. of dry straw per square foot of brattice, the drying time being one hour. A seven section five tier machine will produce from 550 to 600 lbs. of dry straw per hour. The brattices are made up of tinned steel elements attached to steel tubes at 6 inches pitch and are controlled by means of endless conveying chains. The straw consumption would be 800 lbs. per hour and the power required to drive the machine is 12 b.h.p. Warm air up to 160° F. is circulated through the straw in an upward vertical direction through the drying chamber, and about 10 per cent. is constantly exhausted by means of a fan in order to get rid of the moisture. L.

(D)—ARTIFICIAL

Cellulose Acetate Solutions: Spinning Capacity and Alcohol Content. H. Erbring. *Kolloid Z.*, 1936, **77**, 32-36.

Experiments are described that deal with the spinning properties of cellulose acetate solution in acetone-alcohol mixtures of varying concentration. The spun liquid threads are coagulated by heat, and the tensile properties of the threads are investigated. It is found that spinning qualities are lowered with increasing additions of alcohol, and pass through a minimum which coincides with the viscosity minimum. Still further additions of alcohol produce coagulation and, directly before this, a maximum of the spinning qualities occurs. This maximum occurs in the course of an "unmixing" within the colloidal system, which is a general characteristic of spinnable liquids. The mechanical properties of the solid thread are dependent on the previous state of the micelles in the spinning solution. Breaking load and extension values sink with introduction of alcohol into the reaction mixture. C.

Rayon Production Machines. H. B. Vollrath. *Rayon Text. Monthly*, 1936, **17**, 573-575, 665-667.

Brief descriptions are given of modern forms of steeping presses, shedders, xanthating churns, viscose mixers, filters, pigment dispersers, and apparatus for caustic soda and spinning bath recovery in the viscose and acetate processes. The improvements which have been made on the apparatus initially used are indicated in each case. An important step for the acetate process is the application of chrome nickel iron; modern acetylators made of this metal are described. C.

"Saurer" Parabolic Spinning Pump. A. Saurer S. A. (Crowther Ltd.). *Text. Mfr.*, 1936, 62, 427-428.

Factors influencing the regularity of rayon are outlined and the importance of reliable spinning pumps is emphasized. The requirements of a good spinning pump, cleaning, lubrication and adjustment, and some common faults are briefly discussed, and gear-wheel and piston pumps are compared. In the Saurer parabolic spinning pump a drum or rotor carrying five pistons is mounted in a "floating" manner on the driven shaft. It is pressed against a plane distributing surface by means of a very strong spring, the reaction of which is taken by thrust bearings. The spring is not a working part but takes up wear and maintains tightness. The pistons are operated by two oppositely facing cams. Results obtained in a works test show that greater regularity is obtained with this pump than with the usual types. C.

Tantalum Spinning Jet Cleaning Apparatus. J. Brandwood. *Silk and Rayon*, 1936, 10, 878 and 883.

The disadvantages of the usual methods of cleaning spinning jets are pointed out and plant for cleaning tantalum and precious metal jets is described which consists essentially of means of inducing a flow of filtered carbonising or other liquid through the capillaries in a direction the reverse of that of the viscose flow in spinning. A diagram is given. Jets are dealt with in groups of 104, the standard plant dealing readily with 312 jets per hour. C.

Lactron Thread and Lastex Yarn. R. G. James. *Trans. I.R.I.*, 1936, 12, 104-123.

The advantages of Lactron thread over cut rubber thread are that it is made in continuous lengths with perfectly even surface, and can be made in very fine gauge with tensile strength as high as 6 kg. per square mm. The methods of expressing the "count" of square and circular cross-section rubber thread are explained. The compounding, filtration and de-aëration of the latex are described, and the factors influencing thread diameter analysed, showing how one dimension of Pyrex glass extrusion nozzle will produce a range of thread counts. The operations of coagulation (medium strength acetic acid or slightly acid saline solutions) stretching, drying and vulcanising (up to 400° F.), are described, while details are given of the covering operation and particulars noted of typical yarn constructions with various textile fibres. Lastex yarn is stated to survive the normal life of garments into which it is incorporated, and is unaffected by normal dry-cleaning. A discussion follows. C.J.W.

Patents

Fibres Resembling Wool. I. G. Farbenindustrie A.-G. F.P.799,782 of 19/6/1936, (through *Chem. Abs.*, 1936, 30, 8645).

Xanthate threads in the form of thick bands of fibres are cut into staple fibres which are decomposed to cellulose hydrate in acid baths at the same time as they are mechanically broken up into individual fibres, and they are afterwards brought to different complementary treating baths in a continuous mode of working. Oxidising agents such as activin, HOCl or H_2O_2 may be added to the acid bath. W.

Cellulose Ester Filaments: Spinning. H. Dreyfus (London). E.P.453,869 of 20/3/1935.

Filaments, threads, ribbons, foils, films and like materials are obtained by spinning a solution of an organic thermoplastic filament- or film-forming substance, and during the spinning operation subjecting the materials while still containing a substantial quantity of volatile solvent to the action of steam under pressure at above 100° C. The spinning solution containing a volatile solvent may be extruded into steam under pressure at above 100° C., or it may be extruded into heated air preferably under pressure and before the solvent is removed the filaments or films are carried into a space containing the steam. The products may be subjected to stretching during the spinning operation, and the tension may be wholly or partly prevented from acting on the materials immediately upon extrusion from the nozzles. The steam may be wet or saturated and at 110-135° C., under a pressure of 10-30 lb. or more per square inch above atmospheric pressure. The steam may contain acetone, dioxane or other solvent

vapours. Spinning may be started in air at atmospheric pressure, the air being replaced by steam after spinning has begun. The process is applicable to the production of filaments or films of cellulose esters such as the acetate, formate, propionate, butyrate and nitro-acetate, or cellulose ethers such as methyl, ethyl or benzyl ethers, or polyvinyl compounds such as polyvinyl acetate. Hollow filaments may be obtained by using steam at temperatures 30° C. or more above the boiling point of the solvent of the spinning solution. C.

Cellulose Derivative Filaments and Films: Stretching. H. Dreyfus (London). E.P.454,580 of 3/4/1935.

Artificial filaments, yarns, films and the like having a basis of an organic derivative of cellulose are softened by means of an acidic medium comprising a high proportion, e.g. 25-65 per cent. of a neutral organic solvent or swelling agent (e.g. acetone, ethers, esters and ether-esters of olefine glycols and polyolefine glycols, formaldehye, dichlorethylene) and a low proportion, e.g. less than 10 per cent. of an acidic solvent or swelling agent (formic, acetic or lactic acid), and subjected to a stretching operation. The stretching preferably takes place while the filaments, films or the like are travelling from one place to another, and in a single or in a plurality of stages. After stretching, the solvent or swelling agent may be removed by evaporation, or by washing with dilute alkali or with media containing the solvent or swelling agent in successively decreasing concentrations. The stretched materials may be subjected to after treatments, for example, to shrinkage operations or to saponification. C.

Polyvinyl Resins: Preparation. H. E. Potts, Liverpool (Shawinigan Chemicals Ltd., Montreal, Canada). E.P.454,691 of 27/12/1934.

Polyvinyl resins are manufactured by reacting together a polyvinyl ester (other than formate), a body containing an active carbonyl group capable of combining with free hydroxyl groups of a hydrolysis product of the polyvinyl ester, and water in the presence of a hydrolysing and acetalising catalyst and of a lower aliphatic acid as solvent. Alternatively a hydrolysis product of a polyvinyl ester (other than formate) not previously acetalised is reacted with a carbonyl compound in the presence of an acetalising catalyst and of a lower aliphatic acid as solvent, with or without water. The products may be worked up into films or threads or may be precipitated in fine granules by addition of water. C.

Cellulose Ethers: Preparation. Rohm and Haas Co. (Philadelphia). E.P. 455,253 of 18/9/1935 (Conv. 26/10/1934).

Cotton linters, pulp, or rayon is dissolved or suspended in a quaternary ammonium hydroxide (e.g., trimethylbenzylammonium hydroxide) and treated with an etherification agent (e.g., caustic soda and dimethyl sulphate). C.

Cellulose Esters: Production. British Celanese Ltd. (London). E.P.455,344 of 24/9/1935 (Conv. 29/9/1934).

Cellulose is esterified, without the need of a separate stabilizing step, by treatment with an esterification medium containing less than 10 per cent. of sulphuric catalyst (on the weight of cellulose) and at least 2 per cent. of Zn or Al chloride. For example, cellulose is pre-treated with acetic anhydride, acetic acid and a very small amount of sulphuric acid and then acetylated by means of a mixture of acetic anhydride, acetic acid, sulphuric acid and aluminium chloride. On completion, dilute hydrochloric acid is added and the solution is ripened to acetone solubility. C.

Crimped Cuprammonium Rayon Spinning Plant. A. Wagner (Dresden). E.P. 455,534 of 13/11/1935 (Conv. 8/6/1936).

In plant for spinning crinkly and woolly cuprammonium filaments, a group of filaments is spun in a freely descending column of precipitant, to a joint thickness which is a function of the aperture of the discharge nozzle for the precipitant, the resultant bundle is stretched by a column of the same precipitant, flowing at a higher velocity, in the upper part of a second bowl, and the tension in the stretched bundle is relaxed in the lower part of this bowl. Spinning may, therefore, proceed at a high velocity, about 100 metres per minute. C.

Basic Resin—Cellulose Ester (or Ether) Filaments and Films: Production. W. W. Groves (for Aceta Ges., Berlin). E.P.455,602 of 18/1/1935 and 455,849 of 25/1/1935.

(1) Affinity for acid dyes is imparted to cellulose ester and ether materials by incorporating in the spinning solution artificial resins containing basic groups

or capable of yielding basic groups by hydrolysis, reduction or alkylation, and selected according to their capacity to fix acid dyes. The polymeric methylene-aminobenzylaniline obtained by treating methylene-*o*-toluidine with glacial acetic acid followed by formaldehyde is the first of a long list of examples. (2) For the same purpose, the resin may be one that contains groups capable of reacting with an amine or the like to secure basic properties. The first of a long list of examples is the resin obtained by condensation of halogen-alkylaryl-sulphonamides with aldehyde. C.

Esterified N-Hydroxyalkylarylsulphonamides : Application in Cellulose Ester Filaments and Plastics. British Celanese Ltd. (London) and W. H. Moss. E.P.455,694 of 27/4/1935.

Aromatic sulphonamides containing one or more N-monohydroxyalkyl groups acylated at the O-atom, are useful as constituents of cellulose ester plastics or spinning solutions. In examples of their preparation, N-mono (or di)-mono-hydroxyethyl-*p*-toluenesulphonamide is esterified by heating with acetic anhydride and acetic acid or with phthalic anhydride. C.

Rayon Spinning Machine Acid-spray Shield. Vereinigte Glanzstoff-Fabriken A.-G. (Elberfeld). E.P.455,764 of 8/4/1936 (Conv. 8/4/1935).

For warding off acid splash or spray and for preventing crystallization of spinning-bath solutions on guide rollers in rayon spinning plant, an impact plate is arranged near the guide rollers, provided with a large number of narrow, sloping slots and so shaped that the acid flung off the roller is caught and caused to run back to the roller. C.

Staple Fibre Cutting Apparatus. K. Tutihasi (Tokyo, Japan). E.P.457,022 of 7/7/1936 : 19/11/1936.

A band or ribbon of continuous fibre is wound in zig-zag fashion successively over and under a series of bars or rollers arranged in close proximity to one another and while being moved in one direction is cut by scratching with needles or spikes attached to a drum arranged angularly to the passage of the fibre so that the cut ends of a group of fibres come irregularly and not in a straight line. When such staple fibre is treated afterwards, for instance directly formed into sliver, unevenness is avoided and the nature of the yarn manufactured is considerably improved. C.

2—CONVERSION OF FIBRES INTO FINISHED YARNS

(A)—Preparatory Processes

Scutcher Lap : Moisture Content and Weight Regulation. *Text. Mfr.*, 1936, **62**, 424.

The variations in lap moisture contents with variations in atmospheric humidity are discussed and the application of the Aldrich and Gherzi indicators in the control of lap weights is described. C.

Carding : Efficiency Determination. R. E. Booth. *Text. Rec.*, 1936, **54**, No. 644, 32-34.

If the details of length, dispersion, amounts of short hair, immaturity value, hair weights, etc., are known with respect to lap, sliver and waste in carding, as well as the percentage of waste made, it is possible to determine a " theoretical " analysis of the sliver by deducting the values of the waste made from the original lap figures. This theoretical analysis may then be compared with the actual sliver tests, and some indication of the amount of carding damage may thus be obtained. An example illustrating this method of examination is studied in detail. C.

Finisher Scutcher Lap : Regularity. *Platt's Bulletin*, 1936, **3**, 440-441, 465, 476-478.

Conditions for securing lap regularity are reviewed. Regulators fitted with cone drums are considered to be inefficient and advantages are claimed for Platt's electro-pneumatic lap-making system. C.

Opening and Drafting Problems : Discussion. Southern Textile Association (Carders' and S. Carolina Spinners' Divisions). *Cotton* (U.S.), 1936, **100**, No. 11, 82-84.

The following problems are discussed (1) *Beater speeds.* A reduction in speed compared with ten or fifteen years ago seems to be general. A test is mentioned

that shows less damage by the Kirschner beater than by the two-bladed beater. (2) *Lap regularity.* A lap-inspection table with a light below is mentioned. (3) *Lap tension.* Improvements in lap regularity are claimed for a tension-relieving device. (4) *Sliver and roving testers.* The use of a commercial sliver tester is considered to be valuable. The difficulty with roving testers appears to be to interpret the graph produced by them. C.

Single-process Scutcher Colour Blending Unit. Saco-Lowell Shops. *Saco-Lowell Bull.*, 1936, 8, No. 4, 1-3.

The adaptation of the single-process scutcher to the blending of white and coloured cotton is described. The coloured laps of the desired weight to give 25-75 per cent. of colour are carried on the apron behind the beater in the intermediate section. Blending begins in the beater box and is continued in the blending reserve and in the beater box of the finisher section. If it should be desired to mix in less than 25 per cent. of colour the appropriate lap would be too small and flimsy for the above plan. A heavier lap is made and its feeding is regulated by a suitable reduction gear. These gears are normally supplied to obtain 5, 10, 15 or 20 per cent. blends. C.

Card Flats: Action and Adjustment. *Saco-Lowell Bull.*, 1936, 8, No. 4, 5-7.

Hints are given on causes of faulty action in card flats and the importance of the knee action of the wire is stressed. The wire should be able to bend through about 10-15 degrees when working but cannot do so if ground down too much. C.

Controlled Draft Roving Frame: High-speed Photography. Saco-Lowell Shops. *Saco-Lowell Bull.*, 1936, 8, No. 4, 18-21.

An illustrated account is given of some preliminary work on a study of drafting by means of high-speed photography. For the purpose a set of rollers of the Saco-Lowell controlled-draft roving frame was arranged to provide unobstructed end and top views and the top sliver-folding roller (grooved) was made of glass. To study the folding action, the sliver was made with a light centre and dark edges and to study fibre slippage a blend of white and coloured cotton was used. Some photographs illustrate the results obtained. C.

Large Sliver, Roving and Yarn Packages: Advantages. Southern Textile Association (Eastern Carolina Division), *Cotton* (U.S.), 1936, **100**, No. 11, 64-67.

A general discussion is reported which deals with the making of large packages throughout the mill, the means whereby they may be made, and the limitations upon their size and weight. C.

Hopper Efficiency Test in Carding. J. A. B. Mitchell. *Scotch Tweed*, 1936, **12**, 75-77.

A modification of a method for testing hopper efficiency in carding (see *Scotch Tweed*, 1936, **12**, 38-39; *J. Text. Inst.*, 1936, A460) consists in collecting and weighing each discharge from the scale-pan. The hopper's performance was tested under three conditions:—(1) normal, i.e., with the trap-door over the scale-pan in action; (2) with the trap-door out of action; (3) as in (1) but with the surplus wool, normally trapped, isolated from the pan load. W.

Methods of Applying Oil to Woollen Blends. *Wool Rec.*, 1936, **50**, 1569-1570.

Hand and machine methods are described. W.

Oiling of Wool. G. E. Cowlishaw. *Cumberland Text. Soc. J.*, 1936, pp. 31-37.

The points to be considered in selecting a wool oil are discussed and recommendations made of blends for various types of wool. W.

Modern flax processing machinery. Flaxman. *Text. Rec.*, 1936, **54**, No. 645, 36-37.

This article refers to the wet spinning of flax yarn, by the cold water and hot water methods. Both processes are fully described and the qualities of yarns produced by the two methods commented upon, and mention is made of points requiring special attention. L.

(B)—Spinning and Doubling

Staple Fibre: Use in Conjunction with Wool. H. Ashton. *Text. Mfr.*, 1936, 62, 414-415.

A general account is given of the processing of " Fibro " alone or blended with wool on wool and worsted equipment and the properties of the products are

discussed. It is claimed that the introduction of " Fibro " into worsted cloths produces an improvement in handling and draping qualities and that the dry and wet strengths of mixture yarns increase with increasing percentages of " Fibro." C.

Spinning Problems : Discussion. Southern Textile Association (Northern North Carolina Division). *Cotton* (U.S.), 1936, **100**, No. 11, 72-74.

The following problems are discussed. (1) *" Loose drafting " with unweighted middle rollers.* Experiences with small-diameter, unweighted middle top rollers are in favour of their use if high-drafting equipment cannot be installed. (2) *Overhead cleaners on high-draft frames.* Tests on high-draft spinning are reported. Overhead cleaners are considered essential to deal with the additional " fly." (3) *Cork-covered rollers.* Experiences suggest that humidity and weighting on the front rollers should be increased when running cork-covered rollers. Rollers for warp yarn should be re-buffed about once a year and for weft twice a year. (4) *Single-process drawing.* One-process drawing seems satisfactory for better quality cottons (1 inch and more) and when the speed is reduced. C.

Taper-top Bobbin Winding Mechanism. Saco-Lowell Shops. *Saco-Lowell Bull.*, 1936, 8, No. 4, 8-9.

An attachment for twisters with cross-shaft or longitudinal-shaft traverse motions is described whereby bobbins can be wound with a taper at one end instead of parallel. Advantages in winding costs are claimed. C.

XL Spindle for Ring Spinning and Twisting Frames. Prince-Smith & Stells Ltd. *Wool Rec.*, 1936, **50**, 1103-1107.

In the XL ring spindle the objectionable features of previous braking and lubricating systems are overcome. A steel sleeve is securely fixed in the spindle rail. A bolster, made of steel machined from the solid bar, rests upon the flange of the sleeve. The braking of the spindle is brought about by the application of a very slight pressure from the operative's knee to the front of a pivoted lever situated just below the spindle rail. This pressure lifts the bolster and with it the complete spindle unit from the normal resting position upon the outer sleeve, so that the lower flange of the whorl is made to form contact with a stationary leather-faced brake shoe. The spindles have an oil capacity of 12-20 c.c. To add oil, the brake shoe is withdrawn until the leather-faced abutment is clear of the whorl flange. The solid bolster is a safeguard against oil leakage. W.

" Magnum " Universal and Combination Ring-twisting Frames. Prince-Smith and Stells Ltd. *Text. Mfr.*, 1936, **62**, 387.

New models of ring twisters incorporate a clutch spindle (see preceding abstract), tape spindle drive with twist reversing arrangements, and the " Magnum " building motion, in which the spindle rail gives half the traverse. The machines have special advantages for mohair and hand-knitting yarns. W.

Twin-clutch Ring-twisting Spindle. Prince-Smith & Stells Ltd. *Text. Mfr.*, 1936, **62**, 345 and 349.

A stop-motion patent clutch spindle for all types of ring-twisting frames allows the application of tape and tension pulley spindle drive. A diagram is given of the spindle, which is of the oilspout flexible type. Means are provided to retain idle spindles in the running position even when the trappers are down. W.

The Gibson Patent Spindle. T. Barbour. *Irish Text. J.*, 1936, **2**, No. 9, 7.

The Gibson patent spindle is described in this article. The invention embraces most of the advantages of ring spinning and permits of the employment of bobbins or pirns having double the ordinary length of traverse and it retains all the advantages associated with the use of flyers. Briefly described, a small metal disc is located on the spindle, which rotates with the spindle and acts as a support for the bobbin. The ordinary traversing builder is discarded, and a fixed member, situated in the most convenient position relative to the base of the bobbin is substituted to carry the drag band, so that the dragging is performed in the ordinary way. Flyers with increased length of leg are used and when screwed on to the spindle the legs are made to pass through holes in the solid rim of a brass disc of uniform section, having angular slits to take up the yarn and to serve the purpose of the existing brass eye or twizzles. The disc is thus held in position and positively driven and made to traverse up and down the flyer legs by means of a simple mechanism actuated from the present builder shaft.

The revolving disc is covered in to exclude obstruction by dirt, and doffing is carried out in the same manner as at present. Great economy is claimed with the use of the new spindle and new type bobbins spinning alongside the old type require five hours to fill against 1½ hours taken by the latter, and they hold seven cuts of yarn as against two. L.

Modern flax processing machinery. *See* Section 2A.

(C)—Subsequent Processes

Crêpe Yarn Steaming Apparatus. J. Brandwood. *Text. Rec.*, 1936, 54, No. 644, 50-51.

Atmospheric pressure, and displacement vacuum steamers are critically discussed and the advantages of the Brandwood vacuum steamer are described. The steaming process in the Brandwood vacuum steamer involves (*a*) the exhaustion of the closed vessel by a vacuum pump, ejector or the equivalent until there exists a vacuum of 28 in. mercury column, (*b*) the admission of steam at relatively high pressure into the vessel through special orifices so that it is " wire-drawn," and only slowly increases the pressure in the vacuum vessel, and (*c*) the admission of atmospheric air into the vessel, thus destroying the remaining vacuum. A small steamer suitable for productions of approximately 10,000 lb. per 48 hours, and a semi-continuous, fully automatic vacuum steamer capable of steaming approximately 30,000 lb. of yarn in 48 hours are shown in diagrams and briefly described. C.

The machine drying of flax cheeses. *Irish Text. J.*, 1936, 2, No.10, 9-11.

Refers to the machine drying of flax yarn on cheeses. Comparisons of the Musgrave and Marr dryers are made and photographs showing the layout of the two machines are given. The Musgrave dryer is of the cabinet type into which the heated air is delivered by means of a fan and steam heater located on top of the machine. Production is approximately 220 lbs. of dry yarn per day. The new type Marr dryer is of the continuous travelling type and the production is high. A great saving is claimed in floor space and steam consumption, while only two operatives are needed. L.

(D)—Yarns and Cords

Problems of Yarn Stocks. R. W. R. *Text. Mfr.*, 1936, 62, 334-335.

As an aid in the problem of eliminating superfluous stocks of yarn, tables are given showing (1) the variety of cloths and weights that can be made from 2/32's worsted mixture yarn, and (2) the changes in costing when using half-cut as compared with two-cut warps. W.

Applications of Latex. I. G. Fol. " *India Rubber J.*" 1936, 92, 575-589.

The natural and artificial latices are reviewed and the precautions necessary in their use noted. Among the industrial applications of latex, the Lastex thread process is briefly described. C.J.W.

The Trend of Rubber Latex Application. E. A. Hauser. " *India-Rubber J.*," 1936, 92, No. 18a, 5-8.

Recent developments in the latex field are reviewed, and include two novel methods of thread manufacture. A thin band of latex is coagulated on a heated surface, and the dried strip wound helically into a thread of circular cross-section, or the tape is wound round an inner core of silk or cotton under comparatively high stretch, when release of tension causes the fibre core to crinkle. Latex freed from mineral matter and deproteinised, finds use in the insulated cable industry. By the use of high pressure and well balanced compounds heavy textiles can be completely impregnated, giving materials resistant to long water immersion and great resistance to flexing, etc. C.J.W.

Curled yarn effects. *See* Section 3C.

Patents

Revolving Creels for Gilling, Doubling, Drafting, and like Machines. W. Prince-Smith and G. H. Ambler. E.P.453,475 of 5/3/1936.

In a revolving creel for use with gilling, doubling, drafting, and like machines, each of the individual driving rollers serving to rotate the balls of sliver is fitted with a stop-motion the action of which is controlled by the amount of the sliver extending from the corresponding ball to the machine. W.

Lubricants for Fibres. W. W. Groves. E.P.454,559 of 27/3/1935.

Lubricants for fibres comprise a dispersion in water or an organic solvent of a liquid carboxylic acid R-X-$(COOH)_n$, R being a fatty radicle which has at least eight C atoms and may contain substituents, *n* a whole number, and X an aliphatic or aromatic group containing N, O, S, or P. There may also be added :—an emulsifier, e.g., sodium carbonate, ammonia, or triethanolamine ; olein ; olive or other neutral oil ; other organic oiling agents, e.g., polyglycol, dibutylene glycol ; and salts, e.g., magnesium sulphate, and salts of phosphoric acid such as sodium hexametaphosphate. Acids specified are oleic acid sarcoside, dodecyl-amino-acetic acid, the acid of dodecyl-methyl-diglycollamide, hexyl-phenoxy-propionic acid, dodecyl-oxyethyl-oxy-acetic acid, ketotridecylic acid, dodecyl-oxyacetic acid, octyl-cyclohexyl-oxyethyl-oxyacetic acid, dodecyl-amino-diacetic acid. Examples of suitable mixtures for wool and artficial silk are given. W.

Filament Crimping Apparatus. British Celanese Ltd. (London). E.P.453,320 of 19/12/1935 (Conv. 19/12/1934).

Apparatus for crimping the filaments or fibres of yarns, particularly those made of or containing filaments or organic derivatives of cellulose, comprises a false twisting device provided with a member, such as a grooved roller, rotatable about an axis at right angles to the axis of rotation of the twisting device, the yarn passing around the member and the twist being set therein by a medium, such as steam in a pipe, or heated gases, vapours of a solvent for the substance of the yarn, hot water and swelling agents or restricted solvents. The yarn may be stretched or caused to run in contact with an abrading surface to break the continuity of the fibres. The apparatus may be used in the production of yarn from filaments or fibres of thermoplastic materials, and the yarns may contain effect materials, and/or modifying agents, and may contain non-thermoplastic material such as fibres of cotton, wool, silk, linen or regenerated cellulose. C.

Winding Machine Bobbin Sleeve Mandrel. Vereinigte Glanzstoff-Fabriken A.-G. (Elberfeld, Germany). E.P.453,327 of 24/1/1936 (Conv. 8/2/1935).

A mandrel for holding the sleeves upon which the yarn is wound in winding machines comprises a shaft mounted in the usual cradle, a hub on the shaft, a mandrel sleeve rotatably mounted on the hub, and a pair of flanges on the sleeve between which the bobbin sleeve is held. C.

Cellulose Ester and Ether Threads : Twisting. British Celanese Ltd., London (C. Dreyfus, New York). E.P.453,934 of 21/12/1934.

Threads of cellulose ester or ether filaments ready for fabric-forming operations are subjected to the action of heat and, while hot, are given a twist insufficient to impart any crêping power to the threads. The threads may be drawn off rotary packages, through guides, and through a steam pipe, and wound on to bobbins. C.

Winding Machine Traverse Mechanism. G. Lalevee and C. Miesch (Thann, France). E.P.454,062 of 17/12/1935.

In yarn or thread winding machines the traversing roller comprises two outstanding helicoidal ramps crossing each other, secondary ramps being provided at the crossings to assist the passage of the yarn. The roller shaft may be driven through appropriate differential gear so that it is retarded at regular intervals to prevent ribbon winding. C.

Cellulose Ester Yarns : Shrinking. H. Dreyfus (London). E.P.454,507 of 1/4/1935.

A process for the treatment of artificial filaments, threads, ribbons and similar materials having a basis of organic derivatives of cellulose comprises subjecting them in the absence of tension sufficient to stretch them to treatment with neutral organic shrinking agents particularly latent solvents such as methylene chloride, ethylene chloride, chloroform, tetrachlorethane or ethyl acetate at a temperature of 12° C. or less. Suitable diluents may be added to the shrinking agents, preferably diluents with boiling points of 80° C. or less. The yarns may be treated in hank form or during travel from one point to another, the shrinking agent being applied either in a bath or as a vapour. The degree of shrinkage may be controlled by means of positively driven rollers. The shrinking may be effected continuously with production of the yarns or with stretching or saponification processes. Cellulose acetate yarns in warp form may be stretched in the presence of steam, shrunk according to the invention and then saponified. C.

Hollow Fibres: Spinning. Alsa Soc. Anon. (Basle, Switzerland), R. Picard and R. Fays. E.P.454,811 of 2/9/1935.

When spinning from viscose hollow fibres of 2 deniers or less, particularly staple fibres, while employing the coagulating baths described in E.P.255,527, the temperature of the bath is increased in a manner inversely proportional to the desired elementary titre, the minimum value of the temperature being given by the expression $(a - bd)$, where $a = 70\text{-}75$, $b = 9\text{-}11$, and d = desired elementary titre. As a modification, the temperature is raised to a smaller extent in conjunction with a variation of the concentration of the bath. C.

Crimped Rayon Yarns: Production. H. Dreyfus (London). E.P.455,021/2 of 4/4/1935.

(1) Yarns formed from crimped filaments are treated so as to render the crimp in some filaments out of phase with that in other filaments, and a synthetic resin is formed in the filaments to increase the permanence of the crimp, before or after the treatment, but preferably before if the reagents for the resin are applied in aqueous solution or emulsion. Wetting agents may be employed to assist penetration. The crimp may be imparted by heated rollers. Or the yarn may be highly twisted, impregnated with the resin, and then untwisted. Or " twistless " yarns may be impregnated and then twisted to break up the crimp. Or twisted yarns may receive reverse twist. Another process for breaking up the crimp is to " crack " the yarn so as to produce a " staple fibre " yarn. A blast of air on the running yarn is sufficient to break up the crimp if a " twistless " yarn is treated. Examples quoted relate to viscose rayon and partially saponified cellulose acetate yarns. (2) The resin is formed in the presence of an oil or plasticizer for derivatives of cellulose. C.

Card Flat Bar Lubricating and Burnishing Device. Platt Brothers & Co. Ltd. (Oldham) and J. K. Clegg. E.P.456,548 of 20/8/1935 : 11/11/1936.

For the purpose of periodically lubricating and burnishing the operative extremities of flat bars in carding engines there is used an attachable and detachable and temporarily applied apparatus comprising a shaft adapted to be positively driven with means to position the same when in action, means to carry and ensure operative disposition of the lubricant and a positively driven brush adapted to pick up the lubricant and apply it to the flat ends and to burnish the same. C.

Silk Cocoon Reeling Plant. W. Wilke (Celle, Germany). E.P.457,249 of 24/3/1936 : 24/11/1936.

An installation for reeling silk of the type in which the threads are conducted through conduits traversed by a counter-current of hot air and are then wound on bobbins, has the spinning frames and winders in separate compartments, and a number of drying conduits are located in the spinning compartment. The boiling compartment with its tables is disposed adjacent to the spinning compartment. C.

Compound Drafting System Fibre-consolidating Guides. Howard & Bullough, Ltd. (Accrington) and J. Pilling. E.P.457,513 of 9/7/1935 : 30/11/1936.

In a compound drafting system (two sets of rollers in tandem) a guide funnel or the like is placed behind the delivery rollers of the first drafting set, at a distance greater than the length of the longest fibres being drafted, and before the feed roller of the second set, at a distance not greater than the length of the shortest fibres. C.

Embossed Paper Tube or Pirn. A. S. Lowry (Textile Paper Tube Co., Romiley). E.P.457,553 of 28/2/1935 : 30/11/1936.

Paper tubes, especially for condenser weft, are provided with embossings or grooves to prevent the coils of weft from slipping lengthwise. The depth of the embossings is lessened at the nose of the tube. C.

Drafting Roller Pressure Mechanism. J. A. Kinnear, M. G. Gow, and T. Duff and Co. (Dundee). E.P.457,804 of 6/6/1935 : 7/12/1936.

A device for applying pressure to drafting rollers consists of a pair of levers and resilient devices between them and the arbors of the pressing rollers, so formed that the levers can be swung forward to apply pressure or backward to relieve it. The operation of the device relieves the rollers during rest periods and facilitates the removal of obstructions. C.

Ring Frame Twist-tube Mounting Device. H. Seabrook (for Ernst Gessner A.-G., Aue, Saxony). E.P.457,918 of 18/8/1936 : 8/12/1936.

The twist tubes of a ring frame (particularly for worsted) are carried by a frame that is slidable and adjustable on guide-ways parallel with the path of the yarn. C.

Synthetic Rubber Drafting Roller Covering. R. W. Cutler (Boston, U.S.A.). E.P.457,937 of 27/6/1935 : 9/12/1936.

The roller coverings or aprons of drafting mechanism are made of synthetic rubber of the polymerised halogenated acetylene type (polymerised chloroprene) with appropriate compounding substances. C.

Cellulose Ester or Ether Crêpe Yarn : Twisting. British Celanese, Ltd. (London), H. Dreyfus and R. W. Moncrieff. E.P.458,162 of 12/6/1935 : 14/12/1936.

In the crêpe-twisting of cellulose ester or ether threads, an oil or non-aqueous medium containing oil is used as sole auxiliary agent and at least the last part of the twist is inserted while the yarn contains at least 6 per cent. of its weight of oil. C.

3—CONVERSION OF YARNS INTO FABRICS

(A)—Preparatory Processes

Rayon Yarns : Warping ; Cotton or Silk System ? H. R. Mauersberger. *Rayon Text. Monthly*, 1936, 17, 672, 675.

An argument in favour of the silk system is supported by particulars from " a prominent mill man who was taught under the cotton system and has been converted to the silk system of warping." C.

(B)—Sizing

Viscose Rayon Warp : Sizing ; Research Programme. U.S. Institute for Textile Research. *Text. Research*, 1936, 6, 521-523.

Brief notes are given of work in hand and planned on the sizing of viscose warps. C.

(C)—Weaving

Loom Let-off and Take-up Motions : Adjustment. J. W. Hutchinson. *Text. Rec.*, 1936, 54, No. 644, 34-35.

The causes of barry places in woven fabrics are discussed and it is pointed out that this fault can be eliminated by careful adjustment of let-off and take-up motions. A negative chain let-off motion, a ratchet taking-up motion, the Dobcross let-off motion, the Dobcross negative take-up motion, Hattersley reversing catches, and the Dobcross quadrant let-off are studied. C.

" Northrop " Single-pick Weft-mixing Loom. British Northrop Loom Co. Ltd. *Text. Merc. & Argus*, 1936, 95, 646-647.

Details are given of a loom that inserts one pick only from three different shuttles in succession, and automatically replenishes exhausted pirns. Only two shuttle boxes are used at both ends of the loom and a pick-at-will motion is not required. The shuttle-box changes are positively controlled. C.

Piano Jacquard Card Cutting Machine : Improvements. S. Dracup & Sons, Ltd. *Text. Mfr.*, 1936, 62, 426 and 436.

A ladder-rack which can also be conveniently used for casting-out, a card centring motion, and other improvements applied to piano jacquard card machines, including the Vincenzi-pitch plate piano cutter, are briefly described. C.

Rayon Loom. *Silk and Rayon*, 1936, 10, 858, 860, and 869.

A negative dobby loom for weaving rayon has four drop boxes at either end of the loom and a reed space of 57 in. The speed is 140 picks per minute but for good work the loom may be run at 160 picks per minute. The drawbars of the dobby are actuated by a pair of tappets at the front and at the back of the dobby. A rope and weight lever letting off system is employed. The take-up mechanism is controlled by a tappet on the low shaft. The principal features of the shedding tappets, balks and feelers, reversing mechanism, underpick motion, fast and loose reed, letting-off and take-up motions, boxing motion, weft fork mechanism and driving wheels are described. C.

"Saurer" Loom. Crowther Ltd. *Text. Mfr.*, 1936, **62**, 429 and 434.

The "Saurer" standard loom can be adapted as a weft-replenishing automatic loom, box loom, or pick and pick loom, dobby or tappet shedding, and used for all classes of cotton, wool, silk, rayon or linen goods. The loom sides consist of two box parts connected by two hollow beams. The drive is by motor, though an ordinary belt drive can be used. A patent motion for turning the loom slowly backwards is provided. Mechanically the loom is suitable for speeds of 290 picks per minute, but for cotton materials the normal would be 210 picks per minute, and for silk or rayon 190 picks per minute, using the automatic weft replenisher. The mainshaft is an ordinary one, not a crankshaft, and it revolves at three times the speed of the cranks. The drive is started before the loom, so that there is a flywheel effect; the loom starts quickly and runs smoothly. The cranks for the slay are operated independently at each side by the high-speed shaft, the cranks having a double spur-wheel shape. The slay is a pressed steel bearer to which the wooden shuttle race is screwed. The reed can be fixed or spring supported, or be a special loose-reed arrangement. The shafts are controlled from underneath, the connections being positive and having special click joints which make connection and adjustment quick and simple. A special patented model of dobby is of the double-lift open shed type, gear driven, and with a spring reverse motion in the dobby. Picking is cone underpick type with parallel motion. The nose of the picking cam has two profiles for two ranges of strength of pick. Warp let-off motion is mechanical and automatic without weights or brakes. The take-up motion is arranged so that the cloth piece can be cut and taken away without stopping the loom. Either a side or centre weft stop motion is fitted and usually a warp stop motion of the vibrating comb type. C.

Weaving Shed Electric Drive: Comparison of Group and Unit Systems. *See* Section 8D.

Cause and Prevention of Flying Shuttle Accidents. *Wool Rec.*, 1936, **50**, 1379-1385.

The largest percentage of flying shuttle accidents is due to breakage of warp threads. This can be minimised, but not eliminated, by good tuning, and by the use of warp-stop motions on automatic looms. Risk of injury can be reduced to a minimum by correct construction of the going part and shuttle boxes, and by replacement and readjustment of worn parts. Types of shuttle guards are described. Details are given of the regulations of H.M. Chief Inspector of Factories for the provision of shuttle guards. W.

Camel Hair Driving Belts: Production. H. Pflanzer. *Textilber.*, 1936, **17**, 720.

The belt is constructed of four plain cloths, and usually consists of a long coarse camel hair warp and a cotton weft. The four cloths are joined by a special binding warp of cotton yarn. Weaving particulars and a cross-section of the belt are given, also a short description of the finishing processes. W.

Curled yarn effects. *Irish Text. J.*, 1936, **2**, No. 9, 14.

The possibility of the application of curled yarn effects to linen is discussed and reference is made to the number of novelties which have been introduced in the past few years In the mohair and wool trades the invention of a machine for producing curled yarn effects has made possible new effects. The curl is "set" by boiling, and if the process is to be extended to linen, hemp, jute, and cotton yarns some method will have to be devised to "set" the curl in those materials, as boiling alone would not suffice. A brief description of the method for producing curled yarn is given and the average cost of curling on the machine is approximately 1½d. per lb. L.

(D)—KNITTING

Plush Fabrics: Knitting on Flat Frames. W. Hildebrandt. *Rayon Text. Monthly*, 1936, **17**, 511-513, 621-623 and 626.

Plush fabrics are classified into types and the advantages and possible applications of coulier plush fabrics are briefly reviewed. The knitting of coulier plush on the flat frame (system "Cotton") is described in detail, including modifications designed to produce special effects. Diagrams are given. C.

"R.M.U." Interlock Knitting Machine: Application. W. and J. Foster Ltd., Preston. *Text. Merc. & Argus*, 1936, **95**, 624.

A new warp knitting loom is mentioned by means of which solid stripes and novel check and "aero" effects can be produced at high speeds in interlock fabrics. Some designs are illustrated. C.

(G)—FABRICS

Cotton Road-making Fabrics: Application. G. H. Watson. *Cotton (U.S.)*, 1936, **100**, No. 11, 57.

Some details are given of an extended programme which is being fostered by the U.S. Department of Agriculture in which some 6,167,000 square yards of cotton fabric are being provided for the building of over 500 miles of roads in 24 States. The cotton fabric used resembles burlap bagging. It is laid down after the sand clay and hard-surfacing asphalt coating, and before the finishing of asphalt and heavy and fine slag. The use increases road cost by about $1,000 per mile. Cotton fabrics are also to be used for curing concrete roads. C.

"Simplifying" linen yarn bleaching. *Irish Text. J.*, 1936, **2**, No. 10, 5.

A new method of "simplifying" the bleaching of linen yarn is explained by Herr W. Zizka. The process was first speeded up by boiling the yarn for two hours in an open vessel with a sulphite solution. This treatment decreased the strength by 3 per cent., and caused a loss in weight of 3·5 per cent. The boiled material was rinsed, acidified, with HCl (dil.), rinsed, neutralised with soda solution, rinsed and slowly dried. The dry silver grayish yarn was then bleached with a bleaching powder solution of 0·3° Bé., causing a further loss in strength of 3·5 per cent. and a loss in weight of 4 per cent. Still better results are obtained when the boiling with the sulphite bath is carried out in a closed vessel without excess pressure. L.

PATENTS

Curling Yarns. F. Godfrey and J. Micklethwaite. E.P.454,187 of 30/10/1935.

A machine is illustrated and described which provides means whereby mohair and alpaca yarns may be curled. Provision is also made for decurling curled yarns. W.

Loom Surveying Mirrors. E. Hochheimer (Aachen, Germany). E.P.453,403 of 26/2/1936 (Conv. 10/4/1935).

At one or both sides of the loom a surveying mirror is adjustably supported by flexible pipes or universally movable and adjustable joint members whereby the warp threads, etc., may be inspected, the mirrors being movable out of the way when hanging up new shafts, etc. They may be reducing or enlarging and be of non-splintering hardened glass. The known mirrors arranged above the shafts may also be used. C.

Ladder Webbing: Weaving. T. French & Sons, Ltd. (Manchester and G. F. French. E.P.453,832 of 13/3/1935.

In Venetian-blind ladder and like webbing with cross tapes, the length of the free warp threads extending between the webs from one binding-in portion of the cross tape warps to the other is made short (about $\frac{1}{16}$") so that one cut at each free warp part only is necessary when separating the successive cross tapes. Instead of extending loosely from the beginning of one binding to the end of the other, as in the old method, the weft of the cross tapes may be woven into these bindings. A dobby or jacquard may be used. The cross tapes may comprise warp threads only. Pairs of cross tapes may be arranged opposite to one another or side by side. The webbing may have three rows of cross tapes. C.

Woven Driving Belts. Etablissements Flinois Colmant & Cuvelier, Colmant & Cuvelier Successeurs (Mons en Barocul, France). E.P.453,999 of 21/2/1936 (Conv. 30/12/1935).

A driving belt comprises a backing of woven hair or textile material provided with soft facing ribs, for example, of cotton. The ribs are separated from each other by grooves. C.

Multi-ply Fabrics. H. Pferdmenges (Giesenkirchen, Germany). E.P.454,049 of 20/9/1935.

In fabrics with one or more closely-woven plies of thin threads and at least one ply of widely-spaced relatively-thick threads, the thick threads are made from

pre-shrunk fibres, whereby puckering of the fabric on wetting is prevented. The shrinking may be effected by wetting the yarn and then treating it for 2 minutes at 15° C. under slight or no tension with caustic soda solution of 35° Bé., neutralising with acid, washing and drying. The thick thread ply may comprise threads extending in one direction passing over all the threads extending in the other direction, binding threads engaging the over-lying threads. The thick threads may be in spaced groups. C.

Warp Yarn Guide. British Celanese Ltd. (London), R. W. Moncrieff and J. Straw. E.P.454,155 of 21/3/1935.

A comb or guide for yarns in warp form, e.g. in a sizing machine or a machine for treating the yarns with a solvent or softening agent consists of a bar with a number of narrow shallow and evenly-spaced recesses in one edge. The comb may be moulded, e.g. in porcelain. C.

Slidable Shuttle Boxes. Société Anonyme A. Saurer (Arbon, Switzerland). E.P.456,504 of 19/5/1936 : 10/11/1936.

A slidable shuttle box comprises a plurality of separate cells for the reception of shuttles, each of the cells being independently and detachably secured as a whole to a common carrier. C.

Stationary-lay Looms. J. Wolfensberger (Bauma, Switzerland). E.P.456,796 of 16/1/1936 : 16/11/1936.

In a loom having a beating comb and a stationary lay and shuttle boxes, the beating comb is moved continuously in a guide rake, extending up to the reed and serving as a shuttle path or race, along an ovoid or pear-shaped path between the reed and the material. C.

Warp Thread Isolating Device. Koefoed, Hauberg, Marstrand & Helweg Aktieselskabet Titan (Copenhagen). E.P.457,084 of 21/4/1936 : 20/11/1936.

A device for isolating individual threads or groups of threads from sheets of crossed yarn, intended especially for use in connection with warp tying machines comprises a pair of lease cords threaded through a common hollow lease rod. The lease rods are preferably of the known type provided with a pointed wedge-shaped head. The lease rods preferably have two grooves or holes, one on either wedge surface (or, in the case of a pointed head, on diametrically opposite sides), in such a manner that the threads are directed serparately into the lease rods. The point will thus be covered by two threads. The threads can easily slide from the cords on to the lease rods, without the individual threads becoming pinched or caught between the cord and the point. The point of the lease rods is covered by the two lease cords, so that the threads are smoothly lifted on to the lease rods by means of their wedge-shaped heads. The lease rods, which are made curved, can be swung about their longitudinal axis. As a rule they are swung or rocked through an angle of about 90°, but they may also swing through a larger or smaller angle. By this swinging motion, the edge thread of one sheet is freed from the curved rods. C.

Circular Loom Vane Wheel Mechanism. British Celanese Ltd. (London), F. C. Hale and J. Jabouley. E.P.457,103 of 20/5/1935 : 20/11/1936.

The vane wheels of a circular loom are supported and driven by shafts mounted on a ring between which and the warp threads there is relative circular motion with respect to the loom axis, the shafts being mounted at a different level from their supporting ring and extending tangentially away from the weaving circle to gearing connecting them with a gear ring disposed at substantially the same level as the shaft-supporting ring and between which and the shaft-supporting ring there is relative circular motion with respect to the loom axis to drive the vane wheel shafts. Incorporated in the gearing connecting each vane wheel shaft with the gear ring is a toothed free wheel clutch mechanism to make the vane wheel shaft and the vane wheels capable of over-running the connecting gearing. Consequently, when relative motion between the shuttles and the warps ceases, the vane wheel shafts and the vane wheels can continue rotating. The loom stop mechanism is therefore relieved of the necessity of rapidly overcoming the momentum of the vane wheels and the vane wheel shafts. C.

Circular Loom Starting and Stopping Mechanism. British Celanese Ltd. (London) and W. Pool. E.P.457,104 of 20/5/1935 : 20/11/1936.

Starting and stopping mechanism for circular looms includes an electro-

magnetically controlled clutch interposed between the driving means and the driven part of the loom, an electro-magnetically controlled brake for stopping the circular motion, a switch in the magnet circuit and adapted on being operated to bring about this engagement of the clutch and the simultaneous application of the brake, and means for rendering the electro-magnetic control of the clutch ineffective for engagement of the clutch while the brake is in the applied position. C.

Circular Loom Vane Wheel Mechanism. British Celanese Ltd. (London) and F. C. Hale. E.P.457,105 of 20/5/1935 : 20/11/1936.

In a circular loom in which rotatable vane wheels are provided to pass between the warp threads into engagement with a shuttle to position the shuttle within the warp shed, a free wheel mechanism is interposed between the vane wheels and the driving means for the vane wheels so as to make the vane wheels capable of over-running the driving means. Consequently, when relative motion between the shuttles and the warps ceases, the vane wheels can continue their rotation. Therefore, when the loom stop mechanism is called on to bring weaving to an end, the stop mechanism is relieved of the necessity for rapidly overcoming the momentum of the vane wheels themselves and is able to bring relative rotation to an end in a short space of time. C.

Shuttleless Loom Weft Trapping Mechanism. C. H. Baddeley (Bradford). E.P. 457,232 of 12/11/1935 : 24/11/1936.

A weft trapping mechanism for shuttleless looms has a pivoted finger which is moved by a lever on the horizontal operation of a stud moving in a fixed slide in the path of the lever, the stud being operated from a cam on a moving shaft of the loom. [See also E.P.363,219 (1932, A. 189) and E.P.424,966 1935, A. 300).] C.

4—CHEMICAL AND FINISHING PROCESSES

(B)—Boiling, Scouring, Degumming and Washing

Silk-Cellulose Acetate Fabrics: Degumming. O. Niegay. *RUSTA*, 1936, **11**, 575-579, 637-639.

Saponification of cellulose acetate in degumming processes may be avoided or considerably reduced by adding a protecting agent or reducing the temperature of the soap solution, by degumming with non-alkaline degumming agents, e.g., diastases, or by giving the material a preliminary treatment with diastase, or with acid or alkali before degumming with the usual soap solution. Various procedures are described and it is pointed out that the methods involving preliminary treatments are the most interesting. C.

Staple Fibre Fabrics: Preparation for Dyeing. *Text. Merc. and Argus*, 1936, **95**, 677, 679 ; 1937, **96**, 9.

A general review of the operations of singeing, scouring and bleaching of rayon staple fibre fabrics with many references to published work on the chemistry of cellulose. C.

Wool Scouring and Lime Soap. F. Wykypiel and R. Klatt. *Textilber.*, 1936, **17**, 412-414, and No. 4E, pp. 183-184.

A method, based on the determination of the ash content of scoured loose wool, is described for evaluating the lime soap dispersing efficiency of textile auxiliaries in soap-soda wool scouring liquors. The following additions to the scouring baths were found to give a scoured wool with a low ash content, probably for the reasons quoted : (*a*) sulphonates derived from fatty alcohols and acids, by reason of solvent or dispersing effects ; (*b*) soda, by aiding coarse precipitations, which are easily rinsed off ; (*c*) metaphosphate, pyrophosphate, citrate and tartrate, by complex salt formation ; (*d*) globulins, by a protective colloidal effect ; (*e*) the polysaccharide scouring agents, by protective colloidal effects and also by aiding coarse precipitation. W.

(E)—Drying, and Conditioning

Low-temperature Circular Fabric Drying and Calendering Machine. Samuel Pegg & Son, Leicester. *Text. Merc. and Argus*, 1936, **95**, 599-600.

An illustrated description is given of a machine for drying and calendering

circular fabrics. The cloth is loaded on a " cartridge " from which it is drawn over a perforated tube heated by hot air, then over a final drying " head " consisting of aluminium rings the diameters of which control the tension in and width of the fabric, and finally through the calender. C.

Rayon Skeins: Controlled Drying. B. Miller. *Rayon Text. Monthly*, 1936, **17**, 594-595, 670-671.

The necessity for proper control in the drying of rayon skeins is emphasised by a brief outline of the defects which follow under or over drying. Drying systems can be classified under room, truck, and automatic dryers. A brief description is given of each of these three types. A table summarises the data from four detailed analyses of modern automatic dryer operations. These were made under four different conditions. In one case an old makeshift room dryer was replaced. In the second case two old-type truck dryers had previously been used. Case 3 compares the results of modern truck dryers with an automatic machine. Case 4 shows the advantages of a new dryer over two old automatic machines. Each of these comparisons shows the same advantages in modern methods; these are enumerated. C.

(F)—Carbonising

Piece Carbonising. B. Baier. *Wollen und Leinen Ind.*, 1936, **56**, 321.

Fabrics carbonised with sulphuric acid are liable to develop spots which lead to dyeing faults. The following process has been found satisfactory in eliminating the spots before dyeing—fabric (100 kg.) is boiled for 1½ hours in a solution of iron vitriol (24 kg.), tartar (6 kg.) and copper sulphate (5 kg.), and left overnight. It is then boiled for 1 hour in a solution of logwood slate (90 kg.) and fustic slate (8 kg.), and acidified with sulphuric acid (1 kg.) at 30° C. to remove the bronze tone. It is an advantage to wash with fuller's earth and soda. Logwood extract is not as satisfactory as logwood slate. Neutralisation is unnecessary if the pieces are dyed immediately. Fewer difficulties arise if aluminium chloride is used instead of sulphuric acid for carbonising, but a sticky handle results and the process is dearer. W.

(G)—Bleaching

Pulp: Bleaching. F. Komaroff and I. Nagrodsky. *Zellstoff u. Papier*, 1936, **16**, 502-504 (from *Bumasch. Prom.*, 1936, No. 4).

The authors have compared the results of bleaching pulp: (1) by a single treatment with soda chemic, (2) by a double treatment with soda chemic, and (3) by a double treatment, first with lime chemic and then with soda chemic, the alkalinity, temperature, and time being varied within certain limits. For comparison, treatments with lime chemic were carried out on the same material. The results are tabulated, the chief data being viscosities and lignin, ash and α-cellulose contents. A single treatment with soda chemic has no advantages over one with lime chemic. A double treatment with soda chemic, although restricted to the normal bleaching time, has advantages, provided the alkalinity is controlled. C.

Cotton and Staple Fibre Mixtures: Bleaching. H. Korte, E. Kayser and W. Waibel. *Textilberichte*, 1936, **17**, 801-803, 864-865; *Also English Edn.*, 1936, **17**, No. 4E, 189-193.

Yarns containing 16 per cent. of staple fibre and fabrics woven from them have been scoured and bleached by normal cotton methods (open or pressure boil, soda chemic, peroxide) and tested for loss of weight and strength. The effects were not more severe than for pure cotton goods. Nor did the mercerised fabric suffer more severely, but the limit of staple fibre content for a mercerised cloth above which bleaching might cause trouble appears to be 30 per cent. Details of the tests are fully recorded. C.

Cotton-Viscose Rayon Calico: Bleaching, Dyeing and Finishing. G. Cherpin. *RUSTA*, 1936, 529-533, 579-581, 633-635.

A general account is given of the preliminary treatment, bleaching, dyeing and finishing of calicos having cotton warps and viscose rayon wefts. C.

Rag Half Stock: Bleaching by Calcium Hypochlorite. R. C. Crain. *Paper Trade J.*, 1936, **103**, *TAPPI*, 343-352.

A study has been made of the following variables: concentration of hypochlorite solution used, ratio of available chlorine to cellulose, time of treatment, variation in temperature over a range of 15-45° C., and *p*H of bleach liquor. Changes were followed by determinations of viscosity, α, β and γ cellulose, copper number and absorption of methylene blue. Results are tabulated and graphed and a useful survey of the literature on the bleaching of rag stock is presented. It appears that in the ordinary operation of bleaching as carried on in the mill, there is very little loss in weight of the stock, for recoveries ranging between 99·6 and 99·8 per cent. have been obtained over a wide range of concentrations of available chlorine. The rate of degradation of the stock is dependent upon the concentration of the hypochlorite system used, and, within limits, is independent of the ratio of available chlorine to stock. The extent of degradation likewise is related to the time of treatment, although the rate of degradation falls off as the time is prolonged. The effect of temperature as followed by changes in viscosity shows that there is roughly a linear relation between the loss of viscosity and the temperature of bleaching up to 35° C. As the temperature is increased beyond this point the viscosity decreases much more rapidly, and above 45° C. the shapes of the extended curves indicate that the modification of cellulose is very rapid. The most rapid degradation of stock within a *p*H range of 4·5-10 occurs at about *p*H 6·8. Strength tests of rag stock at consistencies of 4 per cent. support the chemical data. The first constant to be modified greatly as bleaching proceeds is that of viscosity. As the viscosity decreases, and until it approaches a value in the range 30-40 only a slight drop in Mullen and tear strengths is noted; as the viscosity falls below this point, strength values begin to decrease rather rapidly. Under the conditions resulting in appreciable loss in strength there is also a definite decrease in α-cellulose content. Data obtained on strength-testing of rag stock at a consistency of 4 per cent. or less have only a qualitative value, especially in the range of the higher viscosities. In order to bring out strength differences at these higher viscosities, it is necessary to do strength tests at consistencies well above 4 per cent. C.

(H)—Mercerising

Cotton Fabric: Mercerisation. *Text. Merc. & Argus*, 1936, **95**, 464, 566.

A general discussion of factors conducive to maximum lustre in piece mercerisation. Good penetration before stretching is emphasised and the relative arrangement of padding mangles, cylinders, and stenter frame is considered. C.

(I)—Dyeing

***p*-Phenylenediamine: Oxidation.** (1) and (2) W. Ptschelin; (3) J. K. Silberkweit and W. P. Dobrinskaya. *Shurn. prikl. Chimii*, 1936, **9**, 846-854, 855-861, 862-878 (through *Chem. Zentr.*, 1936, ii, 3948, 3949).

(1) The oxidation of *p*-phenylenediamine has been conducted at *p*H 3 (excess sulphuric acid), 4·5 (mono-salt), 8·5 (free base), and 10·5 (excess caustic soda). The most favourable conditions are *p*H 8·5 and 4·5; the oxidation proceeds slowly in the first ten hours but the decomposition of the dye is slight. Much more soluble product is obtained at *p*H 4·5 than at 8·5. (2) The products obtained at *p*H 8·05 and 4·45 contain a large proportion of colloidal particles but those obtained at *p*H 3·05 and 10·05 contain none; the former *p*H values favour the production of dye. The particles formed at *p*H 8 and 4·5 are variously charged; in a medium at *p*H 3 they are positively charged, at *p*H 11 negatively. The magnitude of the charge is exceedingly small. The alteration of the reaction of the oxidised solution has little influence on the dispersion of the dissolved phase but a great influence on the solubility of the Bandrowski base, which suffers coagulation at higher *p*H's. (3) The dyeing of rabbit fur with oxidised *p*-phenylenediamine is investigated in relation to the dependence of the dye absorption on the weight of the absorbent. C

Rayon: Affinity for Dyes. G. S. Ranshaw. *Silk and Rayon*, 1936, **10**, 872 and 877.

A general discussion of theories of dyeing, the affinity of rayon for dyes, the kinetics of the dyeing process, and the importance of the time factor in relation to levelness. C.

Rayon Marocains : Causes and Prevention of Chafing. G. L. Atkinson. *Silk J.*, 1936, **13**, No. 150, p. 36.

The causes of chafing of rayon marocains are discussed and it is pointed out that this fault is a purely mechanical one. Overcrowding of goods in the dye vessel, bad distribution of the pieces in the vessel, the use of the wrong type of winch, too much material idle in the machine, and unsuitable lengths of travel and speeds are some of the main causes of chafing in dyeing processes. Various tests are described and methods of preventing chafing are indicated. C.

Stilbene Azo Dyes : Structure and Substantivity. P. Ruggli and F. Lang. *Helv. Chim. Acta*, 1936, **19**, 996-1007.

One of the theories of substantivity of direct dyes is based on the assumption of long, straight-chain structure. The authors now show that direct dyes need not have straight-chain molecules. Starting with *p* : *p'*-dinitrotolane, they have prepared *cis*- and *trans*-*p* : *p'*-diaminostilbenes and converted them into dyes by diazotising and coupling with naphthionic acid and 1-naphthol-4-sulphonic acid. The *cis*-modifications are substantive dyes as well as the straighter *trans*-modifications ; their absorption curves are similar except that the curve for the *cis*- form is displaced by about 200 Å towards the short-wave end and is somewhat more pronounced in the ultra-violet. The intermediates and the dyes are fully described. C.

Aniline Black : Application. M. Aymondin. *TIBA*, 1936, **14**, 689-691, 763-765.

A general account is given of methods and apparatus for dyeing raw cotton with aniline black. C.

Aniline Black Catalysts : Application. E. Justin-Mueller. *TIBA*, 1936, **14**, 753-763.

The influence of catalysts in aniline black dyeing and printing processes is discussed and investigations of the reaction of catalysts used in these processes with guaiacum and leuco-phenolphthalein in the presence of hydrogen peroxide or sodium chlorate are described. The conclusion is drawn that salts of copper in the aniline black condensation promote dissociation of the oxidising agent and liberate active oxygen by dehydration. The perhydrated copper compound is unstable and decomposes to the normal salt which again acts on the oxidising agent. Vanadium compounds liberate oxygen from the oxidising agent and at the same time are converted to pyrovanadic acid which in suitable media loses part of its oxygen and again enters into reaction. When the quantity of vanadium compound used is too large an excess of pyrovanadic acid is formed which does not appear to react. Practical experience has shown the desirability of using only minimum quantities of vanadium compounds. Organic catalysts such as *p*-phenylenediamine and aminoazobenzene combine with oxygen in the first phase of the reaction and then give up the added oxygen and the process is repeated. These catalysts reduce the tendency to turn green and prevent volatilisation of aniline particles in steaming in the production of aniline blacks with ferrocyanide. C.

Dyes, Textile Assistants and Equipment ; Novelties, 1936. *Amer. Dyes. Rept.*, 1936, **25**, 657-664, 675-688.

An alphabetical list of new dyes, assistants and equipment developed during 1936 is presented. Sufficient information is supplied to give a specific idea of the intended uses and properties of the product or machine. An alphabetical list of the manufacturers is given. C.

Plush : Dyeing. *TIBA*, 1936, **14**, 771-773.

Apparatus for dyeing plush in lots of fifty pieces comprises five vats each capable of holding ten pieces of 55 m., and a central reservoir for the dye liquor. A pump causes the liquor to circulate through the vats and control valves are fixed in the feed pipes and means are provided for maintaining the level of liquid constant and at the same height in all the vats. A diagram of the system is given and details of construction are discussed. Conditions for successful operation are outlined and the importance of good preliminary scouring is emphasized. Suitable dyes are mentioned and details of the dyeing process are discussed. C.

Antique Finish on Carpets. *Wool Rec.*, 1936, **50**, 1435-1437.

The effect of age on carpets is produced by dyeing the yarns to a gaudy shade, then bleaching with chloride of lime. The sheen of old carpets, due to smoothing

the scaly surface of the wool by constant friction, is reproduced by the action of alkalies in conjunction with chloride of lime. The system of manufacture of antique carpets is described, and the points stated which indicate a chemically treated " old " carpet. W.

Influence of Dye Vessels on Shades. *Wool Rec.*, 1936, **50**, 1191-1193.

Copper, iron and lead are liable to alter the shade in dyeing by reason of their dissolving in dyebaths (especially acid baths) and production of salts which react with the dyestuffs. When scouring agents, such as the sulphonated fatty alcohols, are used, the detergent is liable to scour the copper pipes and thus expose the clean surface of the metal to attack by acids. It is recommended that the copper should be coated with a film of oxide or the vessel boiled out with a solution of ammonium sulphocyanide. An alternative method is to add ½ lb. sulphocyanide per 100 lb. material. The influence of iron when dyeing in neutral or faintly acid baths may be minimised by previously boiling out the machine with sodium sulphide, thus causing the surface to become coated with insoluble ferrous sulphide. An alternative method is to add about 1½ oz. bichrome per 100 gallons liquor before dyeing is started, thus minimising the colour change, especially with the chrome mordant colours. Lists are given of dyestuffs unaffected by, and sensitive to, copper and iron. W.

Union Dyeing. C. H. A. Schmitt. *Canadian Text. J.*, 1936, **53**, No. 18, pp. 35-38 and 48.

Address delivered before the Canadian Association of Textile Colourists and Chemists, Hamilton, Ontario, August, 1936. The use of a reserving agent, Thiotan RS, is recommended for the dyeing of low grade mixture fabrics and automobile fabrics, for burl dyeing, for the production of two-tone effects, for the dyeing of mohair pile fabrics with cotton back and for the dyeing of spun rayon and wool dress goods. W.

Methods for Increasing Lustre on Wool. *Textilber.*, 1936, **17**, 733.

Chlorination processes may be used for increasing the lustre of wool carpet yarns, and for " antiquing " carpets. Methods are described. W.

Mohair Bearskin Fabric : Processing. *See* Section 4K.

Experiences with Sensitivity Tests on 2,000 Patients. *See* Section 11.

Claims for Alleged Dermatitis. *See* Section 11.

Cotton-Viscose Rayon Calico : Bleaching, Dyeing and Finishing. *See* Section 4G.

(J)—PRINTING

Silk : Hand Block Printing. T. C. Hutchins. *Amer. Dyes. Rept.*, 1936, **25**, 613-615.

The selection of thickenings for use with chrome mordant dyes is discussed and a general account is given of the preparation of the printing pastes, the hand block printing process, and the steaming, washing, drying and finishing of the prints. C.

(K)—FINISHING

Oleins and Oils : Oxidation ; Retarding Effect of Stannous Salts. S. H. Bertram. *Text. Mfr.*, 1936, **62**, 430-431.

The oxidation of oleins and oils used in the textile industry may be retarded considerably by the addition of oil-soluble stannous compounds in amounts equivalent to about 0·1 per cent. of tin ; the induction period is greatly prolonged, and the velocity of oxidation once started is diminished. These tin compounds are free from the disadvantages of other anti-oxidation catalysts, being non-poisonous and causing no stains on heating. The oxidisability of such oils appears to be due to the catalytic effect of traces of oxidation products already present. The amount of these oxidation products is roughly proportional to the peroxide content of the technical samples. The function of the stannous salts as retarding catalysts may be considered as a reduction of the highly catalytic oxidation products. The results of Mackey tests on oleins and cotton oil with additions of stannous oleate, stearate and benzoate and some other anti-oxidation catalysts are given. C.

Static Electricity Eliminating Device. F. Klein. *Text. Mfr.*, 1936, **62**, 431.

An arrangement for eliminating static electricity comprises an electrostatic inductor in which the electrically charged material forms one of the inductor elements, a second inductor element in the form of a roll made of a substance electrically opposite to the first inductor element but occupying the same relative position in the electric series as that which caused the original charge in the first inductor element, and means to neutralise the charge between the first and second inductor elements. When warping silk or rayon the threads pick up a positive charge produced by friction with the air or metals. By passing the ends over a roller electrically negative to the silk (e.g. a roller of hard rubber) there is induced in the roller a negative charge equal in amount to the charge in the silk. The charge is drawn off the roller by pointed collectors set in a steel bar and that on the silk is drawn off by a similar set of collectors. The two sets of collectors are conductively connected by a metal strip. C.

Watered Effect Fabrics: Production. *Text. Weekly*, 1936, **18**, 737.

The production of watered effects by calendering two sheets of cloth together is discussed. The best effects are obtained when the weft ribs of the two cloths coincide at some points but not at others so that calendering flattens them in the first places and forces them into half-round forms in the other places. C.

Urea-Formaldehyde Resins: Use in Anti-crease Finishes. L. Molinari. *TIBA*, 1936, **14**, 775-781.

Patent literature relating to the use of synthetic resins for improving the crease-resistance and other properties of textile materials is reviewed and the mechanism of the urea-formaldehyde condensation reaction is briefly discussed. Industrial methods of application are outlined. The properties of fabrics impregnated with synthetic resins are discussed and the results of tests on various fabrics are tabulated. C.

Raising Machines: Description and Operations. *De Textielindustrie*, 1936, **17**, 127, 174, 215, 252, 338, 397, 443, 481.

An exhaustive account of the raising process under the headings: different types of raising machines, the double-action machine, machines with revolving card rollers, driving, and calculation of machine settings. C.

Double Finish for Dress Goods. *Wool Rec.*, 1936, **50**, 1565-1569.

A description is given of the preparing and finishing of dress goods with a finished width of 54 in. The reduction of temperature after scouring between the washing off and cooling down should be gradual. Crabbing is unnecessary. After dyeing, 55½-66 in. represents a safe wet drying width. Cutting, perching and decatising follow. In decatising, cooling by means of the exhaust pump of the machine, and also excessive steaming should be avoided. The double finish consists in pressing with warm press papers, re-decatising and pressing with cold papers. W.

Dyeing and Finishing "Impact-resisting" Woollens and Worsteds. G. Rice. *Text. Col.*, 1936, **58**, 670-671.

Suiting and overcoating fabrics in which a maximum resistance is provided against the general effects of wear are known as "impact-resisting." In the finishing of woollen fabrics, milling is followed by raising, tentering, drying, steaming, shearing and pressing. In the raising process, the setting of the card wires and the shape of the points is of importance. Dyeing methods are described for clear-cut worsteds. W.

Handle of Textile Fabrics. G. L. Atkinson. *Amer. Dyestuff Rep.*, 1936, **25**, 631-633.

The effect on handle of the crabbing and steaming, milling, scouring, damping, decatising and pressing processes is discussed. Drying does not assist the handle to any appreciable extent. W.

Finishing Light-weight Wool Flannels. G. L. Atkinson. *Canadian Text. J.*, 1936, **53**, No. 20, pp. 36-37.

Scouring should take place both before and after milling. To avoid chafing during dyeing, the cloths should be bagged face inside. The cutting and finishing processes are briefly described. W.

Handle in Wool Fabrics. *Dyer*, 1936, **76**, 464-465.

Finish is defined as the general physical state and appearance of the fabric, and handle as an inherent quality. Goods may be the same in finish but not in handle. Handle is dependent upon the natural condition of the cloth at the time of the operation, especially the moisture content of the fibre cells and the plasticity of the material. Defective handle liable to arise in crabbing and hot-pressing is discussed. In the damping operation, the amount of water taken up by the fibre cells of the cloth is of more importance than the amount of water it is possible to force into the piece. W.

Washing, Sterilizing and Dyeing Cloths for "Finishing and Polishing." G. Rice. *Text. Col.*, 1936, **58**, 743-744.

The processing is described of rags used for the manufacture of cloths for finishing and cleaning purposes. W.

Decatising Light Cloths in the Grey. *Wool Rec.*, 1936, **50**, 1195-1197.

Decatising is applied to yarn-dyed cloths instead of crabbing, to give a light setting. A better setting is obtained if the cloths, after being wrapped and steamed, are cooled by means of the exhaust pump of the machine, but this procedure is liable to lead to faults. Throughout the operation uniform tension must exist between the piece and the wrapper. The presence of tight or slack lists in the fabric itself may lead to the formation of nips. Curved tension rollers are available which can be fitted to machines and used for processing cloths with or without faulty lists. Convex guiding rollers must be used in conjunction with a straight roller if undue shrinkage is to be avoided. The ends of the piece should be trimmed, not rolled. W.

Mohair Bearskin Fabric: Processing. T. Tolly. *Text. Col.*, 1936, **58**, 734-736.

Mohair bearskin fabric consists of mohair pile woven into grey cotton backing. The pieces are degreased, and this operation effects a partial liberation of the spinning twist in the pile yarn and assists in the development of a bushy surface. The pieces are then rinsed, centrifuged and dyed. The degreasing and dyeing processes are described in detail and lists of suitable dyestuffs given. W.

Cotton-Viscose Rayon Calico; Bleaching, Dyeing and Finishing. *See* Section 4G.

PATENTS

Metallized Threads. Kathon, Ltd. F.P.798,936 of 29/5/1936 (through *Chem. Abs.*, 1936, **30**, 7466).

Apparatus is described for depositing metals on textile threads by cathodic bombardment. W.

Aluminium Compounds. P. Spence & Sons, Ltd. F.P.799,292 of 10/6/1936 (through *Chem. Abs.*, 1936, **30**, 7793).

Al phosphosulphates are prepared by placing together the three constituents, Al_2O_3, H_3PO_4 and H_2SO_4 under such conditions of concentration and temperature that solutions are formed containing more than one molecule of Al phosphate for two molecules of $Al_2(SO_4)_3$, and the solutions are evaporated if desired. The products may be used as *mordants for textiles, for sizing paper* (by precipitation of Al phosphate), *in tanning leather and for purifying water.* W.

Metallized Threads. E. Justin-Mueller. F.P.799,671 of 17/6/1936 (through *Chem. Abs.*, 1936, **30**, 7732).

Heat-coagulable proteins (albumin, casein, etc.) with appropriate plastifying agents (uncondensed or partly condensed PhOH-CH_2O or urea-CH_2O derivatives, partly hydrolyzed noncoagulable proteins such as gelatin, or glue and soluble collodions) are mixed with metal powders or pigments to obtain a metallized or leather-like film, thread or cloth. W.

Proofing Cloth. R. Grimoim-Sanson and H. Danel. F.P.800,618 of 15/7/1936, (through *Chem. Abs.*, 1936, **30**, 8647).

Cloth particularly *for gas masks*, is rendered impermeable to gases by treatment with gelatin containing an aqueous solution of a dichromate, e.g., gelatin 50, $K_2Cr_2O_7$ 30 g. and water 1 litre. The process may be combined with a treatment of the cloth with a solution of rubber in benzine containing powdered cork. W.

Treatment of Textile and other Materials. L. de R. Faber and C. J. Carroll. U.S.P.2,023,013 of 3/12/1935 (through *Brit. Chem. Abs.*, B, 1936, 1205).

Treatment liquids, e.g., for washing, cleaning, scouring, dry-cleaning, de-

gumming, bleaching, dyeing, etc., are aërated so as to yield a foam which is drawn through the material by maintaining a difference of pressure on the two sides thereof. Apparatus is claimed. W.

Yarn Wetting Agent. F. Pospiech (to Chemische Fabrik Pott & Co. G.m.b.H.) U.S.P.2,055,588 of 29/9/1936 (through *Chem. Abs.*, 1936, **30**, 7728).

Salts of polyamino bases and capillary active alkylated aromatic sulphonic acids, such as the ethylene-diamine salt of diisopropylnaphthalenesulphonic acid, are used as yarn-wetting agents (suitably with CH_2O). W.

Bleaching Animal Fibres such as Cut Furs. C. F. Fabian and A. N. Sachanen (to Non-Mercuric Carrot Co.). U.S.P.2,057,296 of 13/10/1936 (through *Chem. Abs.*, 1936, **30**, p. 8645).

The fibres are treated with a weak non-oxidizing alkaline solution such as a 1-2 per cent. solution of borax and subsequently treated with a slightly acid bleaching solution containing H_2O_2, an alkali metal persulphate and a salt of an alkaline earth metal such as $CaCl_2$. W.

Making Emulsions. R. C. Williams and H. M. Bone. E.P.453,096 of 31/1/1936.

Glass wool fibres are coated with a film deposited from an emulsion of oil and water ; owing to the presence of water the emulsion is non-inflammable so that the coating may be carried out at a temperature which would constitute a fire hazard where hydrocarbon oils alone are employed. The water evaporates or is evaporated, leaving a residual oil film on the glass wool. The emulsion may comprise bright stock mineral oil, water, bentonite, stearic acid and triethanolamine, and may be further diluted with water before application. Steam-refined cylinder oil or crude scale paraffin wax may be substituted for the bright stock mineral oil ; caustic soda or potash substituted for triethanolamine ; fatty acids such as oleic substituted for stearic acid, and ordinary starches, pectin, agar, gelatin, Karaya gum and the like substituted for bentonite. Ammonia may be added to the emulsion, the ammonium soaps formed rendering the coating waterproof ; alternatively methyl or ethyl amine may be used. Calcium chloride or other deliquescent salt may be added to render the coating permanently non-inflammable. W.

Furs. J. B. Speakman, N. H. Chamberlain and H. and W. MacDonald. E.P. 453,559 of 3/12/1934.

A process for applying a permanent wave to keratin fibres (including human and animal hair and wool) in which there is a metal compound (as from a dye) capable of interfering with the waving treatment, comprises subjecting the fibres to a preliminary treatment with a reagent for converting the metal into a sulphide, then removing the reagent with an acid and thereafter subjecting the fibres under acid or neutral conditions to a moist heat treatment at about 100° C. as is usual in permanent waving. Possible modifications are (*a*) the fibres may be treated with hydrogen sulphide or with sulphur in the form of a solution or colloidal dispersion, (*b*) the solution of sulphur employed is one in a mixed solvent comprising a solvent for the sulphur and a swelling agent for keratin, (*c*) the reagent employed contains metal sulphide, soluble poly-sulphide or hydro-sulphide. W.

Compound Fabrics. J. Kenyon & Son, Ltd. and J. H. Sleigh. E.P.454,452 of 2/5/1935.

A machine cloth applicable as a blanket on the cylinders of printing machines or for covering rollers of textile spinning machines comprises two outer layers of a soft, resilient, woollen cloth adhesively united to an intermediate layer of finely, closely woven fabric such as cotton, linen, silk, hemp or hessian. The intermediate layer is impregnated with adhesive, or adhesive is applied to one face of each outer layer, and the three layers are united by pressure. Rubber or rubber solution is preferably employed as adhesive ; other adhesives may, however, be employed, e.g., cellulose derivative varnish or dope, gum, asphalt, or resin. The surface of the cloth may be coated with a cellulose derivative varnish or dope. W.

Tie-dyed Fabrics : Production. E. Koechlin. *Bull. Soc. Ind. Mulhouse*, 1936, **102**, 453-457. Pli cacheté No. 2564 of 3/3/1924. Refereed by M. Haller.

A method of printing fabrics without the use of printing and steaming machines is described in which the cloth is folded, plaited or tied up in various

ways, according to the effect desired, before immersion in the dye bath. In order to obtain bright multi-colour effects ground colours are discharged in a boiling solution of sodium hydrosulphite and the discharged areas are then dyed another shade as desired. In the report it is pointed out that the method resembles the Japanese " Shibari " process but depends for its success on the use of dyes which are readily discharged and doubt is expressed concerning the possibility of obtaining satisfactory discharges by means of hydrosulphite solutions. C.

Tubular Fabric Finishing Apparatus. T. Geeson (Macclesfield). E.P.453,947 of 18/4/1935.

In apparatus for steaming, drying and finishing tubular fabrics, the fabric passes in succession over a conical device and a circumferential steam outlet in a steam head, and then passes immediately from contact with the latter on to a stretcher frame where it is dried internally by heat radiated from the steam head. The fabric is drawn off by rollers. C.

Azo Dyes: Production. Society of Chemical Industry in Basle. E.P.453,953 of 30/4/1935 (Conv. 19/5/1934).

Dyeings or printings are produced on the fibre by coupling thereon an arylide of 2 : 3-oxynaphthoic acid with a diazo compound of an amine of given general formula. Suitable amines are made by condensing, for example, acetyl chloride with bromobenzene, nitrating the product, condensing the product with a phenol and reducing. Examples describe the dyeing of cotton yarn in red shades. C.

Sulphonic Acid Wetting and Emulsifying Agents. Chemische Fabrik R. Baumheier A.-G. (Zschöllau, Germany). E.P.454,183 of 9/7/1935.

Water-soluble products are obtained by the joint condensation and sulphonation of a polynuclear hydrocarbon or a substitution product thereof, a fatty acid having ten or more carbon atoms or a derivative thereof, and an alcohol corresponding to the acid of a natural fat, or a sulphuric ester of such an alcohol. The acids obtained may be converted into their alkali or ammonium salts or into salts with organic bases, e.g. ethanolamine, triethanolamine or pyridine. The products are useful (*a*) as wetting and cleansing agents in the textile and allied industries, (*b*) as emulsifiers for oils, fats and waxes, and (*c*) as fat-splitting catalysts. C.

Oxazine Dyes: Production. W. W. Groves, London (I. G. Farbenindustrie A.-G., Frankfort). E.P.454,302 of 25/3/1935.

Oxazine dyes are made by treating a 1:4-benzoquinone derivative containing sulpho-groups prepared from a sulphonated aminodiaryl, aminodiaryl ether, aminodiaryl sulphide or aminodiarylurea of given general formula with sulphuric acid, chlorosulphonic acid or fuming sulphuric acid or with an alkaline condensing agent, preferably in presence of an organic or inorganic oxidising agent. The products dye animal, vegetable and artificial fibres. C.

Brown Dyes: Production. W. W. Groves, London (I. G. Farbenindustrie A.-G., Frankfort). E.P.454,423 of 26/3/1935.

Brown dyes for wool and silk are obtained by condensing an aromatic *o*-diamino compound of the formula $RR_1N{\cdot}Ar{\cdot}NH_2$, wherein Ar stands for a substituted or unsubstituted aromatic radicle, R for hydrogen or alkyl and R_1 for hydrogen, alkyl, aryl, acyl or aroyl, with a mono- or di-α-halogenanthraquinone containing no free or substituted amino groups in the anthraquinone nucleus, preferably in the presence of copper or a copper compound and an acid-binding agent, and sulphonating the product so obtained if it does not contain a sulpho group. C.

Yarns and Fabrics: Anti-crease Finish. E. Pollak (Vienna). E.P.454,424 of 26/3/1935 (Conv. 27/3/1934).

Fibres, yarns, fabrics, felt and paper are rendered crease-resistant by impregnating with an aqueous solution of an artificial resin together with a wetting agent comprising an alkylnaphthalenesulphonic acid, then hardening the resin. The material may be subjected to a pre-treatment for softening, swelling or loosening. The material is preferably impregnated with a resin solution of low viscosity until the maximum amount is absorbed. After impregnation, surplus is removed by squeezing or the like, and hardening preferably effected under tension. C.

Partially-saponified Vinyl Ester Sizing and Finishing Compounds: Preparation. British Celanese Ltd. (London), D. Finlayson and C. E. Stafford. E.P. 454,425 of 27/3/1935.

Polymerised vinyl esters are partially saponified with the aid of a base in the

presence of an alcohol, the saponification process being interrupted while the polyvinyl compound still contains a proportion of at least of the order of 20 per cent. of the theoretical maximum content of ester groups, the amount of base employed being of the order of 20 per cent. or less of the amount theoretically necessary to effect the desired degree of saponification. Suitable bases include sodium and potassium hydroxides, ammonia, methylamines, ethylenediamine, pyridine and aniline. Suitable alcohols include methyl alcohol, ethyl alcohol, glycerol or glycol. The products, which may be water-soluble if they contain a high proportion of ester groups, may be used for the sizing or finishing of textile materials such as cotton, wool, regenerated cellulose or cellulose esters or ethers. Sulphonated oils, oils, fats or waxes may be added to the compositions. The products may also be used as resists or for coating or in conjunction with other after-treatment processes such as stretching or crêping. C.

Azo Dyes : Production. J. R. Geigy A.-G. (Basle, Switzerland). E.P.454,445 of 5/4/1935 (Conv. 9/4/1934).

Diazotised 2 : 5-dichloro-4-nitraniline or 5-chloro-2 : 4-dinitraniline is coupled with a N-alkyl-N-dioxypropylamine of the benzene series which is unsubstituted in *p*-position to the amino group and contains no substituents inducing solubility in water. Bluish-red to violet dyes applicable to cellulose esters are obtained. C.

Polyazo Dyes : Production. Chemical Works, formerly Sandoz (Basle, Switzerland). E.P.454,470 of 18/11/1935 (Conv. 22/11/1934).

Polyazo dyes containing at least three sulphonic groups in the molecule are manufactured by coupling tetrazotised diaminodiaryldisulphonic acids on one side with a sulphonated 1-aryl-3-methylpyrazolone or a naphtholsulphonic or an N-arylamino- or N-acylamino-naphtholsulphonic acid (other than a 1-N-acylamino-8-naphthol- or 2-N-acylamino-5-naphtholsulphonic acid), and on the other side with phenol, its homologues or substitution products. Alternatively, a monodiazotised diaminodiaryldisulphonic acid or its monoacyl derivative is first coupled with one of the coupling components, and the monoazo dye obtained is further diazotised, after saponification if necessary, and coupled with the second coupling component. The products may be acylated by means of an arylsulphohalide in the presence of acid binding agents. They dye animal fibres yellow, orange, red and brown shades. C.

Cellulose Ester Coating Compositions : Application. E. I. Du Pont de Nemours & Co. (Wilmington, Delaware, U.S.A.). E.P.454,590 of 4/4/1935 (Conv. 12/5/1934).

Glossy coatings are produced on flexible sheet material such as woven fabric, felt or paper by applying first a coating composition comprising a cellulose derivative, e.g., cellulose nitrate or acetate, a softener other than blown vegetable oil, e.g., raw castor oil, tricresyl phosphate, dibutyl phthalate or dibutyl tartrate and a pigment, then applying a further coating composition comprising a cellulose derivative, a blown vegetable oil, e.g., blown cottonseed, rapeseed or castor oils and a pigment, and finally applying a clear drying-oil varnish. C.

Urea Formaldehyde Resins : Application to Reduce Swelling of Rayon. W. W. Groves, London (I. G. Farbenindustrie A.-G., Frankfort). E.P.454,657 of 1/2/1935.

Threads, fabrics and like materials of cellulose or hydrated cellulose are treated in order to diminish the swelling effect of alkaline liquids or water, by impregnating the materials with the components of a urea or thiourea-formaldehyde resin and with two other organic substances, one containing at least one free hydroxyl group and also at least one reactive group, namely, halogen, primary or secondary amino group, carboxyl group, or additional hydroxyl group, and the other being an alcoholate, phenolate, acid chloride, acid anhydride or salt of an organic acid. The reagents are fixed on the materials by heating to a temperature of 60-120° C. The materials may be treated with the reagents in any order or simultaneously. The process may be applied to mixtures of regenerated cellulose threads with wool or cotton. C.

Dressing and Lubricating Composition. British Celanese Ltd. (London). E.P. 454,666 of 30/4/1935 (Conv. 4/5/1934).

A finish suitable for application to filaments, fabrics, straws, bristles, films and foils, comprises a non-drying animal or vegetable oil, a fat, or a higher fatty

acid, and a hydroxybenzene substituted in the para position (other than cresylic acid or a xylenol). Examples of such substituted compounds are hydroquinone and *p*-hydroxybenzoic acid alkyl esters. The proportion of hydroxybenzene compound in the mixture is preferably 0·2 to 4 per cent. The composition may be applied to the textile materials and the like during or after manufacture, or it may be incorporated in the solution from which the filaments or films are produced. C.

Dyeing Apparatus. H. E. Partridge (Edinburgh). E.P.454,678 of 22/6/1935.

A dyeing vat of the kind provided with means for introducing compressed air in order to agitate and circulate the vat liquor is provided also with means for introducing and controlling steam or heated vapour, whereby simultaneous or successive jets of air and steam may be obtained automatically and periodically, so that stream-line circulation of the liquor is avoided and heat is evenly distributed. C.

Azo Dyes : Production. J. W. Leitch & Co. Ltd. (Huddersfield), A. E. Everest and J. A. Wallwork. E.P.454,729 of 16/5/1935.

Animal fibres such as wool or silk, with or without an admixture of cotton or rayon, are dyed by subjecting them to the action of a bath containing an aqueous solution of a diazotised amine and one or more compounds or salts of Cr, Cu, Ni or Co, and thereafter rinsing in water and drying. C.

Azo Dyes : Production. Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimique de Nord Reunies Etablissements Kuhlmann. E.P.454,757 of 12/2/1936 (Conv. 5/3/1935, 30/10/1935 and 28/12/1935).

Azo dyes for cellulose esters are made by coupling the diazo compounds of aromatic amines containing no free COOH or SO_3H groups with hydroxyalkyl derivatives of 3-hydroxydiphenylamine of given general formula. Red, brown, Bordeaux and violet shades are obtained. C.

Synthetic Resin Coating Compositions. G. Frenkel (Surbiton). E.P.454,769 of 26/3/1936.

A primary coating for pliable bases such as paper, cardboard or textile fabric comprises an artificial resin such as a polyvinyl resin together with a known surface tension increasing agent such as rubber, chlorinated rubber, or a metal salt such as aluminium stearate, dissolved in solvents such as aromatic hydrocarbons, ketones and esters. C.

Synthetic Resins : Production in Textile Materials. I. G. Farbenindustrie A.-G. (Frankfort). E.P.454,868 of 8/4/1935 (Conv. 7/4/1934).

Vegetable and artificial fibrous material is impregnated with a solution of a compound capable of condensing with formaldehyde to produce a resin, dried, and then treated with formaldehyde vapour above 100° C. The condensation may be effected in the presence of a solvent for the formaldehyde which is not a solvent for the resin or for the other component, e.g., xylene. Suitable impregnating materials are phenol, urea, dicyandiamide and butylurea. C.

Azo Dyes : Application in Printing. E. I. Du Pont de Nemours & Co. (Wilmington, Delaware, U.S.A.). E.P.454,869 of 8/4/1935 (Conv. 6/4/1934).

Textile materials are dyed or printed by applying to the material a composition comprising a water-soluble diazoamino compound (derived from a diazo component free from solubilising groups and a secondary amine), a suitable ice-colour coupling component, and a developing agent (i.e. a water-soluble compound capable of generating acid during the subsequent steaming or heating operation), together, if desired, with a wetting agent or solvent, alkaline-reacting substance, and thickening agent, and thereafter applying heat and moisture, e.g., by steaming. Vat dyes may be applied prior to developing the azo colour. The process is applicable to cotton, animal and synthetic fibres, e.g., cellulose acetate, viscose, wool and silk. C.

Crease-resisting Textiles : Production. I. G. Farbenindustrie A.-G. (Frankfort). E.P.454,875 of 11/4/1935 (Conv. 11/4/1934).

The crease-resisting properties of vegetable and artificial fibrous materials are improved by impregnating with a solution containing a compound capable of condensing with formaldehyde and a soluble compound capable of yielding formaldehyde, drying the material, and heating without addition of formaldehyde and in the absence of a catalyst, to form a synthetic resin. C.

Pyrazinoanthraquinone Dyes: Production. Coutts & Co. (London) and F. Johnson (I. G. Farbenindustrie A.-G., Frankfort). E.P.454,882 of 11/6/1935.

Pz.5·6-Dihalogen-1 : 2-pyrazinoanthraquinones are reacted with aromatic or heterocyclic primary or secondary amines. Either one or both halogen atoms of the 1 : 2-pyrazinoanthraquinone are replaced according to conditions, or both may be replaced by different radicles, or the compound may be condensed with an ortho-diamine either to replace one halogen atom or to form a dihydroazine ring by replacement of both. Dyes suitable for cotton are obtained. C.

Paper, Yarns and Fabrics: Impregnation with Polystyrene. Standard Telephones and Cables Ltd. (London) and J. K. Webb. E.P.454,923 of 8/3/1935.

Paper, fabric, yarn, etc., in wound form, is impregnated with monomeric styrene, with or without a plasticizer, the styrene is polymerised in a closed vessel and the material is unwound while hot, subjected to treatment for removal of surplus polystyrene and re-wound, preferably after calendering. C.

Cellulose Ester Materials: Delustring. H. Dreyfus (London). E.P.454,942 of 9/4/1935.

Permanently delustred textile materials, foils, films, and the like of organic substitution derivatives of cellulose are obtained by subjecting the materials to local or uniform delustring treatment with hot aqueous liquids or moist steam and then subjecting the delustred materials to esterification treatment so as to render the delustring permanent. The products are resistant to the relustring action of wet ironing and other laundering treatments, and under a lens they still have the crazed appearance characteristic of cellulose acetate which has been delustred with boiling water or moist steam. The products have increased resistance to further delustring by hot or boiling aqueous liquids, and the affinity for dyes, particularly dispersed insoluble dyes is modified. The process may be applied to cellulose acetate or other cellulose ester material, and the esterifying agent may be acetic, propionic, or butyric anhydride. The anhydride is diluted to suppress its solvent power and reduce its relustring power preferably so that there is little or no change in lustre during esterification. Yarns may be treated in hank form or as open wound packages, or as woven, knitted or other fabrics. The reaction may be carried out at raised pressure and temperature. Differential dyeings may be obtained on mixed fabrics containing treated and untreated yarns or treated yarns and other types of yarn such as cotton, regenerated cellulose yarn or animal fibres. Local effects are obtained by printing a fabric with a wax or other resist, delustring by treatment with boiling soap solution, removing the wax or other resist, and subjecting the whole fabric to acetylation. C.

Starch Ether Adhesives: Preparation. E. I. Du Pont de Nemours & Co. (Wilmington, Delaware, U.S.A.). E.P.454,963 of 11/4/1935 (Conv. 11/4/1934).

Glues, pastes, adhesives and like materials are obtained by treating starch or other similar carbohydrates with or without gelatinisation, with certain etherifying agents in the presence of alkali, the quantity of etherifying agent employed being from 0·02 to 0·75 mol per mol of $C_6H_{10}O_5$. All carbohydrates, other than cellulose, of the type $(C_6H_{10}O_5)_n$, for instance, maize, potato, corn, cassava, wheat and rice starches, starchy fruits, starch flours, soluble starch, amorphous and crystallised starch (amylo-dextrin) α- and β-amylan, dextrins, inulin, geloses and hydrolysed and oxidised starches such as British gum, may be used as initial materials to be etherified, and the etherifying agents may be esters and mixed ester salts of inorganic acids and their alkali salts or cyclic olefine oxides and chlorhydrins of the type of cyclohexene oxide and chlorhydrin. C.

Titanium and Tin Delustring Agents: Application. H. Dreyfus (London). E.P. 454,968 of 12/4/1935.

Insoluble compounds of Ti and Sn are fixed on textiles by impregnating with a double salt of a weak polybasic acid with a volatile base and one of the metals, and decomposing the double salt. For example, the lustre of cellulose acetate fabric is reduced by padding with a solution containing 5 per cent. of diethylene glycol and titanium ammonium tartrate, equivalent to 2·5 per cent. of TiO_2, and then steaming. Titanium ammonium carbonate is mentioned for use with regenerated cellulose rayon. C.

Wetting Agents : Production. W. J. Tennant (for Henkel Ges., Düsseldorf). E.P.455,086 of 7/3/1935.

Soap substitutes having wetting, dispersing and foaming properties are prepared from compounds of the type Alk. Ar. OH, by hydrogenating and introducing a water-solubilising group (sulphonic, phosphoric, sulphuric, etc., acids). In the first example, *n*-heptyl-*o*-cresylketone, and the mixture of ketones prepared by condensing coconut fatty acids and cresols, are hydrogenated and sulphonated. Several other examples are cited. C.

Hosiery Dyeing Form. British Celanese Ltd. (London). E.P.455,194 of 16/3/1936 (Conv. 16/3/1935).

A form for supporting hosiery in the dye-bath has a hinged shield which is placed over the upper part of the article to protect it from excessive ebullition and so prevent the formation of blisters, streaks, etc., especially when the goods contain cellulose esters. C.

Blue Acetate Rayon Dyes. J. R. Geigy A.-G. (Basle). E.P.455,216 of 13/3/1935 (Conv. 7/4/1934).

Blue dyes for acetate rayon are obtained by diazotising a 6-halogen-2 : 4-dinitraniline in concentrated sulphuric acid and adding the acid diazo solution directly to a solution of a mono-dihydroxypropyl amine of the naphthalene series obtained by condensing the corresponding amine with chlorodihydroxy-propane. C.

Azo Dye Metal Complexes : Preparation. A. G. Bloxam (for Society of Chemical Industry in Basle). E.P.455,274 of 10/4/1935.

In the dyeing of cotton and rayon with direct azo dyes of which the complex Co, Ni, Mn, Zn and Cu compounds are but sparingly soluble, the dyeing and after-treatment with the metallic compound are performed in one and the same bath, appropriate wetting assistants being advantageous. A large number of examples are given, all specifying a copper treatment. C.

Cellulose Acetate : Dyeing. A. Carpmael (for I. G. Farbenindustrie A.-G.). E.P.455,285 of 15/4/1935.

Cellulose acetate is dyed with an azo dye from the diazotised sulphurous acid ester of 1 : 8-aminonaphthol and a coupling component not containing a free sulphonic or carboxylic group, the sulphurous acid ester group being split off during the dyeing process. C.

Wetting Agents. I. G. Farbenindustrie A.-G. (Frankfort-on-Main). E.P.455,310 of 18/4/1935 (Conv. 21/4/1934).

A fatty acid of the soap-forming type (or derivative of such acid) containing attached to the methylene group adjacent to the carboxyl group a non-acid hydrophilic residue (fifteen types are shown in graphic formulae) is used as a textile assistant. For example, the compound of *α*-chlorolauric acid with mono- or di-ethanolamine is a wetting agent for mercerising. C.

Dyed Plastic Masses : Manufacture. Society of Chemical Industry in Basle. E.P.455,320 of 12/8/1935 (Conv. 13/8/1934).

Metallic complexes (Ni, Zn, Co, Cu, Cr) of arylmethane dyes are claimed for incorporation in the moulding powders etc. from which coloured plastic masses are formed. A large number of examples are given. C.

Soluble Azo Dyes : Production. Coutts and Co. (London), and F. Johnson (for I. G. Farbenindustrie, A.-G.). E.P.455,352 of 16/4/1935.

Azo dyes soluble in water are obtained by coupling diazotised amines with amines of the general formula R·NXY, where R is an aromatic residue, X is an alkyl, cycloalkyl, aralkyl or aryl group, and Y is an alkyl group, free from carbonyl, to which is attached a quaternary ammonium system. For example, diazotised *p*-nitraniline is coupled with the condensation product from pyridine and N-*n*-butyl-*ω*-chloroethylaniline ; the dye gives brilliant red shades on cotton and rayon. C.

Alkylated Aromatic Wetting, Washing and Emulsifying Agents. W. W. Groves (for I. G. Farbenindustrie A.-G.). E.P.455,379 of 15/1/1935.

Compounds of the formula ARX, where A is an aryl radicle, R is an aliphatic radicle attached to A by a C-C linkage, and X is a carboxylic, sulphonic, substituted amino or quaternary ammonium group, are treated in the presence of an acid condensing agent with at least two molecular proportions of an aliphatic

alcohol containing at least three carbon atoms to yield products that, in the form of salts, are useful agents for washing, scouring, addition to dye liquors, etc. The first example is tri-isobutylphenylacetic acid, obtained by condensing phenylacetic acid with butyl alcohol in the presence of sulphuric acid. A large number of examples are cited. C.

Sulphonated Alkylphenol Wetting Agents. W. W. Groves (for I. G. Farbenindustrie A.-G.). E.P.455,491 of 21/2/1935.

Alkylphenols having more than four carbon atoms in the alkyl radicle are sulphonated and condensed with an aldehyde to form tanning agents, the salts of which are wetting, dispersing and cleansing agents. For example, *p*-isohexylphenol is sulphonated and condensed with formaldehyde. C.

Soluble Secondary Disazo Dyes: Production. Imperial Chemical Industries, Ltd. (London) and A. H. Knight. E.P.455,643 of 25/4/1935.

Soluble secondary disazo dyes devoid of sulphonic or carboxylic groups are made by coupling a diazotised aminoarylhydroxyalkyl ether with a *p*-coupling amine of the benzene or naphthalene series, again diazotising, coupling with a phenol, and converting the disazo compound into its sulphuric ester. The dyes give orange shades on acetate rayon and are also suitable for silk, wool and leather. C.

Azine Dyes: Production. Imperial Chemical Industries, Ltd. (London) and F. H. S. Curd. E.P.455,693 of 25/4/1935.

Azine dyes are made by oxidising a mixture of a 1 : 3-diarylaminonaphthalene-8-sulphonic acid with a 4-amino-4^1-alkyldiphenylamine-2-sulphonic acid in which the alkyl group contains 3 to 8 carbon atoms. The dyes are soluble and give fast blue shades on animal fibres. C.

Chromable Acid Anthraquinone Dyes: Production. W. W. Groves (for I. G. Farbenindustrie A.-G.). E.P.455,711 of 22/3/1935.

Acid anthraquinone dyes that yield chromium lakes or may be chromed on the fibre are prepared by condensing an α-halogenanthraquinone sulphonic acid (or substitution product) with an aromatic amino-*o*-hydroxycarboxylic acid having the NH_2 and OH groups in different rings. C.

Cellulose Acetate Fabrics: Scrooping. British Celanese, Ltd. (London), G. H. Ellis and E. W. Kirk. E.P.455,782 of 27/4/1935.

A scroop finish is imparted to cellulose acetate fabrics and the like by depositing thereon about 0·05-2·5 per cent. by weight of an insoluble higher aliphatic ester of a polyhydric alcohol or of a higher acyclic monohydric alcohol. The agent is applied as a solution in an organic solvent or as an emulsion with glue and a wetting agent. In an example, 100 gm. of beef fat or spermaceti are melted, stirred into 100 cc. of water containing 50 gm. of glue and 10 gm. of Nekal A, and made up to 1 l. of emulsion. The dyed fabric is steeped in a 2·5 per cent. solution of this emulsion, hydro-extracted until it retains 40 per cent. of its weight of liquid, dried and finished. C.

Rubberised Felt: Manufacture. V. G. Manufacturing Co. Ltd. (London) and F. M. Van Gelderen. E.P.457,341 of 31/5/1935 : 26/11/1936.

Fleecy webs or loosely woven fabrics are impregnated with aqueous dispersions of rubber, varnish, drying oils, artificial resins or cellulose derivatives, squeezed to remove surface layers of the liquid, and then exposed to a coagulating agent (e.g., acid). The special claim is made that the coagulant drives the dispersion before it before coagulation actually takes place so that, for example, if a liquid coagulant is applied to one face of the material (e.g., by roller) the rubber is deposited in the opposite face. Alternatively, if the impregnated fabric is hung up in a coagulating atmosphere, the rubber is driven to the middle. The " one-sided " material can be used as a felt base for artificial leather, rubber-cloth and the like. C.

Ageing or Steaming Machine. W. Horridge (Lancaster). E.P.457,952 of 20/11/1935 : 9/12/1936.

The steam chest of an ageing or steaming machine is divided into two independent chambers at the top of the machine and feeding to opposite ends. Either chamber may be connected to the steam supply or exhaust by a suitable valve so that steam may be circulated through the machine in either direction relative to the cloth. C.

5—ANALYSIS, TESTING, GRADING AND DEFECTS

(A)—Fibres

Cotton Muslin Fibres: Shrinkage in Water and Alkali. B. M. Yoder and M. L. Willard. *Text. Colorist*, 1935, **57**, 772-775 (through *Chem. Abstr.*, 1936, **30**, 7858[6]).

The diameters of fibres in grey muslin were measured before and after treatment with water and with caustic soda (0·1 and 5 per cent.) at 20° and 100° for periods up to 12 hours. Shrinkage was fairly constant after 30 minutes at 20° or 1 minute at 100°. Most shrinkage was obtained with 5 per cent. alkali. C.

Ramie and Mercerised Ramie Fibre: Optical Properties. A. Frey-Wyssling. *Helv. Chim. Acta*, 1936, **19**, 900-914.

The refractive indices of ramie and mercerised ramie fibres have been measured by the method in which the wave-length of the light is changed instead of the index of the mounting medium. No well-defined value can be ascribed to the fibre for the index varies with the mounting medium. In imbibition experiments with mixtures of glycerol or benzyl alcohol and other liquids there is an indication that these alcohols are gradually accumulated in the fibre, suggesting an optical method for investigating adsorption. There is scarcely any difference in dispersion between native and mercerised ramie; the values of $n_F - n_C$ lie between 0·0070 and 0·0077. Similarly, the value of the dispersion of the double refraction is 1·01 for both materials. On the other hand, there is a wide difference in refractivity. The value of n_D in the direction parallel to the fibre axis (n_a; " ausserordentlicher Strahl ") is 1·596 for native ramie and in the perpendicular direction (n_o; " ordentlicher Strahl ") is 1·528; for mercerised ramie the values are n_a 1·574 and n_o 1·525. The double refraction, $n_a - n_o$, therefore falls on mercerising from 0·068 to 0·049, suggesting an optical test for mercerisation. C.

Textile Fibres: Structure and Properties. W. T. Astbury. *Nature*, 1936, **138**, 824-825.

A brief summary is given of papers bearing on the structure and physical properties of fibres read at the British Association meetings, 1936. C.

Vegetable Fibres: Structure. A. Sakostschikoff. *Helv. Chim. Acta*, 1936, **19**, 973-978.

The author replies to Haller's denial of the existence of transverse structures in cotton and other vegetable fibres by showing that modifications introduced by Haller in the author's technique were sufficient to account for his failure to obtain the same effects. In particular, the sulphuric acid used by Haller was too weak and his method of washing by water too slow. The acid should be at least 93-94 per cent. C.

Cellulosic Fibres: Tensile Properties in Various Media. Mlle. V. Bossuyt. *Bull. Soc. Chim., France*, 1936, [v], **3**, 1975-1982.

Load-extension diagrams are reproduced for ramie, raw and mercerised, in dry air, air at 70 per cent. RH, water, formamide, concentrated solution of lithium thiocyanate, and caustic soda (5-37 per cent.). In some cases, the curves trace the third cycle of loading. Similar diagrams are also given for hemp, flax and cotton fibres in air at 70 per cent. RH. The effect of attack on the cellulose is seen in the curves and is more pronounced on mercerised ramie than on the raw fibre. The apparatus used appears to be of the balance type in which the load is exerted through an aluminium plunger in water and the extensions are registered by an optical lever device. C.

Cotton Hairs: Determination of Average Length and Fineness. N. Ahmad and C. Nanjundayya. *J. Text. Inst.*, 1936, **27**, T253-272.

Kapok and Other Upholstering Filling Materials: Springing Capacity and Pentosan Content. J. J. Hansma. *Chem. Weekblad*, 1936, **33**, 620-624; 624-625 (through *Brit. Chem. Abs.*, B., 1936, 1199).

The official Dutch method for testing the springing capacity of upholstery filling materials is based on a microscopical examination and determination of the pentosan content which is stated to be usually 25 per cent. for genuine kapok. This method is, however, unreliable if certain adulterants, notably " Akan " (akund), are present, as these give high results. The specific springing capacity, initially (D_0) and after 24 and 48 hours should also be taken into account.

Data for 48 samples show that a genuine kapok has a pentosan value of 23·5-29 per cent., a value of D_0 above 30 and D_0—D_{48} not more than 4·5. An apparatus is described by means of which D may be determined. A lacquered wire basket weighted with about 2·5 kg. of lead is suspended from the arm of a balance. The hinged lid of the basket bears a thin copper disc with four wire legs. The basket is immersed in water containing 1 per cent. of formaldehyde up to a mark on one of the wire legs. Balance is struck (a gm.) and then x gm. of the sample (e.g., 60 gm.) are placed in the basket and the weight required to restore balance (b gm.) is found immediately and after 24 and 48 hours; $D = (a\text{-}b)/x$. C.

Characteristics of Wool. D. Sutherland. *Natl. Wool Grower*, 1936, **26**, No. 4, pp. 19-20.

Factors in the judgment of wool quality and fineness, and methods of flock improvement are discussed. W.

Determination of Wool and Mohair by Scale Size and Diameter. J. H. Skinkle. *Amer. Dyestuff Rep.*, 1936, **25**, P620-P621.

Measurements of scale length in microns (S), and diameter in microns (**D**) have been made. It is found that values of S, D and S^3/D are sufficient to determine whether a fibre is wool or mohair. For example, if S is less than 17 the hair is wool; if S is greater than 18·5 the hair is mohair; if S is between 17 and 18 the hair is probably wool, and the value of S^3/D, if below 140, confirms this; if S is between 18 and 18·5 the hair is probably mohair and the value of S^3/D, if below 160, confirms this. Details of the technique for the microscopic examination of the fibre are given. W.

(B)—YARNS

Rayon Yarns: Lustre Measurement. A. S. Hunter (Du Pont Rayon Co.). *Rayon Text. Monthly*, 1936, **17**, 609-610, 673-674.

The lustre of rayon yarns is measured by means of the Du Pont "Lustermeter" which is described. The yarn is wrapped in a controlled manner on a cylinder in which form it presents a line of high-intensity specular reflection bordered by zones of diffuse reflection. The magnitude and sharpness of the "line" is a measure of the optical smoothness of the surface. The instrument brings the two reflections into a matching field and by adjusting a diaphragm it is possible to "stop down" the specular reflection and secure a match. The diaphragm is so graduated that it shows "relative lustre" directly. For the purpose of comparison with outside standards, plates coated with titanium dioxide can be inserted. If the plate blocks the diffused reflection, then the instrument indicates "specular reflection" by contrast against the standard surface, and vice versa. The instrument and plates are calibrated against cylinders coated with magnesium oxide ("relative lustre" 0 per cent., "specular reflection" 0 per cent., "diffuse reflection" 100 per cent.), white enamel (18·3, 13·8, 99·6 per cent.) and grey enamel (38·0, 11·2, 81·5 per cent.). Values obtained on various bright, matt and semi-matt rayon threads are tabulated. C.

Textile Alignment Charts: Application. R. G. Oversby. *Text. Mfr.*, 1936, **62**, 418-419.

The author describes the construction and use of nomograms for finding the count of yarn in the loom from the count in the finished cloth, and the weight per yard from counts and shrinkage, or conversely. C.

Rayon Cakes and Cones: Influence of Humidity on——. *RUSTA*, 1936, **11**, 645-647.

When viscose rayon cakes are stored in an atmosphere of different humidity from that of the spinning room they gain or lose weight and become harder or softer according as the humidity is higher or lower than that in the spinning room. Cones of viscose rayon show similar changes with variations in atmospheric humidity, but in this case the changes occur more slowly. Tables showing losses and gains in weight of cakes and cones after storing for different periods at various humidities are given. A humidity of 65 per cent. is recommended for rooms used for storing wound packages of rayon. C.

Spinning Mill Testing Problems: Discussion. Southern Textile Association (Carders' and S. Carolina Spinners' Divisions). *Cotton* (*U.S.*), 1936, **100**, No. 11, 84-85.

Problems of testing in the mill are discussed. Various members described testing equipment in use and some advocated the seriplane for cotton yarn. The technique of " ends-down " observations is discussed by one member who reported that about half the causes remained " unclassified." C.

(C)—FABRICS

Cotton Cloths: Tensile and Bursting Strength Tests. *Rayon Text. Monthly*, 1936. **17**, 681 (from *Bull. Lowell Text. Inst.*).

A " directed " bursting strength test was made on a machine of the diaphragm type but with the usual base replaced by a hollow square with two opposite sides cut away so that the yarns passing under them were free to move as the diaphragm extended. By this means, the load could be " directed " to the warp or weft as desired. Three cotton cloths—grey printer, grey shoe drill and an army duck—were tested by this machine and by the standard strip and grab tests. The results tabulated show that the three tests place the cloths in the same order for strength, show differences of the same magnitude and, with one exception, give the same indications of variability. C.

Cotton Fabrics: Effects of Processing on Strength. J. Anderlitschka. *Mitt. tech. Versuchsamtes*, 1935, **24**, 65-71 (through *Chem. Abstr.*, 1936, **30**, 4330[1]).

Tensile and wear tests have been made on a series of cotton fabrics, woven by different methods from the same yarns, bleached, and washed. The " quality numbers " (tearing strength × 20 ÷ weight per square metre) show that the behaviour at different stages is not uniform. Bleaching is said to reduce the properties more than oft-repeated washing. C.

Crepe Fabrics: Measurement of "Pebble." I. J. Saxl. *Text. Research*, 1936, **6**, 515-517.

A method for determining quantitatively the surface pattern of textiles—notably the " pebble " of crepe cloths—consists in making a plaster cast and investigating its relief structure either by optical or mechanical enlargement of the profile in the direction of the warp and the weft. C.

Dyed Textiles: Measurement of Colour. R. D. Nutting. *Text. Research*, 1936, **7**, 5-23; *Amer. Dyes. Rept.*, 1936, **25**, 585-592, 630-631.

An equation is put forward that correlates the concentration of dye on cloth with the amount of light absorbed, and is based on analogies with the transmission of light by dye solutions. The absorption is measured by the spectrophotometer at the wave-length of maximum absorption and allowance is made for the reflection of the undyed material. The subject is illustrated by reference to dyeings on wool with blue, green, yellow, orange and red colours, the data and curves being reproduced in full. Some errors in previous papers are corrected. C.

Dyed Textiles: Colour Tolerance Specification. Dorothy Nickerson. *Text. Research*, 1936, **6**, 505-514.

The value of the Munsell system in colour specification is discussed. The Munsell values for hue, brilliance and chroma are plotted for a set of nineteen pairs of cotton materials, each pair being a commercial match, and a similar set of woollen materials. The plots suggest that matching was more closely demanded for the woollen materials and also provide a basis for expressing tolerance limits in Munsell units. Another series of plots refers to faded samples. (See below.) C.

Faded Fabrics: "Index of Fading." Dorothy Nickerson. *A.S.T.M. Standards on Textile Materials* (*Ctte. D.*13), 1936, pp. 238-241.

The author recommends the application of the Munsell system of colour measurement to fading tests and proposes as an " Index of Fading " the formula $(C/x)dH/3 + dL + dC/2$, where H is hue, L lightness (brilliance), C chroma, and d difference. The C/x factor is introduced to allow for the increasing number of perceptible hue steps at increasing chromas. [In a later paper (see above), x is given as 5.] C.

Silk Dresses: Wearing Qualities. Mary C. Whitlock. *A.S.T.M. Standards on Textiles* (*Ctte. D.* 13), 1936, pp. 272-280.

Records of the life of twenty silk dresses made from seven materials and worn by different women are tabulated, graphed and discussed. The best service was given by a green, pure-dye, flat crepe. (One dress from this silk was worn 197 times and then destroyed in an earthquake!) Major defects were fading, running of colour, yarn slippage and water spotting. Ten of the dresses were injured by perspiration. C.

Silk Dress Goods: Wearing Qualities. Pauline B. Mack. *A.S.T.M. Standards on Textile Materials* (*Ctte. D.* 13), 1936, pp. 242-248.

A summary is given of investigations extending over seven years on the wearing qualities of silk goods in relation to price, sales information and customer's judgment. A general conclusion drawn from the study is that the main cause of loss of durability in silk goods is the presence of mineral weighting. As the result of an extensive questionnaire it appears that a high proportion of American women are aware of the weighting process, but the investigation states several times that it is quite common for retailers to describe a material as unweighted when in fact it may be heavily weighted. In tests of judgment in which women from the general public and some with textile training were asked to assess fabrics for weighting and probable durability, the over-all percentage of accurate judgments in both groups was actually less than if the selection had been left to chance. Those without textile knowledge tended to over-value the fabrics and those with textile training to under-value them. C.

Silk and Rayon Dress Goods: Serviceability. Ethelwyn Dodson. *A.S.T.M. Standards on Textile Materials* (*Ctte. D.* 13), 1936, pp. 256-258.

Tensile, yarn slippage, shrinkage in dry- and wet-cleaning, and colour fastness tests are summarised on popular autumn and winter dress materials of the 1935-36 season in the U.S.A. Of the 82 fabrics, none broke under less than 20 lb., nine showed signs of yarn slippage under a load of 10 lb. or less, 70 shrank less than 5 per cent. in dry-cleaning, but only 13 passed all the fastness tests. C.

Tendered Silk: Viscosity Test. S. R. Trotman. *J. Soc. Chem. Ind.*, 1936, p. 325T-327T.

The value of viscosity measurements is demonstrated by further examples. Zinc chloride of *d* 1·67 is recommended; less concentrated solutions do not dissolve silk completely. The silk solution is 2·5 per cent. (wt./vol.). Undamaged silk at 20° shows a viscosity of about 19 centipoises, or 3-3·1 compared with water. Degummed silk gave the following values: (1) degummed with olive oil soap, 3·10; (2) with soap and soda, 2·00; with monopol soap and sodium metasilicate, 2·95; with pancreatin, 2·52; commercial degummed silks, 2·80 and 2·95. Dyed silk gave lower viscosities if the dyebath was hotter than 85° or contained salts; a tendered stocking containing sodium sulphate had a viscosity of 1·70. Evidence of tendering was shown on exposing silk to the Fadeometer lamp; samples at about *p*H 10 were less tendered than more acid samples. Exposure to ultra-violet light (behind Wood's glass) had the effect of rendering the silk less soluble and degummed silk became yellowish-brown. C.

Textile Materials: Specification and Testing. American Society for Testing Materials. *A.S.T.M. Standards*, 1936, Pt. II. Also *A.S.T.M. Stnds. on Textile Materials, Ctte. D.* 13, 1936.

These volumes give details of the current standards. Slight changes from previous particulars have been made in the following cases:—D39, Standard general methods of testing woven textile fabrics; D76, Standard specifications for textile testing machines; D123, Tentative definitions and terms relating to textile materials; D180, Standard general methods of testing and tolerances for cotton yarns and threads; D204, Ditto for cotton sewing threads; D437, Standard method of test for shrinkage in laundering of woven cotton goods; D435, Tentative method of test for fastness of dyed or printed cotton fabrics to laundering or domestic washing (new tentative standard); D181, Standard methods of testing and tolerances for hose ducks and belt ducks; D274, Ditto for certain light and medium weight cotton fabrics; D433, Ditto for certain carded cotton grey goods (new tentative standard); D354, Ditto for tubular sleeving and braids; D259, Tentative methods of testing and tolerances for woven

tapes; D335, Standard specifications for 0·007 in. cotton tape for electrical purposes; D436, Tentative method of test for fastness of dyed or printed silk or rayon fabrics to laundering or domestic washing (new tentative test); D434, Tentative method of test for resistance to yarn slippage in silk, rayon and silk-rayon woven broad goods (new tentative test); D232, Standard method of estimating hard scoured wool in wool in the grease; D403, Standard methods of testing and tolerances for woollen yarns; D404, Ditto for worsted yarns; D418, Tentative methods of testing pile floor covering; D375, Standard specifications and methods of test for asbestos roving for electrical purposes; D299, Ditto for asbestos yarns; D315, Ditto for asbestos tape; D377, Tentative methods of test for small amounts of Cu and Mn in textiles. C.

Waterproofed Fabrics: Testing. R. N. Wenzel. *Amer. Dyes Rept.*, 1936, **25**, 598-601.

Barr's hydrostatic pressure test of waterproofness is described and applied to some light silk and rayon fabrics. It is pointed out that the pressure at which the first drop penetrates is often erratic, being below subsequent pressures. Sometimes, the pressure at the second drop may also be more than 5 cm. below the maximum (in 5 cases out of 78 recorded). The author proposes to neglect the first drop, and also the second if the reading is more than 5 cm. below the maximum. The data recorded relate to penetration by proofing emulsions, the article being one of a series on testing proofing agents. C.

Clothing: Heat Retention Measurement. T. C. Angus. *J. Text. Inst.*, 1936, **27**, T273-284.

Bar Defects in Wool-Rayon Unions. *Wool Rec.*, 1936, **50**, 1039-1042.

In a large number of cases of bars in wool-rayon worsted piece-dyed fabrics, the faulty portions have been obtained from a different run of spinning. Another cause of the fault is a modification of the properties of the rayon, when processed under different conditions, e.g., different atmospheric conditions. W.

Trade Customs for Woollen and Worsted Cloths. "R.W.R." *Text. Mfr.*, 1936, **62**, 411 and 419.

The varying customs in the textile trade are illustrated by the divergencies in the "weight per yard" system of cloth buying. Tables are given showing a simple and accurate method for calculating the counts of yarn in any given sample of cloth, or the weight per yard that may be expected from any number of ends and picks per inch of given counts, subject to an estimate of the loss and shrinkage according to the finish. W.

Watering and Embossing Faults in Worsted Cloths. *Dyer*, 1936, **76**, 572-573.

The types of watering marks caused by (1) crabbing and steaming, (2) decatizing, and (3) pressing, are described. As a general rule, crab watering cannot be removed either by steaming or by re-scouring; decatizing watering can be removed by steaming; press watering, if not too severe, by steaming, decatizing or re-scouring. Crab watering is liable to develop in finishing, after perching. The influence of the following factors on the liability to crab watering is discussed; beaming tension, number of pieces on the roll, crabbing methods, steaming pressure and time, and type of steaming can used. W.

Chafing of Heavy Serges in Preparing and Finishing. *Dyer*, 1936, **76**, 463-464.

The chafing of heavy piece goods is entirely a mechanical fault, occurring with the greatest frequency in scouring and dyeing. Points at which it is liable to occur in scouring are discussed, with special reference to the type of rollers on the machine, number of pieces in the machine, form in which the goods are run, and temperature. In dyeing, it is advantageous to speed up the travel of the winch and to replace the dividing stocks by light steel or alloy rollers. Methods of correcting the fault are described. W.

Listed Defects Due to Alkali Action. *Wool Rec.*, 1936, **50**, 1375-1377.

Listing is in many cases due to faulty carbonising or to careless neutralisation of the acid used as dyeing assistant. In woollen fabrics of both high and low quality, faintly heavier dyeing tends to occur on the lists than on the body of the fabric, especially with yellow dyestuffs. The fault is due to alkali attack on the wool, arising in milling but not revealed till the material is dyed. The alkali at an elevated temperature attacks the wool substance, especially the selvedges which receive greater friction and generate more heat. The fault can be

prevented either by milling less quickly (i.e., reducing the heat by keeping open the doors of the milling machine) or by milling with soft soap or a readily soluble soda soap. In the case of soft soap, alkalinity should be obtained by the addition of potash, not soda ash. W.

Sulphide Tendering in Wool-Cotton Unions. *Wool Rec.*, 1936, **50**, 1561-1563.

In wool-cotton unions the degree of tendering depends upon the depth of shade, and is due to the necessary presence in sulphide dyestuffs of loosely combined sulphur. Dyed material may be tested for tendering by hanging in a stove at 140° C. for two hours, and exposing to a free supply of air. Tests of this nature indicate that there is little difference between the various types of sulphur blacks, with the exception of the Indocarbons. Tendering is prevented by padding the material with some alkaline substance which reacts with the sulphuric acid as it is formed. This protection, however, only lasts till the cotton is immersed in water, either during treatment or in actual use. The method of fixing a calcium salt on the cotton by means of a weak acid, e.g., tannic acid, gives protection which resists washing in neutral or alkaline liquors. In the case of wool-cotton unions for cross-dyeing, the goods should invariably be neutralised after acid dyeing. W.

An example of nitric acid damage to Linen. *Text. Manuf.*, 1936, **62**, 360.

A case of damage to linen is reported as having been traced to prolonged storage in contact with knitting needles made from a composition containing cellulose nitrate. Nitric acid was found in the tendered linen. L.

(D)—Other Materials

Dyes: Testing Degree of Dispersion. E. Neraal. *Z. ges. Text. Ind.*, 1936, **39**, 463-464 (through *Chem. Abstr.*, 1936, **30**, 6947[6]).

To test the degree of dispersion of dyes, 3 per cent. gelatin solution is allowed to solidify in test tubes and then covered with the dye solution (e.g., 1 and 0·1 per cent.); the rate of diffusion is noted. A 1 : 1-mixture of a blue direct dye and a yellow acid dye was almost separated by this means; the yellow dye soon diffused into the gelatin but the blue did not penetrate far during several days. C.

Wood: Moisture Content and Electrical Resistance. D. Narayanamurti. *Current Science*, 1936, **5**, 79-80 (through *Chem. Zentr.*, 1936, ii, 2327).

There is a linear relation between log. relative humidity and resistance for Indian timbers but not between relative humidity and log. resistance. C.

Weather-ometer Accelerated Weathering Cabinet. Atlas Electrical Devices Co. *Engineering*, 1936, **142**, 712.

The "Weather-ometer" is intended to imitate and intensify the action of sun, rain, and low temperatures on paints, varnishes, asphalts, oil products, roofing, and paving materials, insulated wire and cable, and other products exposed to the atmosphere. It consists essentially of a revolving aluminium specimen drum around the internal circumference of which oblong metal and coated wood panel specimens are held in clips in a vertical position (test lengths of insulated wire are clamped at an angle of 33° from the horizontal), a central violet carbon arc lamp, a shielded fine water spraying equipment to simulate light rainfall, and an electric motor and gearing which slowly rotate the drum. C.

Paper: Colour Problems. L. C. Lewis. *Paper Trade J.*, 1936, **103**, *TAPPI*, 323-330.

A useful review is given of recent photometric methods for measuring colour in paper and of colour problems in paper-making. C.

Paper: Opacity Measurements. O. Maass. *Pulp and Paper Mag. Canada*, 1936, **37**, 689-694.

It has been suggested that the optical properties of paper are best represented by obtaining absolute measurements of the percentage of light transmitted and that reflected. The measurement of absolute transmittances by means of the dynamic photo-electric opacimeter is described. A relation between reflectance and transmittance is developed, the variation of these with basis weight is studied, and the results are tabulated. The relationships were not found to hold perfectly when thus tested by experiment, but agreement is close enough for practical use. An attempt has been made to use the opacimeter for the measure-

ment of the percentage of light reflected, and for the calculation of printing opacity, and contrast ratio. The optical characteristics of ground wood sulphite mixtures are investigated and the results are tabulated. The influence on optical properties of wet pressing, fibre length, filler, and beating are also studied, the data being graphed and tabulated. Results are briefly discussed. C.

Paper Penetration Tester. J. Hammond. *Paper Trade J.*, 1936, **103**, *TAPPI*, 313-315.

A device for testing the penetrability of paper by ink employs two photo-electric cells on opposite sides of a light source. The lower cell receives reflected light from the paper (through a test aperture) and the top one is adjusted until in balance with the bottom one. This device compensates for any peculiarities of colour, texture and surface of the paper. A special screen is then inserted in front of the top cell to reduce the illumination and a well of ink is raised to touch the paper. The time is observed that elapses before the ink reduces the reflecting power of the paper until the two cells are again in balance. Typical results are shown in curves. C.

Scientific Approach to the Poison Gas Question. P. H. Anderson. *Text. Col.*, 1936, **58**, 805-806.

A description of some published methods for detecting sulphuretted hydrogen, one of the poisonous gases most often met in textile, particularly rayon, manufacture. W.

6—DESIGN

(B)—Structure of Fabrics

Novel Rayon Fabrics: Structure. J. Henriess. *Silk and Rayon*, 1936, **10**, 935-936.

Many rayon fabrics do not, by their structure and design, conform to the particulars of the standard types such as crêpes, taffetas, marocains, etc. Examples of such fabrics are illustrated and the ground weave is given together with further details connected with their construction. The fabrics include a lining material, a duplex print brocade, a dress material with printed threads, a viscose-warp, cotton-weft check of the crêpe type, and a similar mixture with coloured stripes. C.

Rayon Warp Loom Fabrics: Design. W. Davis. *Silk and Rayon*, 1936, **10**, 927-928.

Particulars are given of fine-guage charmeuse rayon fabrics that are worked on warp looms. Lapping plans and details concerning yarn, count, and method of dyeing, are given for a blue and white diamond pattern and a material with black and red stripes. Some of the most effective patterns from warp looms are obtained by leaving certain guides in one or other of the bars empty so that a space occurs at that part of the fabric. Details are given for the production of a cellular effect, an open stripe effect, an open and solid stripe effect, and a varied open-work pattern using silk yarn. C.

7—LAUNDERING AND DRY CLEANING

Patents

Manufacture of Flame-resistant (Dry-cleaning) Fluid. G. L. Parkhurst, Assr. to Standard Oil Co. U.S.P.2,017,568 of 15/10/1935 (through *Brit. Chem. Abs.*, B, 1936, p. 1148).

Gaseous mixtures of hydrocarbons C_{1-2} and greater than C_2 are chlorinated and the fraction of initial b.p. 72-100° and maximum b.p. 100-155° is blended with 5-60 per cent. of naphtha of the same distillation characteristics but of such a distillation range that the highest and lowest fractions of the blend are largely chlorinated compounds. W.

Dry-cleaning Composition and Process. W. H. Alton, Assr. to R. T. Vanderbilt Co. Inc. U.S.P.2,018,507 of 22/10/1935 (through *Brit. Chem. Abs.*, B., 1936, p. 1090).

Used dry-cleaning liquor is purified by adding to it non-H_2O-absorbent pyrophyllite (I) (or, alternatively, talc, soapstone, steatite, etc.) having a graded particle size, and then filtering, whereby the larger sizes of (I) build up a filtering foundation which supports the finer particles and so ensures purification. W.

Marking Fabrics such as Laundry Articles for Identification. L. S. Smith, Jr. U.S.P.2,056,809 of 6/10/1936 (through *Chem. Abs.*, 1936, **30**, 8648).

A marking ink is used of a viscous or sticky character and containing substances such as petrolatum and xylene substantially colourless and invisible in normal light but made fluorescent by radiant energy such as ultraviolet light and subsequently all the viscous or sticky substance is removed from the surface of the fabric, leaving small quantities of the fluorescent substance. W.

Dry-cleaning Textile Materials. Imperial Chemical Industries, Ltd., and C. Dunbar. E.P.453,523 of 13/3/1935.

Textile materials are cleaned by treating with a solvent such as trichlorethylene, benzene or white spirit in which is dissolved a quaternary ammonium salt, one or more radicals of which consist of a saturated or unsaturated carbon chain containing eight or more carbon atoms free from hydroxy groups, and directly or indirectly attached to the N atom. The carbon chains may be straight or branched. For example, cetyl pyridinium bromide, cetyl trimethylammonium bromide, *p*-stearamidophenyl trimethylammonium methyl sulphate, dimethyl dicetyl ammonium bromide, dicetyl piperidinium bromide or octadecoxy methyl pyridinium chloride, the preparation of which is described in specification 394,196 are used dissolved in small amounts in trichloroethylene. (See *J. Text. Inst.*, 1933, A522.) W.

8—BUILDINGS AND ENGINEERING

(A)—Construction of Buildings

Hollow Girder Floors. F. von Emperger. *Engineering*, 1936, **141**, 471-473; **142**, 518.

(1) Illustrations are given of a new type of floor construction in which the girders are hollow, reinforced concrete structures, pre-fabricated in a centrifugal casting machine. The girders weigh about 56 lb. per foot and the tension in the steel reinforcement at fracture is about 12·7 tons per square inch. (2) Illustrations are given of a new mill in Jugoslavia constructed on the new system. Attention is called to the ease with which line-shaft brackets can be suspended from the girders. C.

Silver: Use in Plant Construction. C. H. S. Tupholme. *Amer. Dyes. Rept.*, 1936, **25**, 628-629.

The advantages of silver in the construction of chemical plant are discussed and a table is given showing the effects of various reagents on electrolytic silver. The most extensive industrial application so far is in the construction of apparatus for the condensation and handling of acetic acid. Silver alloys are used for valves, cocks, taps, etc., in plant for the manufacture of cellulose acetate rayon and fine silver condensers are used in solvent recovery processes. C.

(C)—Steam Raising and Power Supply

Bearing Metals: Composition and Properties. H. C. Mougey. *Ind. Eng. Chem. News Edn.*, 1936, **14**, 425-428.

The composition of modern bearing alloys, especially Babbitt metals, is recorded and their desirable properties are discussed under the headings (1) mechanical strength, (2) bonding characteristics, (3) melting point, (4) fatigue resistance, (5) anti-friction characteristics, (6) non-scoring characteristics, (7) conformability, (8) " embedability," and (9) corrosion resistance. C.

(D)—Power Transmission

Roller Chains: Application for Driving and Conveying. *Rayon Text. Monthly*, 1936, **17**, 691-695.

The advantages of accurately finished roller chains are stressed and the applications are mentioned, with illustrations, to a vertical goods lift and for driving a pump, a sulphur-dyeing range, a carding engine, and spinning and twisting frames. The cost of repairs at a mill in the Southern States, where seventy-two chain drives have been in use almost continuously for nine years. is given as 50 cents. C.

Weaving Shed Electric Drive : Comparison of Group and Unit Systems. *M/cr. Guard. Comml.*, 1936, 34, 9.

When installing electric drives for new looms, or reorganising sheds, three chief points must be taken into consideration, (1) the efficiency of the motors, (2) the efficiency of the transmission of power between the motor and the loom, and (3) the speed at which the loom is to be driven. Each of these points is discussed with reference to the choice between group and unit systems. Cost of installation and of maintenance is considered. The unit system is the more expensive to instal, but is cheaper to maintain, and gives greater flexibility in use. Furthermore, overhead transmission (group system) involves a heavier lighting bill, and causes oil drip and dirt, which increases the production of "seconds". A suitable motor for the individual drive is of the totally-enclosed high-efficiency type. Motors must be designed to have a sufficiently rapid acceleration so that the first pick is made at the same speed as subsequent picks. The adjustments necessary so that the motor may not develop too high a temperature from the frequent stopping and starting are described. C.

(F)—Lighting

Textile Factory : Lighting. A. J. Handels. *Textielindustrie*, 1936, 17, 898-901, 938-945.

A general account of efficient lighting for various textile operations. The use of the Weston Lux-meter is described and typical good and bad lighting effects are shown in illustrations. C.

(G)—Heating, Ventilation and Humidification

Thermo-junction Psychrometer : Effect of Wind. W. Koch. *Gesundheits-Ing.*, 1936, 59, 504-505 (through *Physikal. Ber.*, 1936, 17, 2122).

Five thermo-junctions were enveloped in porous pipe-stems of external diameters 5, 3, 2 and 1 mm., moistened and then placed in air of known moisture content. The temperature readings were taken with the air at rest and in motion. The ventilated junctions recorded the same temperature, but in still air only that in the narrowest envelope gave the same low reading. The conclusion is drawn that a very narrow junction and moistened envelope might be used as a psychrometer without special ventilation. C.

American Weaving Sheds : Air Conditioning. J. W. Robertson. *Cotton (U.S.)*, 1936, 100, No. 11, 53-56.

Two large weaving sheds (2000 and 1800 looms) of a large mill in the Southern States have been equipped with a modern system of air-conditioning. Essentially, the system is based on the principle of cooling by definitely measured air-change (without opening windows, doors, or transoms) and direct humidification. A series of ducts is located on the ceiling of the room with outlet vents along the side walls, each duct connected to a unit which is equipped with two sets of dampers—one for admitting outside air, the other for re-circulating inside air. The system, its method of functioning, and the principles involved are described in detail. Temperature was maintained at 85° and relative humidity at 85 per cent. throughout the department. C.

Psychrometric Chart. W. T. Taylor. *Ice and Cold Storage*, 1936, 39, 140-145 (through *Sci. Abstr.*, 1936, *B*39, 734).

A chart has been prepared on which temperatures can be read to less than 1° F. and humidities to within 1 per cent. It includes a large number of properties of air-water mixtures, 15 of which can be obtained as the result of a single straight-line movement, and about as many more indirectly. C.

Wet-bulb Thermometer : Effect of Air Velocity. D. Dropkin. *Cornell Univ. Exp. Sta., Bull., No.* 23, 1936 ; 45 pp. (through *Sci. Abstr.*, 1936, *A*.39, 1212, and *B*.39, 725).

In experiments with wet-bulb depressions of 7-20° F. it is shown that only at an air velocity of 1025 ft./min. is the actual wet-bulb temperature equal to the temperature of adiabatic saturation. At higher velocities the temperature is less than that corresponding with this condition. This is explained by the ratio of the coefficient of heat transfer to the coefficient of evaporation being smaller than the humid specific heat of the air. As the air velocity is decreased, the wet-bulb temperature becomes steadily higher than the temperature of adiabatic saturation, due, in part at least, to the effect of radiation becoming more pronounced. C.

(H)—Water Purification

Iron in Textile Water Supplies. *Wool Rec.*, 1936, **50**, 925 and 933.

An amount of iron not exceeding a quarter part per million is suitable for most textile work. Methods of removing iron present in suspension and in solution are given. Peaty water requires special treatment. A sensitive test for dissolved iron consists of adding to the iron solution a drop of thioglycollic acid, followed by a drop or two of ammonia. If iron is present, a violet or brown coloration is developed. The test can be used colorimetrically by comparing the strength of colour with that produced by solutions of known iron content. Suspended iron is filtered, the filter paper ashed, and the ash dissolved in acid before making the test. W.

Patents

Separating Unsaponifiable from Saponifiable Material such as that contained in Sperm Oil, Wool Fat, etc. M. Schellmann & H. Franzen (to I. G. Farbenind. A.-G.). U.S.P.2,056,984 of 13/10/1936 (through *Chem. Abs.*, 1936, **30**, 8670).

Saponifiable constituents are converted into an aqueous mixture of Mg, Ca and K soaps in such relative proportions that the m.p. of the crude saponification product, when in an anhydrous state, is below 150° and volatile unsaponifiable matter is separated from the aqueous soap mixture by distillation. W.

Recovering Fats from Waste Waters. A. de Vreese. E.P.453,285 of 8/4/1935.

Fats are extracted by means of solvents from sludge precipitated when waste water containing grease or soap is treated with calcium sulphate or with both a calcium salt, such as chloride sulphate or lactate, and lime. Natural calcium sulphate, more or less pulverized and dehydrated, may be used or calcium sulphate obtained as waste in the production of calcium phosphates. The precipitate formed is removed by decantation, filtration or centrifugal treatment. Turf dust, sawdust or refuse obtained by willowing wool may be added to the separated sludge which is dried before treatment with the solvents for the fats. W.

9—PURE SCIENCE

Cellulose : Degree of Polymerisation. H. Staudinger and K. Feuerstein. *Liebig's Ann. Chem.*, 1936, **526**, 72-102.

The degree of polymerisation of various celluloses has been determined from measurements of the viscosity of dilute solutions in cuprammonium according to the equation $\eta_{sp}/c_{gm.} = 0{\cdot}81 \times$ " degree of polymerisation." In many experiments the materials were dissolved in cuprammonium and reprecipitated in Rochelle salt solution in order to remove non-cellulosic impurities. Apparatus for doing this in the absence of air and white light is described. According to the " degree of polymerisation " cellulose does not suffer much degradation under the given conditions. Oxidative degradation in cuprammonium is greatly hindered by adding about 0·3 per cent. of cuprous chloride to the reagent. A round value for the degree of polymerisation of raw cellulose is 2,000. How this varies with the kind of material is shown in a series of tables that record degrees of polymerisation for raw cotton, linters, ramie, mercerised ramie, flax, manila, sisal, nettle, jute, willow, papyrus, " B-cellulose " produced in cultures of *Bact. xylinum* on cane sugar, growing points of young plants, wood pulps and rayons. Another table records breaking lengths, specific strengths and degrees of polymerisation for the chief raw fibres, but without stressing any connection between them. C.

Cellulose Micelle Hydration Film : Structure. K. Hess and J. Gundermann. *Z. physikal. Chem.*, 1936, B**34**, 151-157.

Kolkmeijer's conclusion that the X-ray diagrams of cellulose and starch are due to a hydration film round the micelles having the structure of ordinary ice is discussed and it is shown that this conclusion is not supported by comparisons of the fibre diagrams of ice and cellulose and comparisons of the X-ray diagrams of cellulose fibres of different water contents. C.

Cold-swelling Starches : Preparation and Properties. M. Blinc and M. Samec. *Kolloid Z.*, 1936, **77**, 134-139.

The term " swelling starches " is defined and the principle of the preparation of such starches is explained. Patented processes of preparation are reviewed

under the following headings. (1) Degradation with chemical reagents at ordinary temperatures, including the action of alkali in the presence of organic liquids; precipitation with metallic salt in the presence of aqueous alkali; addition of aqueous alkali in small amounts with subsequent drying; grinding with solid caustic potash; and treatment with salts. (2) Degradation with hot water. (3) Degradation and partial peptisation. (4) Preparation of formaldehyde starches. Methods of avoiding the formation of lumps are also reviewed. C.

Starch: Colloidal Behaviour and Structure. P. Koets. *Natuurwet. Tijdschr.*, 1936, **18**, 44-54 (through *Physikal. Ber.*, 1936, **17**, 2163).

The properties of starch (and also glycogen and cellulose) are discussed in the light of the molecular chain conception. The feeble surface charge is increased by the addition of sodium hydroxide so that the properties of starch approach those of an ordinary hydrophile colloid. At higher concentrations, however, alkali exerts a dehydrating influence. C.

Starch-Iodine Compound: Rate of Reaction with Thiosulphate. H. von Halban and H. Eisner. *Helv. Chim. Acta*, 1936, **19**, 915-927.

A flow method is employed in an investigation of the rate at which "starch iodide" is decolorised by thiosulphate or sulphite. The results can best be explained on the assumption that at 25° the controlling process is the reaction between free iodine and the reducing agent, the disruption of the starch iodide being instantaneous. At 5° the two processes appear to proceed at the same rate. The rate of decoloration by thiosulphate is increased by the presence of neutral salts and decreases with increase in *p*H. Decoloration by sulphite or bisulphite is slower than by thiosulphate and increases with increase in *p*H. The fresher the starch iodide, the more rapidly is it decolorised. C.

Isatin: Structure. E. G. Cox, T. H. Goodwin, and A. I. Wagstaff. *Proc. Roy. Soc.*, 1936, A**157**, 399-411.

The failure of chemical and spectroscopic methods to decide between the lactam and lactim structures for isatin has suggested an attempt on the problem by X-ray methods. The present paper contains an account of the determination of the molecular arrangement in crystalline isatin, from which the conclusion is drawn that the structure is intermediate between the two. The molecules are disposed in parallel layers in such a way that the N atom and adjacent O atom in one molecule approach very closely (2·8A) to the O and N atoms, respectively, in the next molecule. It is inferred from this that some type of co-ordination (hydrogen, hydroxyl, or "amino" bonds) occurs. Several related substances have also been examined but, with the exception of 3-hydroxyquinoline, their structures do not appear to bear any marked similarity to that of isatin. C.

Molecules: Structure. H. J. Emeléus and S. Miall. *Chem. and Ind.*, 1936, 637-641, 793-798, 952-956.

A general review under the following headings: determination of crystal structure by means of X-rays, forces holding atoms and molecules together in a crystal, the homo-polar bond, other types of binding in molecules, ring structures, some aliphatic molecules, tartaric acid, long-chain molecules, molecular structure of some complex natural materials, diffraction of X-rays by gases and vapours, electron diffraction, resonance, and diffraction of electrons by solids. C.

Silk Chrysalis Oil: Composition. J. Ozaki and B. Kasai. *J. Agric. Chem. Soc., Japan*, 1936, **12**, 443-456 (through *Chem. Abstr.*, 1936, **30**, 6830^{9}).

The chrysalis oil examined contained 2·93 per cent. of unsaponifiable matter of which 18 per cent. was paraffin hydrocarbons (C_{22}, C_{24}, C_{26}, C_{28}) and 82 per cent. sterols (chloresterol and sitosterol). C.

Dyes: Adsorption from Solution: Influence of *p*H. N. A. Yajnik, D. N. Goyle, and J. R. Jain. *Kolloid Z.*, 1936, **77**, 99-103.

Adsorption experiments have been carried out on typical dyes with animal charcoal, silica gel, and alumina-gel as adsorbents. The results are tabulated. The adsorptive capacity is shown to be in the order silica gel < alumina < animal charcoal. Some acid dyes are particularly strongly adsorbed on acid adsorbents and some basic dyes on basic adsorbents. The degree of adsorption is noticeably lowered on addition of acid to some dyes (methylene blue, bismark brown, etc.), but with other dyes it is raised (water blue, picric acid). In the dyeing process, it is important to have the correct *p*H in order to secure level dyeing. C.

Foams: Mechanical Properties. A. Siehr. *Kolloid Z.*, 1936, **77**, 27-32.
Columns of foam exercise a pressure at their base corresponding to their weight. They also exercise a side pressure which is termed " foam pressure." The measurement of these quantities is described for saponin solutions. Foam pressure increases with height of column but it is not a linear function of height. Foam height is shown to be proportional to gas pressure. The " wetness " of a foam is largely dependent on the gas pressure. Reduction of the moistness of foam with time is accompanied by a (not proportional) reduction of foam pressure. At the same gas pressure dilute saponin solutions give much " drier " foams than do more concentrated solutions; the saponins in these latter solutions fix more water. The increase in foam pressure is a linear function of foam moisture. C.

Protective Emulsions: Film Formation. H. Wagner and G. Fischer. *Kolloid Z.*, 1936, **77**, 12-20.
The problem of film formation from emulsions which serve as surface protectors is discussed. The films so formed are described and distinguished as gluey films, mono-layer rosin size films, two-layer " broken " films and oily films. The latter arise from water-in-oil emulsions. Waxy films form a special case. If aqueous emulsions are considered as intermediate steps between glues and oils and varnishes, their films can be arranged in a series changing from hydrophilic, porous, reversible films (glue) to hydrophobic, compact, irreversible films (oils). Some test methods are described which, together with microscopic film tests, might be applied for practical purposes. C.

Electromagnetic Surface Tensiometer. A. S. Achmatov. *Kolloid Z.*, 1936, **77**, 20-26.
An apparatus for measuring two-dimensional pressure is designed as a " null " instrument in which the pressure to be measured is balanced by an electromagnetic field, the strength of which is read. The relation between the torsion moment (M) of the moving system and the current strength (J) is given by $M = KJ^2$. The apparatus has a wide range and is independent of elastic after-effects since the elastic torsion forces do not enter into the balancing of the surface pressures. C.

Mono- and Poly-molecular Films on Water: Influence of *p*H on——. W. D. Harkins and R. J. Myers. *J. Chem. Phys.*, 1936, **4**, 716-724.
Apparatus for the study of monomolecular and polymolecular films on water, comprising a glass trough and an improved torsion balance, is described in detail and shown in photographs and diagrams, and an improved technique for spreading from a volatile solvent is also described. The results of studies of the effect of the rate of compression on the character of the force-area curves of pentadecylic acid films and of the effects of the hydrogen ion concentration of the substrate upon the force-area curve and the equilibrium pressure of myristic acid on water are shown graphically and discussed. The influence of *p*H on the collapse pressure of films is briefly discussed. C.

Methylcellulose Solutions: Osmotic Pressure. G. V. Schulz. *Z. physikal. Chem.*, 1936, A.**177**, 453-459.
Osmotic pressure measurements have been made on aqueous solutions of four highly-degraded methylcelluloses, representing a homologous series of polymerides. They show a new type of concentration effect that appears to be characteristic of incompletely substituted, hydroxylic carbohydrates and cannot be reconciled with the van't Hoff law by introducing the van der Waals correction. At concentrations below 0·5 per cent. the osmotic pressure and viscosity are normal; the solutions contain simple fibre-molecules. At this point, however, the curve connecting p/c with c passes through a minimum before rising again. C.

Fibroin Sol: Preparation. T. Tanizaki. *J. Agric. Chem. Soc., Japan*, 1936, **12**, No. 4, 343-347; No. 5, 343-346 (through *Chem. Abstr.*, 1936, **30**, 6950[4]).
The dispersion of silk fibroin in 55 per cent. zinc chloride solution at 40° is most striking after 20-40 hours. The viscosity of the sol decreases with time and increase of temperature. The colour of the sol depends on the dispersion medium. The rate of coagulation by different precipitating agents varies considerably. C.

Cellulose Esters and Ethers: Swelling and Solubility; Effect of Dielectric Constant of Solvent. W. L. H. Moll. *Kolloid Z.*, 1936, **77**, 85-93.
Data published by other workers are used to confirm the deduction that solubility and swelling of cellulose derivatives are approximately a function of

the dielectric constant of the solvent. Each cellulose ester or ether has a solubility (or swelling) optimum in a characteristic dielectric constant range the position of which is shifted according to rule when the composition of the dissolved substance is systematically changed. The extent of the solubility (swelling) range depends on the surface tension (or related quantities) and on the chemical character of the solvent. C.

Corn Starch Pastes : Viscosity. W. Gallay and A. C. Bell. *Canadian J. Res.*, 1936, B14, 360-372.

Several series of modified corn starches covering a wide range of fluidities were prepared from corn starch treated with varying dilutions of hydrochloric acid at 50° C. The fluidities were measured by means of a standard fluidity funnel, and the effect of acid concentration on the speed of modification was noted. The viscosities of the pastes were measured in the MacMichael viscometer and the flow-pressure relations noted. The data are well expressed by the relation $F = KP^n$, where F is the flow, P is the pressure, K and n are constants. For pastes of the same concentration, there is a rapid decrease in the value of n with increasing degree of modification. Transitions from one type of flow to another are shown in the same viscosity measurement at different driving pressures. Microscopic examination shows that the dispersed phase of ordinary starch pastes consists of swollen starch granules. The viscosity of a starch paste which has not undergone severe pre-treatment depends on the deformability of the swollen granules and on the volume relation between dispersed phase and dispersion medium. C.

Tragacanth Mucilage : Viscosity. H. Brindle and J. M. Rowson. *Quart. J. Pharm. Pharmacol.*, 1936, 9, 161-173 (through *Chem. Abstr.*, 1936, **30**, 6890[5]).

The falling-sphere viscometer is recommended for evaluating mucilage of tragacanth for use as a suspending agent in pharmacy. Conditions for the determination are defined. A minimum working standard for a 1·25 per cent. mucilage at 20° C. is 60 poises. C.

Monochromator : Elimination of Errors due to Stray Light. J. S. Preston. *J. Sci. Instr.*, 1936, **13**, 368-370.

A method of eliminating the errors which may arise in spectrophotometric measurements through the presence of stray light in the exit slit of the monochromator is described. The method is primarily applicable to direct photoelectric observations, and dispenses with the usual stray light filter. C.

Photographic Light-filter Cell : Construction and Application. C. A. Mitchell and T. J. Ward. *Analyst*, 1936, **61**, 751-755.

A filter cell for holding a liquid light-filtering medium consists essentially of a small rectangular glass cell one side of which is attached to a support made to fit closely upon the flange of the camera lens or microscope objective, so that the cell becomes a readily detachable part of the camera or microscope. The form for the microscope has a tube of cardboard lined with velvet which slides on the objective and bears at one end a flat support for the cell ; this rests on a small ledge and is held in position by two rubber bands. The cell is one of the " vitrified " type cemented with acid-proof material, without optically worked glasses, and having an internal width of 3·5 mm. and a capacity of about 3 ml. When the cell is filled with the required light-filtering medium the top is closed with a glass lid kept in position by a film of vaseline, or, for the narrow microscope filter, by a suitably curved glass rod. The camera cell has an internal width of 13 mm. Examples of the various uses of the cell are described. C.

Photographic Photometry Intensity Standards. W. Kinder. *Z. Instrumentenkunde*, 1936, **56**, 493-494.

Systems of cylindrical lenses are considered to provide the best geometric means for furnishing a graded series of light intensities for photographic photometry. Known systems are reviewed and classified and a new arrangement with several advantages is described. The system has been applied to the experimental proof that instantaneous shutters differing in transmitting power (e.g. iris and slit) allow the same degree of blackening when the photographic plate is illuminated by the same amount of light and developed in the same way. C.

Photographic Plates : Sensitising. T. Kiu. *C. r. Acad. Sci.*, 1936, **203**, 1144-1146.

Treatment with 10 per cent. sodium salicylate sensitises plates not only in the ultra-violet but also in the visible region of the spectrum. C.

Colour : Measurement. D. B. Judd. *J. Opt. Soc. Amer.*, 1936, **26**, 421-426.
A standard mixture diagram is developed for the estimation of chromaticity differences. A group of ellipses shows the scales of perceptibility at the various parts of the diagram, the distances from the boundaries of the ellipses to their "centres" corresponding to the same number (100) of "least perceptible differences." Another mixture diagram facilitates the estimation of the nearest colour temperature. A family of straight lines intersects the Planckian locus, each line corresponding approximately with the locus of points representing stimuli of chromaticity more closely resembling that of the Planckian radiator at the intersection than that of any other Planckian radiator. C.

Non-uniform Brightness : Measurement by Photographic Photometry. A. Bloch. *J.Sci. Instr.*, 1936, **13**, 358-364.
Some precautions are indicated which have to be observed when the field investigated is not uniform, but is composed of a large number of small elements of varying brightness. The photographic plate will give a correct arithmetic mean value only when its transmission is (over the necessary range) linearly dependent on the original brightness values, which makes it necessary, in principle, to carry out measurements on a positive transparency in which $\gamma = 1$. Erroneous readings, varying with the length of exposure, will occur when the elements are not rendered on the straight line part of the characteristic. If the size of the single elements is small, the influence of secondary effects (developer, turbidity, gelatin-effect) has to be considered. Formation of mean values simultaneously with the first exposure (e.g. by reducing the resolving power of the objective) is then preferable, and may eliminate the necessity of making a positive print. C.

Polarised Light Microscope Illuminator : Application. L. Capdecomme. *C. r. Acad. Sci.*, 1936, **203**, 994-996.
In the determination of reflecting power by means of the microscope, the observations can be halved by employing an illuminator that furnishes polarised light. The device is conveniently constructed of glass prisms especially when the index of refraction of the glass is near $\sqrt{3}$. C.

Laboratory Cements and Waxes : Composition and Application. L. Walden. *J. Sci. Instr.*, 1936, **13**, 345-352.
The composition, properties, methods of application and uses of various laboratory cements and waxes are discussed. Sources of supply are indicated and useful data are tabulated. C.

Aerosols : Acoustic Coagulation. O. Brandt, H. Freund and E. Hiedemann. *Kolloid Z.*, 1936, **77**, 103-115.
A formula is derived by means of which it is possible to calculate how far a suspended particle will participate in the vibration set up by a stationary sound wave, given the size of the particle and the frequency. The formula shows that for each particle size there is a particular frequency at which the particles are almost completely excited or, alternatively, that at a given frequency particles up to a certain critical radius are set in motion. In an anisotropic disperse system, such as is presented by acoustic coagulation, the amplitudes of vibration of the particles are of different magnitudes and thus lead to collisions and "orthokinetic" coagulation. The course of this coagulation can be calculated on simple assumptions ; it is a decisive influence with concentrated aerosols. The hydrodynamic forces between the particles are also investigated as causes of aggregation ; their influence is particularly great at higher frequencies. C.

Ultra-sonic Radiation : Production and Application. E. Baumgardt. *Chim. et Ind.*, 1936, **36**, 686-695.
A general account is given of the production of ultra-sonic waves, the functioning of a quartz emitter and the characteristics of the emission. The laws of propagation and absorption of ultra-sonic waves are explained and methods of measuring some of the characteristic coefficients of these waves are briefly described. The mechanical, thermal and chemical effects are discussed, and applications in physico-chemical research and as a means of control in industrial processes are reviewed. C.

Cotton Hair: Early Development. F. M. L. Sheffield. *Empire Cotton Grow. Rev.*, 1936, **13**, 277-286.

An account is given of the development of cotton hairs from primordial cells in the epidermis. This account is based on the results of a detailed cytological study of material of Old and New World varieties of cotton obtained from India and Egypt and of cotton grown under glass in England. Pollination stimulates cell division in the epidermal layer. Mitosis continues in the epidermis and young hairs are differentiated for a considerable period after flowering. The number of epidermal cells in active division seems to reach a peak at about the second day, but mitosis occurs to a diminishing extent until at least ten days after flowering. The discrepancies in the results of previous workers appear to be due to an unexpected variation in the rate of development and differentiation in different cells in the same seeds, and in different seeds within the same boll. C.

Specific Gravity Apparatus. J. Ciochina. *Z. anal. Chem.*, 1936, **107**, 108-111.

A new apparatus for the determination of the specific gravity of liquids is described and illustrated in which water and the liquid under examination are introduced into two U-shaped tubes and maintained under the same excess or reduced pressure. An equation is deduced for calculating the results from the heights of the liquid columns. Data obtained by this method, by the Mohr-Westphal balance, and by the pyknometer show the degree of agreement obtained. Special advantages of the method and apparatus are briefly enumerated. C.

Universal Indicators. J. V. Dubsky and A. Langer. *Z. anal. Chem.*, 1936, **107**, 187-191.

The preparation of two new universal indicators, A for the acid range and B for the basic, is described, and their colour changes are tabulated. Differences of 0·2 *p*H can be detected. The composition of these indicators has been determined with the aid of a table showing the range of colour change for well-known single indicators. Indicator A appears to be stable, but indicator B showed some deterioration after six months. With both, the colour changes are in the order of the spectrum. C.

Castor Oil: Micro-determination of Acid Value. L. Szebellédy and St. Tanay. *Z. anal. Chem.*, 1936, **107**, 269-276.

Sources of error in the official Hungarian method of determining the acid value of castor oil are reviewed and it is shown that the chief need is a solvent for the acid present that does not dissolve the true oil. A 90 per cent. methyl alcohol fulfils the requirements. The potassium hydroxide and phenolphthalein used in the titration are dissolved in this alcohol. Details are given of the determinations; 0·1*N* alkali is used if the weight of oil is 0·56 gm. (one-tenth of that used in the official method) and 0·01*N* if 0·1 gm. of oil is taken. C.

Calcium Hypochlorite: Solubility. M. Je Posin and Z. A. Lewina. *Shurn. chim. Promyschlennosti*, 1936, **13**, 864-866 (through *Chem. Zentr.*, 1936, ii, 4199).

Calcium hypochlorite containing small quantities of chlorate and lime has been prepared and its solubility determined. By extrapolation the solubility of the pure substance is 22·7, 21·5 and 22·5 per cent. at −10°, 0° and 18°, respectively. Addition of calcium chloride depresses the solubility considerably. C.

Cellulose: Source and Molecular Size. *Correction*, to A51, 1937.

This note was prepared from an abstract. The original paper has now been consulted. The method of measurement used was *viscosity* not the *ultracentrifuge*. C.

Cellulose Esters and Ethers: Preparation. R. E. Montonna. *Paper Trade J.*, 1936, **103**, *TAPPI*, 331-335.

A review of cellulose derivatives other than the nitrate, acetate and xanthate, with a useful bibliography. C.

Lignin: Isolation and Composition. N. I. Nikitin and I. M. Orlowa (Part 2 with M. Awidon). *Ber. Dtsch. Chem. Ges.*, 1936, **69**, 2434-2438, 2439-2443.

(1) Lignin is isolated from spruce by boiling under reflux with about 8 parts of dioxane containing 0·12-0·75 per cent. of its weight of conc. hydrochloric acid (see patent by Engel and Wedekind, 1932). Crude lignin is precipitated from the

extract by adding ether. The product is soluble in cuprammonium and also in dilute ammonia. Analytical data are tabulated. (2) Similar data are recorded for lignin extracted from beechwood. C.

Chilled Olive Oil: Inhibited Deposition of Stearin. W. Clayton, S. Back, R. I. Johnson, and J. F. Morse. *Nature*, 1936, **138**, 801.

It has been observed that addition of very small amounts of blown cacao-butter (Iodine No. 20) to olive oil permits the oil to remain liquid and free from stearin deposit on storage at 2°-4° C., even up to 4 years. Untreated olive oil sets solid within 12 hours under such conditions. The amount of blown cacao butter required varies from 0·1-0·5 per cent., depending on the technique of oxidation, and on the length of time the olive oil is to be stored cool. The inhibition effect is highly specific in that no other blown oil or fat serves so well, and protection is not afforded to other oils such as arachis, or cotton-seed. The phenomenon furnishes a quantitative guide to the property of blown cacao butter to prevent fat-bloom in stored chocolate, in which respect it is greatly superior to lecithin and other anti-bloom agents. C.

Silica Gel: Sorption of Vapours by——. A. G. Foster. *Trans. Faraday Soc.*, 1936, **32**, 1539-1569.

Iso-thermals of carbon tetrachloride on two samples of silica gel have been determined at 25° C. by means of a static vacuum method. The effect of heat treatment and flushing out has been examined, but no well-defined discontinuities have been observed under any conditions. After prolonged heating at 120° C. with carbon tetrachloride, some of the residual water is removed from the gel, and a marked alteration occurs in the shape of the iso-thermal, resulting in greatly increased adsorption at low pressures. The dynamic retentivity method has also been used to determine iso-thermals of water, ethyl alcohol, and carbon tetrachloride on silica gel, but a comparison of the results with those obtained by the static technique show that the retentivity method is not reliable when applied to iso-thermals of abnormal type. C.

Gelatin Solutions: Activity Coefficients and Membrane Equilibrium. N. R. Joseph. *J. Biol. Chem.*, 1936, **116**, 353-370.

Thermodynamic equations are developed to correlate the osmotic properties of three-component systems with the activity coefficients of the dissolved components. The effect of gelatin on the activity coefficient of zinc chloride is determined electrometrically and the effect of zinc chloride on the activity coefficient of gelatin is calculated. The salt effect, determined electrometrically, is compared with that determined for gelatin by membrane equilibrium, and for other proteins by solubility studies. The results are discussed from the point of view of the inter-ionic force theory as applied to the interaction of ions and "Zwitter" ions. C.

Liquids: Drop Formation, Viscosity, Surface Tension and Density. D. L. Das. *Sci. and Cult.*, 1936, **1**, 656-657 (through *Chem. Zentr.*, 1936, ii, 4196).

The rate of drop formation when a liquid is allowed to flow through a very narrow horizontal capillary, and then fall through a circular, horizontal hole in a short piece of glass tubing is connected with physical properties of the liquid by the expression $\eta s = chTd^2$, where η is viscosity, s surface tension, h height of the column of liquid, T drop period, d density and c the instrument constant. A calibrated instrument therefore provides a means of determining ηs. C.

Falling-sphere Viscometers: Application. W. Phillippoff. *Arch. Techn. Mess.*, 1936, No. 65, T147.

The basic principle underlying the falling-sphere viscometer is explained. Falling-sphere viscometers due to Lawaczek, Cochius, Höppler, Stange, and J. B. Bemberg Co. are illustrated, and briefly described. Cohn's method for opaque substances and glass melts is also described and explained. This class of viscometer is simple and reliable but, apart from the Höppler viscometer, it is only suitable for highly viscous liquids. C.

Dye Ions: Light Absorption and Dimensions. G. Kortüm. *Z. physikal. Chem.*, 1936, B., **34**, 255-274.

Measurements on the range in which dyes obey Beer's law are applied to determine the relations between the degree of dispersion on the one hand and ionic dimensions, number and distribution of hydrophilic groups and steric

influences on the other, previous work on the eosin anion having indicated that this optical method could be used to study the initial stages in micelle formation. The dyes examined are Naphthol yellow, Methyl orange, Orange II, Fast-red A, Azorubin S, Congo red, Benzopurpurin 4B, Tartrazin, and Methylene blue. Their purification is indicated in a table and the reasons for selecting them for investigation are given. In this connection, absorption curves are reproduced. The bearing of the investigation on the kinetics of the dyeing process is mentioned. C.

Fogs : Formation by Ultra-sonic Waves. K. Söllner. *Trans. Faraday Soc.*, 1936, **32**, 1532-1536.

Evidence concerning the formation of fogs of non-metallic liquids by ultra-sonic waves is adduced to show that it is due to the same mechanism as other disruptive and destructive effects of ultra-sonics, namely to cavitation, or rather to the vehement collapse of cavities. This collapse may be brought about by an external gas pressure, or in the absence of a foreign gas by the vapour pressure of the irradiated liquid itself, provided that this vapour pressure is not too small ; for this reason, fog formation stops at low temperatures in the absence of a foreign gas. The fact that the vapour pressure of irradiated liquids—in the absence of a foreign gas—can affect the collapse of cavities, explains also the fact that at higher temperatures the process of emulsification proceeds also in the absence of a foreign gas. The importance of fog formation in the oil bath for the technique of ultra-sonics, and for its further development is shortly discussed. C.

Soap Film : Vibration by Ultra-sonic Radiation. J. Hartmann and P. v. Mathes *Phil. Mag.*, 1936, **22**, 883-891.

An arrangement is described for photographing a soap film under perpendicular bombardment by sound waves of 12,400 cycles per sec. generated by a Hartmann air-jet device. Under an intensity of about 3·4 ergs per c.c., a film of the right thickness shows a peculiar granular surface which suggests that the natural state of vibration of a liquid film is that produced by three sets of stationary, transverse waves at 120° to each other. C

Ultra-sonic Waves : Action on Suspensions. F. J. Burger and K. Söllner. *Trans. Faraday Soc.*, 1936, **32**, 1598-1603.

By means of ultra-sonics, rod- or plate-like particles (mica, mosaic gold, gypsum, selenite, steatite, quartz, kaolin, etc.) can be orientated with their longest axes normal to the flux of energy. To produce this effect the energy may be below the limit necessary for accumulation. These results are obtained as a rule with particles of microscopic size, but orientation was also found in truly colloidal solutions of vanadium pentoxide and ferric oxide. Concentrated rheopectic suspensions of gypsum and kaolin are solidified by ultra-sonics of low and medium energy. The solidification is correlated with the accumulation of the particles by ultra-sonics. If the energy applied is sufficiently high, these concentrated pastes can also be liquefied, as a consequence of cavitation. Mixtures of sea sand or quartz powder with water which are normally dilatant lose this property when exposed to ultra-sonic waves. C.

Ultra-sonic Waves : Cavitation by——. K. Söllner. *Trans. Faraday Soc.*, 1936, **32**, 1537-1539.

Cavitation by ultra-sonic waves may be made directly visible if long columns of de-gassed liquids are irradiated with high energy. Slightly opaque and glittering zones which disappear without producing gas bubbles are formed in the liquid when it disrupts due to the stretching by ultra-sonic waves. C.

Photo-electric Frequency Curve Plotting Device. I. J. Saxl. *Rev. Sci. Instr.*, 1936, **7**, 429-432.

A photo-electric device is used to measure automatically the time of exposure of the cell to a moving beam of light, e.g. the beam from a mirror galvanometer or the author's yarn regularity tester. The cell can be moved in the path of the beam to record the frequency of exposure at any point. The photo-current energises a relay that actuates an electrical stop watch, this recording, therefore, the total actual exposure for that setting of the cell as a fraction of the total running of the instrument. By moving the cell and repeating the runs, data for the frequency curve are obtained. Thus, the yarn in the regularity tester can be wound to and fro. C.

Probability: Mathematical and Physical Meaning. T. E. Sterne. *Science Progress*, 1936, **31**, 250-257.

The mathematical notion of probability is explained, and this conception is extended to classical physics. Thus it is shown that, in classical physics, probabilities, when they exist, can be defined in the usual mathematical fashion as the ratio of some class frequency A to the total frequency N, in some universe of equally favoured outcomes. The notion of probability in quantum mechanics is in some respects anomalous. C.

Exponential Populations: Interval Analysis. P. V. Sukhatme. *Statistical Res. Mem.*, 1936, **1**, 94-112.

A statistical technique analogous to that applicable in the case of the normal law of variation has been developed for the exponential law. This method of " interval " analysis is illustrated on several problems in connection with intervals between random events which are known to follow an exponential law of variation. The approach of the alternative method of " count " analysis is described and the two methods briefly compared. C.

Statistical Data: Sampling Distribution. P. P. N. Nayer. *Statistical Res. Mem.*, 1936, **1**, 38-52.

In testing whether groups into which observations of a variable quantity fall, have been drawn from populations having a common standard deviation, Neyman and Pearson have introduced the criterion L_1, the ratio of the weighted geometric mean of the group variances to their arithmetic mean. The adequacy of the approximation by which the sampling distribution of L_1 is represented by a Pearson Type I curve is here investigated. Tables of 5 per cent. and 1 per cent. probability levels for L_1 when the groups are of equal size are provided and the possibilities of using the tables when the groups are not of equal size are demonstrated. C.

Statistical Data: Sampling Distribution. B. L. Welch. *Statistical Res. Mem.*, 1936, **1**, 52-56.

The use of Neyman and Pearson's L_1 criterion for testing the hypothesis that the variance about a regression straight line is the same in a number of populations is extended to the case when there is more than one independent variable. C.

Oriented Adsorption and Tensio-active Surfaces: Rôle in the Textile Industry. J. Vallée. *Rev. Gen. Mat. Col.*, 1936, **40**, 313-322.

A study has been made of the surface tensions of various compounds in solution, notably sodium oleate. As a result of this work, emphasis is laid upon the difference between static surface tension measurements and the tensions operative in agitated solutions. In order to explain a considerable number of results dealing with static surface tensions, the postulation of adsorbed molecular films which are oriented on the surface of the adsorbent is made, a certain " activity " being endowed upon the surface. This hypothesis is applied with considerable success to certain biological problems and also to textile problems. In addition, as a result of measurements on wool, a high surface activity is assigned to this material and the importance of adsorption phenomena in connection with wool is emphasised. W.

Control of Silverfish. *Australia: J. Council for Sci. & Ind. Res.*, 1936, **9**, 319-320.

The composition and preparation are described of a bait for silverfish. This has been developed as the result of a number of tests carried out in the Division of Economic Entomology, Canberra. W.

Enamel Protein. P. Pincus. *Nature*, 1936, **138**, 970.

Preliminary results of an investigation into the nature of the protein in the enamel of teeth indicate that it contains no sulphur, though it has hitherto been believed to be a keratin. Its X-ray picture also differs from that of some keratins, and it appears to contain tyrosine. W.

Reactivity of the Sulphur Linkage in Animal Fibres. Part II. The Action of Baryta and Cautic Soda on Human Hair. J. B. Speakman and C. S. Whewell. *J. Soc. Dyers & Col.*, 1936, **52**, 380-387 (for Pt. I, see *J. Text. Inst.*, 1936, A579).

(1) The main action of baryta water on human hair at low temperatures is to remove sulphur from the fibres. In addition, secondary reactions give rise to the

formation of –S–Ba–S– and (probably) –C–S–C– linkages from the disulphide bond, the new linkages being more stable than the latter. The –C–S–C– type of linkage is also formed when animal fibres are treated with caustic soda solution. (2) The ability of animal fibres to take a permanent set in boiling M/20 borax solution is diminished by previous treatment with baryta or caustic soda solution. In the case of baryta-treated fibres, the loss of setting power is proportional to the fall in sulphur content, confirming the view that permanent set is due to the formation of –S–NH– linkages between the peptide chains of animal fibres. W.

Wool Fat. I. Separation of Wool Fatty Acids. II. New Carboxy-acids of Lano-fatty acid Series: Lanomyristic, Lanopalmitic, Lanostearic, and Lanoarachic Acid. T. Kuwata and Y. Ishii. *J. Soc. Chem. Ind., Japan*, 1936, **39**, 317B, 318-319B (through *Brit. Chem. Abs. B.*, 1936, p. 1214).

I. On shaking, the saponification (EtOH-KOH) product of wool fat with petroleum aqueous EtOH, K lanocerotate, was precipitated. The mixed acids from the EtOH-sol. salts separated from warm MeOH as crystalline solids. The Mg salts of these on treatment with boiling EtOH gave Mg lanopalmitate as a residue. Separation was then effected by repeated fractionation of esters and use of the different solubilities of the acids in MeOH and the Pb salts in EtOH. Besides a large quantity of fluid, saturated acids, five solid acids were obtained: *lanomyristic*, $C_{14}H_{28}O_2$, m.p. 58·5-59·5° (*amide*, m.p. 95·5-97·5°), *lanopalmitic*, $C_{16}H_{32}O_2$, m.p. 44·5-46° (*amide*, m.p. 81·5-82·5°), *lanostearic*, $C_{18}H_{36}O_2$, m.p. 54·5-56° (*amide*, m.p. 89-90°), *lanoarachic*, $C_{20}H_{40}O_2$, m.p. 56·5-58·5°, and an *acid*, m.p. 67·5-68·5° (*amide*, m.p. 102·5-103°), probably $C_{21}H_{42}O_2$. II. The molecular formulae of these acids were confirmed by saponification values, elementary analysis, combustion of the acid Mg salts, and N analysis of the amides. Mixed melting point with the corresponding fatty acids and amides gave depressions, and it is concluded that in wool fat there is no acid normally found in fats. W.

Reactivity of the Sulphur Linkage in Animal Fibres. Part III. Methods for Realising a Permanent Set at Low Temperatures. J. B. Speakman. *J. Soc. Dyers and Col.*, 1936, **52**, 423-429.

Three methods of realizing a permanent set with strained animal fibres at low temperatures are described. Each method, like steam setting, comprises two successive reactions, viz., disulphide bond breakdown to induce fibre relaxation, followed by linkage rebuilding. Fibre relaxation is brought about by means of sulphite solutions at *p*H 6 or 11, the temperature varying from 35° to 50° C. Linkage rebuilding, on the other hand, may occur in three ways. With sulphite solutions at *p*H 6, –S–NH– bonds are formed sufficiently rapidly at 50° C. to ensure a permanent set. Alternatively, with fibres relaxed at *p*H6 and 35° C., linkage rebuilding may be brought about either by after-treatment with salts to form the –S–Ba–S– type of bond from cysteine side-chains, or by using oxidizing agents to re-form disulphide bonds. Likewise, in the case of fibres relaxed at *p*H 11 and 35° C., linkage rebuilding may be realized by means of oxidizing agents. Although the experimental work was carried out with sulphites, the latter are to be regarded as typical of reducing agents in general. W.

Stability of Dilute Solutions of Sodium Hexametaphosphate. L. Germain. *Chim. et Ind.*, 1936, **35**, 22-26 (through *Brit. Chem. Abs., B.*, 1936, p. 1206).

Titrimetric methods are described for analysing commercial mixtures of sodium ortho-, pyro-, and meta-phosphate, and are applied to study the change of $(NaPO_3)_6$ (I) in solution. The power of (I) to dissolve $Ba_3(PO_4)_2$ increases with temperature and decreases with addition of sodium salts. (I) decomposes in H_2O with a speed increasing with temperature and decreasing with increasing *p*H, forming (*a*) NaH_2PO_4 and (*b*) a polymeride of indeterminate molecular weight which does not dissolve alkaline-earth phosphates. The polymeride hydrolyses much less easily than (I) or the pyrophosphate. The speed of reaction (*a*) increases with the temperature and acidity, whereas that of (*b*) increases with temperature but is almost independent of *p*H. The neutral sodium pyrophosphate has no special stabilising influence. These results are applied to the industrial uses of (I). The higher the temperature the more frequent must be the renewal of baths of (I), and an alkaline medium (aqueous Na_2CO_3) and a temperature of not greater than 70° should be used. W.

Bisulphite Compounds of Azo Dyes. V. Bisulphite Reaction of Azo Dyes Containing Two Auxochromes. N. N. Woroshtzow and A. S. Tsherkasski. *J. Amer. Chem. Soc.*, 1936, **58**, 2327-2333.

Addition products containing two molecules of bisulphite can be obtained from monoazo dyes with two auxochromes. This proves the dominant importance of the auxochrome group (and the nucleus containing it) in the reaction of naphthaleneazo dyes with bisulphite. The di-bisulphite compound of the dye prepared from diazotized, 1, 8-aminonaphthol and *α*-naphthol may be obtained easily from the monobisulphite compound. Due to side reactions, a pure product cannot be obtained from the unbisulphited dye. The formation of the di-bisulphite compound from the monobisulphite compound of the *α*-naphthylamine dye is accompanied by hydrolysis of the amino group and the transition of the organic nucleus to the dihydroxy dye. On hydrolysis of the di-bisulphite compound of the dye in alkaline solution stepwise decomposition takes place. The formation of bisulphite compounds corresponding to both the azoid and hydrazone forms is possible. W.

Determination of the Oil Content of Sulphonated Oils. D. Burton and G. F. Robertshaw. *Fette u. Seifen*, 1936, **43**, 152-155 (through *Brit. Chem. Abs., B.*, 1936, p. 1106).

The usual method of determining oil content by difference is unsatisfactory, and Wolff's hydrolysis technique was found to cause rupture. Extraction of an acidified aqueous solution with Et_2O was slow, but the following method gave good results. 50 ml. of CCl_4, 100 ml. of distilled H_2O, and 50 ml. of pure HCl (*d* 1·19) are poured into a separating funnel in the order given, 5 g. of the sulphonated oil are added, and the mixture is well shaken. Residual oil is removed by 2-3 extractions with 5 ml. of CCl_4, and the CCl_4 evaporated off. W.

Statistics for the Veterinarian. H. N. Turner. *Australian Veterinary J.*, 1936, **12**, 90-100.

The author, presupposing no previous statistical knowledge, gives a lucid introduction to the application of statistical methods to animal experimentation. The paper, after discussing the usual statistical constants, deals with the question of significance, and ends with an example of a faulty experimental lay-out, indicating in what direction the design of the experiment could be improved. A further paper is promised on association and correlation problems. W.

On the Chemical Structure of Natural Rubber and Varieties of Artificial Rubber. J. P. Wibaut, *India-rubber J.*, 1936, **92**, 609-624.

A comprehensive review of the work on the structure of the rubber hydrocarbon and the artificial rubbers, with special reference to condensation products of butadiene and chloroprene derivatives. C.J.W.

The Vulcanisation of Rubber with *m*-Dinitrobenzene. J. M. Wright. *Trans. I.R.I.*, 1936, **12**, 183-196.

The statement of earlier workers that rubber can be vulcanised with certain organic nitro compounds is confirmed in the case of *m*-dinitrobenzene (6 per cent.), especially in the presence of litharge. Many other oxides are found to induce vulcanisation, but barium monoxide gives the quickest cure. Various minor additions to the mix improve the vulcanisate, and results of ageing tests are reported. C.J.W.

10—ECONOMICS

American Cotton : Price Forecasts. "Textile Weekly" Cotton Bureau. *Text. Weekly*, 1936, **18**, 695-696.

Crop reports from the U.S.A. and statistics of supplies and production are tabulated and discussed and forecasts are made of the trends of futures prices for the coming season. C.

Cotton Piece-goods : Marketing. K. W. Bowden. *Text. Weekly*, 1936, **18**, 643-644, 679-680.

A report of a lecture giving a concise account of the organisation of the "Manchester Trade," including references to the influence of foreign exchanges, C.

French Silk and Rayon Weaving Industry : Development. G. Abert. *Text. Weekly*, 1936, 18, 638, 641, 642.

A report of a lecture in which the history of the Lyons industry is traced. There are about 700 manufacturers with 65,000 power looms. The use of rayon has increased considerably at the expense of silk ; the consumption of silk has fallen from 16 million lb. in 1913 to 6 million lb. in 1935. Scarcely any manufacturers carry out all processes from the yarn to the finished cloth. A large number of firms are commission weavers. An influential man in the industry is the " chef de service," whose functions are those of a "producer". He is a designer with sound knowledge of manufacturing and produces hundreds of samples for trial by his associates in the sales departments. Automatic looms are coming into favour. C.

World Cotton Crops : Statistics. J. A. Todd. *Empire Cotton Grow. Rev.*, 1936, 13, 302-309.

Statistics are given showing American, Egyptian and Indian cotton crops, world's carryover of American cotton, and world's consumption of cotton since 1929, and U.S. consumption of cotton by varieties, highest and lowest futures prices, and Liverpool spot prices of American with other varieties as percentages in 1934-35, 1935-36 and 1936-37. The figures are discussed. C.

British Textile Engineering Industry : Survey of Conditions. A. H. Milnes. *J. Text. Inst.*, 1936, 27, P372-382.

Japanese Cotton and Rayon Industries : Competitive Power. P. Ruprecht. *Leipzig. Wochenschr. Text. Ind.*, 1936, 51, 597-600, 609-611.

A general review with statistics of the influence of Japan on European cotton and rayon industries. C.

Lancashire Cotton Industry : Revival. B. Hesketh. *Text. Weekly*, 1936, 18, 676-677, 710-712, and 739.

A report of a lecture in which suggested measures for improving the Lancashire cotton trade are surveyed. Statistics of production and export are tabulated and the influences of one-process opening, replacement of mules by ring-frames, automatic winding and beaming, automatic looms, bulk dyeing and finishing are discussed with appropriate data on costs. C.

Textile Machinery Depreciation Account : Computing. S. H. Withey. *Text. Weekly*, 1936, 18, 633-634.

A discussion of modern methods for computing depreciation allowances in mill book-keeping. C.

Swedish Cotton Yarn Imports. *Leipzig. Wochenschr. Text. Ind.*, 1936, 51, 537-538.

The imports of cotton yarns of various types by Sweden are discussed with special reference to Germany's prospects in the trade. Statistics are tabulated for 1934 and 1935 according to the chief countries of origin. C.

Textile Production Statistics, November, 1936. *Bd. Trade J.*, 1936, 137, 930.

Statistics are given of raw cotton delivered to mills, rayon production and silk deliveries for home consumption, and of the state of unemployment in the cotton and wool industries. C.

Textile Wholesale Prices : November, 1936. *Bd. Trade J.*, 1936, 137, 832, 835.

Index numbers for November are Cotton 94·0, Wool 114·5, Other textiles 74·4 (1930 = 100). Average monthly wholesale prices are quoted for the main lines in raw fibres, yarns and fabrics. C.

11.—INDUSTRIAL WELFARE, INDUSTRIAL PSYCHOLOGY, AND EDUCATION

British Launderers' Research Association Laboratories. *M/cr. Gdn. Comml.*, 1936, 33, 535.

An illustrated description of the laboratories and an account of the activities of the Launderers' Research Association. C.

Chlorinated Hydrocarbons: Toxicity. K. B. Lehmann and L. Schmidt-Kehl. *Arch. f. Hyg. u. Bakt.*, 1936, **116**, 131-268 (through *Bull. Hygiene*, 1936, **11**, 815-816).

A series of experiments are reported which were carried out on animals from 1927-1932 to determine the narcotic effects of thirteen chlorinated hydrocarbons. Three signs were specially observed: (1) inability to prevent the head falling when raised with a stick; (2) disappearance of the corneal reflex (light narcosis), and (3) disappearance of all reflexes (deep narcosis). The times taken to produce these signs with different strengths of the poisons were noted on graphs. By consideration of the results presented in graphs and tables the relative poisonous effect of each substance has been worked out. Animals which have been brought to the stage of deep narcosis and then brought into the air were found to have very different rates of mortality. A few died soon after removal, but most of the deaths occurred two to five days after removal. With dichloro-methane, ethyl chloride, dichloro-ethane and tetrachloro-ethylene no deaths occurred; with chloroform and ethylene dichloride mortality was 16-30 per cent.; with carbon tetrachloride, 40·4 per cent.; with trichlorethane 58·5 per cent.; with methyl chloride 100 per cent. In acute industrial poisoning cases it is rare for deep narcosis to be reached as rescue usually takes place before. Some notes are given on protective measures against poisoning by these substances; enclosed apparatus and exhaust ventilation are recommended. C.

Eczema from Dyed Clothing: Occurrence in Denmark. P. Bonnevie and V. Genner. *Arch. Dermat. u. Syph.*, 1936, **34**, 220-227 (through *Bull. Hygiene*, 1936, **11**, 840).

The occurrence is discussed of eczema due to wearing dyed clothing, with reference to a number of cases seen at the Finsen Institute, Copenhagen. Nearly all the cases were women. A common site was the axilla due to sweat dissolving the dye out of the clothes, and most cases occurred in the summer. The commonest colour was blue, and positive skin tests were obtained in many cases by using the suspected material. A characteristic of the eczema was the chronic condition set up; it lasted several months after the noxious clothing had been discarded, with intermittent variations in intensity. The dyes at fault were difficult to determine, but in several instances positive tests were obtained with such dyes (sic) as *p*-phenylenediamine, *p*-aminophenol, and aminoazotoluene. C.

Scrotal Cancer: Occurrence in the Blackburn Registration District, 1837-1929. S. A. Henry and E. D. Irvine. *J. Hygiene*, 1936, **36**, 310-340 (through *Bull. Hygiene*, 1936, **11**, 837-838).

A search of the registers of Blackburn, over a period of nearly 100 years, brought to light 132 cases of cancer of the scrotum; 105 were mule spinners, past or present, 4 were chimney sweeps, and in a number more information was gathered indicating exposure at some period to mineral oil. In other cases no such exposure could be traced. C.

Experiences with Sensitivity Tests on 2,000 Patients. W. Zündel. *Arch. Dermatol. Syphilis*, 1936, **173**, 435-472 (through *Chem. Abs.*, 1936, **30**, 7665).

Of 1,000 persons given skin tests for Hg (I), quinine (II) and resorcinol (III), 14 per cent. reacted positive to I, 2 per cent. to II, and 2·8 per cent. to III. Of 1,500 persons tested, 242 were sensitive to *p*-phenylenediamine, 146 to *p*-amino-phenol, 154 to aniline and 70 to Pellidol. Data on sensitivity to spices, food dyes, preservatives and essential oils, and on results of specific tests on painters, masons, metal workers, tailors and bakers, are given for small individual groups. Fifty references. W.

Claims for Alleged Dermatitis. *Wool Rec.*, 1936, **50**, 1499-1500.

The legal view of alleged dye dermatitis is different from that of other forms of idiosyncrasy. Claims may fall into three groups, in connection with (1) furs dyed with one of the aromatic amines, but imperfectly oxidised and washed; (2) garments dyed with a dyestuff which is harmless to the majority of people; (3) garments worn for the first time. The difficulties are stressed of settling the questions of incidence rate and of testing the incidence. W.

Psychological reactions of workers. *Irish Textile J.*, 1936, **2**, No. 10, 4.

Statistics reveal that most industrial accidents happen on Monday, and slightly more than the average on Friday. Looking forward and back to doing nothing over the week-end is disturbing. Production in factories generally rises to maximum about Wednesday, so do eye accidents to factory workers. L.

The Toxicology of Organic Solvents. 1-4-Dioxan (Diethylenedioxide). W. Wirth and O. Klimmer. *Arch. f. Gewerbepath. u. Gewerbehyg.*, 1936, **7**, 192-206 (18 refs.) (through *Bull. of Hyg.*, 1937, **12**, p. 21).

As the result of a number of experiments on animals and man 1-4 dioxan is shown not to be as harmless as is generally supposed. It is largely used as a solvent for lacquers which are applied by spraying, during which the air may contain an injurious quantity of it. It is also used in cosmetic and medicinal preparations. T.

Etiologic Studies on the Formation of Skin Blisters in Viscose Workers. W. C. Hueper. *J. Indust. Hyg. & Toxicol.*, 1936, **18**, 432-47. 8 figs. (through *Bull. of Hyg.*, 1937, **12**, p. 22).

An investigation is reported into the occurrence of blisters on the hands of doffers employed in the spinning operation of a viscose plant for the manufacture of artificial silk. The lesions appeared on the fingers below the second joint, even though the hands were protected from drips by rubber gloves. Experiments, in which the ears of rabbits were exposed to various agents, indicated that carbon bisulphide was the chemical at fault; it is generated when viscose comes into contact with the acid bath. Rubber gloves were found to provide no protection as the carbon bisulphide penetrated the rubber and then the fingers were in a bath of this substance. Drips falling on the forearm, which could evaporate, only caused redness without any blisters. The skin reactions were characteristic of second and third degree chemical burns; and their severity varied directly with the concentration of carbon bisulphide. Effective protection was obtained against blister formation by the use of emulsions of eucerin, paraffin-paraffin oil mixtures or moisture-proofed cellophane. T.

Industrial Dust. Hygienic Significance, Measurement and Control. Philip Drinker and Theodore Hatch. (pp. viii +316. With 104 figs. 1936. London: McGraw-Hill Publishing Co. Ltd. Aldwych House, W.C.2. 24s.) (through *Bull. of Hyg.*, 1937, **12**, p. 82).

Perusal of this book indicates how knowledge upon the hygienic influence of dust has grown up in recent years, since all the studies here consolidated have been made during the last 25 years. Particular attention is devoted to those dusts, e.g., composed of quartz and asbestos, which are known to exert pathological influence upon the pulmonary tissues when inhaled. The size of dust particles which may reach the interstices of the lungs or remain in the air is explained, as well as the amount of dustiness which may safely be permitted. Methods for determining this permissible dustiness are fully described and illustrated. While this volume is one with which industrial physicians should be familiar, its value must be greatest to engineers when called upon to control a dust hazard, the existence of which has been determined by the physician. It is well and clearly written; and the illustrations are numerous and informative. T.

Toxicity of Dioxan. H. H. Schrenk and W. P. Yant. *J. Indust. Hyg. & Toxicol.*, 1936, **18**, 448-60 (through *Bull. of Hyg.*, 1937, **12**, p. 21).

Dioxan is the name given to diethylene dioxide which is used as a solvent of ethers, resins, oils, waxes and dyes. A detailed summary is presented of various studies of the toxicity of this solvent, which was the cause of five deaths in England in 1932, owing to exceptional exposure to high concentrations of its vapour. Animal experiments show that dioxan when inhaled, ingested, or administered subcutaneously has a toxicity of low order. With large doses the kidneys and liver are damaged; exposure, if repeated, to 0·1 per cent. vapour by volume cause such damage, which may also be produced by absorption through the skin. Exposure to the vapour sets up irritation of the nasopharynx and eyes, drowsiness, vertigo, headache and gastric symptoms with nausea and

vomiting. No jaundice has been observed. In advanced poisoning, acute haemorrhagic nephritis supervenes with suppression of urine, uraemia, coma and death. The odour of dioxan is easily noticeable at first, but decreases in intensity with continued exposure. High concentrations are not intolerable. With sublethal doses tolerance is acquired with complete recovery from symptoms. Dioxan is only one of many organic solvents concerning which exposure should be carefully controlled during industrial use. T.

The Causation of Pneumoconiosis. P. Drinker. *J. Indust. Hyg. & Toxicol.*, 1936, **18**, 524-36. 3 figs. (23 refs.) (through *Bull. of Hyg.*, 1937, **12**, p. 17.) T.

Clinical Aspects, Diagnosis and Treatment of Pneumoconiosis. W. I. Clark. *J. Indust. Hyg. & Toxicol.*, 1936, **18**, 537-49. (29 refs.) (through *Bull. of Hyg.*, 1937, **12**, p. 17). T.

Sand-Blasting and Silicosis. W. Bergerhoff. *Arch. f. Gewerbepath. u. Gewerbehyg.*, 1936, **7**, 156-81, 6 figs. (68 refs.) (through *Bull. of Hyg.*, 1937, **12**, p. 17). T.

The Sterilization by Steam of Materials Suspected of Infection by Anthrax. K. Angerer. *Arch. f. Hyg. u. Bakt.*, 1936, **116**, 282-94 (through *Bull. of Hyg.*, 1937, **12**, p. 19). T.

NOTES—In the references to publications abstracted the name of the publication is followed by the Year, Vol., Issue No., or date, if necessary, and Page No. (or Nos.).

Literature relating to the composition and manufacture of Dyestuffs is not dealt with in the abstracts of this *Journal*.

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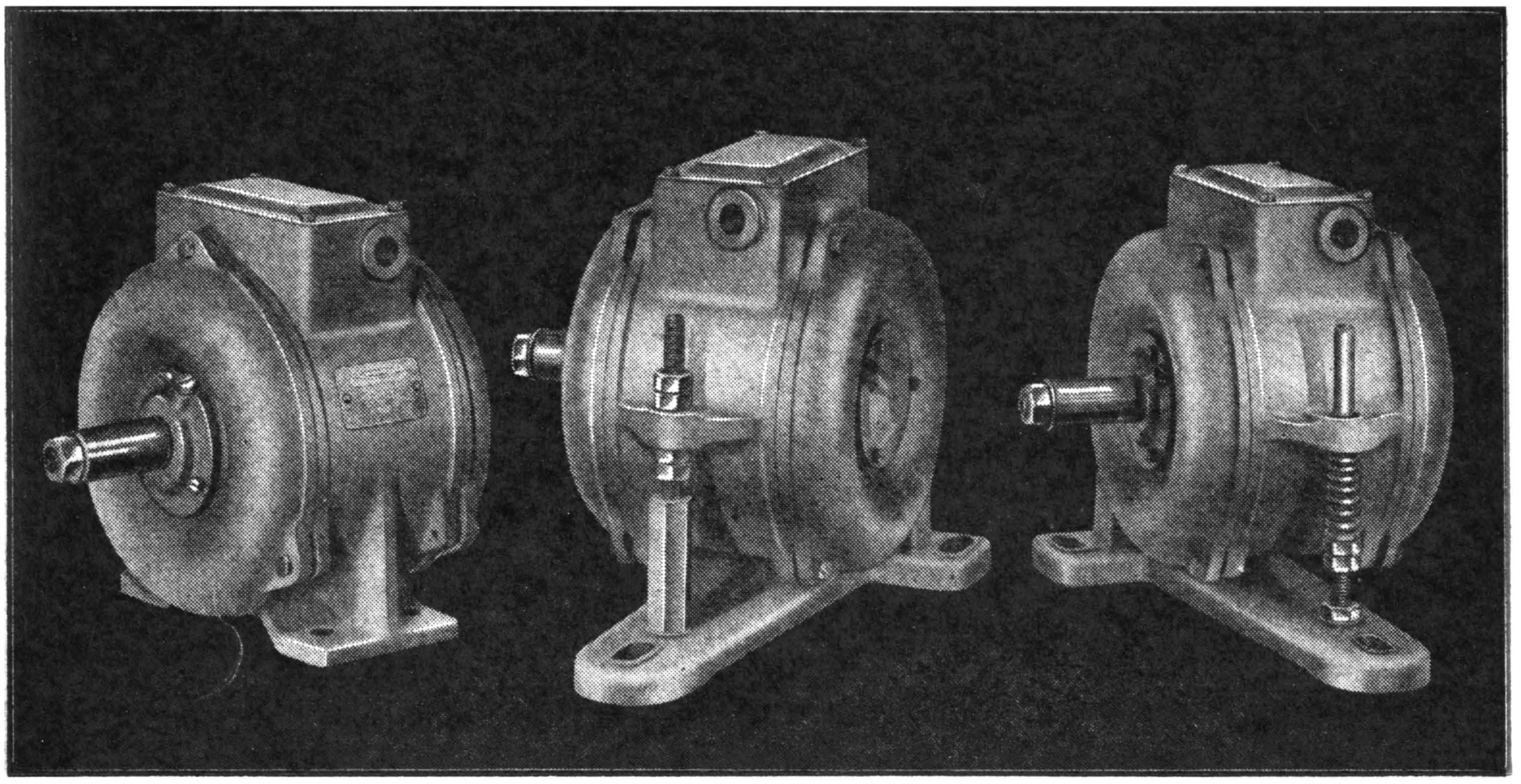

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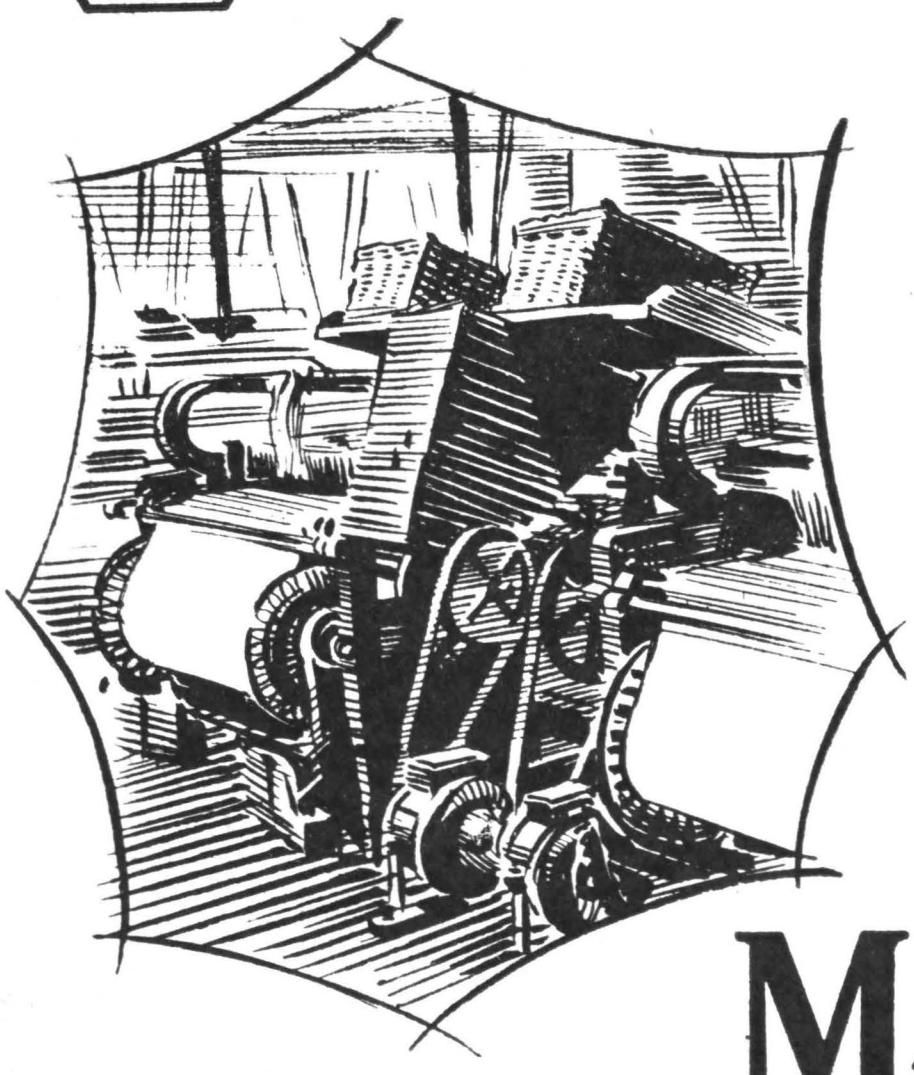

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