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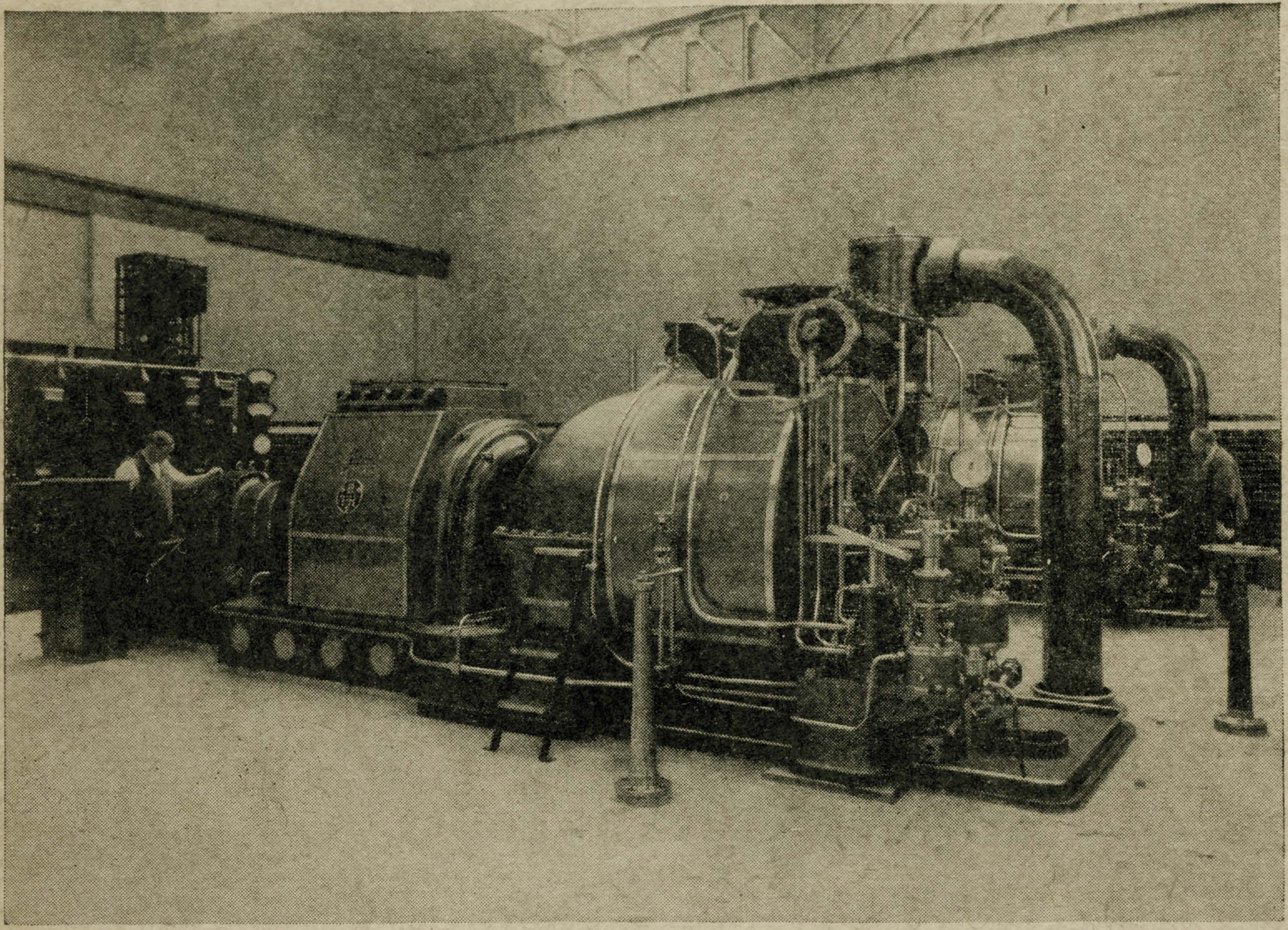
THE TEXTILE INSTITUTE
ST. MARY'S PARSONAGE, MANCHESTER



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THE TEXTILE INSTITUTE

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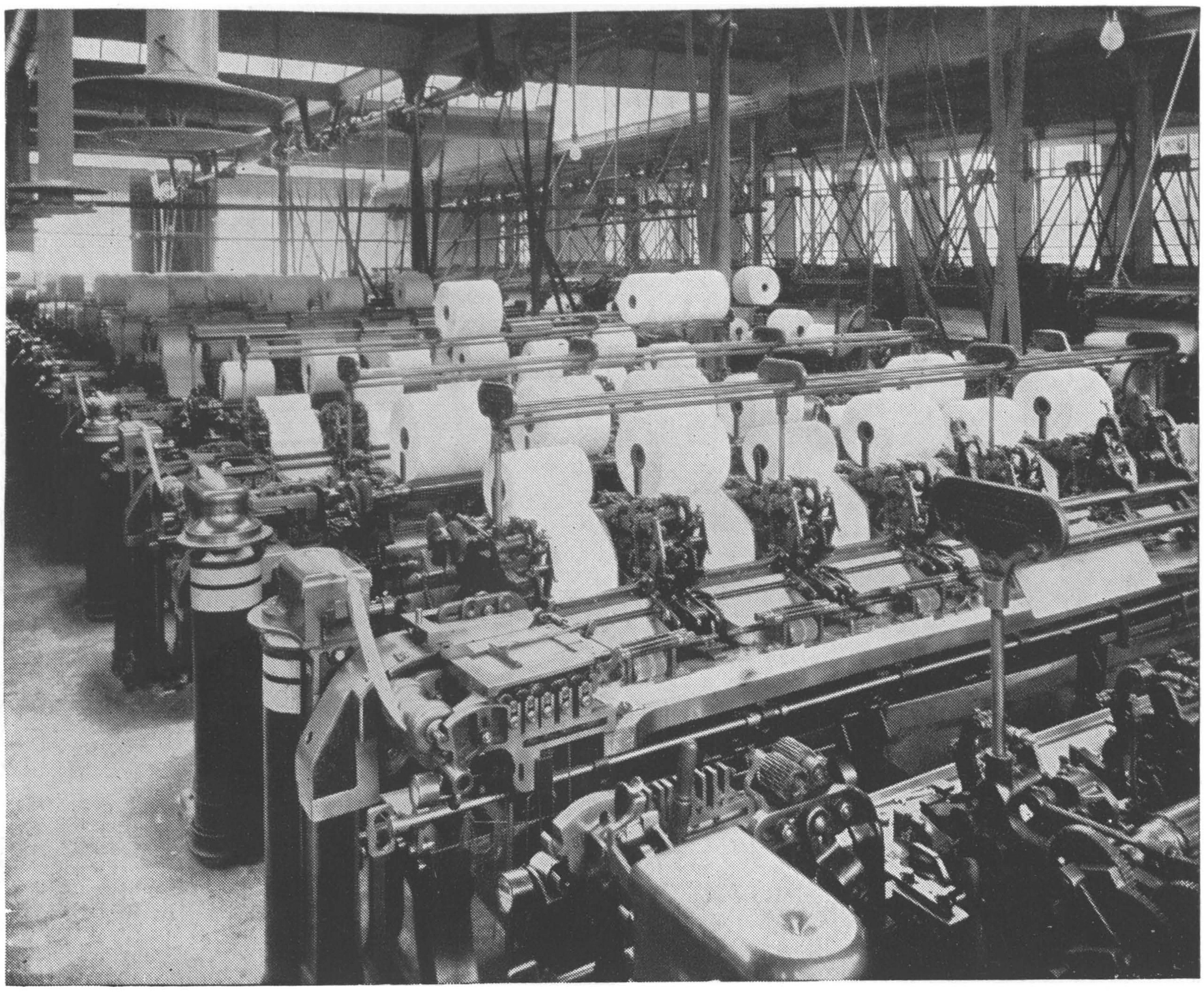
NOTICES: INSTITUTE MEETINGS

Friday	2nd September	*Manchester*—3 p.m. Meeting of Lancashire Section Committee.
Monday	12th September	*Manchester*—2 p.m. Meeting of Joint Committee *re* National Certificates in Textiles.
Tuesday	13th September	*Manchester*—3 p.m. Meeting of Publications Committee.
Friday	16th September	*Manchester*—3 p.m. Meeting of Unification of Testing Methods Committee.
Wednesday	21st September	*Manchester*—2 p.m. Meeting of Finance and General Purposes Committee.
Wednesday	21st September	*Manchester*—3 p.m. Meeting of Council.



The illustration above shows an Installation of new Model Nasmith Combing Machines in a Lancashire Mill.

THE JOURNAL OF THE
TEXTILE INSTITUTE

Vol. XXIX AUGUST 1938 No. 8

PROCEEDINGS

NOTES AND ANNOUNCEMENTS

SECTION ANNUAL MEETINGS

These events now form a part of the activities of each Institute section, and there are not wanting signs of renewed interest not only in these meetings but in Section affairs generally. Whilst space demands have prevented the earlier publication of these Notes they are now printed—in abstract—to serve as a permanent record.

Irish Section: Annual Meeting

The 12th Annual Meeting of the Irish Section was held at the College of Technology, Belfast, on Friday, 8th April, 1938. Dr. Gibson was voted to the Chair.

The minutes of the 11th Annual Meeting (23/4/37) were read and passed.

The Hon. Secretary, in presenting his report, stated that during the Session a meeting had been held on Thursday, 28th October, 1937, when a discussion took place entitled:—

" Standardisation—Textile Institute Scheme."

the principal speakers being, Mr. C. Le Maistre (British Standards Institution), Dr. W. H. Gibson (Linen Industry Research Association) and Mr. F. Nasmith (Textile Institute).

At the same meeting, Mr. Nasmith, on behalf of the Council of the Textile Institute, handed over the Medal awarded to Mr. W. H. Webb earlier in the year. Owing to illness, Mr. Webb was, unfortunately, unable to attend, and the Medal was received by Mr. McCall. A second meeting had been arranged for the 8th April, when it was hoped to have a paper from Dr. F. C. Wood, of Messrs. Tootal Broadhurst Lee Co. Ltd. Unfortunately, this meeting had to be cancelled. On the proposition of Prof. Bradbury, seconded by Mr. Bleakley, the report was adopted.

It was decided that the Section Committee, etc., be recommended to Council for election as follows:—Messrs. T. Bleakley, F. Bradbury, W. J. Cowden, J. Dorman, W. H. Gibson, F. J. W. Shannon and W. H. Webb.

A discussion took place regarding Meetings for next Session. Professor Bradbury suggested that a lecture from Mr. Copley on " Dyeing " would be appreciated. The General Secretary stated that he thought this could be arranged if desired—he also said Dr. Wood was prepared to give his postponed lecture during next Winter. It was agreed that arrangements should be made for both these lectures if possible, and in addition, one lecture by a local member. Further arrangements were left in the hands of the Committee. Mr. Robinson, in his remarks, spoke of the Institute Schemes for Standardisation and Technical Education. He stressed the importance of these matters and urged that as many members as possible should attend the Institute Annual

Meeting at Halifax and the Annual Conference to be held at Peebles. The Chairman thanked Mr. Robinson for his attendance, and the Meeting then terminated.

Lancashire Section: Annual Meeting

This was believed to be the first Annual Meeting of members in Lancashire and was well attended. It was held on Friday, 15th July, at the Institute, and Mr. H. C. Barnes presided.

After some discussion it was resolved to recommend that the committee be elected on the basis of three groups: (*a*) Spinning interests, (*b*) Weaving interests, and (*c*) Finishing interests. It was further resolved that these group sub-committees should each prepare a syllabus of lectures, visits, discussions, or any other events which might be of interest to the members. It was also agreed that the events should be planned to cover as wide an area as possible. The following were nominated for election to the committee in the sections indicated:—

(*a*) *Spinning interests:* H. C. Barnes (Manchester), A. W. Bayes (Hyde), H. Bromiley (Bolton), H. P. Curtis (Manchester), W. English (Prestbury), H. G. Greg (Styal), W. Heywood (Oldham), W. Howarth (Bolton), T. E. Mitchell (Rochdale), G. Moores (Manchester), G. H. Thompson (Oldham).

(*b*) *Weaving interests:* A. Anderson (Blackburn), F. Chadwick (Preston), H. P. Curtis (Manchester), H. Greenwood (Bury), W. A. Hanton (Manchester), E. Lees (Ashton-under-Lyne), J. Read (Salford), J. Starkie (Nelson), S. Taylor (Manchester), W. Wilkinson (Blackburn).

(*c*) *Finishing interests:* H. P. Curtis (Manchester), H. L. Dilks (Swinton), T. L. Elliott (Manchester), S. Heap (Rochdale), B. Hesketh (Farnworth), H. C. Kemball (Manchester), J. W. McMyn (Salford), H. Nisbet (Manchester), F. Scholefield (Manchester), F. C. Wood (Manchester).

It was unanimously agreed to recommend that Mr. H. P. Curtis be Honorary Secretary of the Lancashire Section Committee for the following year. The Chairman and General Secretary authorised to call meetings of Sub-Committees as soon as possible.

London Section: Annual Meeting

The Sixteenth Annual Meeting of the London Section held at the Hotel Victoria, Northumberland Avenue, London, W.C.2, at 6.30 p.m., on Friday, 25th March, 1938. Mr. T. C. Petrie presided. The Minutes of the last Annual Meeting, 28/4/1937, were read, approved, and signed.

The Committee's Report to Members of the Section for the past year was read by the Chairman. Mr. R. H. H. Stanger, supported by Mr. W. A. Dutton, referred to the excellent state of the Section as shown by the Report and moved the adoption, which was carried unanimously.

The Hon. Secretary reported that nineteen nominations to the Section Committee had been received by the closing date and that a further nomination had been received afterwards. Mr. C. H. Colton proposed, and Mr. S. H. Carter seconded, that the late nomination be accepted, and this was carried. On the proposition of Mr. G. N. Warnock, seconded by Mr. J. T. Holden, it was resolved that the following be recommended to Council for election as the London Section Committee for the ensuing year:—Messrs. G. M. Canham, C. H. Colton, A. R. Down, A. E. Garrett, E. W. Goodale, A. Gowie, F. C. Harwood, F. Henley, J. Howard, I.S.O., L. S. Irvine, A. Mason, W. H. Matthews, R. S. Meredith, P. J. Neate, T. C. Petrie, G. A. Rushton, H. R. Murray Shaw, C. F. Sunderland, J. G. Williams and W. A. Dutton.

The Lecture Syllabus, 1938/9, was discussed at length and many suggestions were made which the Hon. Secretary was requested to bring to the notice of the Lecture Sub-Committee at its next meeting.

The General Secretary, Mr. Hugh L. Robinson, addressed the Members upon Institute matters in general. His remarks respecting the linking of Sections more closely with Headquarters were enthusiastically received.

A very hearty vote of thanks was accorded Mr. T. C. Petrie for the considerable efforts he has made to stimulate interest in London in the Textile Institute.

Midlands Section: Annual Meeting

This meeting was held on 11th April, 1938, at the Victoria Station Hotel, Nottingham, when the attendance was small but representative. Dr. E. Wildt presided.

The minutes of the previous annual meeting were read and approved.

The Hon. Secretary, Mr. T. A. Purt, reported that the Membership now stood at 156 as against 142 the previous year and 101 in 1932, and this included 47 Associates and 7 Fellows.

The previous season's programme had been carried out as originally arranged with the exception of the visit to Messrs. Tinkers which unfortunately had had to be cancelled. Three excellent lectures were given by Dr. J. B. Speakman, Dr. Trotman and Mr. J. K. Ebblewhite, respectively, and all of these meetings had a good attendance. The visits to the L. M. & S. Locomotive works and to the Rope works of Messrs. Wrights Ropes Ltd., Birmingham, were greatly appreciated by those members taking part, and were generally voted as being interesting and instructive. The Second Annual Dinner was carried off most successfully at Nottingham with an even better attendance than at the First Dinner.

Two Standardisation Meetings were held in the Midlands in January, with Dr. Wildt presiding at the Leicester meeting and Mr. S. E. Ward at Nottingham.

The members' attention was drawn to the very efficient and conscientious manner in which Dr. Wildt had again carried out the Chairmanship, only one meeting having been missed, and this was owing to his unavoidable absence abroad. Thanks were also expressed to those members of the Committee who had rendered very valuable services during the past season, and particularly to Mr. Chamberlain. An appeal was made for Members to attend the Annual Meeting at Halifax and also to complete and return the Council Ballot Papers.

It was decided to recommend the following names to Council for election to the Section Committee:—Messrs. P. A. Bentley, W. N. Bignall, W. E. Boswell, G. H. Buckley, J. Chamberlain, J. K. Ebblewhite, A. S. Greenwood, F. Hern, H. F. Lilburn, W. Pritchard, A. Stoppard, S. E. Ward, W. H. Towle, G. Davis, W. A. Edwards. The latter two names were nominated in the place of Messrs. H. S. Bell and E. M. Walker.

Suggestions for the Programme for the coming Session were put forward for later consideration by the Committee. It was decided to hold the Annual Dinner on December 2nd or 9th at Nottingham. The meeting closed with a hearty vote of thanks to the Chairman proposed by Mr. W. Pritchard, seconded by Mr. W. E. Boswell.

Yorkshire Section: Annual Meeting

The Annual Meeting of the Section was held at the Midland Hotel, Bradford, on the 31st March, 1938, with Mr. G. Haigh in the Chair.

The Chairman reviewed the events of the past session briefly and expressed himself as being very satisfied with the excellent attendances at the Lectures. He wished, however, that a larger increase in membership had been obtained, especially in the outlying districts.

Two vacancies had been caused in the Committee by the decease of Mr. H. Binns and Mr. E. T. Holdsworth. The Meeting recorded its great appreciation of the long and active interest shown by these two members in the work of the Institute in general and of the Yorkshire Section in particular.

A letter was read from D. Wilson suggesting that Committee Meetings might be held at 6.30 to give an opportunity for Textile Teachers to attend. This suggestion was approved. It was also suggested that the Committee might meet more frequently than had been the case in the past, preferably on the same evening but prior to a lecture.

After considerable discussion it was decided to hold meetings as far as possible on the 2nd Thursday of each month from October to March. It was agreed that in view of the experience of the past few years when great difficulty had been experienced in inducing members to attend meetings outside Bradford, all the meetings should be held in Bradford with the exception of joint meetings with Textile Societies in Halifax and Leeds. The principle of joint meetings with Bradford organisations was approved.

Textile Institute Examination Awards, 1938

The results of the current year's Examination in relation to the Associateship of the Textile Institute, held simultaneously at Manchester, Bradford, Nottingham, London, Belfast and Cawnpore (India), have just been issued, and the following passes are recorded:—

Part I (Auxiliary Subjects)—*S. Goddard (Colne), J. E. Lynam (Nottingham).

Part II (General Textile Technology)—T. Crawshaw (Halifax), *N. E. L. Eyre (Coventry), *P. A. Fewster (Nelson), A. Gledhill (Bolton), *S. Goddard (Colne), *T. R. Hartley (Middlesex), *H. Hilton (Chorley), *G. Keighley (Bradford), Wm. Leng (Sowerby Bridge), J. E. Lynam (Nottingham), *J. Longworth (Bolton), J. P. Moffat (Nottingham), E. H. Nagarwalla (Blackburn), J. E. Priestley (Halifax), *R. Robinson (Shipley), *S. Roscoe (Cawnpore, India), W. C. Russell (Leicester), N. Schofield (Bradford), A. Shaw (Bury), *D. H. Sheppard (Pentrich), *K. Slack (Carlisle), *A. Smith (Mansfield), G. Smith (Nottingham), *S. C. Smith (Bradford), F. Webster (Bolton), *W. W. Wilkinson (Blackburn), *G. W. Worthington (Bolton).

Names marked with an asterisk are of candidates who have now completed the qualification requirements in regard to award of Associateship (A.T.I.).

Federation of Textile Societies and Kindred Organisations

The Eleventh Annual Meeting and Conference of the Federation took place at Manchester on Saturday, 7th May, 1938, by invitation of the Manchester College of Technology Textile Society.

The programme commenced with two visits, the first of which was to the works and laboratories of Metropolitan Vickers Electrical Co. Ltd., the second to the works of Messrs. Small & Parkes Ltd. Between 30 and 40 members went with each party, and general appreciation of the facilities provided was expressed. On returning from these visits, delegates assembled in the Refectory of the College of Technology, where lunch was served. Mr. John Crompton, O.B.E., M.Sc., F.T.I., a Past-President of the College Society, presided and welcomed the delegates in attendance. The Federation President, Mr. G. W. Hood, and the President-elect, Mr. H. Thorpe, both spoke thanking Mr. Crompton and the College Society for their hospitality. The two firms concerned with the visits, and Mr. E. M. Gray, whose paper was to be delivered later, were also thanked.

Annual Meeting.

The attendance register was signed by the following members of the Committee of Management and delegates:—Ashton-under-Lyne Mill Managers Association—C. E. Anderson, F. Proctor, E. Lees; Batley Textile Society—N. Barker, N. Collinson, J. B. Sugden; Belfast Municipal College of Technology Textile Society—F. Bradbury, Wm. Huggan; Blackburn Textile Society—A. Cresswell, R. Bleasdale; Bradford Textile Society—F. Pickles; Burnley Textile Society—H. H. Brown, W. Long; Bury & District Textile Society—

E. Law, H. Tonge, H. Warburton; British Association of Managers of Textile Works—F. I. Sharp; Colne & District Textile Society—N. S. Brookes-Carey, F. Hartley, T. H. Holden, D. Johnson; Derby Textile Society—F. Cheetham, A. Pollard, A. S. Wilmore; Dewsbury Textile Society—N. C. Gee, J. Hodgson; Halifax Textile Society—H. E. Brearley, E. A. Shooter, J. Sykes; Haslingden and District Textile Society—R. Davenport, R. Stansfield, F. Sunderland; Huddersfield Textile Society—A. G. Crowther, A. F. Priestley; Keighley Textile Society—J. R. Emms, J. Ogden; Manchester College of Technology Textile Society—G. A. Bennett, E. C. Stevens; Morley & District Textile Society—L. Bellwood, H. Hardy, G. W. Hill; National Federation of Textile Works Managers Association—W. P. Crankshaw, T. E. Mitchell; Nelson Textile Society—V. Jowett, H. H. Parker, J. Turner; Oldham Technical Association—J. Gartside, H. Jinks, J. Pilkington; Preston & District Textile Society—W. H. Johnstone, T. Yates; Rochdale Cotton Spinning Mutual Improvement Society—J. Birtles, W. Taylor, J. H. Townson; Rochdale Textile Society—F. Coop, E. Thornton; Shipley Textile Society—J. Blackburn, F. R. Holbrook, R. Jones; Textile Teachers' Association (Lancs. Section)—H. Fullard, H. W. Schollick; Todmorden Textile Society—A. Doel, J. A. Scholfield, A. Sutcliffe; Committee of Management—J. Greenwood, H. Nisbet, W. P. Richmond, J. W. Wolstenholme; and Hon. Secretary, H. L. Robinson.

The Minutes of the previous meeting (1/5/37) were taken as read, approved and signed.

The Report of the Committee of Management with the Statement of Accounts to 31st December, 1937, were submitted and adopted.

Messrs. W. A. Hanton and J. W. Wolstenholme were appointed scrutineers for the Committee of Management ballot.

Proposals embodied in the report of the Committee of Management that Past Presidents should be given the opportunity to serve on the Committee of Management by invitation, and that this invitation be extended to the first three Chairmen of the Federation, Messrs. F. Briggs, J. T. Stokes, and N. Collinson, were formally received and unanimously adopted.

The Hon. Secretary explained the position in regard to the ballot, and referred to the admission to Membership of the Federation of the Derby Textile Society. Discussion took place as to the basis upon which the Committee of Management should in future be constituted having regard to the existence of Textile Societies in Leicester and Derby, Cumberland and Belfast. Various suggestions were made, but in the end, by a large majority, the matter was referred to the Committee of Management for discussion and recommendation to the next Annual Meeting.

The Ballot for election to the Committee was then taken. At a later state in the meeting, the scrutineers reported the results of the vote and the President declared Messrs. W. P. Richmond, D. Atkinson and R. Stansfield elected to represent Lancashire Societies, and Mr. N. C. Gee to represent Yorkshire Societies.

The retiring President, Mr. G. W. Hood, proposed from the Chair, and Prof. F. Bradbury seconded, that on the nomination of the Huddersfield Textile Society, Mr. H. Thorpe be elected President for the ensuing year. The election was unanimous, and Mr. Thorpe took the Chair. He thanked the delegates for their confidence in him, and assured the meeting that he would do all that lay in his power to forward the work of the Federation.

On the proposal of Mr. Thorpe, a unanimous vote of thanks to the retiring President, Mr. G. W. Hood, was recorded. Mr. Hood expressed his appreciation of the vote, and stated that it had been a pleasure to serve the Federation in which he was definitely interested.

The Hon. Secretary, Mr. H. L. Robinson, was unanimously re-elected to office, and thanked for his services during the past year.

The Hon. Auditor, Mr. W. Kershaw, was re-elected to office, and thanked for his services during the past year.

The President referred to the matter of venue for the 1939 Conference, and stated that the Committee of Management would be glad to have suggestions from interested Societies. Later in the day, the matter was raised by delegates of a Society present, and the President expressed satisfaction with the proposal. Announcement is to be made later on this point.

The Hon. Secretary reported that the adjudication on the Prize Scheme had not yet been completed, and it was agreed to leave the matter for completion in the hands of the Committee, with the request that announcement should be made in a circular to Societies.

A paper on "Wage Payments in the Textile Industry" was delivered by Mr. E. M. Gray, M.Sc.Tech., of the Cotton Economics and Research Department, Manchester University. This paper was received with a unanimous vote of thanks and an expression of appreciation of Mr. Gray's excellent work on the part of Mr. J. Crompton.

Later, Tea was served in the Refectory when the delegates were again Guests of the College Textile Society.

TEXTILE INSTITUTE DIPLOMAS

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

ASSOCIATESHIP

EYRE, Norman E. L. (Coventry).
FEWSTER, Percival Allan (Colne).
GODDARD, Sidney (Colne).
HARTLEY, Thomas Richard (Middlesex).
HILTON, Herbert (Chorley).
KEIGHLEY, Geoffrey (Bradford).
LONGWORTH, James (Bolton).
ROBINSON, Ralph (Shipley).
ROSCOE, Samuel (Cawnpore, India).
SHEPPARD, Douglas Herbert (Pentrich).
SLACK, Kenneth (Carlisle).
SMITH, Arthur (Mansfield).
SMITH, Sydney Clark (Bradford).
VASHIST, Shankar Dat (Lucknow, India).
WORTHINGTON, George William (Bolton).
WILKINSON, Walter William (Blackburn).

Reviews

Leaves from my Embroidery Note-Books. By Louisa F. Pesel. (B. T. Batsford Ltd., 15, North Audley Street, London, W.1. 5s. 6d. net.)

This is at once an instruction book on geometrical embroidery and a compendium of designs. The plates composing the work are divided into four series of increasing complexity, and are produced on squared paper. Intended as foundations or starting-points, so that the worker may introduce modifications if desired, this collection of designs should prove of the utmost interest to all interested in embroidery. T.

Industrial Fibres, 1937/38. (Published by the Imperial Economic Committee. 2s. 9d. post free.)

The outstanding feature in this statistical summary relating to the world's industrial fibres is the continued advance in the production of rayon staple fibre. The estimated world production during 1937 is more than double that of 1936 and nearly 100 times that of 1930. How far this phenomenal increase is due to the official decrees in Germany and Japan enforcing the admixture of natural fibres and rayon staple fibre in fabrics for home consumption it is impossible to state. Italy and Japan easily lead the world in exports of rayon yarn, the country in which the industry originated being a long way behind. As the Empire as a whole is by far the largest importer of rayon, one is left with the impression that production costs within the British Commonwealth of Nations are too high.

This work deserves close study by all concerned with the production and utilization of industrial fibres, both natural and synthetic. Its perusal gives rise to very interesting speculations as to possible developments of the attempts of certain nations to make themselves self-supporting and self-sufficient. Since international trade cannot be eliminated it would appear that a day of reckoning is inevitable ultimately.

By means of its publications the Imperial Economic Committee is rendering a most useful service. The presentation of the data is excellent. T.

The Juvenile Labour Market. By John and Sylvia Jewkes. Published by Victor Gollantz Ltd., London, 1938. (154 pages, 3 appendices and index. Price 4s. 6d. net.)

The cover sheet of this book says " Professor Jewkes, of the University of Manchester, and his wife, present a picture of juvenile labour conditions in this country which will come as a shock to readers unfamiliar with the facts." Modified to the extent that the picture has been drawn within a definite geographical limit, this is a very fair indication of the impression the book gives.

In the first place Professor and Mrs. Jewkes are to be congratulated on the experiment they planned, on the conduct of the work itself and most particularly on the lucid way in which it has been written up. Sociological experiments carried out in similar manner and presented with such moderation in regard to the conclusions drawn would do much to remove the suspicion with which social pronouncements are nowadays regarded.

It would be unfair to the authors to attempt to summarise this book in a review; the object being admittedly to get as many people as possible to read the book for themselves. It will probably be best therefore to indicate the questions Professor and Mrs. Jewkes put to themselves at the outset of the work and to describe, in their own words, the methods adopted to obtain the answers. Then read the book and therein you will find the answers. The reviewer will unhesitatingly say that every employer, teacher, parent and educationist ought to read the book. It will be surprising if they can all do so with equanimity.

This is what the authors say as to their problem and how they attacked it.

" It is one of the strangest features of contemporary British life that seven out of every ten children still leave school, to begin to earn their own living, at the age of 14 years.

" This recurrent flow of young workers into industry is one of the most important events in national economic life; its significance lies not only in its influence on the individual but also in its effect upon the distribution of the labour force of the country and hence upon economic efficiency. How do elementary school leavers fit themselves into the economic system? Is there any relation between the inclinations and capacity of children and the kind of posts they obtain? Is there any evidence that efficiency in industry can only exist if children begin industrial work at an early age? How do wages increase as children grow older? What forms does unemployment among juveniles take? Is juvenile unemployment ever likely to be as serious in the future as it was in the depression of 1930-33? Is the existing legislation adequate to prevent the exploitation and ill-treatment of young workers? These are some of the questions which the community, in its own interests, must study. Mistakes and maladjustment at this point are likely to be irreparable and the temporary gains of sectional interests obtained only at the expense of long period losses for the community as a whole."

" The story that is to be told in the following pages falls into two parts. Part I embodies the results which were obtained from a very detailed enquiry made in five representative Lancashire towns, Ashton-under-Lyne, Atherton, Burnley, St. Helens, and Warrington, between Easter 1934 and the middle of 1936. Part II is concerned with the implications of the results obtained from this investigation in the broader sphere of national policy."

" The collection of the facts upon which the first part of this book is based involved the visiting, at intervals over a period of two years, of the homes of 2,000 children. The labour was carried out by voluntary workers. In St. Helens and Burnley, with the permission of the Directors of Education, the School Attendance Officers generously gave of their time. In Warrington, Ashton-under-Lyne and Atherton the visitors were mainly school-teachers. Without this assistance the enquiry could not even have been begun. The fact that, at the end of the period, contact had been maintained with 96 per cent. of the children in the original sample speaks itself of the conscientious manner in which the work was performed." T.

Wool Year Book, 1938. (Published by the *Textile Mercury*.)

The production of an annual such as this provides the compilers with much food for thought. It must frequently be difficult to decide what may be jettisoned in order to make room for the insertion of new matter so that the work may be kept abreast of the times.

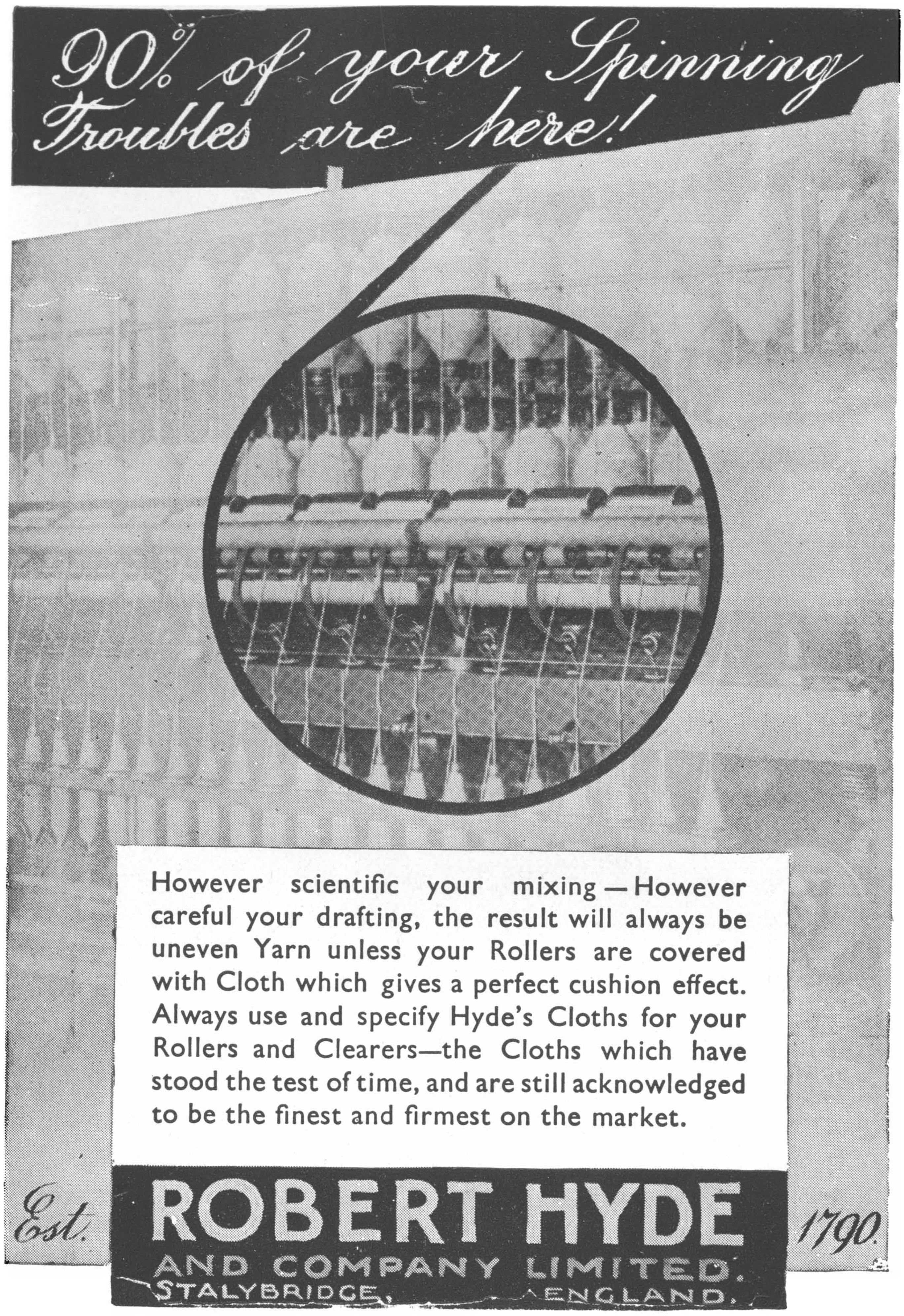
The statistical matter following the references to the outstanding features of the year is valuable since it affords the broad general view of the trend of the industry so necessary to correct perspective.

It is good to have new matter placed in fairly prominent positions at the beginnings of the respective sections. This is better than the procedure in the Rayon Section of quoting a paper by Oxley, for it is difficult to avoid the impression that it is imperfectly incorporated.

The standard and usefulness of this publication as a whole are well maintained. T.

Official Report of the XVIII International Cotton Congress, Egypt, 1938.

This beautifully produced volume gives the report of the proceedings of the meetings, the papers read and the discussions. The whole makes interesting reading and the illustrations are a credit to all concerned. T.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THE JOURNAL OF THE
TEXTILE INSTITUTE
TRANSACTIONS

16—ON THE HEAT TRANSMISSION OF TEXTILE FABRICS

By C. D. Niven and J. D. Babbitt
Physicists, National Research Laboratories, Ottawa, Canada

INTRODUCTION

At the present time considerable attention is being paid to air conditioning and comfort temperatures, yet little attention is being paid, by the authorities on heating and ventilating, to the rate at which the human subject loses and develops heat. Comfort temperatures have little meaning if we do not know how the subjects are clad, how they are nourished and under what conditions they have been living. In this communication an attempt is made to ascertain in some measure the effect of the clothing which men wear indoors in preventing heat loss. By restricting the problem to indoor conditions and thus simplifying it, it was hoped to gain some useful information in regard to the type of apparatus needed for determining the insulating quality of clothing under more complex conditions.

The difficulty, of course, in a problem such as this is that it is hard to duplicate natural conditions on a piece of laboratory apparatus. To stretch a piece of cloth over a heated surface and determine how the heat escapes from that surface may or may not give useful information depending on whether the piece of cloth is to be used tight over a man's knees, as when he is sitting, or loose, as when he is standing. If one considers the complicating factors comprising air movement, humidity of the air, the air space between the hot body and the cloth, the surface conditions depending on the " pile " of the cloth and the effect of other textile fabrics worn along with that material, the difficulties of getting any results of scientific value become apparent. For this reason experimenters in the past have sometimes constructed apparatus without much serious attempt to duplicate natural conditions. This was especially true in the case of those whose objective was merely to standardize cloth. Thus Rood[1] placed the sample between metal discs. Haven's[2] method of wrapping the sample round a cylinder three layers deep also fails to duplicate natural conditions. Sale's[3] method comes nearer to actual conditions. Sale used a heated plate on the warm side of the sample and free air on the cold side. While this method duplicates conditions well in still air, the plane surface does not appear to be so good as a cylinder when air currents are to be taken into account as the latter would average the various directions. In contrast to these experimenters, Angus[4] has developed an apparatus which ingeniously imitates the actual conditions in many respects. The apparatus consists essentially of a tank containing warm water, thermostatically controlled. Two sides of the tank are concave and two are convex, so that when a sample of cloth is stretched around the tank, part of it is in contact with the surface and part is not. The form of the apparatus, however, makes it rather difficult to express the results in scientific terms and it was partly on this account that the authors of this communication, after building an apparatus like that of Angus, decided to revert to the original cylindrical apparatus used at the beginning of the work. This apparatus is simpler and the final conclusions from experiments agree with those of Angus.[5]

The apparatus made by Marsh[6] resembled that employed by the writers but it differed in the important respect, that while they used the air of the room for the cold side, Marsh used an air space between the heated cylinder and an outer watercooled cylinder. Marsh could in this way control the

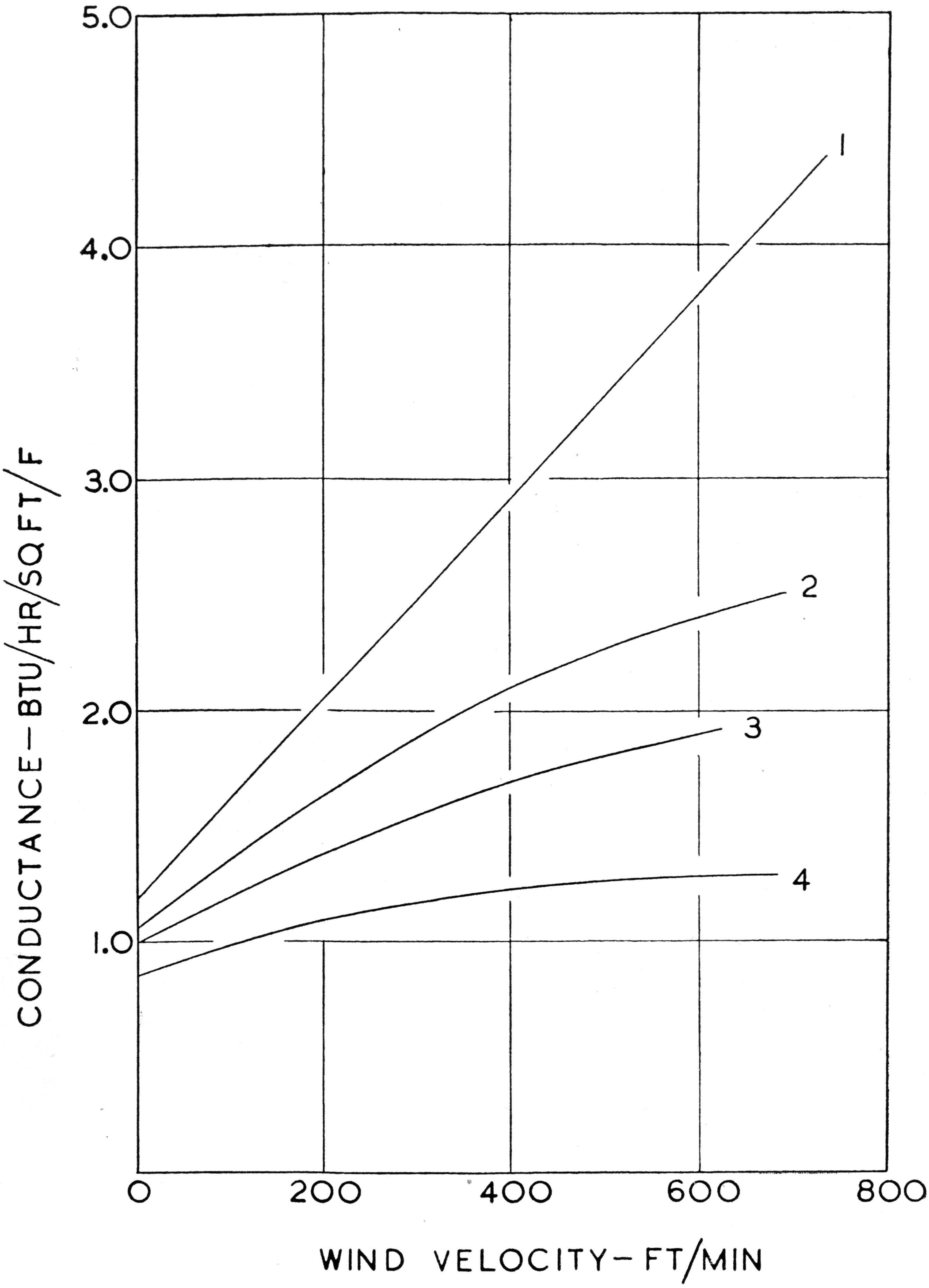

Fig. 1.

1. Uncovered cylinder.
2. Worsted suiting close to cylinder.
3. Tweed suiting close to cylinder.
4. Ladies' coating close to cylinder.

temperature and humidity of the air but the method fails to allow for the testing of the fabric in draughts of air blowing across the cylinder.

Freedman[7] also used a cylinder: he placed it in an air duct and was therefore equipped to use different wind velocities.

Black and Mathew[8] have carried out an important investigation on the effect of wind on a sample which they measured by means of the cooling method: their apparatus was small and could be placed inside a box in which atmospheric conditions were controlled.

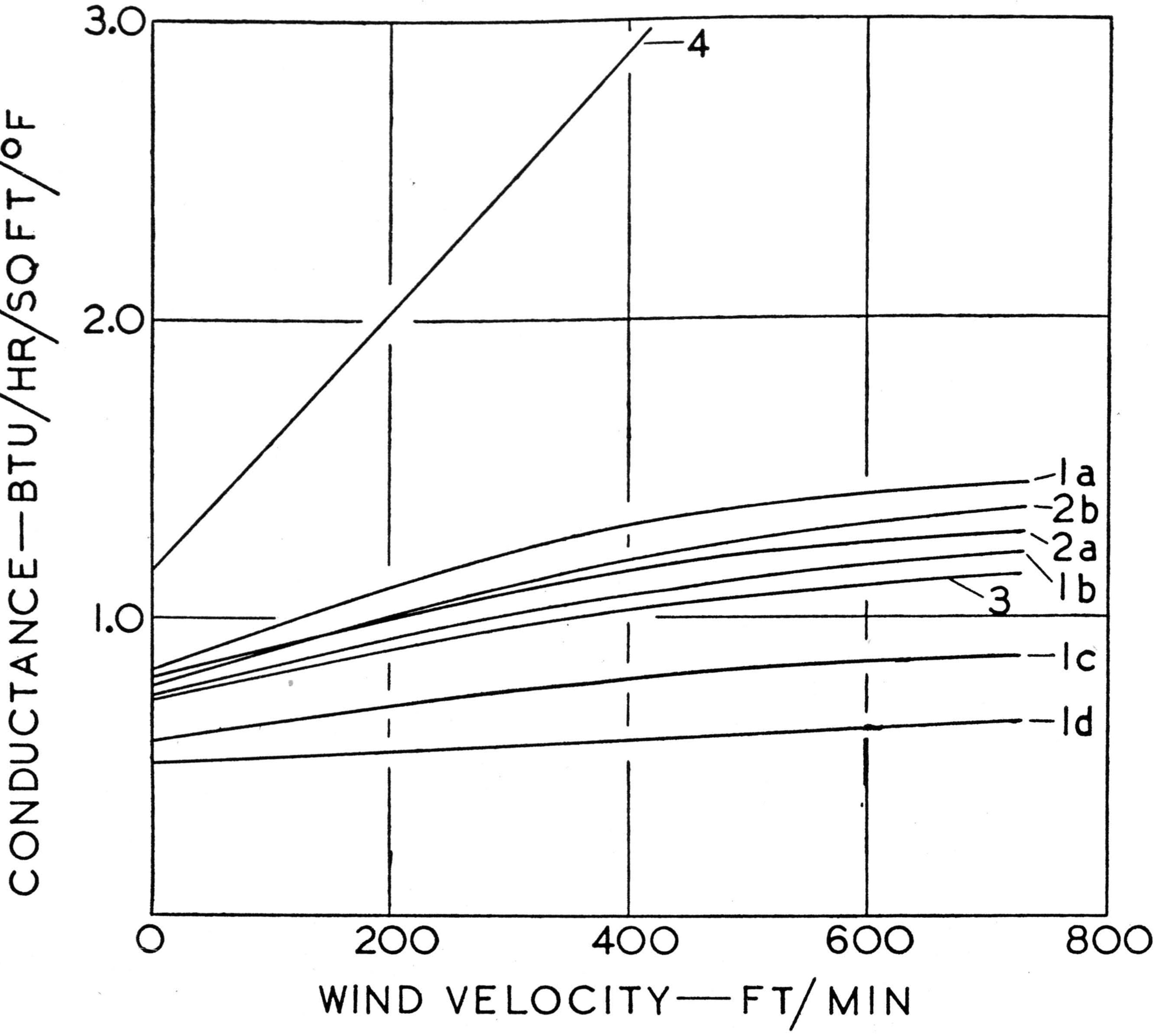

Fig. 2.

1a. Wool underwear, shirting, suit lining and tweed suiting, very tight over cylinder.
1b. Wool underwear, shirting, suit lining and tweed suiting, fairly loose over cylinder.
1c. Wool underwear, shirting, suit lining and tweed suiting, very loose over cylinder.
1d. Wool underwear, shirting, suit lining and tweed suiting, held out from cylinder a quarter of an inch.
2a. Shirting, suit lining and tweed suiting, close to cylinder.
2b. Shirting, tweed suiting and suit lining—latter on outside—close to cylinder.
3. Wool underwear, shirting, suit lining and worsted suiting, fairly loose over cylinder—comparable with 1b.
4. Uncovered cylinder.

DESCRIPTION OF APPARATUS

The cylinder actually used for the work described in this communication consisted essentially of a heated brass pipe three inches in diameter and eight inches in length supported horizontally by wooden supports at the ends which came in contact only with the discs of cork closing the ends of the cylinder. The cylinder was in three parts as was also the heating element which consisted of manganin wire wound on spirally grooved wooden cylinders. The heating elements which warmed the two end portions of the cylinder were connected in series and could be heated independently from the central position. The temperature of the end portions was adjusted to equal the temperature of the central portion by observing when the reading was zero on a thermocouple the junctions of which were placed one on the central portion and one on the end or guard portion ; when this e.m.f. reading was zero then no heat was travelling from the central portion of the cylinder towards the ends. Between the wooden cylinders wound with manganin and the brass pipe there was a sheet of micanite fitting tightly between them ; the manganin was thus electrically insulated from the metal pipe. The form of the apparatus was practically a cylindrical replica of the

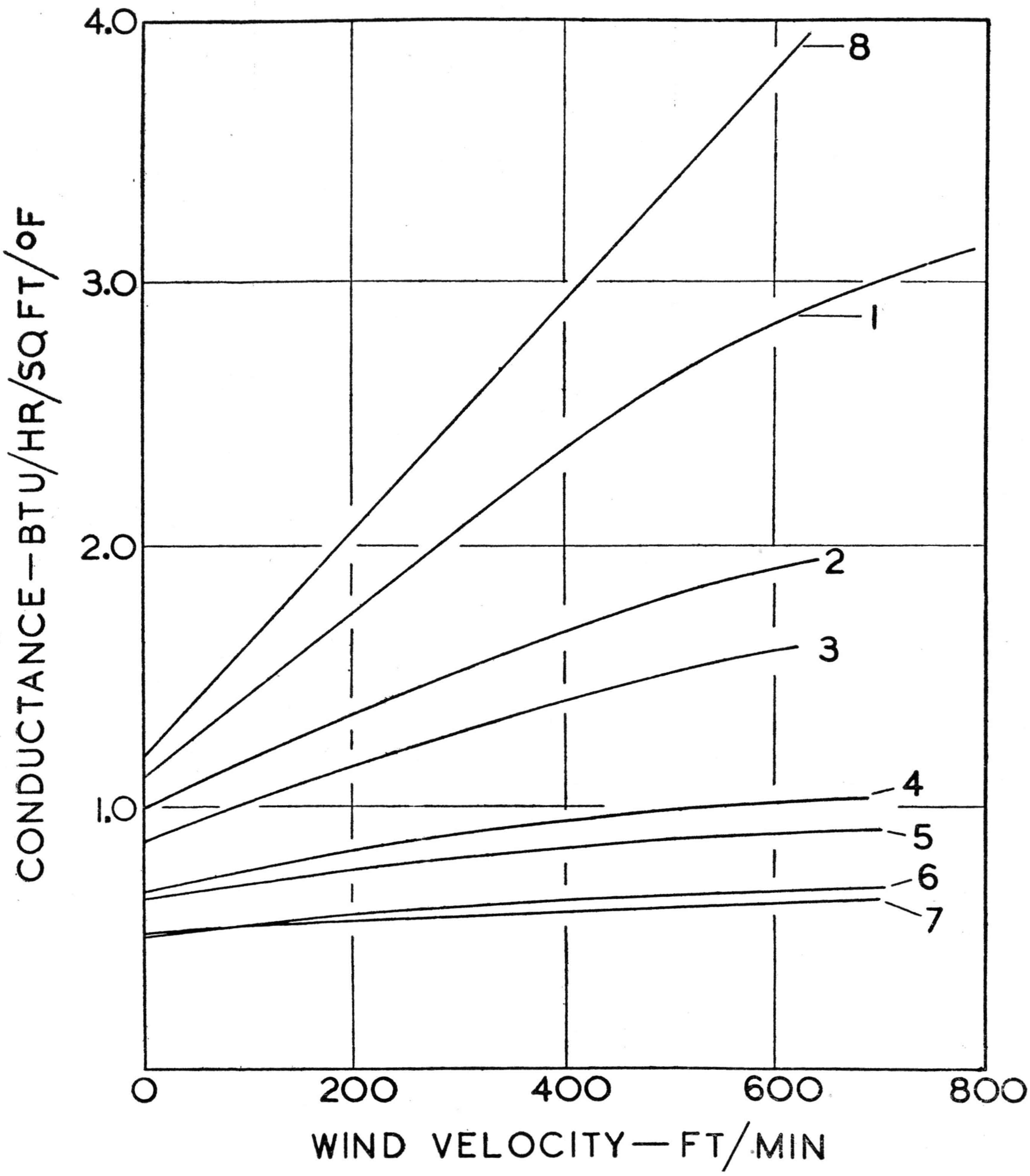

Fig. 3.

1. Shirting alone close to cylinder.
2. Tweed alone close to cylinder.
3. Shirting and tweed close to cylinder.
4. Shirting alone, held out from cylinder a quarter of an inch.
5. Tweed alone, held out from cylinder a quarter of an inch.
6. Wool underwear, shirting, suit lining and worsted suiting, held out from cylinder a quarter of an inch.
7. Wool underwear, shirting, suit lining and tweed suiting, held out from cylinder a quarter of an inch.
8. Uncovered cylinder.

hot plate apparatus used at the Bureau of Standards in Washington and at the National Research Laboratories in Ottawa. This apparatus has been described by Van Dusen.[9]

The supports of the brass cylinder measured about ten inches in height so that there was ample room for the free passage of air around the apparatus. The cylinder was covered with a piece of buff coloured leather: it was hoped thereby to reproduce in some measure the physical properties of human skin. This may have been an unnecessary precaution but it was a simple one and obviated errors arising from the difference between the radiation from tarnished brass and that from animal skin tissue. The apparatus was not set in an air duct as Freedman did but was placed on a table in the laboratory. Undoubtedly there were disadvantages to this procedure as the air in a

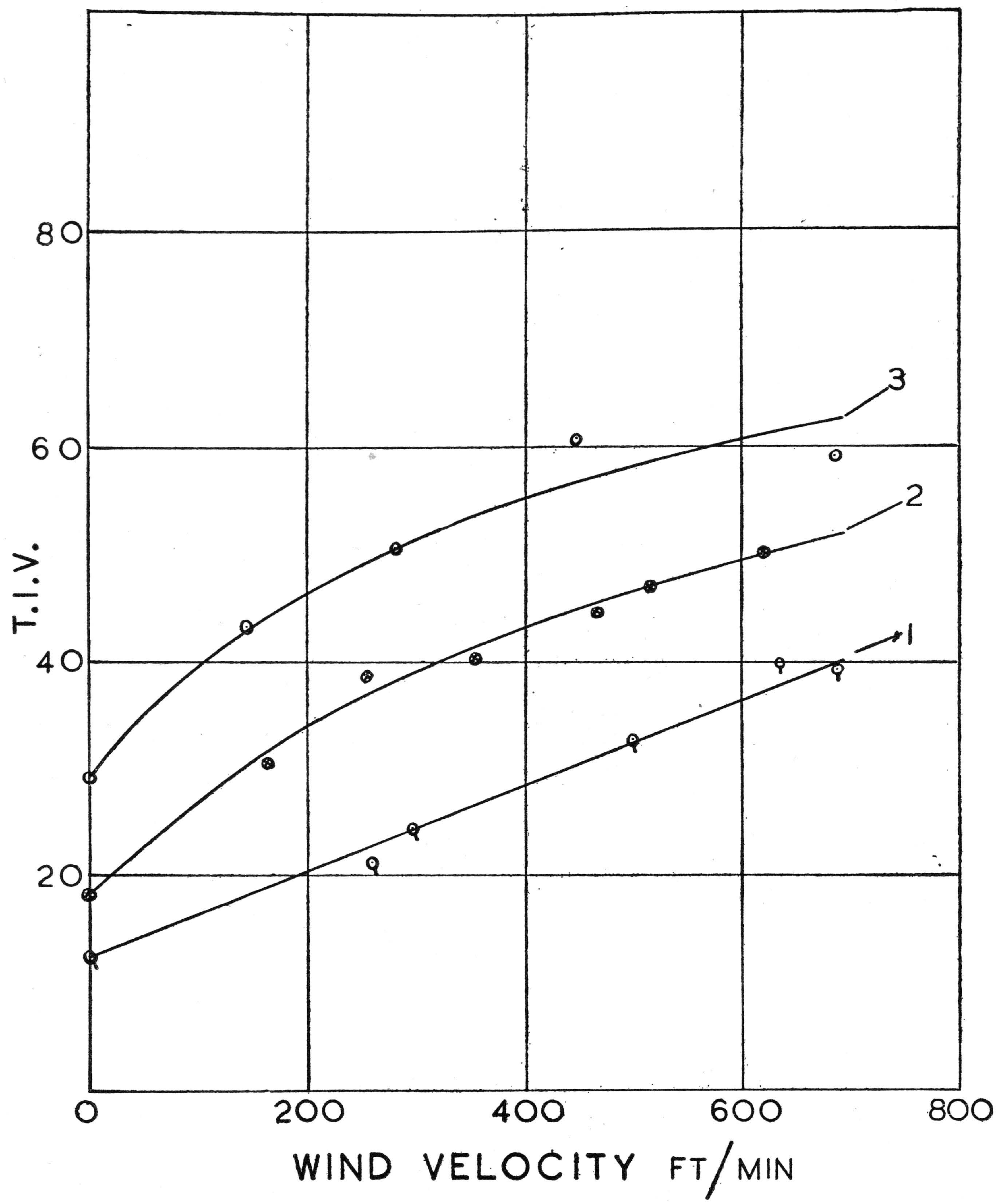

Fig. 4.

1. Worsted suiting close to cylinder.
2. Tweed suiting close to cylinder.
3. Ladies' coating close to cylinder.

room does change slightly in temperature and the humidity varies from day to day and if there had been available a large chamber in which atmospheric temperature and humidity were controlled it would have been used for the work. It was found, however, that during certain hours of the day the temperature in the room remained constant, and by giving sufficient length of time for the tests so as to be sure that fluctuations in room temperature were not affecting the results one was able to avoid the construction of a special chamber or duct with controlled air temperature. Incidentally it

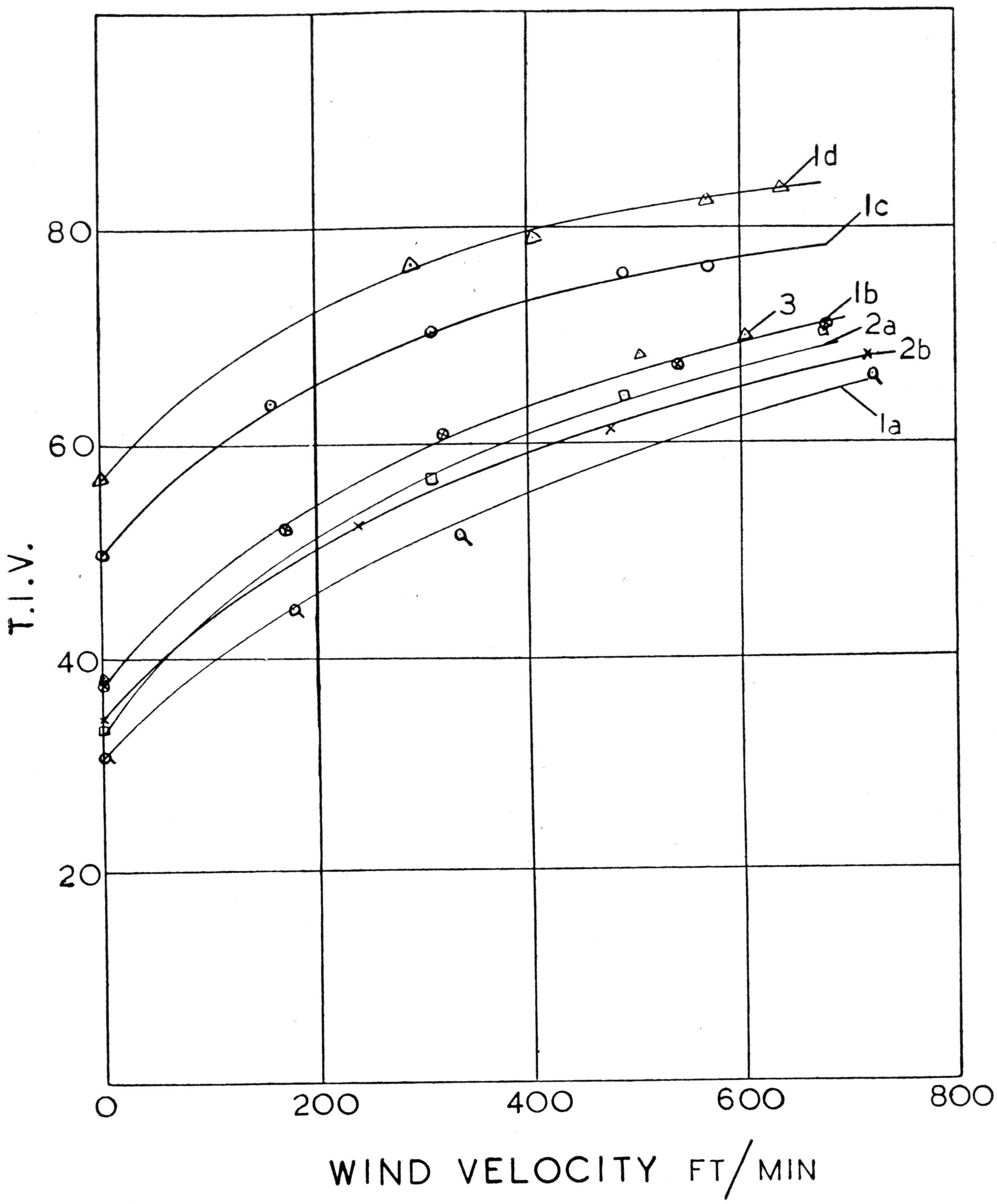

Fig. 5.

1a. Wool underwear, shirting, suit lining and tweed suiting, very tight over cylinder.
1b. Wool underwear, shirting, suit lining and tweed suiting, fairly loose over cylinder.
1c. Wool underwear, shirting, suit lining and tweed suiting very loose over cylinder.
1d. Wool underwear, shirting, suit lining and tweed suiting held out from cylinder a quarter of an inch.
2a. Shirting, suit lining and tweed suiting close to cylinder.
2b. Shirting, tweed suiting and suit lining—latter on outside—close to cylinder.
3. Wool underwear, shirting, suit lining and worsted suiting, fairly loose over cylinder—comparable with 1b.

might be mentioned that the actual temperature of the air was not important as it is the difference in temperature between the surface of the cylinder and the air, which had to be determined. In regard to humidity, it is reasonable to expect that fabrics wrapped around a warm body in the ordinary indoor atmosphere of a heated house would dry out in a few hours, and as the samples were on the apparatus for several days at a time, their moisture content appears to be of little importance: in point of fact Black and Matthew discarded their humidity control because the humidity of the atmosphere had no measurable effect.

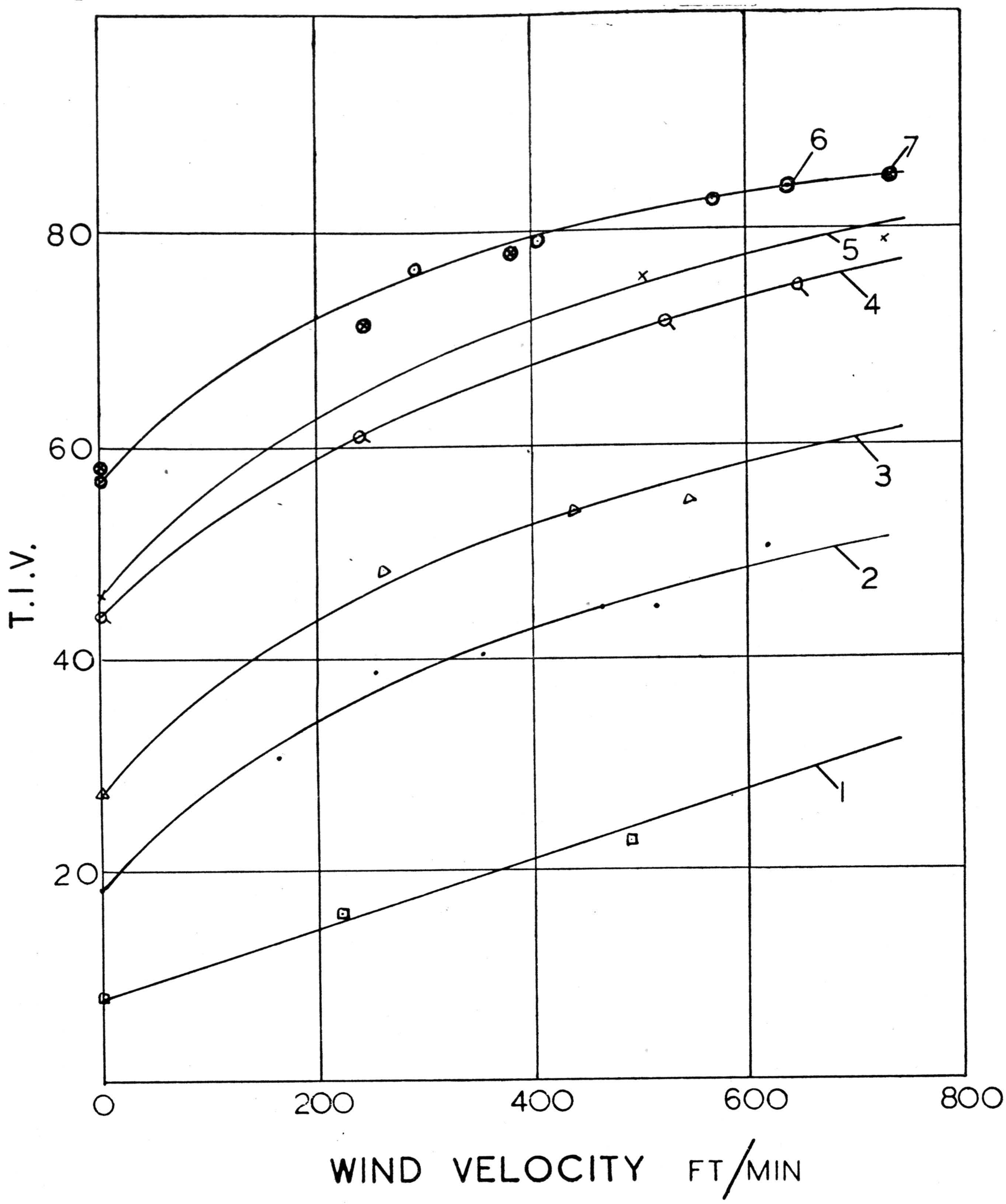

Fig. 6.

1. Shirting alone close to cylinder.
2. Tweed alone close to cylinder.
3. Shirting and tweed close to cylinder.
4. Shirting alone, held out from cylinder a quarter of an inch.
5. Tweed alone, held out from cylinder a quarter of an inch.
6. Wool underwear, shirting, suit lining and worsted suiting held out from cylinder a quarter of an inch.
7. Wool underwear, shirting, suit lining and tweed suiting, held out from cylinder a quarter of an inch.

By having the apparatus set up on the table in an ordinary room, it was possible to allow the draught from a fan to play upon the heated cylinder just as it might play upon a sedentary worker. The fan consisted of the ordinary portable type for room ventilation and was placed about four feet away from the heated cylinder: its speed was controlled by resistance in the motor circuit. The draught created by the fan was measured by means of a Kata thermometer and ordinary thermometer suspended about four inches above the cylinder at one end of it. The calculations necessary to deduce the wind velocities were performed with the aid of the equation and data given by Angus, Hill and Soper.[10]

It was thought desirable to have all the samples stretched at the same tension during test and during the preliminary work the plan adopted by Angus to do this was adopted. It consists of attaching weights by means of small wires to the cloth. Subsequently, this procedure was discontinued and the samples were sewn on, partly because it was sometimes hard to get the samples to close nicely on the cylinder and this was not considered good when wind was blowing, but mainly because it was almost impossible to use the weights when the sample of cloth was held out from the cylinder by means of the celluloid rings described below. Marsh has found that results were not accurately reproducible when the sample is next the surface of the cylinder and this conclusion was confirmed by the writers. The errors, so arising, were not however considered to be serious as the object of the present investigation was to ascertain what the sensations of the human subject might be when certain types of clothing were worn ; as all subjects do not wear their clothing equally tight, and as clothing is looser over one part of the body than over another the errors introduced in this way are not so important as might appear on first consideration, at any rate from the standpoint of one interested in heat losses from the human body.

The temperature of the cylinder was measured by a thermocouple on the surface of the leather: the temperature of the air around the apparatus was measured by a thermocouple soldered to a ring of wire 15 in. in diameter encircling the cylinder at its mid point. The ring had the effect of averaging temperature around the apparatus and its large mass prevented minor fluctuations in temperature due to air currents from affecting the e.m.f. reading.

At the start of the work some results obtained on samples of suitings were very difficult to interpret. While they repeated well when air motion was present, in still air they were unsatisfactory. It was concluded that the air movements in the room were sufficiently large to be affecting the readings. A rough uncalibrated hot wire anemometer was therefore set up in the room to test the assumption ; and as the wire would not glow with constant intensity for any length of time, it appeared that the assumption was quite plausible. A screen was accordingly constructed, consisting of a light frame 30 in. high by 21 in. wide by 22 in. deep ; it was made of ½ in. by ¾ in. lumber, and covered with cheese cloth. The hot wire indicated that one layer of cheese cloth was not a perfect shield: also that unless the cheese cloth were stretched tight the screening effect was rather spoilt. A second layer of cheese cloth was tacked on the other side of the half inch strips forming the wooden frame.

This screen was very effective and when placed over the apparatus, results could be repeated in still air as well as when air movement was present.

Experimental conditions on the whole simulated actual conditions under which clothing would be worn. They can be summarized as follows:— The air temperature was that of the room, the temperature of the surface of the cylinder was from 10° to 40° F. higher depending on the sample. The draught which struck the cylinder at right angles to its axis was similar to that experienced in a room in which fans are operating: presumably this does not differ essentially from a window draught except that it is more steady and the air stream more turbulent. The humidity of the air was not taken into account and errors which might arise from slight variations in room temperature were avoided by leaving the samples on the apparatus for longer periods when there was any doubt.

RESULTS

An estimate of the relative heat losses from the cylinder could be obtained when the heat supplied and the temperature difference on the thermocouples were known, but in order to express the heat loss in fundamental units, the apparatus was, so to speak, calibrated by measuring on it a sheet of $\frac{1}{4}$ in. thick cork. This sheet had been cut from a larger sheet of cork, the conductivity of which had been measured on the standard 18 in. hot plate, already referred to, used by the National Research Council for standardizing building materials. For the calibration the thermocouple measuring the cold side temperature was fixed to the surface of the cork and the constant for the apparatus was calculated from the formula $k = \frac{H \times l}{d} \times \text{Constant}$ where k = conductivity of cork sample, H = power supplied, l = thickness of sample, and d = temperature difference. The constant depends mainly on the surface area of the cylinder. Therefore a slight error in the conductance value is introduced when the samples are thick. The thermal insulating value (T.I.V.) defined as $\left(1 - \frac{\text{heat loss from covered cylinder}}{\text{heat loss from uncovered cylinder}}\right)100$ is, however, not affected thereby because in this expression it is the ratio of the heat losses that appears.

The conductance values appear in Tables 1, 2 and 3 and from these the T.I.V. figures have been calculated. As the calculation involves the heat loss from the uncovered cylinder at the particular wind velocity at which the sample was measured, these values have also been given in the tables. They have been read off from the graph relating conductance with velocity for the uncovered cylinder: it appears to be a straight line.

Table I relates to two suitings of different weight, and for purposes of comparison measurements on a rather heavy ladies' coating have been added. The tweed suiting weighed 11·2 oz. per yard and measured 1·18 mm. on a Randall and Stickney thickness gauge. The worsted suiting weighed 9·1 oz. per yard and measured 0·67 mm. in thickness and the ladies' coating measured 12·2 oz. per yard and 1·81 mm.

The conductances given in Table I have been plotted against wind velocity in Fig. 1 and the T.I.V. figure against wind velocity in Fig. 4. Both ways of expressing the same result are of interest because while the T.I.V. is of interest to one who wishes to compare cloths, the conductance is the figure which is required if heat loss from the human body is under consideration.

Table II relates to some combinations of fabrics. The tweed and worsted were the suitings referred to in Table I ; the wool underwear weighed 7·2 oz.

per yard and measured 0·93 mm. in thickness, the shirting 3·3 oz. per yard and 0·19 mm. and the suit lining 4·0 oz. per yard and 0·22 mm. The celluloid rings consisted of rings ¼ in. wide cut from a sheet of celluloid. The conductances from Table II have been plotted in Fig. 2 and the T.I.V. figures in Fig. 5. Except when otherwise mentioned, the samples lay close

Table I.

Table of Conductances and T.I. Values of Some Samples of Cloth Tested close to the Cylinder and also the Experimental Values of the Conductance from the Uncovered Cylinder.

" Uncovered " conductances except for section headed " uncovered cylinder " are estimated.

Conductances measured in B.T.U. per hour per square foot per °F.

Wind velocities measured in feet per minute.

Worsted suiting close to cylinder.				Tweed suiting close to cylinder.			
Wind Vel.	Conductance		T.I.V.	Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.			Uncovered.	Covered.	
0	1·197	1·05	12·3	0	1.197	0·98	18·2
260	2·32	1·83	21·1	165	1·90	1·32	30·5
296	2·47	1·87	24·3	255	2·30	1·41	38·7
499	3·35	2·26	32·5	354	2·72	1·62	40·5
635	3·94	2·37	39·9	466	3·21	1·78	44·6
688	4·17	2·53	39·3	515	3·42	1·82	46·8
				620	3·87	1·92	50·4

Ladies' coating close to cylinder.				Uncovered cylinder	
Wind Vel.	Conductance.		T.I.V.	Wind Vel.	Conductance.
	Uncovered.	Covered.			
0	1·197	0·85	29·0	0	1·197
143	1·80	1·02	43·3	90	1·54
281	2·41	1·19	50·6	100	1·62
448	3·13	1·23	60·7	130	1·86
687	3·16	1·29	59·2	264	2·35
				415	3·05
				510	3·35
				575	3·60
				713	4·33

to the surface of the cylinder. It is of interest to note that the tightness with which the combination of fabrics is worn is of more importance than the type of suiting. The values for the combination wool underwear, shirting, suit lining and suiting for both tweed and worsted seem to lie on the same curve: the samples were sewn on so that they were neither " baggy " nor stretched. This has been described as loose. When the sample was stretched tight it permitted a greater heat loss from the cylinder than the same sample without the wool underwear but not sewn on tightly. No appreciable difference occurred when the lining was placed on top of the suiting (a jacket turned inside out). The effect of wool underwear seems very small which doubtless accounts for the fact that people who do wear wool underwear seem to have very nearly the same sensations indoors to heat and cold on the body as those who do not.

In Table III there are given some data on certain fabrics or combinations of fabrics when held out from cylinder by the quarter inch rings ; also data on the shirting alone, and on the shirting and tweed suiting. These data

Table II.

Table of Conductances and T.I. Values at Different Wind Velocities.

"Uncovered" conductances estimated from graph in Fig. 1.
Conductances measured in B.T.U. per hour per square foot per °F.
Wind Velocities measured in feet per minute.

Wool underwear, shirting, suit-lining and tweed, tightly sewn on.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·83	30·7
180	1·97	1·09	44·7
335	2·64	1·28	51·5
724	4·32	1·46	66·2

Wool underwear, shirting, suit-lining and tweed, loosely sewn on.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·75	37·3
173	1·94	0·93	52·1
320	2·58	1·03	60·1
540	3·53	1·16	67·1
680	4·13	1·21	70·7

Wool underwear, shirting, suit-lining and tweed, very loosely sewn on.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·60	49·9
160	1·88	0·68	63·8
310	2·54	0·75	70·5
490	3·32	0·81	75·6
570	3·66	0·87	76·2

Wool underwear, shirting, suit-lining and worsted, loosely sewn on.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·74	38·2
505	3·38	1·08	68·1
604	3·80	1·15	69·7

Shirting, suit-lining and tweed close to cylinder.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·80	33·2
309	2·53	1·10	56·5
491	3·32	1·19	64·2
677	4·12	1·23	70·1

Shirting, tweed and suit-lining (lining outside) close to cylinder.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·79	34·0
240	2·23	1·06	52·5
477	3·26	1·27	61·0
720	4·30	1·37	68·1

have been plotted in Figs. 3 and 6. The effect of an air space between the clothing and the skin is indeed pronounced. With the quarter inch air space, it seems to matter little whether the fabric is thick or thin, and even a combination equivalent to heavy indoor clothing does not prevent very much more heat loss under such circumstances than does a piece of thin shirting. Under actual wearing conditions, even if such an air space could be provided the movement of the body would cause a "bellows" effect and thus rather spoil the efficiency of it.

The graph for the shirting and tweed sample has been shown in Figs. 3 and 6 so that it may be compared with the shirting alone. The addition of a tweed jacket even if unlined, over shirting seems to to add very greatly to the T.I.V.

It is in a breeze that the effect of warm clothing is most pronounced. The T.I.V. curve for a combination of fabrics such as might be termed "warm clothing" has a steep gradient at about 100 feet per min., while on the other hand the curve for the worsted suiting or for the shirting alone is no steeper at the low velocities than at the higher ones.

There is nothing particularly novel about these conclusions but they agree in a very satisfactory manner with human sensations and therefore indicate

Table III.

Table illustrating mainly the Effect of a Quarter Inch Air Space on the Conductances and T.I. Values of Various Samples and Combinations at Different Wind Velocities.

" Uncovered " conductances estimated from graph in Fig. 1.
Conductances measured in B.T.U. per hour per square foot per °F.
Wind Velocities measured in feet per minute.

Wool underwear, shirting, suit-lining and tweed on ¼-in. celluloid rings.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·52	56·6
292	2·46	0·58	76·4
406	2·95	0·62	79·0
570	3·66	0·64	82·5
640	3·96	0·65	83·6

Wool underwear, shirting, suit-lining and worsted on ¼-in. celluloid rings.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·50	58·2
195	2·03	0·58	74·4
382	2·85	0·63	77·9
735	4·36	0·67	84·6

Tweed alone on ¼-in. celluloid rings.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·65	45·7
554	3·59	0·88	75·5
730	4·34	0·92	78·8

Tweed alone close to cylinder.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·87	27·3
262	2·33	1·21	48·1
440	3·10	1·43	53·9
547	3·56	1·61	54·8

Shirting alone on ¼-in. celluloid rings.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	0·67	44·0
240	2·23	0·87	61·0
525	3·46	0·99	71·4
650	4·00	1·02	74·5

Shirting alone close to cylinder.

Wind Vel.	Conductance.		T.I.V.
	Uncovered.	Covered.	
0	1·197	1·10	8·1
221	2·15	1·81	15·8
490	3·31	2·64	20·3
870	4·95	3·17	36·0

that the apparatus and methods used to make these measurements are reliable and that the conductances plotted in Figs, 1, 2 and 3 could be used, if so desired, for estimating the effect of clothing on heat loss from the human subject.

ABSTRACT

An apparatus is described which the authors used for measuring the heat transmission of textile fabrics. The heat transmission of some of the clothing worn by men indoors was investigated at various wind velocities, and curves relating conductance as well as T.I.V. with wind velocity for various fabrics and combinations of fabrics are given. The effect of a quarter inch air space between the clothing and the skin was also investigated.

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17—EXPERIMENTAL INVESTIGATIONS OF SHUTTLE FLIGHT DURING WEAVING

By R. McK. KILGOUR, R. WARING and H. BOFFEY

Linen Industry Research Association

SUMMARY

In the following paper a description is given of a method of investigating the acceleration of the shuttle during the development of the pick, in which an actual space-time curve of shuttle motion is obtained as a photographic record. This is done by means of an electrical resistance fixed to the loom and a cathode ray oscillograph with suitable time-base. The exact motion of the shuttle through the shed after leaving the picker has not been followed, but the time of arrival at the far box has been recorded by a simple mechanical attachment to the loom behind the shuttle-box swell, and this device is shown to be also capable of giving other useful information regarding the retardation period of the shuttle entering the box. From the results of these two portions of the investigation, values of average shuttle speed have been calculated, and this has been done over a range of loom speeds from 100 to 220 picks per minute. Over this range, it has been found that the average velocity of the shuttle from leaving the picker to reaching the opposite swell is nearly proportional to loom speed.

The shuttle velocity attained during the development of the pick is much greater than would be calculated from the "geometry" of the picking mechanism and the speed of the loom. The considerable extra shuttle speed developed is due to the "catapult action" of the picking stick derived from stretched connecting leather and bent stick. It was found that the extra speed thus gained is itself proportional to the loom speed.

Under the conditions obtaining in these experiments, the acceleration of the shuttle was found to be far from uniform. The retardation in the far box was not measured, but calculations made from the swell motion records show that at all ordinary loom speeds the shuttle suffers no appreciable retardation between hitting the swell and coming up against the picker near the back of the box.

INTRODUCTION

It has long been recognised that the operation of picking is a fundamental one in the working of the fly-shuttle power loom. The speed at which the latter can be run successfully depends finally upon the length of time necessary for the passage of the shuttle, and the acceleration and retardation necessary to propel and stop the latter involve problems of the sudden development of heavy power loads, the design of picking cams, and the correct checking of a moving body still possessing quite a considerable amount of momentum.

Precise information about the motion of the shuttle whilst being picked from one box to the other during weaving is difficult to obtain from existing records of weaving experiments. Generally, the subject has been treated from a theoretical point of view,[1, 2] and from a knowledge of the proportion of the pick cycle available for the shuttle passage under normal working conditions, values have been derived for acceleration, average velocity and retardation of the shuttle. It is important, however, to have as a basis for other investigations, a more exact knowledge of shuttle movement derived from actual measurement, and it was with a view to supplying such information that the present work was undertaken. Recently,[3, 4] experiments have been made on looms running at speed using "slow-motion" photography, and from the photographic records obtained, values of shuttle velocity, etc., have been calculated.

LOOM AND CLOTH DETAILS

The loom upon which these experiments were made was a 45-in. reed space, plain Atherton loom with side lever, underpick motion, and the reed was occupied to a width of 36½ in. by a 10°°, 40's flax line, grey sett, the weft being also 40's grey and 10 shots on the 37-in. glass. It was arranged to drive the loom through an overhead arrangement of two parallel cones with taper in opposite directions and the belt between the two capable of accurate adjustment at any position along the cones, whereby the loom speed could be altered readily and precisely through a considerable range. The usual stop-watch method of counting picks per minute was used, and this was just comfortably possible at the top of the speed range, 220 picks per minute. Whenever a record of shuttle movement was required, the loom was run for a period immediately before and the speed carefully checked. Then during the actual recording, the apparatus was not brought into action until after the first few picks following restarting of the loom.

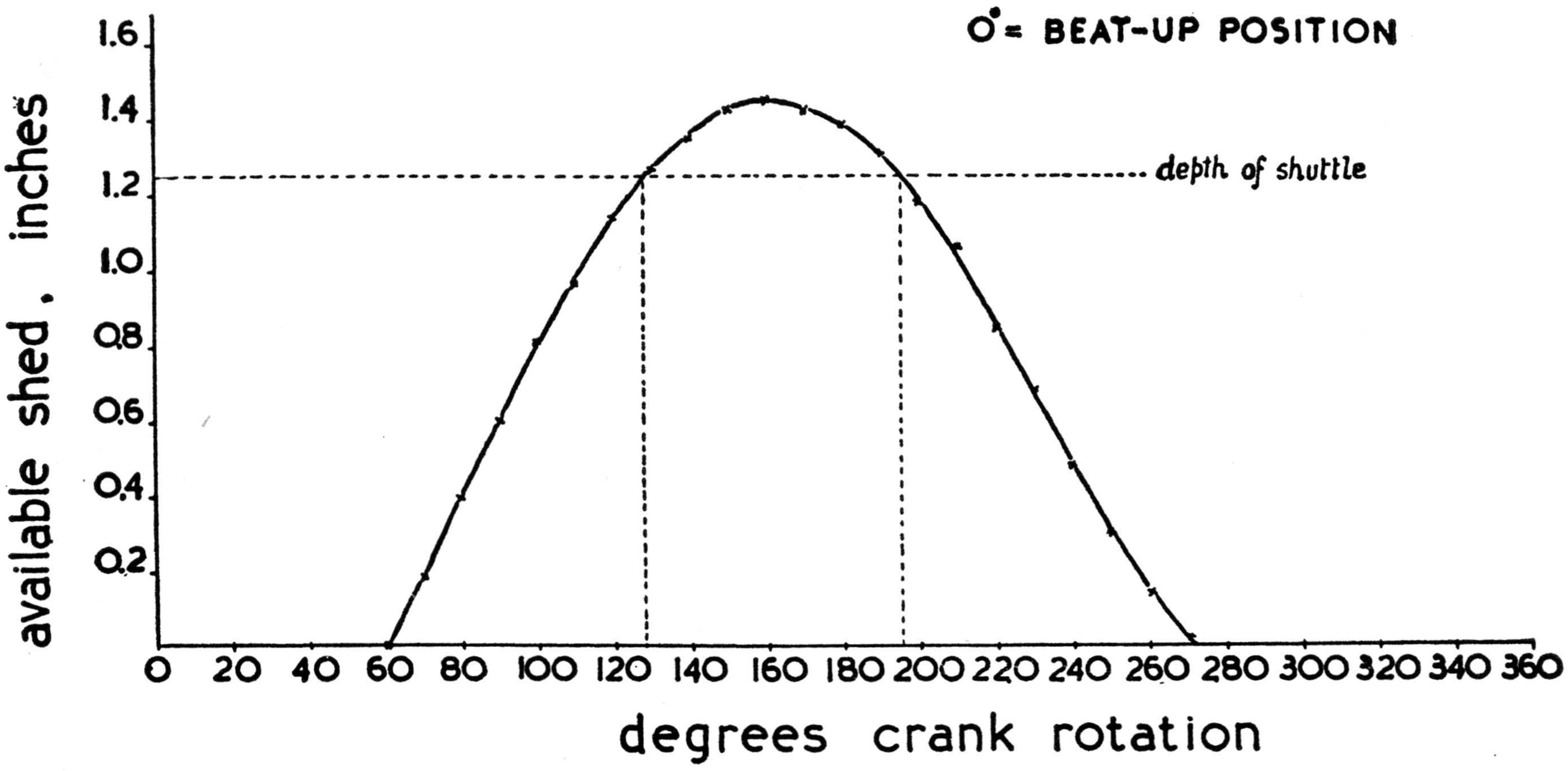


FIG. 1.

The plain shedding under-tappets already in the loom were replaced by a new pair specially designed to suit the shuttle being used, and with a dwell of 120°. Measurements of shed opening at various positions of the crank were made, and the relationship between shed depth at shuttle front, or available shed, and angular crank movement is shown in Fig. 1. The shuttle had a depth of 1¼ inches and therefore according to the graph should have a clear passage through the warp shed between crank angles 128° and 196°, that is, for 68° of crank rotation.

MOVEMENT OF THE SHUTTLE BOX SWELL

Recording Apparatus.

The principle of a simple method for timing the entry of a shuttle into its box was suggested to us by Mr. W. B. Robertson of Dunfermline and has been elaborated in various ways during the course of these experiments. The following is a description of the final arrangement of the apparatus for attachment to the loom, and reference should be made to

Figs. 2a, 2b and 2c which show front elevation, side elevation and plan-view, respectively, of the apparatus. The plane containing Fig. 2a is perpendicular to the loom crank-shaft. The shuttle A is in the box B and presses back the usual swell C and stop-rod finger D against the action of the leaf spring E, which is fastened at one end to the shuttle box. Fixed to the back of D is a small bracket F, to which is screwed a flat springy piece G with its thin edge upwards, so that any movement of the outer end of G with respect to D is confined to a small accommodating motion in a horizontal direction. To the free end of G is attached a pencil marker H, and behind and parallel to G is a board J fixed to the loom gable, so that a piece of drawing paper pinned to J is marked by the pencil H. The latter has an adjustment so that the pencil point can be made to press against the paper just sufficiently for good recording, and the springiness of G sideways helps to ease the motion of the pencil against the paper during actual working. In Fig. 2a the sley is fully forward, the reed being in the beat-up position, and the crank angular position is denoted by 0°. As the crank-shaft turns and the sley recedes from the fell of the cloth, if the shuttle remained boxed

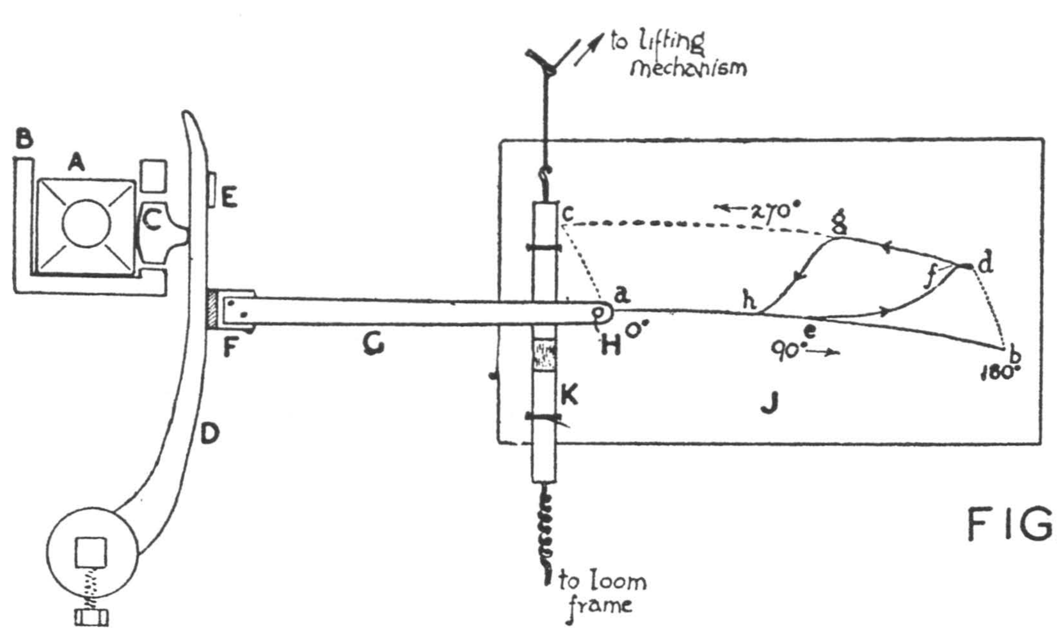


FIG. 2a

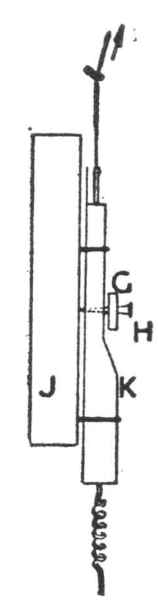


FIG. 2b

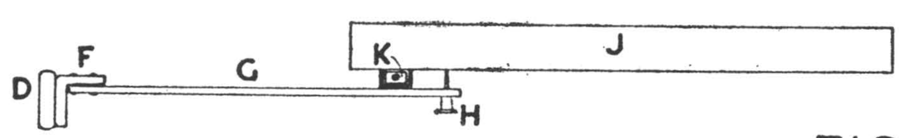


FIG. 2c.

the pencil H would mark out a trace on the paper such as *ab*, which is an arc of a circle whose centre is the rocking-shaft. The outer end *b* of this trace would correspond to an angular position of the crank equal to 180° approximately. In the same way if the shuttle were absent from the box, the top end of the finger D would press inwards with the swell and the pencil H would rise so as to sweep out an arc *cd* during to and fro motion of the sley. (This assumes the absence of the knock-off tongue on the stop-rod.) In practice what happens is that at some point such as *e* on the outward journey, that is from *a* to *b*, the shuttle which has been lying in one box is picked across, and at that moment the trace on the paper rises to meet the upper line *cd* at *f*. The pencil then moves out to *d* and there turns back towards *c*, the shuttle meantime being in motion through the shed, and at some point *g* the shuttle boxes in its new box, the swell in this box operates the stop-mechanism, D is therefore forced outwards and the trace again falls to the first level *ab* to meet it at *h*. The complete record of the movement of the stop-rod finger during a working pick cycle would then be *aefdgha*. It is an easy matter to calibrate such a record horizontally in terms of degrees of crank rotation, by turning the loom crank-shaft through consecutive 10° steps, and at each stage moving the stop-rod finger to and fro by hand and causing the pencil H to sweep out a small arc such as *ac* or *bd*. The most convenient method is to make such a calibration on a piece of tracing paper and ink-in the marks for permanent use; this paper can then be placed over any record, with suitable points in register, and

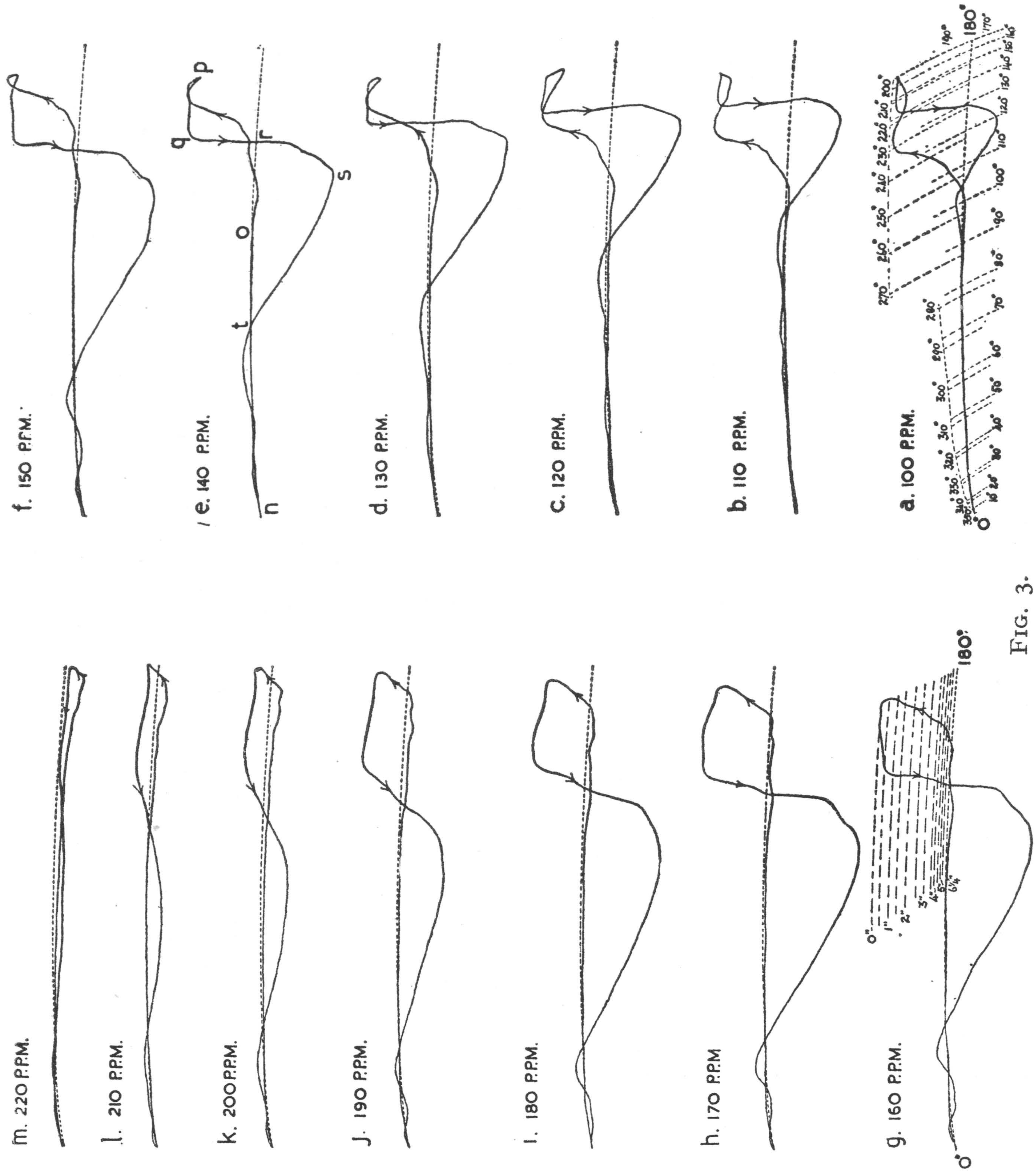


FIG. 3.

any readings required from the record obtained immediately. As will be seen later, it is also essential to calibrate the records vertically in terms of distance moved by the shuttle going into a box required to produce specific outward movements of the swell in that box as indicated by vertical lengths on the record. This calibration can readily be made at the loom by starting with the shuttle just coming into contact with the swell (from the shed), and then moving it by $\frac{1}{2}$-inch steps into the box and marking the height of the recording pencil at each step.

Since the stop-rod, and therefore the finger D, is controlled from both boxes whenever the shuttle leaves or enters either box, and since one complete record in the space *abdc* is made during each pick cycle, it follows that in the ordinary way a record made by the pencil will contain two fairly similar traces, one corresponding to the left-to-right picks and the other to the right-to-left picks. In some cases it is an advantage to have both types of trace recorded simultaneously, but generally each direction of picking produces a trace which is a narrow band rather than a line due to slight variations from pick to pick, and if the left-hand and right-hand picks are fairly evenly balanced, the net result on the record may be rather confusing. For this reason, an extra attachment was added to the recording apparatus to make possible the isolation of whichever of the two types of pick (that is, left-to-right or right-to-left) was required. This attachment is shown in the figures, and consists of a metal piece K uniformly thin at the top and thick at the bottom with a wedge-shaped centre portion (this is seen clearly in Fig. 2*b*), supported vertically by two staples on the recording board J immediately behind the springy strip G. The top of K is looped and connected by means of a cord to some lifting mechanism, and the bottom of K is connected to the loom gable through a return spring. When K is down it does not make any contact with G and recording by means of the pencil H proceeds, but if K is lifted the thick portion is interposed behind G and the pencil is lifted clear of the recording paper. If it is arranged for K to be raised at each alternate beat-up and allowed to fall at each intervening beat-up, then only picks of one direction will be recorded. These experiments were made upon a loom which happened to be equipped with an oscillating bar system with a separate drive taken from the bottom shaft, and it was convenient to attach the cord from the top of K to a point on this system and obtain the correctly timed operation of K.

Experimental Results.

A considerable number of records were made, using the apparatus described in the previous section, under various working conditions and to investigate several points of interest. Apart from the question of the timing of the shuttle from box to box, some interesting features of the problem were disclosed, and it is proposed to deal with these first. Most of them are illustrated in Fig. 3, which shows a series of records made at loom speeds ranging uniformly from 100 to 220 picks per minute. For these records the " pick selection " gear described above was used, and only those picks from the left-hand to the right-hand box were recorded. Fig. 3 was made from tracings of the actual records, which, though definite enough, were not quite so clean as represented here in the figure due to slight irregularities between picks from the same box. In order to avoid confusion the " timing " and " distance " calibration markings mentioned previously are not included on each record, but are shown, to illustrate their use, on the 100 picks per minute and the 160 picks per minute records, respectively. With each curve in Fig. 3 is drawn a dotted line which represents the trace of the recording pencil during movement of the sley with the shuttle fully boxed the whole time in the right-hand box, and this line is regarded as the baseline of each record. Beat-up is represented in all cases by 0° on the crank circle, and therefore this baseline reads from 0° on the left to 180° on the right and back again up to 360° from right to left, as shown in record (a) in the figure. With regard to the " distance " calibration markings, which are drawn on record (g), these show the heights of the curve above the baseline corresponding to certain distances moved by

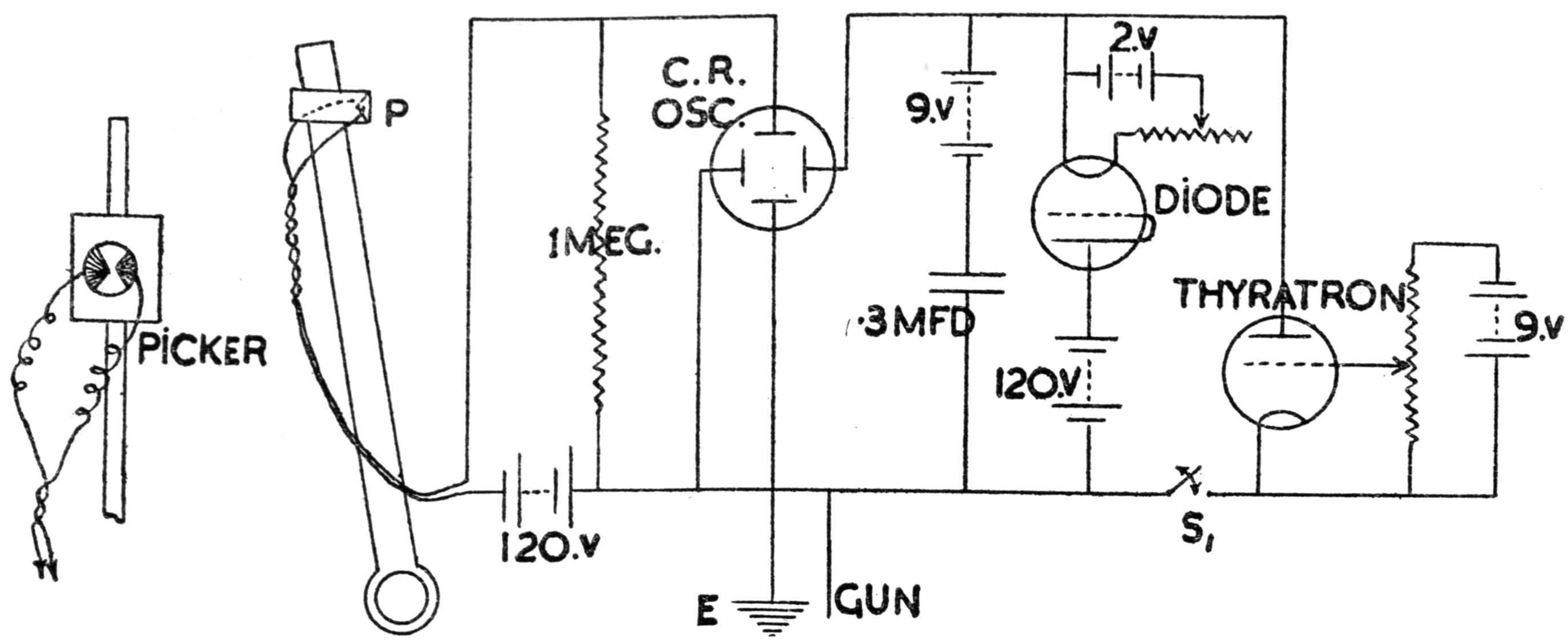


FIG. 4a

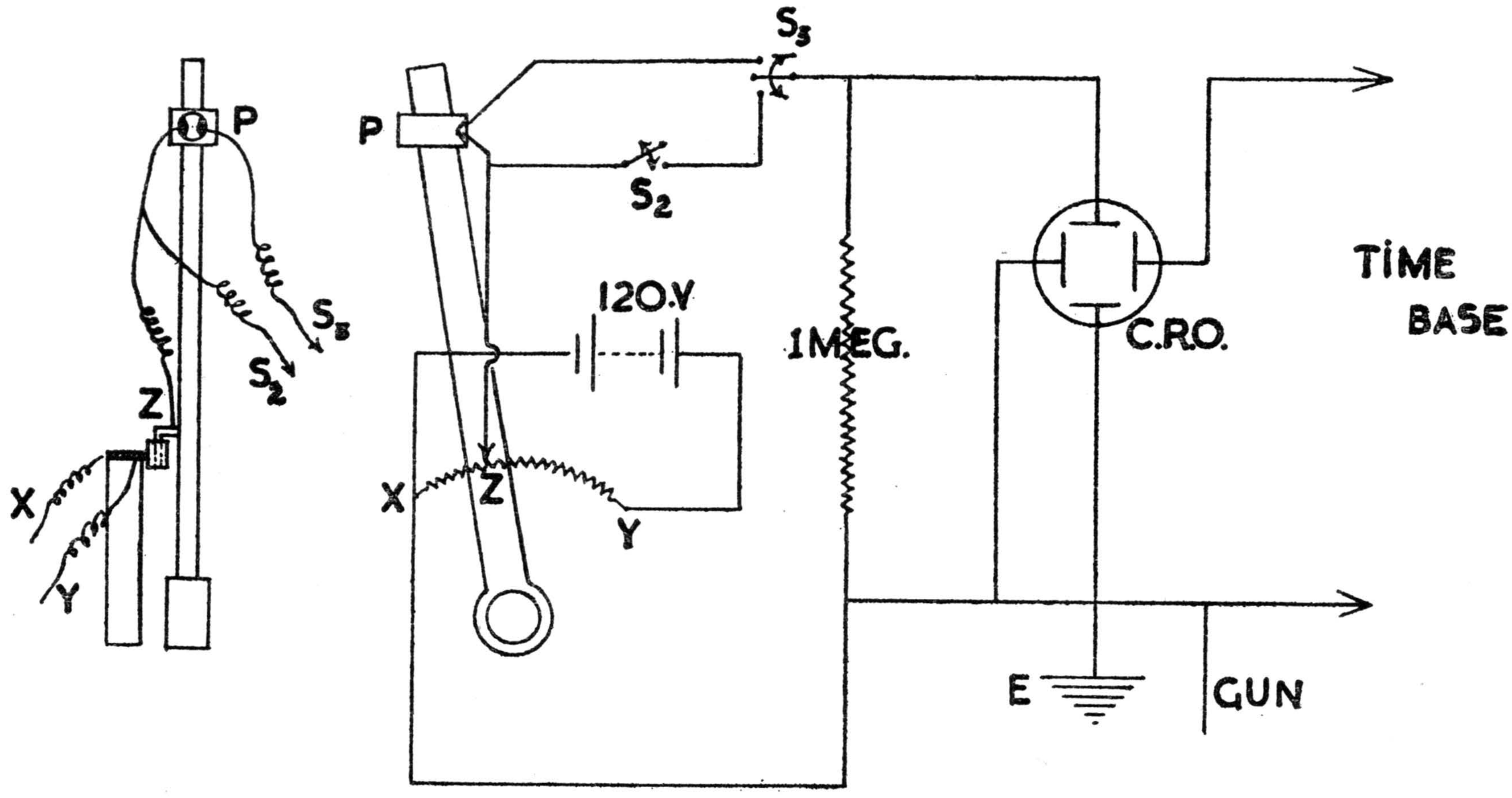


FIG. 4b

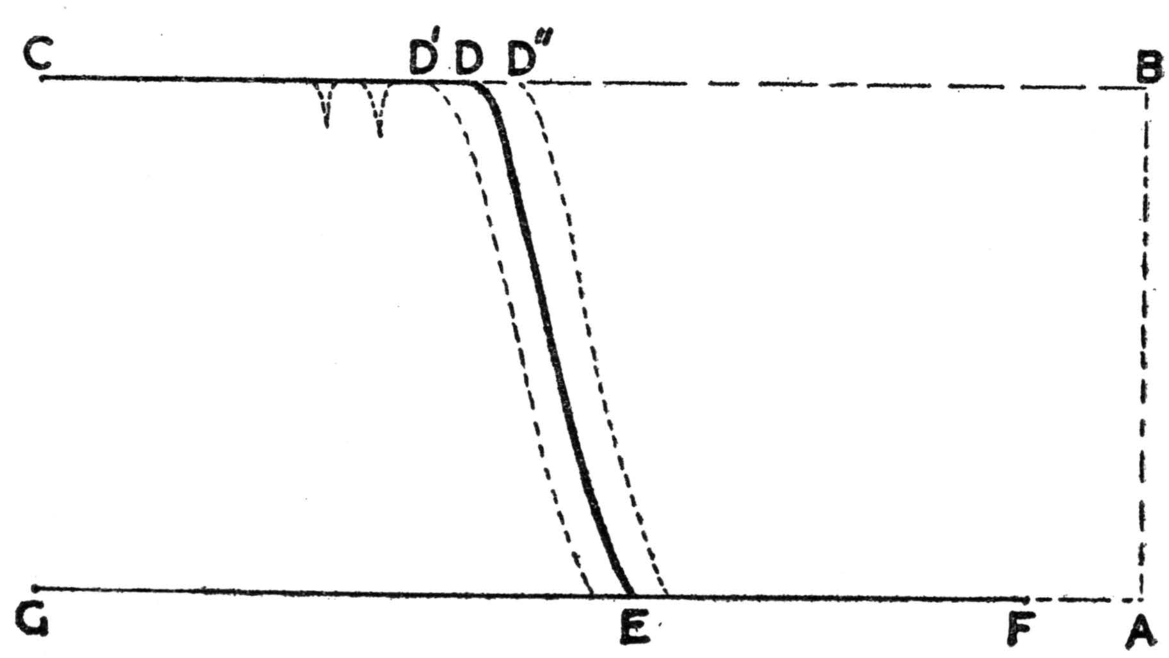


FIG. 5

Table I

Loom Speed.	Overthrow of Stop-rod Finger.	Height of Curve above Base-line.	Shuttle Traverse after reaching Swell.	Crank Circle Reading. Shuttle first meets Swell.	Crank Circle Reading. Curve next crosses Base-line.	Crank Rotation (5) to (6)		Greatest possible Average Shuttle Velocity after first touching Swell (4) ÷ (8)	Approximate Arrival Velocity of Shuttle at Swell.
Picks/Min.	Ins. on Record	Ins. on Record	Inches	Degrees	Degrees	Degrees	Seconds	Feet/Second	Feet/Second
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
100	0·34	0·82	6·25	215	229	14	0·023	22·4	25
110	0·57	0·83	6·25	213	227	14	0·021	24·6	—
120	0·78	0·79	6·25	215	229	14	0·0195	26·8	29
130	0·84	0·76	6·00	219	233	14	0·018	27·9	—
140	0·90	0·78	6·00	223	238	15	0·018	28·0	32
150	0·89	0·75	6·00	227	241·5	14·5	0·016	31·0	—
160	0·93	0·73	5·75	229	244	15	0·0155	30·7	35
170	1·03	0·71	5·75	230	247	17	0·017	28·7	—
180	0·86	0·58	5·00	231	246	15	0·014	30·0	41
190	0·50	0·44	4·25	233	250	17	0·015	23·8	—
200	0·29	0·24	3·25	236	252	16	0·013	20·3	47
210	0·17	0·17	3·00	240	255	15	0·012	21·0	—

the shuttle into the box after first coming into contact with the swell. Thus the recording pencil would be at its highest point when the shuttle first just touches the swell (0″) and will reach the baseline after the shuttle has moved a further $6\frac{1}{4}''$ into the box.

Overthrow of swell and stop-rod mechanism.

Reference to Fig. 3 shows at once that a typical record does not resemble the one which would be expected from "statical" reasoning, in that when the shuttle arrives at the right-hand box the energy imparted to the swell and stop-rod causes these to be thrown far beyond the positions required by the shuttle being fully boxed. Thus the overthrow of the stop-rod finger is represented by the portion *rst* of the curve in record (e). As a matter of interest this overthrow was measured for the various loom speeds in terms of depth of the curve below the baseline in inches, and the measurements are shown in column (2) of Table I. A maximum value is obtained at a loom speed of 170 picks per minute under the conditions ruling in these experiments. The exact amount of overthrow is actually the result of several factors. Increasing loom speed with no adjustment of the picking mechanism means greater shuttle speed and a greater amount of energy given to the swell on impact. Then the whole warp protector system with its return springs has a free period of vibration which may possibly be near to the length of pick cycle at one of the loom speeds, giving a resonance effect. Thirdly, the sley is continually accelerated towards the central position of its stroke, and during the pick cycle from 90° to 270° the tendency of the swell is to press outwards from the box, this effect being greatest at 180° the point of maximum acceleration for the backward half of the movement of the sley. Also from 270° to 90° the swell will tend to press inwards towards the front of the box, the greatest effect again being obtained at the point of maximum acceleration of the sley for the forward half of its movement, at 0°. In terms of modification to the shape of the curve in Fig. 3, this means a raising of the trace in the left-hand half of each record and a lowering of the trace in the right-hand half. With increasing speed of loom and therefore acceleration of sley these effects are magnified; at the same time the gradual shift of the part of the curve below the baseline towards the left with increase of loom speed introduces an additional factor.

Retardation of shuttle.

This paper does not contain any results derived directly from measurement of the retardation of the shuttle upon entering the box, but it is useful to make certain deductions from the above records. Column (3) of Table I gives the heights in inches of the various curves in Fig. 3 above the baseline, showing clearly the effect of acceleration of the sley, discussed above, in lowering the curve with increasing loom speed. The use of the "distance" calibration marks, as shown on record (g), makes it possible to write down the distances still to be travelled by the shuttle into the box after hitting the swell in the case of each record; this has been done in column (4) in the table. The shortest possible time for this residual shuttle traverse is equal to that represented between such points as *q* and *r* in record (e). This interval of time has been derived from the values of angular crank rotation listed in columns (5) and (6) and the speed of the loom, assuming the average value of the latter to hold good at the region of the pick cycle under consideration. The times so calculated are given in column (8). The greatest possible average shuttle velocity after impact with the swell is then given by the division of (3) by (8); velocities so obtained are shown in column (9). During retardation in the box, the shuttle would have such velocities if it remained in contact with the swell throughout. Later in this paper are included values of shuttle velocity on leaving left-hand picker and of average shuttle velocity across the shed, from which can be deduced approximately the arrival velocities at the right-hand box. These are shown in column (10). Only average velocities have been considered in column (9), and to obtain exact information it would be necessary to derive the velocity-time or velocity-space diagrams for the portion *qr*

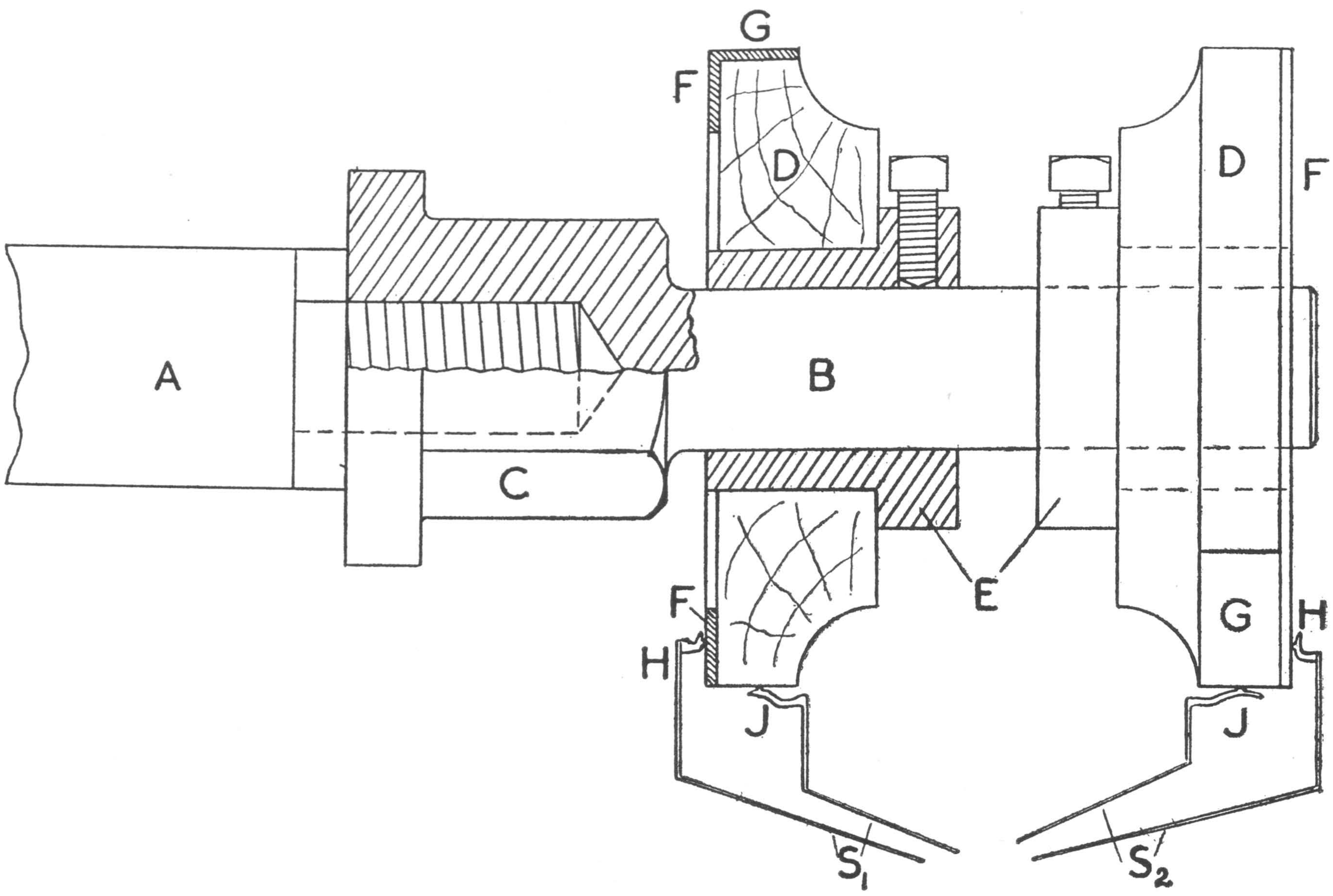


FIG. 6.

(record (e)) in each record, but from a consideration of columns (9) and (10) it seems probable that up to a loom speed of about 180 picks per minute the residual velocity of the shuttle on arrival at the picker at the back of the box must be considerable. At higher loom speeds it is probable that the swell exerts a greater restraint on the shuttle, which reaches the picker with small residual velocity. These deductions will be tested in future experiments.

General change of shape of recorded curve with change of loom speed.

The effect of the acceleration of the sley upon the position the swell tends to assume during running of the loom has already been described. The progressive lowering of the right-hand part of the curve (*pq* in record (e)) with increasing loom speed was clearly shown by the measurements in column (3) of Table I. The general shift of the lower part of the curve towards the left, bringing it into the region 270°—0°—90° where the tendency of the curve is to rise, has also been noted. The total effect is a gradual flattening-out of the ' figure eight ' curve with increasing loom speed, until with the latter at 220 picks per minute the record obtained approaches a single line, as will be seen in record (m). In this case the

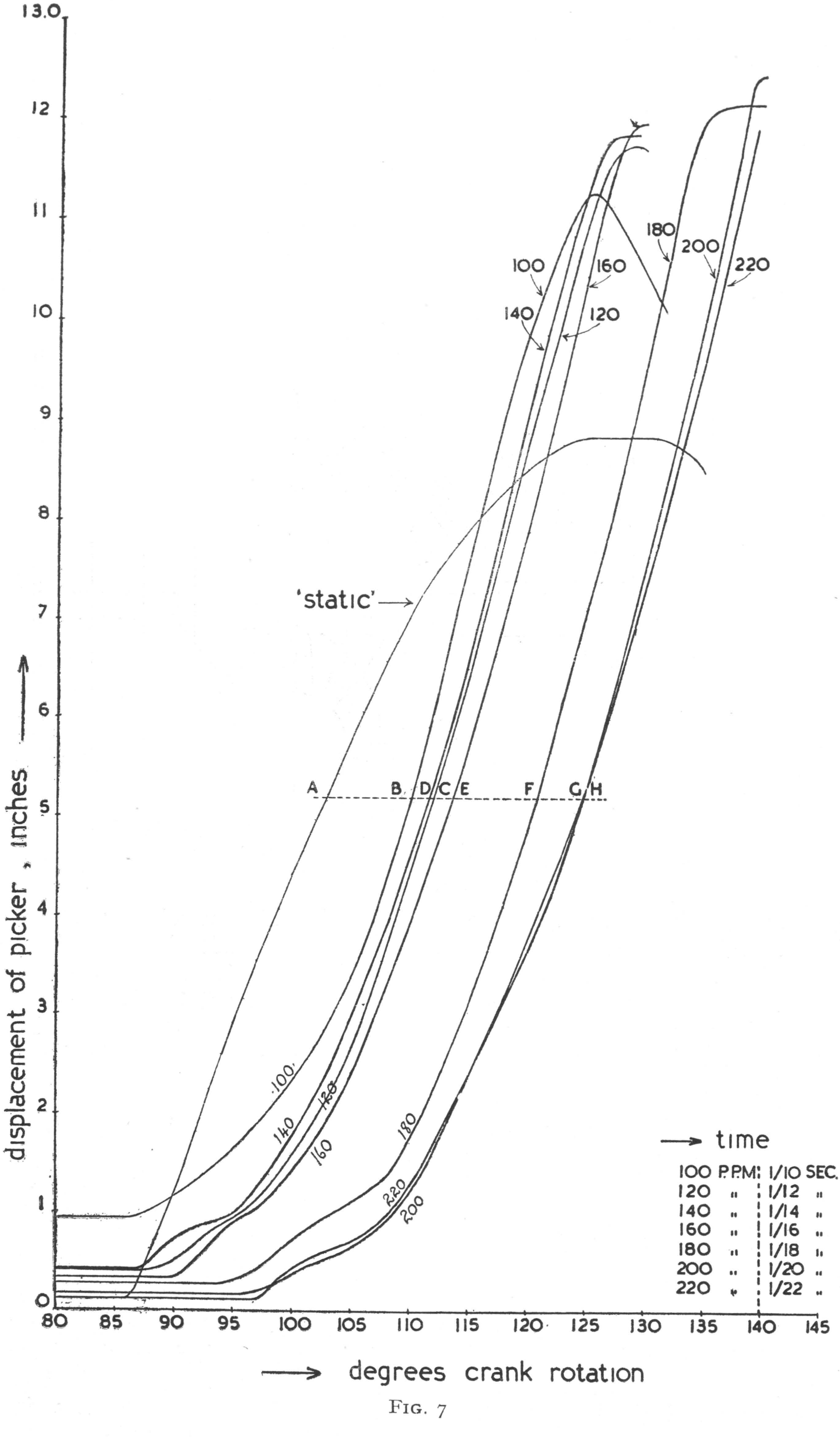

13.0
12
11
10
9
8
7
6
5
4
3
2
1
0
displacement of picker, inches
80 85 90 95 100 105 110 115 120 125 130 135 140 145
degrees crank rotation
'static'
A B D C E F G H
100
140
160
120
180
200
220
time
100 P.P.M. 1/10 SEC.
120 " 1/12 "
140 " 1/14 "
160 " 1/16 "
180 " 1/18 "
200 " 1/20 "
220 " 1/22 "

FIG. 7

stop-rod system scarcely moves at all whilst the loom is running, and the swell is never properly in the box. It was not convenient during the time these experiments were being made, but it would have been useful to have obtained a series of records with the loom running at various speeds without shuttle and with the knees of the warp protector removed from the loom gables. Such records might reveal a loom speed beyond which the tongue of the warp protector motion is never low enough (curve never rises high enough) at the critical moment when it comes over the knee (279° in our loom) for the two to engage when the loom is running normally, even when the shuttle stays in the shed and fails to box. A case of this kind was not encountered during these experiments, but it is understood that in the factory it occasionally happens that a loom in which the warp protector motion seems to be in good order and apparently properly set and timed fails to knock off when the shuttle is trapped in the shed. This may be due to the effect discussed above. One remedy is to strengthen the leaf spring behind the stop-rod finger, but this also involves placing a greater pressure between the swell and shuttle during picking.

Some results from loom running without warp and also with pick starting at different times.

A short test was made of the shuttle traverse with the loom weaving normally and also with no warp or weft present, other conditions being exactly similar. These were normal weaving conditions and ordinary plain loom timing, and the loom in each case was run at three different speeds of 160, 190 and 220 picks per minute. The left-to-right and right-to-left picks were not isolated by means of the selection mechanism, which was only devised at a later stage in the experiments, but sufficient clarity was obtained on the records by making the unwanted pick definitely different in strength from that of the one to be measured, so causing the shuttle to box at distinctly different crank circle angles in the two boxes. The results are shown in the first portion of Table II, and it is clear that the presence of the warp and the weft makes no appreciable difference to the velocity of the shuttle. Retardation of the shuttle during its passage from one box to the other could be due to four causes, (i) air resistance, (ii) pull of weft unwinding from pirn, (iii) frictional resistance between shuttle and reed and between shuttle and sley/warp, (iv) resistance due to warp during too small an available shed. It is plain from the above result that in ordinary circumstances item (ii) does not affect the shuttle velocity, nor is the effect on the latter of item (iii) altered by the presence or absence of warp yarn on the sley. Also from the knowledge of the position of the yarn in the reed space, in particular the distance between the right-hand selvedge and swell, and a consideration of the available shed curve given in Fig. 1, it is estimated that at least in the case of the two higher loom speeds, 190 and 220 picks per minute, the shuttle, near the end of its traverse, would be rubbing appreciably on the upper warps at the right-hand selvedge due to a rapidly diminishing available shed. It appears, therefore, that this resistance of the side warps is not sufficient to have any noticeable effect on the shuttle velocity.

Consideration was next given to the possibility of there being a change in shuttle speed if the time of starting of the pick were seriously altered, due to changes in pressures between shuttle and reed derived from the acceleration of the sley. Theoretically, such changes are bound to arise if the period during which the shuttle is crossing from one box to the other is shifted relative to the general pick cycle, but in practice the shift it is possible to make in the angle at which the pick is started is not sufficient to show an appreciable effect, as will be seen from reference to the second portion of Table II. Here are given the results from picking records from right-to-left in the loom running at 170 picks per minute and without warp and weft. The start of the pick, as defined by the angle at which the picking stick began to move when turning over the loom slowly by hand, was advanced by 5° steps from an early value of 85° on the crank circle to a point, 110°, just beyond which the loom would not run because of the lateness of the shuttle arriving at the opposite box, bringing the knock-off into action. The results show that through the whole range the time for passage of the shuttle, in terms of crank rotation, is constant at about 158 to 160 degrees.

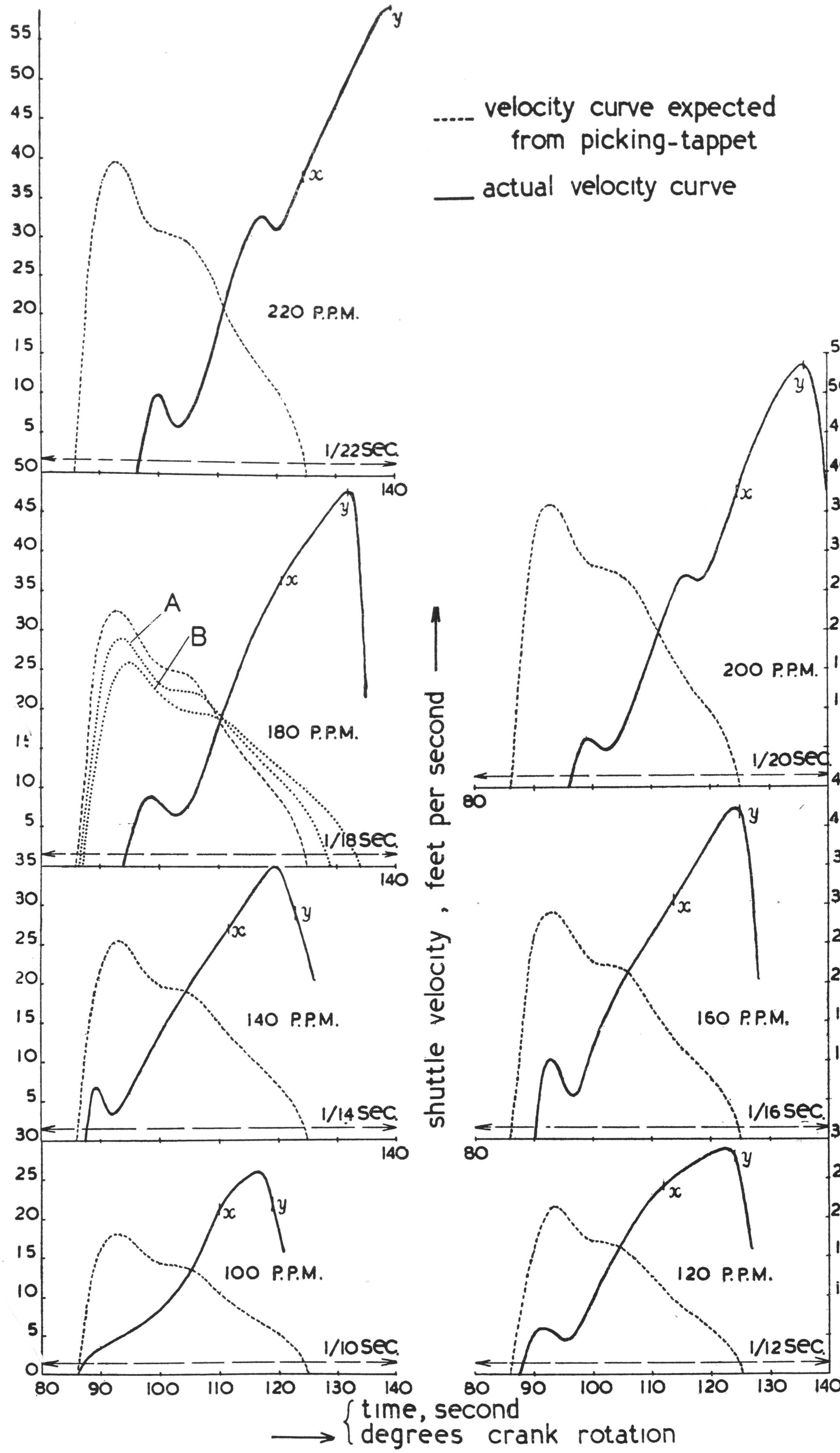
STUDY OF SHUTTLE ACCELERATION

Useful though it proved to be in many ways, the record of the movement of the swell and stop-rod mechanism did not give very precise information regarding the point at which the shuttle actually began to move at the beginning of the pick. At this point the movement of the swell is very slow as will be seen from the " distance " calibration marks on record 3 (g), and it is difficult to define the spot in the curve where the latter breaks away

Table II

Speed of Loom. Picks per Minute.	Records of Picking from Left-hand Box. Crank Circle Reading, degrees, when Shuttle enters Right-hand Box.		Records of Picking from Right-hand Box. No warp in Loom Crank Circle Reading, degrees.		
	Warp in.	Warp out.	Pick begins.	Shuttle enters Left-hand Box.	Difference.
160	232	232			
190	243	245			
220	258	259			
170			85	245	160
„			90	249	159
„			95	253	158
„			100	258	158
„			105	263	158
„			110	268	158

from the baseline. A characteristic feature of all the records is a slight dip in the curve in this region, indicative of an outward movement of the swell. This may be due to a slight swing of the shuttle at the start, in either the horizontal or vertical plane (in the latter case a slightly wider part of the shuttle would be presented between the swell and the front of the box). Whatever the reason, the dip in the curve as at o in record 3 (e) can be taken as significant of the early part of the shuttle movement, and a point somewhere near the beginning of this dip as the actual starting point. It was thought desirable, however, to obtain further and more exact information about the period when the shuttle is being propelled from the box, the " acceleration " period, and an electrical apparatus, details of which are given in an Appendix to this paper, was devised to do this. This



----- velocity curve expected from picking-tappet
___ actual velocity curve
220 P.P.M.
1/22 sec.
180 P.P.M.
1/18 sec.
A
B
140 P.P.M.
1/14 sec.
100 P.P.M.
1/10 sec.
200 P.P.M.
1/20 sec.
160 P.P.M.
1/16 sec.
120 P.P.M.
1/12 sec.
shuttle velocity, feet per second
time, second
degrees crank rotation

Fig. 8.

apparatus was used to record a space-time curve for the picking-stick, such as one of those shown in Fig. 7, one curve being taken for the full movement of the picking-stick and a second up to the point of departure of the shuttle. The two types of record were photographed for each speed of loom from 100 to 220 picks per minute by 20 p.p.m. steps, and traces from enlargements of the negatives are given in Fig. 7. On the same graph is drawn a curve obtained by turning the loom by hand through one degree steps and measuring the movement of the picker in the box for each step. This may be called the 'static' space-time curve of the picker motion, and the curves taken under actual running conditions, "dynamic."

Since these picker displacement records were made on a linear time base distinct from the loom, the x-axis of the graph in Fig. 7 strictly represents units of time, but it has also been calibrated in terms of degrees of crank rotation, derived from the time and the average speed of the loom. This could only be correct if the loom speed during development of the pick were equal to the average, and this is not true as Hanton[5] and Honegger[6] show. In Fig. 7 the crank rotation is taken as common to all the curves, and if the fall in loom speed at the pick were a constant percentage of the average speed, the curves would still have the same relative positions horizontally. The method of graphing in Fig. 7 was adopted because it brings out possible features of comparison between the various curves. The interpretation of the records on the basis of displacement against time is, of course, perfectly valid. The same remarks as above apply to the velocity curves which are described later in Fig. 8. The use of the base-line equal to 60° crank rotation is not strictly correct (the starting point 80° is true), but again it is easier to compare the curves amongst themselves displayed in this way on time bases which are inversely proportional to the average loom speeds.

The line-shaft which supplied the drive to the counter-shaft which ultimately supplied power to the loom in these tests, was driven from a 5 h.p. squirrel-cage induction motor, and during any series of observations all other machinery on the line was stopped, so that the probability is that speed variations at the loom were not excessive, and also that they were regular.

It would be possible to obtain records of picker displacement against true crank rotation by using a time base for the oscillograph derived from the rotation of the loom crankshaft. This method of collecting additional information will probably be used in further experiments.

Experimental Results.

Referring to Fig. 7, all the dynamic curves are approximately parallel to each other. Assuming that the calibration of the horizontal axis in degrees crank rotation is proportionately correct, this means that at any stage during the development of the pick, that is during the period of acceleration of the shuttle, the shuttle velocity is proportional to the loom speed. Another feature of the records is that the start of the pick is continuously retarded both in distance and position of crank as the loom speed increases. Thus at greater loom speeds the picking stick assumes a stationary position further and further back in the box, and also a greater value of crank angle is devoted to tightening up the picking connections before the stick finally begins to move, which results in greater extension

Table III

Loom Speed.	Picking Stick Movement begins.		Shuttle leaves Picker.		Shuttle hits Far Swell.		Shuttle Acceleration Period.					Shuttle Traverse Period.		
	Time.	Distance	Crank Position	Distance	Crank Position	Distance	Total Time.	Total Distance	Calculated Uniform Accelera-tion.	Calculated Leaving Velocity.	Maximum Picker Velocity.	Total Crank Rotation.	Total Distance	Average Velocity
Picks/ Min.	Seconds.	Inches.	Degrees.	Inches.	Degrees.	Inches.	Seconds.	Inches.	Ft./Sec.²	Ft./Sec.	Ft./Sec.	Degrees.	Inches.	Ft./Sec.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
100	0·010	0·95	119	9·45	212	58·90	0·055	8·50	468	25·7	25·9	93	49·5	26·6
120	0·010	0·40	124	10·45	215	58·90	0·051	10·05	653	33·0	28·9	91	48·5	31·9
140	0·009	0·40	123	10·45	223	59·15	0·042	10·05	938	39·6	35·0	100	48·7	34·1
160	0·010	0·34	125	10·40	229	59·40	0·036	10·06	1261	45·9	42·3	104	49·0	37·5
180	0·013	0·28	132	10·60	231	60·15	0·035	10·32	1390	48·9	48·3	99	49·6	44·8
200	0·013	0·16	136	10·45	238	62·10	0·033	10·29	1544	51·5	53·6	102	51·7	50·6
220	0·012	0·12	140	12·10	248	63·50	0·033	11·98	1842	60·7	61·5	108	51·4	52·4

of and therefore tension developed in the connections. As pointed out previously, any bending of the picking stick at this stage is not taken account of in the records; to be comprehensive the initial straight portions of the curves parallel to the horizontal axis would probably be lengthened a small amount. A common feature of all the records, except that for a loom speed of 100 picks per minute, is a small bend concave to the horizontal axis at the beginning of the rising portion of the curve. This denotes a temporary reduction of velocity of the picker and shuttle (the point is brought out clearly in the velocity diagram later), and this is possibly related to the slight depression in the swell motion record referred to previously, and attributed to a lifting or swinging of the back end of the shuttle. If this is so, the same cause which gives rise to a slight outward movement of the swell at the beginning of the pick also results in a temporary slowing down of the shuttle. It is plain from Fig. 7 that the picking-stick moves, during working conditions, to a much further inward position than is determined by the shape of the picking tappet. This overthrow of the stick is to be expected, but it is interesting to know the extent of it, approximately 3 to 4 inches, depending on the loom speed. This overthrow must involve considerable bending of the buffer trap, because the stroke of the picker to the point where the stick is just touching the buffer leather is about $9\frac{1}{2}$ inches, and therefore the remaining $2\frac{1}{2}$ to 3 inches of stroke means a corresponding depression of $1\frac{1}{2}$ to 2 inches of the buffer. The position of the shuttle in the box at which the swell just ceased to have any controlling pressure on the shuttle was found by turning the loom by hand. This point is marked (at A) on the "static" curve in Fig. 7 and corresponds to a crank angle reading of 103° and a stroke of the picker of just over 5 inches, and since this distance is practically independent of loom speed, a horizontal line on the figure through A cuts the "dynamic" curves at points B, C, etc., which at once give the corresponding values for the various loom speeds of the time intervals between beginning of the pick and departure of the shuttle from the swell.

The picker or shuttle velocity graphs obtained from the curves in Fig. 7 are shown in Fig. 8. The actual velocity curves, drawn in solid lines, are strictly correct with regard to the time markings on the horizontal axes, and the expected velocity curves (shown in broken lines), derived from the "static" curve in Fig. 7, are correct only upon the assumption of a loom speed during picking equal to the average recorded. Assuming a fall of speed of 10 per cent. or 20 per cent. below average at the pick, the true expected velocity curves would resemble A and B, respectively, in the 180 picks per minute record. These are correct with respect to the time calibration along the horizontal axis, and therefore can be compared with the curve of actual velocity. The difference between expected and actual is very obvious. The progressively later start of the pick (with increasing loom speed) and also the sudden fall in velocity near the beginning are clearly brought out. In the records for 200 and 220 picks per minute there is also a depression near the middle of each curve which is difficult to explain. It occurs just before the shuttle takes leave of the swell (this point, obtained from Fig. 7, being denoted by x on each record). The picker attains a velocity greatly in excess of that derived simply from the action of the picking tappet, regarded as part of a system of rigid members. It can obtain this extra velocity only by virtue of the effect of releasing the energy stored in the top of a bent picking-stick and in the extended leather connection between lever and stick, due to the rapid acceleration from rest of a body (the shuttle) of quite appreciable mass. The mark *y* on each curve represents the point at which the shuttle leaves the picker. It was pointed out previously that due to the method of finding this point, it will represent the latest departure of the shuttle if any variation in picking exists, and this may account in one or two cases for the presence of *y* beyond the peak value of picker velocity. Values of acceleration have been derived from the curves of Fig. 8. Details are not included here, but the acceleration of the shuttle during the development of the pick is very variable. For example, in the case of a loom speed of 160 picks per minute it assumes a value of about 4,500 ft./sec.^{2} at the beginning, falls to a retardation of 1,000 ft./sec.^{2} and rises to over 2,000 ft./sec.^{2} again, after

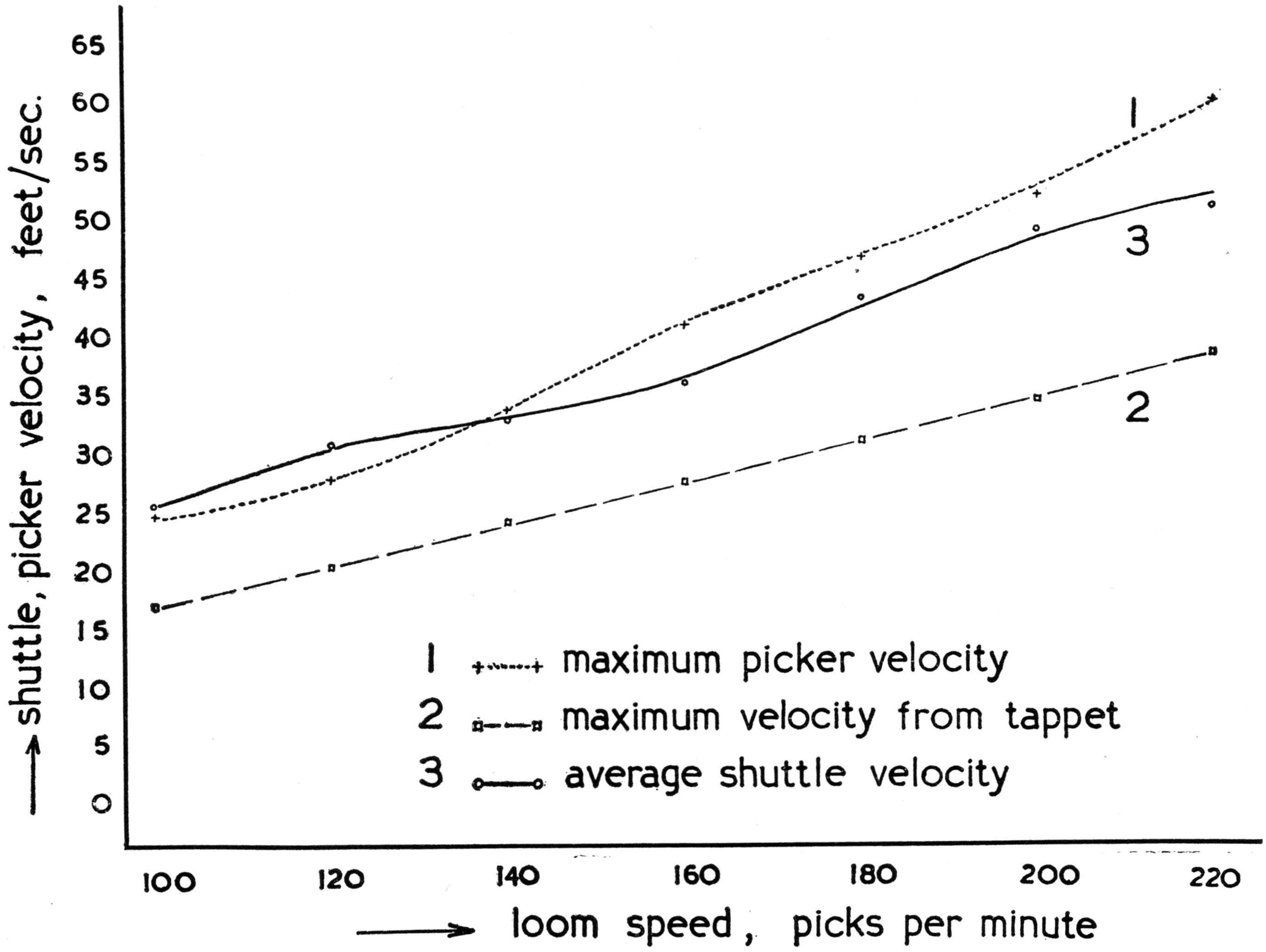


Fig. 9.

which it falls to a fairly level value of 1,100 to 1,200 ft./sec.^{2} for the remainder of the pick. From the point of view of a smooth pick and least disturbance to the pirn and yarn on it, the ideal acceleration would be uniform throughout the period of development of the pick.

Table III gives data collected from both the swell motion records and the picking-stick motion photographs. Columns (2), (3), (4) and (5) are obtained from the latter, and columns (6) and (7) from the former. The distances in inches are referred to a zero at the back of the left-hand box, and the times in seconds are measured from the point where the loom switches in the time base, that is 80°. Columns (10) and (11) contain values which are calculated from the figures in columns (8) and (9), the assumption being that the shuttle starting from rest and moving under uniform acceleration, would cover the distance given in (9) in the time shown in (8). The values of average velocity of the shuttle from the moment of leaving the left-hand picker to that of hitting the right-hand swell are given in column (5), and should be reasonably reliable. Considering the nature of the measurements on the picking-stick, the results of maximum picker velocity recorded in column (12) may be regarded as fair. Obviously a value in (12) cannot really be lower than its corresponding one in (15), but after the first two loom speeds the two sets of figures in (12) and (15) correspond quite well.

The relationship between loom speed and shuttle velocity is shown graphically in Fig. 9. Curve 3 is nearly a straight line, showing that the average shuttle velocity is approximately proportional to loom speed. Curve 1 shows the actual maximum picker velocities, or departure velocities of shuttle from picker. The points on curve 2 are the expected departure velocities of shuttle from picker, being the peak values of the broken line curves in Fig. 8 (the assumption of uniform loom speed during the pick cycle is made here, it will be remembered). The correct expected departure velocities would probably lie on a straight line below curve 2 and diverging from it towards the right. It is clear then, that whatever the forces, operative during the development of the pick, which give to the shuttle an actual speed considerably in excess of that expected from the "geometry" of the picking mechanism, these forces are increasingly effective as the loom speed is raised. The excess of actual over expected velocity is itself proportional to loom speed.

APPENDIX

Apparatus for recording movement of picking stick during acceleration of shuttle.

The apparatus which was first erected to find the point in the pick cycle at which the shuttle left the picker is illustrated in Fig. 4a. It is based upon an electrical method involving the use of a cathode ray oscillograph, which is briefly a large tube with a fluorescent screen at one end, and near the other end an assembly of metal parts so arranged that, if an electrical voltage difference is impressed upon a pair of parallel plates, it causes a movement of a bright spot on the fluorescent screen along a certain line, and if another voltage difference is impressed on a second pair of parallel plates at right angles to the first ones, a movement of the fluorescent spot in a line at right angles to the previous one is obtained. When all four plates are in action, the fluorescent spot describes upon the screen a curve which can be photographed, and with a knowledge of the conditions prevailing during the experiment the record so obtained can be used to give the information required.

The leather picker from the left-hand picking-stick of the loom was slightly modified, by the introduction into the small, conical cavity into which the shuttle tip fits, of two triangular pieces of tinfoil, one glued to each side of the cavity with a gap between the two pieces. These did not interfere with the picking action, and when the shuttle was home against the picker its metal tip touched both pieces of tinfoil, and so made an electrical bridge across the two. When the shuttle left the picker, the connection between the two strips of tinfoil was broken. Thus it was possible to use the picker as a switch in an electrical circuit, to be switched from the "on" to the "off" position at the moment when the shuttle left the picker to traverse the shed. This arrangement is shown on the left of Fig. 4a. The two leads from the picker are part of a circuit, in which a

120-volt battery is in series with a high resistance (about 1 megohm), and the ends of this resistance are also connected to one of the pairs of deflecting plates in the cathode ray oscillograph. To the other pair of deflecting plates are connected the leads from a linear time base. This is a circuit designed to produce, on the oscillograph plates to which it is connected, a voltage difference which starts at zero, builds up at a uniform rate to a certain maximum value, then suddenly drops back to zero, and repeats this procedure continuously, always reaching the same maximum value at the same uniform rate of increase. The result of linking such a time base to the oscillograph is that the spot on the screen moves along a certain line with well-defined end points (comparatively) slowly and at a uniform rate in one direction, and practically instantaneously in the opposite direction. The linear time base used in these experiments is of quite a well-known type employing a diode valve and a thyratron; the circuit is clearly shown on the right of Fig. 4a. By altering the value of the filament current of the diode valve, it is possible to vary the rate of traverse of the spot on the screen (in the slower direction), and therefore the frequency with which it performs its cycle of movement; also, by altering the value of the grid bias to the thyratron valve, it is possible to vary the total length traversed by the spot, and again its frequency (since it moves at the same rate over a different length of line). The only feature of this time base which is particular to the experiment in hand, is the incorporation at S_1 of a switch operated by the loom. This switch is described later; it is arranged in such a way that it can make the circuit at any prescribed point in the 2-pick cycle, stay on for a definite period, and break the circuit for the remainder of the cycle.

The procedure adopted to obtain a record of shuttle leaving picker was as follows. The time base was adjusted so that the length of " sweep " of the spot on the screen was of suitable dimension, and also the rate of movement of the spot such that the length of time occupied by a single sweep represented about 30° of the crank rotation. The latter adjustment was accomplished, with the help of a stroboscope, by setting the frequency of the time base to a definite value determined by the speed of the loom and the amount of crank rotation required for a sweep. Thus, if the latter was 30° and the loom speed was 160 picks per minute, the frequency of the time base was set to $\frac{360}{30} \times \frac{160}{60}$ or 32 sweeps per second. By turning over the loom slowly by hand, the crank angle reading (say $X°$) was found when the picking-stick had reached the farthest point of its inward stroke and the picker was about to recede from the shuttle. Then the switch S_1 on the loom was set to bring into operation the time base at an angle about 10° or so earlier than $X°$. When the loom was subsequently run, the movement of the cathode ray tube spot was similar to that illustrated in Fig. 5.

Starting with the shuttle in the box opposite to the one with the modified picker, and the time base switch S_1 " off," the spot assumes a position such as A. When the shuttle is picked across and boxes, closing the picker switch, the spot moves instantly vertically upwards to B (AB corresponds to a potential difference of 120 volts across the pair of deflecting plates concerned, in the oscillograph). A little later, sometime after the beginning of the next pick and at a point previously arranged as above, the time base switch S_1 is put " on " by the loom, and immediately the oscillograph spot shoots across the screen to C. From there it begins its first uniform sweep along CB towards B, and when it has reached a point such as D the shuttle leaves the picker, breaking the contact at the latter, whereupon the spot descends very quickly to E and continues from that point along a straight line towards A. The switch S_1 being still closed, a point F is reached from which the oscillograph spot flies back very quickly to G (which is vertically below C), and as long as S_1 remains " on " it continues to sweep out the line GF in the usual manner. S_1 is switched off by the loom after two or three complete sweeps, and after that the spot goes to A, and the above sequence of operations is repeated at each pick from the box with the modified picker.

A photograph of the curve traced out by the spot working under the conditions described above was obtained, and knowing the interval of time represented by GF the proportion of CD to GF gave the exact time at D (with respect to the angular value at C), the point of separation of the shuttle and the picker. The next step was to increase the sensitiveness of the apparatus by increasing the frequency of the time base, and so making the line GF represent a smaller time interval. From the previously found position of D, it was possible to set the timing of the switch S_1 so as still to bring point D in on the first sweep from C, in spite of the increased speed of movement of the spot. The record obtained was then capable of defining the point of departure of the shuttle very accurately.

It was found that if, during the making of a record, the loom was run for a fairly large number of picks, for instance one hundred, the portion DE was not sharply defined as a single line but became a narrow band, dropping from the level CB between limits such as D′D″. In a particular case during the experiments, this range D′D″ corresponded to about 3° of crank rotation. At the time the effect was attributed to irregular picking, but the accuracy of operation of the circular switch S_1 on the loom was open to a certain amount of suspicion, and it is possible that the irregularity in the departure angle of the shuttle may not be quite as much as recorded here. The method described above was temporarily discarded in favour of a second one, which had the advantage that it could be used in conjunction with another method for defining the full motion of the picking-stick, as will now be shown. However, as results given later will demonstrate, the first method which was discarded was possibly capable of more useful data regarding the actual point of departure of the shuttle, and it is intended at a later date to revive the method, using a much better type of loom switch S_1 which was designed for the subsequent experiments. It was thought worth while therefore to include here a full description of the early method.

Recording full forward motion of picking-stick.

The arrangement of apparatus to give a record of the motion of the picking-stick during the propelling of the shuttle is illustrated in Fig. 4b. An electrical resistance XY of 50,000 ohms, in the form of uniform, spirally wound, fine wire on a flat, flexible former, is fastened to the top of a board shaped in an arc of a circle of 9-inch radius, the board being rigidly fixed to the loom sley sword so that it lies parallel and close to the sweep of the picking-stick, and also its arc (and therefore the resistance XY) are centred about the axis of the picking-stick shaft. A small roller contact Z is fixed to the stick so as to run along the edge of the resistance, and during the development of the pick this contact moves over the resistance XY from left to right. A 120-volt battery is connected across XY and the effect of movement of the picking-stick is to cause Z to tap off a voltage which varies exactly at the same rate as does the distance of Z along the curve XY. If then the points X and Z are connected to a pair of deflecting plates in the oscillograph, the deflection of the spot on the screen (which varies linearly with the potential difference across the plates) will be proportional to the angular movement of the picking-stick. Although the distance moved by the picker in the box is not strictly proportional to the angular movement of the picking-stick, this divergence from proportionality within the range of movement of the stick is not appreciable enough to be serious in these experiments, and it is sufficiently true to say that the deflection of the oscillograph spot is proportional to the distance through which the picker moves in the box.

The above statement depends also upon the assumption that, during running of the loom, the picking-stick and picker behave as a very rigid member, so that any movement of the lower part of the stick near the resistance wire implies a proportional movement of the top of the stick. In a paper previously referred to, Palmer and Ramsdell[3] find that the picking-stick bends during picking, but do not state the amount of bending. From measurements made of the bending under load of the picking-stick, used in these experiments, taken from the loom and supported rigidly at its lower end, and from calculations of the picking load derived from weight of the shuttle and the acceleration developed (estimated later), it seems doubtful if the amount of bending back of the stick would be greater than about a quarter of an inch in most cases.

Returning to a consideration of the arrangement of apparatus shown in Fig. 4b, the roller contact Z is not connected to an oscillograph plate direct, but via two switches S_2 and S_3. The former is of the same type as S_1 already mentioned, but of an improved pattern. The switch S_1 was re-made to the new design and both S_1 and S_2 were mounted on the same shaft. A diagram of the arrangement of this double switch is given in Fig. 6. A is the end of the bottom shaft of the loom which carries the usual large cog wheel (not shown in the figure), and B is a short extension shaft whose end C is made in the form of a large nut with flange, so that BC can be screwed on to the end of A to replace the nut which normally screws up against the cog wheel. D is a hardwood disc fitted on to a steel bush E which is set-screwed to the shaft B as shown. Fixed to the outer edge of the larger plane face of D is a brass slip ring F, and also sunk into a portion of the circumference of D is a brass sector G, the join between F and G being soldered. Springy contacts H and J make continuous contact with the slip ring F and the circumference of D, respectively, so that during the revolution of the shaft and disc, electrical connection between H and J is made whenever the sector G comes round to J, and is maintained during the time G passes below J. The pair of leads from H and J thus form the loom switch connections into the circuit previously described ; two discs side by side on the shaft B represent switches S_1 and S_2. The proportion of the circumference of the disc covered by the brass sector and also the particular setting of the disc by means of the set-screw on the shaft are arranged to suit the needs of the experiment. S_3 (Fig. 4b) is an ordinary two-way switch, the side terminal of which not occupied by the lead from S_2 is connected to one tinfoil piece in the picker. The other tinfoil is connected to a point between Z and S_2. It is thus possible, by operating the switch S_3, to put into circuit either S_2 or the picker switch. As in the case of the previous circuit, illustrated in Fig. 4a, the linear time base is again used in the apparatus to give a sweep to the oscillograph spot at right angles to the direction of the deflection due to the movement of the picking-stick. In full operation, therefore, the spot traces out a curve whose ordinates are proportional to distances moved by the picker in the box, and whose abscissae are proportional to intervals of time. In other words, a space-time diagram of the picking-stick motion is obtained.

The actual operation of the apparatus was as follows. The loom was turned over slowly by hand, and the crank angles found for the positions when the picking-stick began to move and when it reached its furthest inwards point. The switch S_1 was then set to bring in the time base at an angle just earlier than the start of the pick, and the frequency of the time base was adjusted, with reference to the speed of the loom and the total crank rotation for the whole of the development of the pick, to include the latter within one sweep of the oscillograph spot. The moving arm of switch S_3 was pulled over to connect S_2 in the circuit, and the setting of S_2 was such that it came " on " well before the beginning of the pick, and went " off " just after the picking-stick began to return from the furthest inward point after propelling the shuttle into the shed. The result was to record a space-time curve of the motion of the picking-stick such as one of those shown in Fig. 7. A photograph of the movement of the oscillograph spot was made, from which was obtained an enlarged trace on paper ; the correct calibration markings were put alongside, and all the measurements made for the purpose of calculations and of comparison with other records. Meanwhile, with all the conditions exactly as before on the loom, the arm of the switch S_3 was moved over to include the picker switch, and the result upon running the loom was to obtain exactly the same record on the oscillograph screen as before, but with the top part of the curve cut off at the point of departure of the shuttle from the picker.

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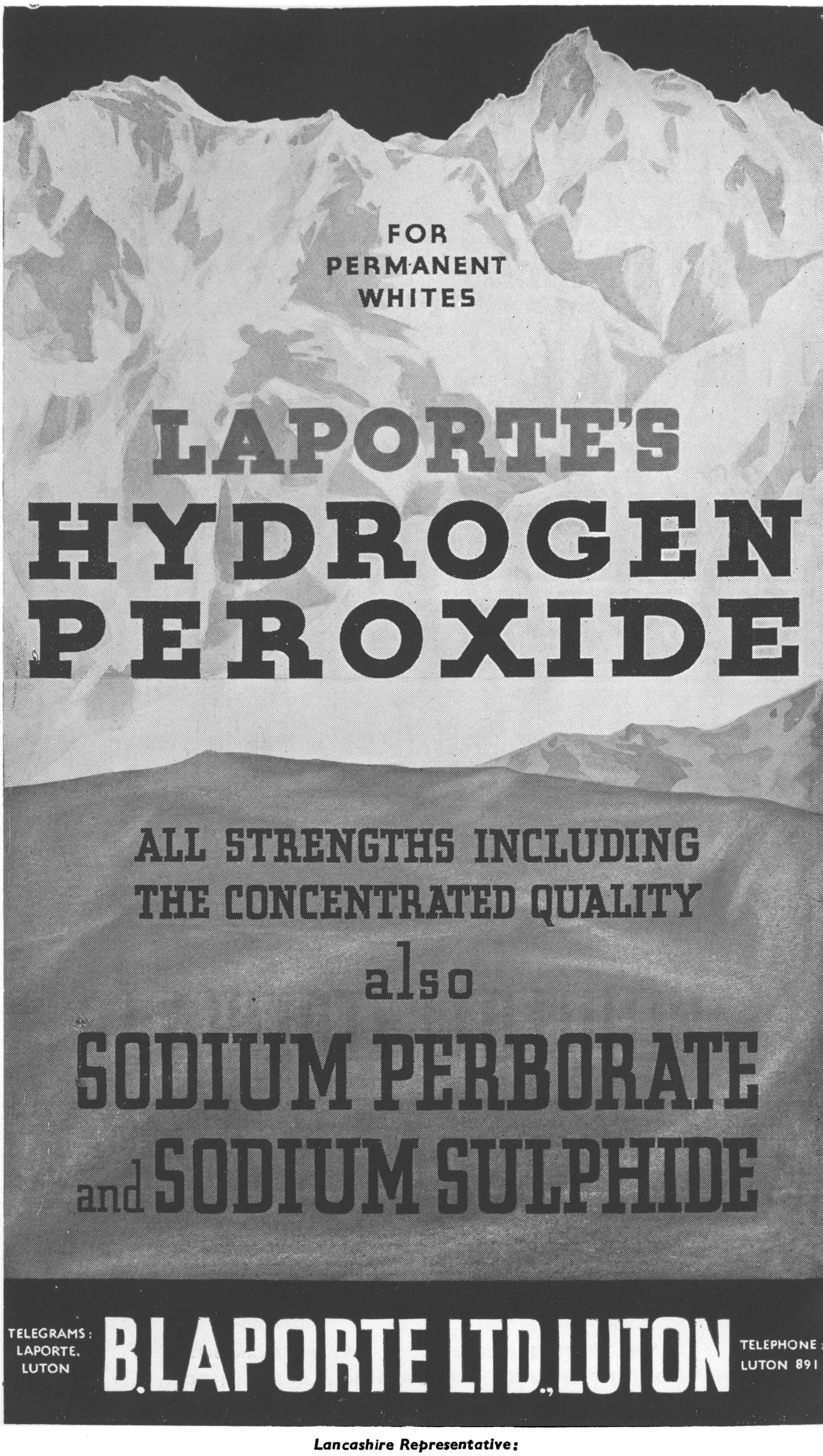
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THE JOURNAL OF THE TEXTILE INSTITUTE

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.
British Launderers Research Association	La.
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Imperial Bureau of Plant Genetics	C. or L.
Linen Industry Research Association	L.
Water Pollution Research Board	W.
Whitelegg, C. J.	C.J.W.
Wool Industries Research Association	W.

1—FIBRES AND THEIR PRODUCTION

(B)—ANIMAL.

Blowfly Control in New South Wales. R. N. McCulloch. *J. Australian Inst. Agric. Sci.*, 1937, **3**, 129-137 (through *Exper. Sta. Rec.*, 1938, **78**, 828).

A combination of crutching and jetting is considered to offer not only the cheapest protection against strike, but cheap control of the blowfly pest in the absence of all other methods. W.

Sheep Blowfly Problem. V. G. Cole. *New Zealand Farmer Weekly*, 1938, **59**, No. 10, p. 8, and No. 13, p. 6.

A description of factors contributing to fly-strike, methods of treatment and prevention. W.

British Sheep Farming. G. H. Holford. *New Zealand Farmer Weekly*, 1938, **59**, No. 14, pp. 30 and 38.

A brief account of the trends and systems of British sheep farming. W.

Wool as an Animal Product. J. E. Nichols. *Pastoral Rev.*, 1938, **48**, 507.

A brief discussion on uniformity in the fleece, more particularly with reference to fibre fineness. W.

Losses due to the Sheep Blowfly. M. J. Mackerras. *Australia: J. Council Sci. Ind. Res.*, 1938, **11**, 97-102.

A summary of data showing estimated losses due to blowflies in the different sheep growing countries. W.

"Defects in Argentine Wools and Problems of Production." (Translated title.) J. C. Speroni. 1938, 31 pp., 8 figs. Buenos Aires: L. Lopez y Cia. (through *Animal Breeding Abstracts*, 1938, **6**, No. 2, 112).

The principal defects in Argentine wools are discussed in detail by the Director of the Wool Research Institute of the Ministry of Agriculture. The most common defects handicapping the utilisation of Argentine wools are lack of uniformity of fibre diameter, length and shape, fibre tips, medullation, harshness and brittleness, pigmentation, and contamination of the fleece by vegetable fibres and parasites. The deterioration in quality is attributed to the growth of the demand for crossbred sheep by the chilled mutton industry. Since, from the textile point of view, uniformity of the individual fibre is perhaps even more important than uniformity of fibre diameters in the fleece, facts regarding the genetic and environmental factors responsible for fibre uniformity should be made more widely known to Argentine breeders. The author recommends a considerable increase in pedigree stock (the present percentage of registered sheep of the woolled breeds being only 0·3-0·5 of the total), organisation of education and research, establishment of experiment stations in wool producing areas, veterinary co-operation, and other essential measures. W.

"The Importance of having a Good Fibre Tip." (Translated title.) L. Thomasset. Campo y Arados, Montevideo, 1937, 1, (4): 2 pp. 3 figs. 7 diagrs. (through *Animal Breeding Abstracts,* 1938, **6**, No. 2, 112).

The majority of Uruguayan wools show a lack of uniform crimping at the distal end of the fibres. This irregularity tends to occur more frequently in crossbred fleeces and influences the reaction of the greasy fibres to (u.-v.) solar irradiation and subsequently to textile dyes. The genetic and environmental causes of irregular terminal crimping are enumerated. Unsatisfactory fibre tips can be avoided by crossing purebred wool breeds only and by selecting for quality of the tips rather than of the proximal part of the fibre, which is already superior to the distal part. Shearing should be arranged so as to precede lactation, as the latter affects the quality of the fibre tip. If the staple is long, lactation will cause a decrease in the diameter of the fibre at the proximal, but not at the distal end. W.

Repeated Arsenical Dipping of Sheep. C. L. O'Gorman. *Australian Vet. J.*, 1938, 14, 68-69.

Sheep were dipped every 14 days for 10 months in a solution of 8 lb. arsenious oxide to 400 gallons water. The dipping was not experimental, but was undertaken to comply with regulations in a cattle tick eradication campaign in New South Wales. No records were kept of the influence of the dipping on the growth of wool or character of the fleece, but it did not appear that any serious damage resulted. W.

(C)—VEGETABLE.

Cotton: Cultivation in Nyasaland. W. Small. *Ann. Rep. Dep. Agric., Nyasaland Protectorate,* 1936. (Issued 1938.)

Statistics are given of the cotton crop produced in the various districts of the Northern and Southern Province of Nyasaland (p. 10). Work on crop pests, the chief of which are stainers and bollworms, shows the necessity of a two months' dead season between the crops, the most satisfactory period in the Lower River districts including a portion of the first rains (p. 20). The production of seed cotton by districts is recorded for the years 1932 to 1936 (p. 43). Work of the Experiment Station at Domira Bay is reported (pp. 56-59). C.

Cotton: Production in Turkey. *Int. Cotton Bull.*, 1938, **16**, 320-2 (from *"Ticaret Ve Sanayi Odasi Mecmuasi,"* Istanbul).

The production of cotton in Turkey has increased from 20,209 metric tons in 1932 to 60,000 in 1937. A policy of sowing of selected seed is in force. Experimental stations have been established by the Ministry of Agriculture at Adana. During last season 500 mechanical tractors were provided and 1,809,686 kg. of new cotton seed distributed. After satisfying home requirements (about 18,300 metric tons of long-staple and 7,440 tons of shorter cotton) there will be a little of the better cotton and about 32,500 tons of the short cotton available this year for export. C

Cotton Plant: Effect of Placement of Fertiliser on Growth. H. P. Smith, H. F. Morris and M. H. Byrom. *Texas Sta. Bul.* No. 548, 1937, pp. 52 (through *Exp. Sta. Rec.*, 1938, **78**, 407-8).

A long series of experiments is reported on the effects of the amount of fertiliser and the way in which it is placed relative to the seed, on germination and the yield obtained. The best result appears to have been obtained when the fertiliser was placed to one side of the seed and below seed level. C.

Cotton Plant: Effect of Potash. J. Y. Oakes. *Louisiana Sta. Bul.*, No. 291, 1937, pp. 11 (through *Exp. Sta. Rec.*, 1938, **78**, 329).

Potash starvation is said to cause premature shedding of leaf, prevents proper development of bolls (which may fail to open), makes cotton hard to pick and often leads to inferior lint. If the soil contains the normal amount of potash, additional potash will not lead to longer cotton. Dry seasons encourage potash starvation. C.

Irrigated Cotton Crop: Micro-climatology. B. M. Dabral and S. S. Chiney. *Indian J. Agric. Sci.*, 1938, **8**, 161-184.

Observations on temperatures and relative humidities are recorded on a cotton crop under irrigated and unirrigated conditions at three typical heights above ground in the Sind district. When the crop is young irrigation reduces temperatures and increases the humidity over the cropped bed. During the later states of growth the differences between the two environments are great. Temperatures are highest at six-inch height above ground on barren ground and decrease as the height increases up to three or four feet. Under cropped conditions the results are reversed. Soil temperatures show wider differences; uncropped open beds show 8-10° higher temperatures than cropped ones for a few days after irrigation and the temperatures run closer as the soil gets drier in all phases of growth. Lowest soil temperatures are reached after a few days of irrigation. Instruments at four feet from the ground as in the Stevenson Screen do not show the conditions inside a crop. C.

Boll-Weevil and Bollworm: Control. J. C. Gaines. *J. Econ. Entomol.*, 1937, **30**, 785-790 (through *Exp. Sta. Rec.*, 1938, **78**, 365).

The Latin square block arrangement, with 1/20-acre blocks, has been found applicable for use in tests for boll-weevil and bollworm control with calcium arsenate, alone or diluted with sulphur, Paris green or lime. The various insecticides were equally effective in controlling the boll-weevil, but an average difference of 3·8 per cent. increase in bollworm injury resulted from diluting the calcium arsenate with 25 per cent. of lime. C.

Pink Bollworm: Occurrence in the Punjab. M. Haroon Khan. *Indian J. Agric. Sci.*, 1938, **8**, 191-214.

The pink bollworm has been studied in the Punjab in relation to the climate. The attack on green bolls starts as soon as they are available and increases as the season progresses, the intensity of attack varies from year to year and the pest is serious in certain parts of the Province and negligible in others. The Punjab is divided into four zones according to the number of green bolls attacked, and the climate is correlated with the disease. It is found that as a rule where the attack is high, the climate is mild and humid and thus favourable for the procreation of the pest. C.

Cotton Breeding: Technique. (1) T. G. Mason (2) Sir Geoffrey Evans. *Empire Cotton Gr. Rev.*, 1938, **15**, 113-117, 118-120.

(1) From his experience of the West Indies, West Africa and India, the author reviews various problems in the technique of cotton breeding and selection. (2) Various comments on Mason's paper are offered. The author feels that the policy of attempting to introduce American Upland types in all the new Empire fields may not have been the best, and that more progress might have been made with Asiatic or perennial types. C.

Crinkle Leaf Cotton Plant Disease: Occurrence in Louisiana. D. C. Neal. *Phytopathology*, 1937, **27**, 1171-5 (through *Rev. Appl. Mycol.*, 1938, **17**, 317).

Several Upland varieties of cotton in Louisiana have been attacked in recent years by a disease described as "crinkle leaf." The bolls also are distorted and mature irregularly, giving weak and almost worthless lint. The symptoms are described. C.

Indian Cotton Crop, 1937-8: Classification. Indian Central Cotton Committee. *Textile Weekly*, 1938, **22**, 15.

A table is given of the varieties of Indian cotton in decreasing order of staple length (34-12 32nds. of an inch), the counts to which they can be spun commercially, and the estimated yield. The totals are: long staple 54,000; medium, A (1 inch) 168,000, B ($\frac{7}{8}$-$\frac{31}{32}$) 1,553,000; short, 3,888,000, bales of 400 lb. C.

Production of Coir Yarn. *Cord Age*, 1938, xxxi, No. 5, pp. 26 and 34.

Machinery required for the recovery of coir fibres from the coconut husks is described. Briefly it consists of a crusher, defiberizer and willow. The husks, after passing through the crusher, are fed to the defiberizer where bristles and mixed fibre are produced. The bristles are separated from the mixed fibres which are further separated in the willow into coir wool, shorts and powder.

A secondary sieve, which is hand operated, finally separates the coir shorts from the powder. The capacity of this coir machine, working 8 hours a day, is 1,000 husks from which an average of 14·5 kilos of bristles, 93·6 kilos of coir wool, 26·9 kilos of shorts and 254·4 kilos of powder are produced. Coir has many and varied uses, the general ones being for caulking cascos or ship fenders, cordage upholstery, mattresses and the like. The bristles are used for making doormats, skating mats, floor polishers and brushes. The coir wools are used for making rugs, sacks, cushion fillings and doormats; the shorts for making paper, filling for cushions, packing material, germinating medium and wulch, and the powder is used for paper making, mulch and wallboard.

Stimulating Flax Production in the United Kingdom. A. Proctor. *Irish Text. J.*, 1938, 4, No. 6, 4.

Refers to the grant of £150,000 to be given by the Government of Northern Ireland to stimulate flax production. The following suggestions are made:—(1) Acquire good stocks of pedigree seed, and release this seed to growers on a bonus basis. (2) Intensive work should be gone on with to achieve good decortication of green flax straw for use as spinning flax fibre as well as for use after washing, drying and dressing the fibre for finer yarn counts. (3) The adoption of a central rettery on the lines of the Norfolk Flax Co., Sandringham. (4) That the British Government should give a grant of £100,000 per annum to be used in conjunction with the grant of the Northern Ireland Government to foster English and Scottish flax fibre production, and ensure an ample supply of faultless, high fibre yielding seed for Northern Ireland (which by her system of production destroys her own seed supply). L.

Problem of the Flax Producer. "Pests and their Prevention." *Irish Text. J.*, 1938, 4, No. 6, 6-7.

A brief account of the diseases and pests which attack the flax crop. Methods are suggested to overcome most of the trouble in flax culture and the article states that pedigree seed, evolved by the Linen Industry Research Association, is more resistant to disease than ordinary varieties. L.

Italian Experiments in New Uses for Hemp. *Textile Manufacturer*, 1938, **64**, 236.

Strong efforts are being made in Italy to encourage production of hemp and its wider utilisation in place of imported textile raw materials. L.

Natural Crossing in Flax. A. C. Dillman. *J. Amer. Soc. Agron.*, 1938, **30**, 279-286 (through *Biol. Abs.*, 1938, **12**, 275).

Seven varieties of flax were grown in rows 1 ft. apart for 3 seasons at St. Paul, Minn., and at Mandan, N. Dakota. The average percentage of natural crossing ranged from 0 to 1·88 per cent. in the seven varieties; a maximum of 5·0 per cent. being observed in one variety one season. On clear days flax flowers opened at sunrise and pollination occurred at once. Fertilsation of the ovules took place within three hours after pollination. Abnormal anthers and deficient pollen in certain flowers, which precludes self-pollination and exposes such flowers to cross pollination by insects, is suggested as the principal cause of natural crossing. L.

Effect of Spacing on the Development of the Flax Plant. A. C. Dillman and J. C. Brinsmade. *J. Amer. Soc. Agron.*, 1938, **30**, 267-278 (through *Biol. Abs.*, 1938, **12**, 275).

Measurements of flax plants grown in varied spacings at Mandan, N. Dakota, for five years are reported. The height, size of stems, number of basal branches, number of balls, and yield of seed per plant, are greatly influenced by the space available for development. In dry seasons, the yield of seed of closed spaced plants (12 plants per sq. foot) was reduced. There was little difference in the yield per unit area from spacings 6, 4 and 3 plants per sq. foot; in the widest spacing (2 plants per sq. foot) the yield was less. L.

The Influence of Soil Moisture and Boron and the Efficiency of Liming Flax. A. D. Kostiuchenko. *Khim. Sotsial. Zemled*, 1938, No. 2, 82-91 (through *Soils and Fertilisers*, 1938, **1**, 120).

Liming had a negative effect on flax on podzolized soils when the soil moisture was insufficient. In the presence of sufficient moisture even large amounts of lime did not have a bad effect on flax. Boron prevented the harmful effects of lime by retarding the entrance of calcium into the flax plant. L.

The Influence of Reaction and Lime-status of Soil on the Productivity of Flax. E. v. Boguslawski. *Bodenk. Pfl.*, 1938, **6**, 209-231 (through *Soils and Fertilisers*, 1938, **1**, No. 2, 76).

Effect of liming and acidifying soil was tested in pot experiments for fibre, seed yield, and fat content of the seed. Liming was favourable to fibre yield but not to seed yield. L.

Reaction Requirements of Fibre Flax and Oil Flax Compared with Barley. E. Morgenroth. *Bodenk. Pfl.*, 1938, **6**, 232-254 (through *Soils and Fertilisers*, 1938, **1**, No. 2, 76).

Pot tests to determine the optimum *p*H limits. For flax a slightly acid reaction was the most favourable in the natural soil and a strongly acid reaction in artificially treated soil receiving lime-water or acid. L.

(D)—ARTIFICIAL.

Electrolytic Chlorine: Application in Pulp Manufacture. U. Pomilio. *Electrochem. Soc. Preprint*, 1938, **73**, No. 24, 343-351.

An illustrated account is given of the Pomilio process, with costs and a graph of production in the various countries since 1920. C.

Wood Pulp: Purification. F. Olsen. *Indust. Engng. Chem.*, 1938, **30**, 524-6.

A general account is given of the preparation and purification of cellulose from wood. C.

Cellulose: Degradation in Viscose Process. A. Lottermoser and F. Wultsch. *Kolloid Z.*, 1938, **83**, 180-196.

The authors have studied the changes in the degree of polymerisation suffered by cellulose in the ageing of alkali-cellulose and the ripening of viscose, and how the changes are influenced by the presence of traces of iron and copper. The study is based on the application of Staudinger's rule to measurements of the viscosity of 0·01-0·03 per cent. solutions of the regenerated cellulose in cuprammonium, and on measurements of the viscosity of the viscose itself in a falling-sphere instrument. Full practical details of the experiments are given in a special section of the paper ; they include a description of elaborate apparatus for dissolving the cellulose in cuprammonium and measuring viscosity in an atmosphere of nitrogen. The discussion traces the various stages in the viscose process and cites other relevant work on the molecular changes. The new results are summarised as follows. (1) The degradation of the cellulose molecule during the ageing of alkali-cellulose increases with increase in the Fe content of the pulp, at a linear rate up to a concentration of 0·015 per cent. Fe. (2) The Cu content of the pulp is without influence in the ageing process. (3) Various observations on the influence of ageing time and temperature, and alkali, carbon disulphide and cellulose concentration on the viscosity of about 7 per cent. solutions of viscose are recorded. (4) The viscosity of the viscose falls with increasing amount of Fe in the pulp. (5) Copper in the pulp leads to an increase in the viscosity of the viscose, due to flocculation of cellulose from the xanthate solution. (6) Samples of cellulose regenerated from viscose after various ripening times show no sign of increasing depolymerisation due to time, or oxidation (air was bubbled through the viscose), or the presence of Fe or Cu. C.

Cellulose Derivatives: Manufacture. R. F. Conaway. *Indust. Engng. Chem.*, 1938, **30**, 516-523.

An illustrated account is given of the manufacture at the works of the Du Pont de Nemours Co. of cellulose nitrate, acetate, and xanthate, higher and mixed esters of cellulose and cellulose ethers. A bibliography is added. C.

Cellulose Xanthate: Reactions with Zinc Sulphate. S. Poznanski and T. Mazowiecki. *Chimica e Industria*, 1938, **20**, 342.

An account is given of the phenomena occurring in the viscose jet during spinning into a bath containing zinc sulphate. C.

Viscose: Determination of Heterogeneity. A. Boryniec. *Chimica e Industria*, 1938, **20**, 339.

A method for the determination of the heterogeneity of viscose depends on the evaluation of the deformations of a viscose thread flowing down into paraffin oil. The influence of chemical and mechanical conditions in the preparation of viscose on its heterogeneity are easily recognised and determined by this means. C.

French Rayon Yarns. *L'Ingénieur Textile,* 1938, No. 344, 180-8.

Some particulars are given of new French rayon yarns, including Cidena (cuprammonium; 60-180 den., 30-60 fil.), an "extra-super" viscose yarn of 1·25 den. per fil., "high resistance" Rhodia, Celtaflamme (lustrous; 150-600 den., 40-120 fil.), the "bigoudi" variety of Celtaflamme (3,000 den., 600 fil. and 6,000 den., 1,200 fil.), Celtogal (300 den., 12 fil. to 1,000 den., 40 fil.), Celtacyl, and various sheet cellulose yarns. C.

Staple Rayon. W. Weltzien. *Holz Roh u. Werkstoff,* 1937, **1**, 89-98 (through *Chem. Abs.*, 1938, **32**, 4329).

A discussion from a technological standpoint of the principal processes and raw material for the production of staple rayon. Methods for testing the fibre are described. Curves are given for the extension of cotton, wool and two types of staple rayon all at 60 and 65 per cent. relative humidity. Other suitable raw materials are briefly discussed. W.

PATENTS.

Artificial Filaments, etc., from Proteins. N. V. Onderzoekingsinstituut Research. F.P.823,962 of 29/1/1938 (through *Chem. Abs.*, 1938, **32**, 4336).

In the manufacture of artificial filaments ribbons and like products by extruding an alkaline solution of casein or other protein into an acid bath, the products are drawn under tension through an acid bath containing a tanning agent, and thereafter they are hardened by treatment with CH_2O or like reagent. The preferred tanning agent is a synthetic tanning agent of the type obtainable by condensing CH_2O or other aldehyde with an aromatic or hydroaromatic compound and sulphonating the product. Examples are given. W.

Irregular Denier Rayon Spinning Device. American Viscose Corporation. B.P. 481,088 of 29/9/1937 (Conv. 15/10/1936).

A rayon yarn of an irregular denier is produced by a spinning pump comprising a pump of uniform delivery producing a yarn of normal thickness and a second pump having an irregular delivery working in parallel with the first pump and causing irregular enlargements on the yarn. C.

Bobbin Spinning Machine Cone Drive. Barmer Maschinenfabrik A.-G. B.P. 481,130 of 7/9/1936 (Conv. 18/10/1935).

In the cone drum mechanism of bobbin spinning machines for rayon, a loose pulley is mounted at the end of the driven cone and a corresponding parallel portion formed on the driving cone, thereby dispensing with clutches. C.

Centrifugal Spinning Apparatus. Barmer Maschinenfabrik A.-G. B.P.481,131 of 7/9/1936 (Conv. 28/11/1935).

In means for reciprocating the thread guide funnels of centrifugal machines for spinning rayon, in which cam discs are angularly adjustable for varying the stroke, the rollers or guide blocks engaging the cam groove are coupled to the guide frame by a simple hinge joint, which comprises a journal fixed in a bevelled square-piece carried by the frame. In a modification, for use when considerable adjustment is desired, the square-piece is loosely mounted on a bolt carrying the block loosely on pins. C.

Cellulose: Isolation. T. Kleinert. B.P.481,631 of 31/12/1936 (Conv. 31/12/1935).

Wood is treated, before applying any lignin-removing or oxidising treatment, with a controlled mixture of steam and oxygen or air, and then without intermediate oxidising treatment with a known reagent to remove the greater part of the lignin. Temperatures and pressures in the lignin-removing step may be lower than usual due to the pre-treatment. The wood may be subjected to a preliminary treatment with weakly acid or alkaline liquids, small quantities of substances to catalyse the oxidising action, e.g. ferric nitrate, being employed if desired. The preliminary treating solutions are not strong enough to effect decomposition themselves. A preliminary steaming treatment may also be employed. Suitable encrustant solvents for the final treatment are alkalis, alkali hypochlorites or organic solvents such as alcohols, ketones, phenols or dioxane. This treatment may be combined with a disintegration treatment. C.

Nitrogenous Bases: Prevention of Metal Corrosion. R. W. Moncrieff and E. B. Thomas. B.P.481,748 of 19/9/1936.

To reduce or prevent the corrosive action of nitrogenous bases on iron, there is added an alkaline earth metal compound which is convertible by aqueous carbon dioxide into a water-insoluble carbonate. Examples of such metal compounds are water-soluble salts of alkaline earth metals with acetic, formic or other lower fatty acid, and alkaline earth hydroxides. Compositions and the use of compositions containing alkaline earth metal salts in concentrations above 2 per cent. are disclaimed. The method may be applied in processes wherein cellulose esters are treated with aqueous solutions of organic bases to change their solubility properties, in processes for stabilising and reducing the viscosity of nitrocellulose, in the treatment of cellulosic materials with organic bases to increase their affinity for dyes, and in the saponifying of organic esters of cellulose. The metal with which the nitrogenous base comes into contact may be pretreated by heating with an aqueous solution of boric acid. C.

Centrifugal Spinning Apparatus. Courtaulds, Ltd., and J. H. Givens. B.P. 481,777 of 8/1/1937.

Artificial filaments and the like are produced by extruding viscous material such as viscose, into a precipitating bath and leading the thread or bundle of threads from the nozzles over a guide, round two or more godets successively, each of which is rotating with a greater peripheral speed than the previous one, and then into a centrifugal box or other collecting device. One or more of the godets is partly immersed in a hot liquid; the godets so immersed are substantially cylindrical for only a portion of their length and conical or tapered for the remainder, and they are so arranged that at least a part of the conical or tapered portion projects from the surface of the hot liquid. C.

Polymerised Vinyl Compound Filaments: Production. W. A. Dickie and D. Finlayson. B.P.482,216 of 30/9/1936.

Artificial filaments, yarns, foils, films and similar materials are produced with a basis of a substance which is a polymerisation product of an organic compound containing an ethylene linkage and which contains ester groups and esterifiable hydroxy groups but which is free from carboxy groups or salts thereof, the proportion of ester groups being from 60-85 per cent. of the theoretical maximum content. The materials may be obtained by shaping and setting a composition containing the polymerisation product containing the ester groups and hydroxy groups, or by saponifying materials obtained from polyesters containing more than the required portion of ester groups. Polymerised vinyl acetate, chloracetate, propionate or benzoate may be employed. The solutions employed for making the shaped materials may contain medium or high boiling solvents or plasticizers. The solutions may be extruded into an evaporative atmosphere or into water or a salt solution or an aqueous solution of a solvent for the partially saponified polyester. The filaments may be stretched during production. Filaments may be passed through solutions of softening agents or through hot water or steam, and stretched while in softened condition. Alternatively they may be allowed to shrink. The materials may be coloured or delustred by incorporating in the solutions from which they are made or in the formed materials, a finely divided white or coloured pigment such as barium sulphate, carbon black or dibenzoyl benzidine. The filaments may be associated with other filaments or fibres such as cotton, regenerated cellulose, cellulose ester, wool, or silk. The yarns may be used in the production of stiffened textile fabrics or collars. C.

Polyvinyl Acetals: Preparation. W. W. Groves (I.G. Farbenindustrie A.-G.). B.P.482,219 of 2/10/1936.

Polyvinyl acetals are manufactured by acting on an aqueous emulsion of a polyvinyl ester containing a polyvinyl alcohol or a water-soluble derivative thereof as emulsifying agent, in the presence of a mineral acid or a strong organic acid, with a quantity of a carbonyl compound sufficient to convert at least part of the polyvinyl ester to a polyvinyl acetal. The product obtained by acetalizing an emulsion of polyvinyl acetate in aqueous polyvinyl alcohol by butyraldehyde in the presence of ethyl alcohol and *p*-toluenesulphonic acid may be worked up as threads. C.

Artificial Wool: Production. W. W. Groves (I.G. Farbenindustrie A.-G.). B.P.482,280 of 22/9/1936.

Artificial fibres resembling wool are obtained by spinning highly ripened viscose into an alcoholic precipitating bath and subjecting the freshly coagulated fibres to a decomposition by means of hot air, or a hot acid or hot salt solution. The fibres may be stretched after leaving the first precipitating bath, and are preferably cut into staple length before the final decomposition. C.

Cuprammonium Rayon: Spinning. I. G. Farbenindustrie A.-G. B.P.482,296 of 26/9/1936 (Conv. 28/9/1935).

Rayon and other shaped articles are prepared from cuprammonium cellulose solutions by precipitating the cellulose in neutral or alkaline media in the presence of acid esters of polyhydric alcohols containing not more than six connected carbon atoms, or of water-soluble salts thereof. The ester or salt may be added to the cuprammonium solution or to the precipitating bath. Amounts of 1-10 per cent. calculated on the weight of the cellulose are sufficient to prevent precipitation of cupric hydroxide in the precipitating funnel. C.

Rubber Threads: Production. R. P. Roberts and R. M. Dingley. B.P.482,335 of 23/9/1936.

Threads are made by extruding into an acid bath (15-25 per cent. acetic acid) a rubber dispersion containing casein having a viscosity about 1·35-1·65 times that of 70 per cent. glycerol at 25° C. The amount of casein is suitably 0·05-0·5 per cent. on the weight of the rubber. Coagulation is complete in 9-10 seconds. C.

Yarn Intermittent Treatment Apparatus. W. I. Taylor and A. H. Woodruff. B.P.482,349 of 26/9/1936.

Apparatus for intermittently treating a running yarn, as in the production of variable denier rayon by stretching, and in the intermittent saponification of cellulose acetate or other cellulose ester yarn, comprises a yarn-engaging member moved in a direction transverse to the path of the yarn by an epicyclic gear in association with speed-controlling means whereby the frequency of movement of the yarn-engaging member is varied. C.

Sugar Acids: Application in Cuprammonium Rayon Spinning. I. G. Farbenindustrie A.-G. B.P.482,664 of 2/10/1936 (Conv. 4/10/1935).

Precipitation of copper compounds on the glass walls of the spinning funnel is minimised by the addition to the cuprammonium solution of an "aliphatic hydroxy-carboxylic acid (or salt) having at least two hydroxy groups for each carboxylic acid group." The first example mentions saccharic acid, the amount used being 3 parts for 100 parts of cellulose. Another example claims a solution made by oxidising starch with nitric acid. C.

Cellulose Ethers: Preparation. Dow Chemical Co. B.P.482,695 of 30/7/1937 (Conv. 30/7/1936 and 1/8/1936).

When making cellulose ethers by the action of alkyl halide on alkali-cellulose at raised temperatures and under pressure, un-reacted alkyl halide is removed by mixing the product with a hot solvent for the ether at a temperature sufficient to vaporise the reagent. The alkali halide is removed from the solution by filtration. C.

Porous Viscose Masses: Production. Viscose Development Co. Ltd. and G. A. Fletcher. B.P.482,700 of 28/9/1937.

Porous masses (e.g. sponges) are obtained by adding to viscose solution a metal (e.g. aluminium) that reacts with caustic soda to liberate hydrogen. Fibres like flax, hemp, cotton or jute may be added to the viscose. C.

Crimped Cellulose Acetate Rayon Staple Fibre: Production. D. Finlayson and R. G. Perry. B.P.482,814 of 30/7/1936.

Cut filaments of cellulose acetate are crimped by placing them in a criss-cross fashion in a special chamber, screwing down a perforated lid until the pressure is about half a lb. per sq. in. and admitting a softening agent, e.g. aqueous acetone. C.

Artificial Animal Fibre Insulating Thread: Preparation. C. Freudenberg Ges. B.P.482,974 of 14/12/1936 (Conv. 21/12/1935).

Thread for electrical insulating braid, cord or flex is prepared by spinning a paste of disintegrated animal fibre. C.

Coloured Cellulose Esters: Production. E. Clayton. B.P.483,148 of 9/7/1936.

Diazo and coupling components are added to cellulose ester dope and the formed filament or film (including a film obtained by spraying the dope or fabric) is treated with nitrous acid. C.

Crimped Hollow Viscose Rayon: Production. Vereinigte Glanzstoff Fabriken A.G. B.P.483,404 of 15/1/1937 (Conv. 15/1/1936 and 20/3/1936).

Coagulated but unfixed viscose filaments, charged with sulphites, carbonates or the like, are treated in an untensioned condition with dilute acids, washed, etc., and dried. For example, viscose of salt-point 10 is spun into a solution containing sulphites and sulphurous acid, or Na bicarbonate, stretched and formed into skeins. These are immersed, whole or cut into staple fibre, in dilute sulphuric acid. C.

Cellulose Acetate-nitrate: Production. E. Berl. B.P.483,474 of 16/10/1936.

Dry cellulose is caused to react with a mixture of acetic and nitric acids (at least one-third of the latter), the waste acid is removed, and the product washed and brought into reaction with acetic anhydride and benzene, the temperature being gradually raised to 25-30° C. C.

Cellulose Mixed Esters: Production. Afag Finanzierungs A.-G. B.P.483,485 of 19/10/1936: 18/10/1935.

Mixed esters of cellulose are obtained by digesting an ester containing sulphuric acid residues (as derived from the catalyst) with a liquid comprising at least one substance that contains at least one radical of the kind to be introduced. For example, cellulose acetate prepared by the heterogeneous method is washed with benzene and ethyl acetate and then digested with ethyl butyrate. The cellulose acetate-butyrate is stabilised by extraction with ethyl acetate. C.

Viscose Cake Treatment Apparatus. Courtaulds Ltd. and E. A. Morton. B.P. 483,856 of 25/11/1936.

Apparatus for treating cakes of thread with a succession of liquids for washing, desulphiding, bleaching, etc., comprises a receptacle with a number of perforated carriers for the cakes that is movable along a guideway for successive co-operation with various stand-pipes arranged below the guideway. Liquid supplied by the stand-pipes rises through the perforated supports for the cakes. C.

Corrugated Pulp Sheet: Continuous Conversion into Alkali-cellulose. Courtaulds Ltd. and E. A. Morton. B.P.486,242/3 of 31/3/1937: 1/6/1938.

The continuous conversion of a roll of pulp into alkali-cellulose is rendered difficult by reason of the contraction in the caustic soda. (1) This is overcome by running the sheet through fluted rollers so that it enters the caustic soda in corrugated form. It is conveyed through the liquor on an endless belt. It can be arranged that the contraction smooths out the corrugations before the impregnated sheet reaches the squeezing rollers. (2) The impregnated sheet passes between two fresh sheets of pulp through the squeezing rollers so that excess caustic soda is taken up by the fresh sheets. C.

Rayon Spinning Tube Spindle Roller Bearing. Barmer Maschinenfabrik A.G. B.P.486,792 of 14/12/1936: 10/6/1938 (Conv. 20/1/1936).

In a roller bearing twisting spindle for removable bodies with large bore, particularly spinning tubes for rayon, the roller bearing is so mounted that unbalances of the rotating mass are directly taken up and the spindle shaft is relieved of static centrifugal forces. C.

2—CONVERSION OF FIBRES INTO FINISHED YARNS

(A)—Preparatory Processes

Carding Engine Doffer: Speed and Staple of Cotton. J. Dugelby. *Textile World,* 1938, **88,** No. 6, 58-9.

From a " series of observations made over a number of years " on cylinder and doffer speeds, carding $\frac{11}{16}$, $\frac{13}{16}$, $\frac{15}{16}$, 1 and $1\frac{1}{8}$ in. American and $1\frac{3}{8}$ in. Egyptian cotton for spinning into 8's-80's yarns, supplemented by the knowledge that the best doffer speed for $1\frac{7}{16}$ in. Egyptian for 150's mule yarn is 8 r.p.m. on a 24 in. doffer, the author comes to the conclusions that the best cylinder speeds are those stipulated by the machinists and that there is a constant relation between the best doffer/cylinder draft and the staple of the cotton. This "practical experience constant" (staple length/draft) is given as 0·036. The best speed of the doffer is then obtained from the equation, speed of doffer = (diam. of cylinder in inches × speed of cylinder in r.p.m. × 0·036) divided by (diameter of doffer in inches × staple length). A table of speeds for a 50 in. cylinder and 24, 26 and 27 in. doffers is given for the range of staple, $\frac{13}{16}$ to $1\frac{1}{2}$ in. C.

Metallic Card Clothing: Application. H. Holt. *Textile Manufacturer*, 1938, **64**, 187.

The differences between metallic (saw-tooth) card clothing and the ordinary wire fillet clothing are discussed and some results of tests on American, Brazilian, Indian and Egyptian cottons are reported. The ordinary clothing took out about $1\frac{1}{2}$ per cent. more waste than the metallic (e.g. 5·7 per cent. as against 4 per cent. on American), the difference being mainly in the flat and brush strippings. Spun into 20's, the American, Brazilian and Indian cottons gave cleaner yarns from the ordinary clothing; the American yarn was also 7 per cent. stronger (lea test), but the others were not appreciably different. The Egyptian slivers were combed and after taking out 13 per cent. more waste from the sliver produced by metallic clothing, they gave similar yarns in 80's. C.

Re-manufactured Staple Fibre: Production. *Spinner u. Weber*, 1938, **56**, No. 22, 1-2.

A brief practical account is given of the types of staple fibre waste and the operations of tearing, willowing and carding. C.

Card Grinding Machine. Dronsfield Brothers Ltd. *Textile Weekly*, 1938, **22**, 48-50.

An illustration is given and explained of a machine (No. 197) capable of grinding 28 flats at a time. The full throw of 16/1000's of an inch takes about 8 hours. The machine is fitted with a flat tester graduated in equivalents of 1/1000th inch. C.

Nasmith Comber: Adjusting, Timing and Setting. M. Merica. *Textile Recorder*, 1938, **55**, No. 659, 28-31; No. 660, 21-2; No. 661, 28-30; **56**, No. 663, 18-20; No. 664, 24, 35.

A detailed description of the adjustment, timing and setting of the Model "N" Nasmith comber. The adjustments to be made during the erection of the machine and subsequently are tabulated against the various adjusting points. C.

Emulsifiers in the Textile Industry. G. Schulz. *Fette u. Seifen*, 1938, **45**, 146-147 (through *Brit. Chem. Abs. B.*, 1938, **57**, 505).

The inclusion of oil-soluble emulsifiers such as "Emulphors" (polyether-alcohols containing ether bridges) in textile oils containing mineral oil facilitates their removal in the subsequent scouring; water-soluble emulsifiers may be used in emulsion oiling. W.

Quality in Blending: Influence on Yarn Costs. *Wool Record*, 1938, **53**, 1307-1311. W.

Developments in Rectilinear Comb Construction. Prince-Smith & Stells Ltd. *Wool Record*, 1938, **53**, 1121-1125.

Details are given of the narrow and wide models of the rectilinear comb and of the following improvements: accessibility of porcupine; drawing-off roller settings; deburring motion; square nip; calendar rollers; shovel plate; noil brush trimmer. W.

Oleins and Mineral Oils in the Textile Industry. M. Kehren. *Fette u. Seifen*, 1938, **45**, 142-144.

Mineral oils have good spinning properties, but comparative scouring tests on woollen yarns oiled with mineral oil and olein show that the mineral oil is not readily removed and in commercial processing it is necessary to use a special "solvent scour" which increases processing costs. The effect of the addition of mineral oil to an olein in reducing the tendency of an oiled material to oxidise is discussed, also the catalytic effect of iron soaps on the oxidation of olein. W.

Flax Straw Drying Machine. *Irish Text. J.*, 1938, **4**, No. 6, 10.

Describes a brattice type machine for drying retted flax. The wet straw is fed on to the brattice to a depth of about six inches, and the brattice holds

75 lbs. of dry straw per square foot of brattice, the drying time being one hour. The production of such a machine with seven sections and five tiers will vary from 550 to 600 lbs. of dry straw 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 remove the moisture. L.

Ambitious German Rettery. *Linen Trade Circular,* 1938, **24**, No. 1276, 2.

The largest and most modern flax retting plant is being erected at Kunzebeck, Western Germany. Consisting of warehouses, retting basins and the installation of centrifugal drying apparatus the process will be carried out independent of the weather. L.

The Manufacture of Hemp and Hard Fibres. Caldwell, S.A.G. *Textile Manufacturer,* 1938, **64**, 270.

Refers to the physical characteristics and qualities of the various raw materials included under the heading of hemp and hard fibres. Methods of softening and preparation of the fibres are discussed and described. L.

" Hays-Gratze " Process for Retting or " Cottonising " Vegetable Fibres. *Textile Manufacturer,* 1938, **64**, 239-257.

Discusses the question of extracting vegetable fibres from raw materials and of efforts to solve the technical problems of fibre extraction based on new knowledge of the physical and chemical constitution of the fibres. Refers to the new processes which have been evolved for flax, ramie and phormium retting, decortication, and the " cottonisation " of these and hemps, based on the use of sulphonated ionised vegetable oils or gels. L.

(B)—SPINNING AND DOUBLING

Spinning Problems: Discussion. Textile Operating Executives of Georgia. *Cotton (U.S.A.),* 1938, **102**, No. 4, 88-93.

The following subjects are discussed. (1) *Blowroom management:* Practices in several mills are reported. (2) *Reduction of scutcher speed:* Cleaner and stronger yarn is reported from several mills. (3) *High-draft roving:* Various experiences are recorded and efficiencies up to 90 per cent. are claimed. (4) *Koroseal roller covering in high-draft roving:* Favourable opinions are reported. (5) *Spindle tapes:* Good results with light-weight tapes are recorded. (6) *Cleaning spindle bolsters:* Some spinners recommended periodic removal of the bolsters for thorough cleaning with kerosene. One spinner reported that instead of removing the bolsters he oils the spindles once a year with lard oil and thus removes accumulated gum. (7) *Cleaning on high-draft spinning:* Details are given of various practices. (8) *Cooling the spinning room:* The use of air ducts and fans in very hot mills (summer temperature as high as 106° F.) is reported. C.

" Andrew-Langstreth " Disc Doubler. *Text. Mercury & Argus,* 1938, **98**, 722; *Textile Weekly,* 1938, **21**, 758.

An illustrated account is given of a doubler for tyre cords on which the yarn is made to balloon round the supply package on the way to the delivery rollers and two twists are inserted for each revolution of the spindle. Production on 5/23's, 21 turns per inch, is 8¼ lb. per spindle per week (47½ hours). The delivery bobbin is 6¾ in. traverse, 6 in. diameter, and holds 5 lb. of yarn. C.

Cotton Waste Spinning Plant: Development. R. Stansfield. *Textile Recorder,* 1938, **56**, No. 662, 19-20.

The following suggestions are made for experiments leading to the improvement of waste spinning machines: (1) pneumatic separation of cotton fibre detached from hard waste in the " devilling " machine; (2) use of static electricity in untwisting yarn waste; (3) possible replacement of soaping by humidification; (4) preparation of slivers instead of laps on the scutcher; (5) variations in the adjustment of the carding engine " fancy "; (6) adaptation of the ring frame for waste spinning. C.

Mule Copping Motions: Functions. R. Fletcher. *Textile Manufacturer,* 1938, **64**, 184, 188.

The author analyses the functions of the various mule mechanisms in the correct building of a cop. C.

Roller Clearing Devices. F. Münch. *Textilberichte,* 1938, **19,** 411-412.

Various clearing devices for the bottom rollers of drawing frames are briefly described and shown in diagrams. Their advantages and disadvantages are pointed out. C.

"Andrew-Langstreth" Double-twist Twisting Machine. Tweedales and Smalley Ltd., *Textile Weekly,* 1938, **22,** 16-21.

A cross-section of the spindle with its disc double-twister is shown in detail and its action explained. C.

"Herr" Crepe Twisting Spindle Flyer. Unisel Ltd. *Textile Weekly,* 1938, **22,** 22.

Illustrations are given of a wire flyer, mounted on ball bearings, for crepe twisting of rayon or silk yarns. The wires vary in style and weight for different deniers and can be exchanged readily by means of a special tool. C.

Ramie Spinning and Finishing. J. B. Pears. *Textile Manufacturer,* 1938, **64,** 227.

A brief description of spinning and winding machinery best suited for ramie yarns. The ramie wet-spinning frame is really a development from the flax and hemp frame but with some important differences in details of construction. The length of the reach is generally about 12 inches for spinning ramie and two pairs of carrier rollers are placed between the drawing and retaining rollers to support the rove. Ring spinning is practised with self-contained Rabbeth type spindles driven by tapes or bands, with a cop building motion. The spindle speed is approximately 4,500 r.p.m. and yarn twist factor varies from 1·75 to 3·00 according to type of yarn. In some cases the finer yarns are treated on the gassing frame to remove surface hairs and at the same time the yarn passes round a series of polishing runners which impart a certain lustre. L.

(D)—Yarns and Cords

Fancy and Novelty Yarns. H. Melton. *Textile Manufacturer,* 1938, **64,** 139-140.

Methods are described for producing fancy yarns, e.g. nep, feather or down, streak and tinsel yarns, using a combination of Schappe silk with French drawing and spinning machinery. W.

Patents.

Wet Spinning Frame Flyers. W. Ewart & Son, Ltd., G. T. Dickey and F. W. Radcliffe. B.P.471,558 of 5/9/1936.

A ring or other attachment is applied to the legs of flyers of wet spinning frames at such a distance from the eyes that the line of the yarn from the rollers to the flyer eye is clear of the bobbin head without any undue deflection by the thread plates, thereby enabling flyers with longer legs and larger bobbins to be used. C.

Porcupine Beater. Howard & Bullough Ltd. and W. Whittle. B.P.480,041 of 14/12/1936.

To reduce eddying in a porcupine beater cylinder one or more rigid vanes or impellers are disposed between certain or all of the adjacent pairs of rows of striker members and extend wholly or partially throughout the axial length of the cylinder. The vanes may be arranged in pairs between either adjacent rows of strikers or between alternate rows. They are constituted by the flanges of channel units and are secured to discs carrying the strikers so as to project radially. The vanes may be divided into a plurality of shorter sub-vanes arranged substantially end to end and spaced apart. These sub-vanes may be inclined to the beater axis. C.

Combing Machine. P. J. Gillespie. B.P.480,043 of 29/12/1936.

In a rectilinear combing machine a constraining member presenting a smooth surface for engaging the edge of the drawing-off band is provided at each end of the oscillating shaft of the upper sword between one of the arms supporting the sword and the adjacent edge of the band. Each member comprises a number of parts securable together about the shaft, e.g. discs of hard wood, metal or other suitable material. In a modification, the members comprise elongated plates. C.

Paper Cop Tube. Swailes Ltd. and A. Taylor. B.P. 480,189 of 10/10/1936.

A paper tube for yarn spinning, winding, and like machines is formed from paper which is embossed at the part forming the interior lower portion so as to provide a corrugated or other interrupted raised surface, whereby a barrel-shaped spindle is adequately engaged. C.

Carding Engine. J. Scholl. B.P.480,635 of 30/4/1937 (Conv. 2/5/1936).

A revolving flat carding engine is characterised in that above a preliminary opener is arranged a series of working cylinders each in working engagement with the adjacent working cylinders and with the preliminary opener and a transmission cylinder interposed between the preliminary opener and the main cylinder and has working cylinders coacting therewith. Of the series of working cylinders, the early ones are preferably covered with saw-toothed wire and the later ones with ordinary card wire. C.

Composite Yarn. J. R. Wylde and D. Finlayson. B.P.482,302 of 28/9/1936.

A composite yarn for use in the weft and/or warp of a fabric is formed by doubling at least two components, one having a voile twist and the other a crêpe twist in the reverse direction to the voile twist, the doubling twist being substantially the same as the crêpe twist but in the reverse direction so that the voile twisted component is twisted to a degree representing the sum of the initial voile twist and the doubling twist and the crêpe twisted component is substantially freed from twist. The components of the yarn may be made of the same or different material, e.g. regenerated cellulose, cellulose acetate, silk, cotton or wool. The yarn may comprise two crêpe twisted components of opposite hand and one voile twisted component. The components may differ as regards colour and lustre, and may be fibrous or continuous. The components may be doubled first with a low degree of twist in the same direction as the final doubling twist. With a yarn including a component of an organic derivative of cellulose initial high twisting may be effected under the influence of steam or hot water. Similarly when the doubling twist inserts a high degree of twist into a component of an organic derivative of cellulose. C.

Composite Yarn: Production. D. Finlayson & J. F. Levers. B.P.482,376 of 29/9/1936.

A composite yarn, which resembles a wool yarn, comprises one or more yarns of crinkled artificial filaments, having in the composite yarn at most only a small degree of twist, associated with one or more highly twisted yarns which, in the composite yarn, are so highly twisted that they possess the ability to shrink on treatment with hot aqueous liquors or associated with one or more yarns capable of being shrunk relatively to the crinkled yarn and in the composite yarn being shrunk and having a degree of twist less than crêpe twist. Instead of a yarn or yarns of crinkled artificial filaments, one or more yarns which are not crinkled but which are crinkled after the association of the yarns may be employed. The yarns may be associated together by a doubling twist and the speed at which the crinkled component is fed to the doubling device may be greater than the speed at which the other component is fed thereto; the proportion of crinkled yarn in the composite yarn may be substantially greater than the proportion of the other yarn. The denier of the yarn or yarns of crinkled artificial filaments may be substantially greater than that of the other yarn or yarns, the tensile strength of the shrinkable yarn is preferably at least 2 g. per denier, at most 30 per cent. of the total denier of the composite yarn is constituted by the high twist yarn or the shrinkable yarn, and the yarns may be doubled together so that in the composite yarn the length of highly twisted yarn is greater than that of the crinkled yarn. The crinkled yarn may also consist of partially or completely saponified cellulose acetate or other cellulose ester or may have a basis of cellulosic material but have been subjected to a process of surface esterification or etherification or may have a basis of an organic derivative of cellulose and have been subjected to a process of esterification, and they may have been stretched prior to crinkling. The crinkled and shrinkable yarns may be different in character or, when the shrinkable yarn is highly twisted, they may be of the same material; the crinkled yarn and shrinkable yarn may be of the same material and the crinkled yarn coated with a resist which prevents the shrinking agent acting upon it or the shrinkable yarn may be stretched so that it is more sensitive to the shrinking agent than the crinkled yarn or the crinkled yarn may contain filaments that have been shrunk. The treatment of the composite yarns with shrinking agents may be carried out prior to, or subsequent to, the conversion of the yarn into a fabric. C.

Conditioning Wool, Shoddy and Like Materials Containing Wool. R. S. Pike. B.P. 484,609 of 16/11/1936.

The material to be treated is carried on a conveyer past a zone where oil is sprayed on it from nozzles ; suction means are placed under the conveyer, the supply of oil being cut off when the spraying means is moved from its operative position above the material on the conveyer. A diagram is given. W.

Cotton Draw Frame Roller Mechanism. J. Elzer (Mistek, Czechoslovakia). B.P.485,416 of 22/4/1937: 19/5/1938.

In a cotton drawing frame for preparing textile material, particularly woollen slivers, for mixture with other material in cotton spinning machines, the operative part of the loaded upper roll co-operating with the normal corrugated drafting rolls is considerably (about 50 per cent.) shorter than the latter, the loading weights being arranged close to the ends of the operative part of the upper roll. A separate pair of stands is provided for this upper roll, the distance of these additional stands being smaller than that of the main stands, in accordance with the reduced length of the operative part of the upper roll. C.

Magnetic Drive Drafting Roller System. P. Devaux (Maromme, France). B.P.485,696/7 of 18/2/1937: 24/5/1938 (Conv. 28/4/1936 and 31/8/1936).

(1) In a drafting system in which a roller of small diameter for guiding the fibres between the pairs of drafting rollers rests on a rotary driving shaft and is rotated from it magnetically, the driving shaft itself is rotated by one of the working cylinders (e.g. the lower intermediate cylinder) of the machine, and the shafts, rollers, and magnetic driving means are divided into independent groups serving , say, 2, 4, 6 or 8 spindles. (2) The guiding rollers are themselves magnets or electromagnets. C.

Self-centering Spindle Sleeve Bearings. Manufacture Alsacienne de Broches (formerly Les Fils d'Edouard Latscha). B.P.486,464 of 9/2/1937: 3/6/1938 (Conv. 14/3/1936).

The claim relates to a flexible bearing for a self-centering spindle, wherein the extremity of the inner sleeve for the spindle lodges in a cup-shaped mount with spherical bottom resting in a corresponding spherical hollow in the bottom of the bolster, the pivot of the spindle proper being positioned in the sleeve in such a manner that it is located at the centre of the sphere of the bottom of the cup. C.

Thread-Guide and Lappet Adjusting Device. Cook & Co., Manchester, Ltd. and N. Cook. B.P.486,484 of 15/6/1937: 3/6/1938.

A special mounting for the curved thread-guide rod is described for which it is claimed that the rod will not move from its adjusted position during the tightening operation. C.

Viscose Drafting Roller Covering. J. S. Taylor (Macclesfield). B.P.486,523 of 3/11/1936: 3/6/1938.

A drafting roller has a jointless covering made from a tube of viscose, put on to the roller in its wet state directly from the forming mechanism, and subsequently shrunk on to the roller and dried. C.

Inverted Flyer Spindle. G. Leclercq et Fils (Lille). B.P.486,551 of 7/12/1936: 7/6/1938 (Conv. 2/10/1936).

A bobbin spindle of the inverted flyer type has a tubular member for supporting the bobbin slidably fitting over one end of the spindle, a box or cup, secured to the spindle below the tubular member, having hooks or teeth for automatically engaging the start of the yarn after it has passed through the eyelet of the flyer, and a cover member for the box for keeping the free end of the yarn within the box. C.

Slub Yarn Ring Frame Roller Gearing. J. A. Orr. B.P.486,806 of 22/2/1937: 10/6/1938.

In apparatus for intermittently de-clutching the drive for the front or other rollers of ring frames for producing slub yarns, cam surfaces or studs are provided at irregular intervals along a helical groove formed in the periphery of a continuously rotating drum or cylinder and are adapted to be engaged in succession by a reciprocating contact arm controlling the clutch. C.

Bobbin Doffing Apparatus. E. Pferdekämper (Weida i/Thüringen). B.P. 486,843 of 20/1/1938: 10/6/1938.

In bobbin doffing apparatus for spinning and twisting machines comprising bobbin rails that are pivotally mounted in rotary members and are held during doffing in positions parallel to their original positions by means of cranks engaging in controlling members that are rotatably mounted eccentrically of the rotary members, the controlling members are positively operated with the same number of revolutions as the rotary members. C.

Grooved Synthetic Rubber Drafting Roller Covering. Sonoco Products Co. (Hartsville, S.C., U.S.A.). B.P.486,911 of 1/10/1937: 13/6/1938 (Conv. 18/8/1937).

A roller covering of synthetic resilient rubber-like material is circumferentially grooved. Grooves may be cut on a lathe and 92 grooves per inch, 3/1000ths. inch deep, are recommended. (*See* Cutler, B.P.457,937, 1937, A71.) C.

3—CONVERSION OF YARNS INTO FABRICS

(A)—Preparatory Processes.

Cone Warping Machine: Adjustment of Settings. L. Lejeune. *Annales Sciences et Arts, Appld. Ind. Text. (Verviers)*, 1938, **1**, 59-64.

Equations are derived for the adjustment of settings in a cone warping machine. C.

"Entwistle" Rayon Beam Warping Machine. Unisel Ltd. *Textile Weekly*, 1938, **21**, 791.

Brief particulars are given of a high-speed beam warping machine that is provided with yardage recorder, stop motion and ball bearings and is easy to operate. C.

Winder's Production Chart. J. Küppers. *Textilberichte*, 1938, **19**, 418-420.

A chart for use in the determination of productions and wages in winding processes is given and its use is briefly explained. An example illustrates its use for the determination of the length of yarn on a cop, the running time of a cop and the number of spindles per operative for cops of given weight and count of yarn. From yarn count, weight and running time it is possible to determine the winding speed, from speed, running time and counts the cop weight can be found, and the yarn count can be determined from the winding speed, running time and cop weight. Production per operative in 10 hours can also be obtained from the chart. C.

"Stutz" Automatic Bobbin-stripping Machine. Muschamp Taylor Ltd. *Textile Weekly*, 1938, **21**, 857.

A small machine is illustrated that grips the base of the bobbin or pirn while a special gripper automatically removes the yarn. A clock registers the number of bobbins that have been cleaned and the machine can treat up to 90 per minute. C.

(B)—Sizing

Rayon Sizing Machine Drying Cylinder Condensate: Removal. E. H. Hammond. *Rayon Textile Monthly*, 1938, **19**, 304-5.

The importance of the immediate removal of condensate from the cylinders of a rayon sizing machine is stressed and the use of an air injection system is advocated. Compressed air is supplied to keep the pressure at about 2-3 lb. even when the steam valve is closed. Photographs and a machine drawing are reproduced of air injection and temperature control systems on a seven-cylinder machine. C.

Rayon Staple Fibre Warp: Sizing. W. L. Bentley. *Rayon Textile Monthly*, 1938, **12**, 301-3.

The author regards the essential requirements in the sizing of staple fibre warps to be the fixation of protruding fibre ("laying down the burl") at a temperature that does not cause excessive stretch. He claims that starch paste leads to dusting on the loom and requires too high a temperature, whereas gelatine sizes fulfil requirements. Load-extension traces obtained by the Scott inclined-plane tester are reproduced for two staple fibre warps, two staple fibre and wool mixture warps, and a staple fibre and silk noil mixture warp to show that gelatin sizing reduces the variability of strength of the yarn without unduly impairing its extensibility or flexibility. C.

(C)—WEAVING.

Photo-electric Patterning Mechanism: Application. *Textil Lloyd,* 1938, **12,** No. 11, 26-31.

The article deals with the possibilities of using the photo-electric cell in the control of patterning mechanism and for stopping a machine if a defect in the cloth appears. The writer opens with an explanation of the cell and mentions German patents in which photo-electric control of Jacquard mechanism is claimed. C.

"Rauschenbach" Bobbin-changing Device: Application. G. Fischer & Co. (Schaffhausen). *Textile Recorder,* 1938, **56,** No. 662, 50-1.

An illustrated account is given of the performance of looms fitted with the Rauschenbach bobbin-changing device, weft feelers and warp stop motions so as to make them semi- or fully-automatic. C.

"Staubli" Paper-pattern Dobby. W. Wilkinson. *Textile Manufacturer,* 1938, **64,** 150-1, 194, 201.

The advantages of paper-pattern dobbies over wooden lags and pegs are discussed, with a detailed description of the Staubli dobby and its auxiliary punching and copying machine. C.

"Uhlig" Reading-in Machine. A. Doring. *Textilberichte,* 1938, **19,** 420-421.

The needle and hook mechanism of the Uhlig reading-in machine is shown in diagrams and its action is explained. C.

Circular Loom: Advantages and Disadvantages. H. Jehle. *Textilberichte,* 1938, **19,** 421-422.

The various advantages and disadvantages of weaving on circular looms are discussed. It is pointed out that on circular looms there is less damage and waste of yarns and less wear on the shuttles than on flat looms, and that although shuttle speeds are lower, productions are higher as the result of the use of several shuttles and the elimination of shuttle motion outside the shed. The production of cloth in tubular form and without selvedges is not always a disadvantage and for some purposes has definite advantages. A disadvantage of the circular weaving process is that the operative is obliged to go round the machine. C.

Double-woven Warp Pile Fabrics: Weaving. W. Watson. *Textile Manufacturer,* 1938, **64,** 149, 234-6.

"Double-plush" weaving is the system by which two separate cut warp pile fabrics are woven simultaneously without cutting wires, thus avoiding the need for extra floor space. A detailed account of the various methods, weaves, yarns and looms is given with diagrams of various motions. C.

Drop-box Loom: Adjustment. M. Grisay. *L'Industrie Textile,* 1938, **55,** 14-19, 68-71.

Detailed instructions, with diagrams, are given for the adjustment of the various parts of a loom having 4-compartment drop boxes at each side, positive harness mounting with closed shed, a positive or negative take-up motion, an automatic reverse motion, and a negative warp let-off motion. C.

Fancy Weft: Weaving Single-pick Effects on Ordinary Looms. J. Daniel. *Kunstseide,* 1938, **20,** 172-176.

When producing pattern effects by the use of flake, knop or similar fancy yarns on looms having a change-box at one side only, the necessity for inserting the fancy yarn in the form of double picks frequently makes it impossible to produce the desired effects. Single-pick effects can be produced on looms of this type provided with dobby mechanisms operated in such a manner that the effect thread is woven in normally during the first pick whilst for the second pick the entire warp is lowered and the effect thread passes back without being woven in. For the next introduction of the effect thread, the shuttle passes over the entire warp for the first of the two picks and is woven normally for the second pick. This method results in the production of a fabric having single picks of fancy yarn at intervals, connected by sections lying along the fabric edge. In order to prevent the loose portions of fancy yarn lying temporarily across the fabric from becoming caught by the temples or being bound down as a result of a change of shuttle carrying weft for the fabric ground, catch threads are used at the sides of the fabric and are passed through healds controlled by the dobby so that the fancy yarn is held above the fabric and above the other shuttles. Means may be provided to hold the pawl of the let-off motion while the "empty" picks are being inserted in order to prevent holes in the fabric. Three methods of putting the pawl temporarily out of action are described. C.

Loom: Slow-motion Photography. A. Palmer. *Cotton (U.S.)*, 1938, **102**, No. 4, 84-5.

A report of a lecture on the facts revealed by a film taken at the rate of 188 pictures per second of Crompton and Knowles looms. When projected the film gave the impression of a loom running at 12 picks per minute instead of 133. It showed that the shuttle loses about one-third of its velocity in passing from one selvedge to the other and that warp tension at open shed is almost as great as at the beat-up. C.

Loom Mechanism: Breakage due to Knocking-off. W. Shuttleworth. *Textile Weekly*, 1938, **21**, 818-9.

An account is given of the parts of the loom that might break under the force of knocking-off, and settings are suggested that minimise the risk. C.

Loom Temples: Setting. *Textile Weekly*, 1938, **21**, 763-6.

A general article on the setting and care of temples and various cloth defects due to incorrect adjustment. C.

Plain Looms: Mechanics. A. Leonard. *Annales Sciences et Arts, Appl. Ind. Text. (Verviers)*, 1938, **1**, 65-83.

Formulae are developed for the torque required for (1) the sley, (2) the shuttle, and (3) overcoming friction, and for the total torque. The formulae are applied to the case of a Schönherr plain loom. C.

Weaving Shed: Management under the Factories Act, 1937. *Textile Manufacturer*, 1938, **64**, 189-190.

Attention is called to the various sections of the new Factories Act that affect weaving sheds and suggestions are made for suitable seats for women weavers. One idea is a stool with compartments under the seat for full and empty pirns. Another device is a seat on a bracket that can be bolted or hooked on the loom frame. C.

Cross-border Dobby Motion. Lupton and Place Ltd. *Textile Weekly*, 1938, **22**, 51-3.

An illustration is given and explained of a new cross-border motion with multiple cylinders which is claimed to eliminate the defects of the peg and lag systems. C.

(D)—Knitting.

Hosiery Machine Stitch Gauge. W. A. Simond. *Textile World*, 1938, **88**, No. 6, 67-8.

By the addition of two small plates, the author's horizontal gauge is improved so that it can be used to secure the correct relation between the needle position and the jack-beds, slur-cocks and verge-plates. C.

(E)—Lacemaking and Embroidering.

Braiding Machines. *Textile Recorder*, 1938, **56**, No. 662, 37-9.

A general account of various types of braiding machine. The size of the machine, apart from the number of yarn carriers, is given by the diameter of the "horngears"—gears with slots or Maltese cross by which the yarn carriers are taken round the sinuous track. These range from 3-5 inches in the smaller machines to 12 inches in the largest. A wire braider is shown with 36 carriers, 12 in. horngears and a take-up wheel of 5 ft. diameter. C.

(G)—Fabrics

Rayon Ribbed, Imitation Leno, and Cloqué Fabrics: Design. A. Hamann. *Kunstseide*, 1938, **20**, 166-170.

Modern rayon ribbed, imitation leno, and cloqué fabrics are discussed, details of typical examples are given, and patterns, drafts, etc., are shown. C.

Glass Fibre Insulating Fabric: Application. K. N. Mathes. *Gen. Elect. Rev.*, 1938, **41**, 218-9.

Glass fibre is now spun in continuous filaments as fine as 0·0002 in. diam. and also cut to staples of 4 to 8 in. (The plastic filament is pulled out in a blast of steam and the "staple fibre" is collected on a continuous belt.) For electrical use the material is braided into slieving and woven into tapes as thin as 0·005 in. or cloth as thin as 0·003 in. Protection from abrasion is afforded by a coat of varnish. The products are useful for electrical insulation at high temperatures (the mechanical yield point is about 500-600° C.) and in corrosive atmospheres. C.

Germproof Shirting Material. *Linen Trade Circular*, 1938, **24**, No. 1276, 4.

Refers to a germproof material produced by a Manchester firm. The material is impregnated by a special process which, it is stated; wards off germs and prevents the carrying of such infectious maladies as influenza. The "dope" with which the material is treated is harmless and gives off a faint agreeable odour which disappears after washing. L.

PATENTS.

Warp Stop Motions. C. Wagner (trading as E. T. Wagner). B.P.480,705/6 of 26/8/1936.

(1) In mechanism wherein upon warp breakage a fallen heald or dropper checks the relative longitudinal movement of two racks, these have oppositely directed teeth and one or both are rotatable through 180° about a longitudinal axis to make their teeth inoperative, both then presenting smooth unserrated surfaces to the heald heads, etc., whereby assemblage of these is facilitated. (2) The warp threads guided by rods on side plates support droppers guided on one or more flat rails carried by levers oscillatable about pins mounted on the side plates. A fallen dropper moves into the path of an oscillating or reciprocating member such as oscillating rails. The corresponding supporting rail is thereby operated and the loom is stopped, for example, by a pin connected by a Bowden wire or links to mechanical or electrical stopping mechanism. The droppers may be of round or flat cross-section. C.

Yarn Swift. R. Holt. B.P.480,972 of 7/11/1936.

In a swift of the kind comprising adjustable skein-carrying arms pivoted at one end near the circumference of a rotatable disc and passing through slots in a rim or flange surrounding the circumference of the disc and movable around it, the rim or flange is non-continuous and the contiguous ends are provided with means for tightening the rim or flange on the disc after it has been turned around to adjust the extent the arms project from the disc. C.

Winding Machine. E. Kinsella and R. W. Moncrieff. B.P. 481,192 of 7/8/1936.

A yarn winding machine comprises a rotatable package support mounted in a movable cradle, a traverse guide moved lengthwise of the support, and a member contacting with the surface of the package and geared to the cradle so as to move the latter and the axis of the package away from the path of the traverse guide as the diameter of the package increases. The package support may be frictionally driven and a tension device connected with the friction driving means is adapted to be controlled by the yarn so that more or less slip is allowed in the drive as the tension of the yarn proceeding to the support increases or decreases. C.

Lock-stitch Fabric: Knitting. Hosiery Developments Ltd., R. K. Mills and T. H. Jones. B.P.481,279 of 1/9/1936.

In the production of lock-stitch fabric on a straight-bar machine having needles with the ends of the beards turned back to form small hooks, the knocking-over bits serve to control the ground or stitch loops to effect engagement of these loops with the hooks and at the same time to maintain the stitch-locking loops clear of the hooks. (Addition to B.P.463,618, 1937, A433.) C.

Conical-ended Bobbin Winding Mechanism. Soc. Anon. des. Etablissements Ryo-Catteau. B.P.481,377 of 24/9/1936 (Conv. 24/9/1935 and 7/7/1936).

A bobbin with truncated conical ends is wound by traverse mechanism comprising a small cylinder or drum having a circumferential yarn guiding groove disposed at an angle to the axis of the drum which is geared to the spindle or roller driving the bobbin through change gearing so that it can be rotated at a speed adjustable with respect to that of the spindle, the drum being at the same time reciprocated along the length of the bobbin. C.

Circular Knitting Machine Sinker Control Mechanism. W. E. Booton. B.P. 481,475 of 10/6/1937.

A circular machine having means for feeding an additional thread to a number of needles in a course is provided with means for imparting an additional movement solely to those sinkers that co-operate with the needles taking the additional thread. C.

Spool Supporting Arrangements. British Insulated Cables Ltd., W. H. A. Robertson & Co. Ltd., S. H. Richards and W. J. Clements. B.P.481,558 of 5/9/1936.

Spools of wire, cord, yarn or other material are readily mounted or dismounted in machines by arranging two tapered supporting centres so that they are simultaneously moved in opposite directions by lever-and-link mechanism, whereby the spool may be deposited upon or raised from an adjustable supporting tray. C.

Double Warp Knitting Machine. (Mrs.) E. H. Wirth, (Mrs.) H. D. Donner, (Mrs.) J. M. Loschner and E. H. Wirth. B.P.481,636 of 1/2/1937 (Conv. 22/2/1936).

In a double warp machine the cam levers that carry the sinker bar by means of double arm levers are mounted on the same shaft as the needle bar levers. The double arm levers are connected by links with levers secured to the shaft that carries the locking-in cam levers. C.

Flat Knitting Machine Loop-transferring Mechanism. H. and R. Stoll (Reutlinger Strickmaschinenfabrik H. Stoll & Co.) B.P.481,697 of 19/4/1937 (Conv. 17/4/1936.)

In flat machines wherein loops are transferred from the needles of one bed to those of another, each transferring needle has attached to its stem a wire spring that is deflected by the entrance of a receiving needle between the needle stem and the spring to expand or spread the loop to be transferred. C.

Straight-bar Knitting Machine Sinker. G. H. Green. B.P.482,046 of 20/8/1936.

A sinker comprises a laminate member of hard carbon steel reinforced at the rear end by plates of soft steel. Protuberances on the outer plates fit in holes in the middle plate and the outer plates are spot-welded at these points. C.

Straight-bar Knitting Machine Patterning Mechanism. G. Blackburn & Sons Ltd. and H. W. and E. Start. B.P.482,055 of 21/11/1936.

Automatic means for adjusting the pattern chain of a straight-bar machine comprise a spring-actuated bolt that when projected puts the chain-advancing mechanism out of action, and a latch lever controlled by pilot studs on the chain to hold the bolt withdrawn. C.

Winding Machine. W. Shaw. B.P.482,274 of 21/7/1936.

A yarn or filament winding machine comprises a winding spindle and a traverse guide carried by a traverse spindle which is reciprocated by a slidable member carrying a pivotal nut block engaging a reversing worm on the spindle, the angular position of the nut block being positively controlled. C.

Split-drum Winding Machine. R. W. Moncreiff and F. B. Hill. B.P.482,289 of 25/9/1936.

The endless slot in rotary traverse drums for winding cross-wound packages is provided at at least one point of reversal with an extension of the outer wall and a pointed part, which may be undercut, on the inner wall, so that yarn drawn across the face of the drum passes into the recess formed by the extension and is engaged by the pointed part and automatically carried into the slot. The drum may comprise two complementary portions of a hollow cylinder secured on a shaft. The arrangement is particularly advantageous when applied to a drum of small diameter traversed longitudinally of the package to give a small cross wind which moves from end to end of the package. C.

Ladder Webbing. T. French & Sons, Ltd., and G. F. French. B.P.482,319 of 10/11/1936.

Ladder webbing for venetian blinds and for use inside helmets for holding strips of cork or pith has single weftless cross strips, two webbings being woven simultaneously by the usual four tiers of shuttles, two of the shuttles weaving the outer bandings of one webbing and also the bindings in of the cross tape swamps with such bandings. There may be weftless cross tapes along and near each edge or a single central row thereof. The weaving is so arranged that a small length only of free warp thread extends between the bindings in of the bandings to enable a single cut to serve to separate the bandings of each length of webbing. C.

Rib Knitted Seamless Tubular Fabric. H. H. Holmes and Wildt & Co. Ltd. B.P.482,438 of 29/8/1936.

A rib knitted seamless tubular fabric comprises a basic rib fabric in which patterns have been produced independently on both surfaces. C.

Float and Stitch Knitted Fabric. M. B. C. Vendors Ltd., T. C. Bromley and A. Shortland. B.P.482,651 of 1/8/1936.

A knitted fabric has across the face floats of yarn that is elsewhere formed into stitches or is interknitted or interlooped into the fabric. Needle selecting mechanism for producing the effect is described. C.

Plush Fabric Knitting Machines. M. Nebel. B.P.482,660/1 of 1/10/1936.

(1) A straight-bar knitting machine for double-threaded plush-loop fabric is claimed that has auxiliary sinkers for the plush thread. (2) A method of knitting plush-loop fabric on circular machines is claimed. C.

Glass Fibre Belting Fabric. N. V. Maatschappij tot Beheer en Exploitatie van Octrooien. B.P.482,774 of 6/2/1937 (Conv. 7/2/1936).

A pulley or conveyor belt comprises glass fibres in the form of single fibres, strands, matted or woven fabric, embedded in a pliable material. Examples are: (1) a number of layers of glass-fibre fabric impregnated with and embedded in rubber, and (2) cotton or flax fabric alternating with sections of glass fibre, all embedded in rubber. C.

V-neck Blank Knitting Mechanism. W. Cotton Ltd., and G. Wilders. B.P. 482,895 of 6/10/1936.

Mechanism for knitting a selvedged blank with a fashioned V-neck opening on a straight-bar machine is claimed. C.

Straight-bar Knitting Machine Yarn Carrier Rod Selecting Device. W. Cotton Ltd. and G. Wilders. B.P.483,040 of 6/10/1936.

A straight-bar machine has a device for selecting each of a number of yarn carrier rods for operation in turn for at least one course, to produce a repeating series, and means for checking the device so that any one rod may remain operative for a period longer than that provided for by the selection. C.

Straight-bar Knitting Machine Main Controlling Device. W. Cotton Ltd. and G. Wilders. B.P.483,041 of 6/10/1936.

A Cotton's or other straight-bar machine has a main controlling device or chain with several rows of stops for controlling the various operations of the machine and a further row of stops that control means for suspending the rocking of the chain for predetermined periods. C.

Knitting Machine Looping Mechanism Checking Device. G. Ball. B.P. 483,149 of 12/10/1936.

A knitting machine has means associated with a controlling cam whereby the sinkers are pressed resiliently against an abutment or verge at the end of their loop-forming stroke. For example, the slur cock is provided on each of its jack-engaging faces, at the forward extremities, with a spring-pressed ball. C.

Silk and Rayon: Soaking. G. F. Rayner, London (Warwick Chemical Co., West Warwick, Rhode Island, U.S.A.). B.P.485,398 of 11/12/1936: 19/5/1938.

A process for soaking silk or rayon consists in discharging a negatively charged oil emulsion bath in which the silk is immersed by adding to the bath an ammonium salt which is capable of generating acid gradually and neutralising the negative charge on the emulsion. Suitable ammonium salts include the sulphate and chloride as well as salts of the type of ammonium silicofluoride. Suitable oils are sulphonated oils such as sulphonated olive oil. The discharging salt and the sulphonated oil material are added together to the soaking bath in such proportions and concentrations that the discharge will be substantially completed after a predetermined number of hours, say from 8 to 15 hours, and so that the oil will be largely if not completely removed from the bath and caused to be absorbed by the yarns. For silk yarns the temperature is preferably 80 to 100° F., but for rayon yarns temperatures of 125 to 140° F. may be used. C.

Constant-speed Loom Take-up Mechanism. R. H. Smith (G. Hattersley and Sons Ltd., Keighley) and G. W. Shackleton. B.P.485,665 of 26/11/1936: 24/5/1938.

In looms for delicate fabrics, a flexible member controlled by a roller in contact with the roll of fabric descends as the diameter increases and actuates a lever that transmits motion to concentric pawl and ratchet wheel devices, varying the movement given by the pawls to the ratchet wheel and thus reducing the speed of the take-up roller. C.

Cop Winding Machine Thread Guide Traversing Mechanism. Maschinenfabrik Schweiter A.-G. (Horgen, Switzerland). B.P.486,078 of 15/12/1937: 30/5/1938 (Conv. 24/12/1936).

In traverse mechanism for the thread guides of automatic yarn winding machines, a coupling is provided between a lever or similar member reciprocated by the traverse cam and a second co-axial lever connected by a link to racks carrying the thread guides, the coupling being automatically disengaged by the machine after the winding operation is completed so that the racks can be retracted. C.

Automatic Doffing and Donning Cop Winding Machine. W. Reiners (W. Schlafhorst & Co., München-Gladbach). B.P.486,474 of 22/3/1937: 3/6/1938 (Conv. 22/4/1936).

The automatic-doffing winder claimed in B.P.474,738 is provided with automatic donning mechanism. Each spindle has a swinging storage container or tube holder, with mechanism for rocking it from a position laterally out of alignment with the spindle to a position in alignment, then moving the holder parallel with the spindle to don the tube, and finally swinging it back to its starting position. C.

Automatic Cop-winding Machine. W. Reiners (W. Schlafhorst & Co., München-Gladbach). B.P.486,811 of 24/3/1937: 10/6/1938 (Conv. 14/5/1936).

An addition to B.P.474,738. The axes of the spindles and all the rods and racks controlling the doffing movements similarly directed are inclined or tilted downwards to the horizontal (e.g. at 45°). C.

Spring-actuated High-speed Loom Picking Mechanism. Tefag Textil-Finanz A.-G. (Winterthur, Switzerland; Assignees of A. Moessinger). B.P. 487,231 of 14/12/1936: 14/6/1938 (Conv. 28/2/1936).

Spring-actuated picking mechanism for high-speed looms (especially of the gripper-shuttle type) is provided with a piston and cylinder brake to dissipate the energy after the pick. C.

4—CHEMICAL AND FINISHING PROCESSES

(A)—Preparatory Processes

Wetting, Dyeing and Finishing Agents. J. P. Sisley. *Rev. gen. Mat. Col.*, 1938, 42, 41-6, 84-6, 124-7, 161-7.

A review of patent specifications under the headings (1) derivatives of sulphonated aromatic hydrocarbons, (2) derivatives of sulphonated alkylnaphthalenes, (3) wetting agents for cellulosic fibres, (4) levelling and penetrating agents for dyeing, (5) auxiliaries for sizing and finishing, (6) antiseptic agents, and (7) agents for wool. A useful table is given of proprietary articles, their makers, compositions and uses. C.

(B)—Boiling, Scouring, Degumming and Washing

Cotton Rags: Cleaning. L. Kollmann. *Klepzig's Textil Z.*, 1938, 41, 349-351, 359-360.

A report is given of an experimental investigation of the cleaning of undyed cotton rags as measured by whiteness and removal of fatty matter. The conclusions reached are as follows: (1) The best white and also satisfactory removal of fat are by a peroxide bleach. (2) The cheapest process is a scour with water glass but the white is not so good and the removal of fat is unsatisfactory. (3) A preliminary rinse with soap containing fat solvents followed by a boil with soap gives better results than water glass but not sufficiently so to justify the treatment. (4) A caustic boil does not secure the best white or removal of fat but in other respects the purification is more complete. (5) A caustic boil followed by a scour and boil with soap containing fat solvent gives good results but the costs are as high as for the peroxide bleach. C.

Sodium Silicate: Application. W. Stericker. *Amer. Dyes. Rept.*, 1938, **27**, 274-7.

A report of a lecture and discussion on the use of sodium silicate in cotton scouring, peroxide bleaching, washing-off prints, rayon shrinking, and dyeing of acetate rayon. C.

Wetting-out. *Wool Record.*, 1938, **53**, 1057-1059.

A description of the mechanism of wetting-out and scouring and of methods for the rapid determination of the wetting power of an aqueous solution. W.

(E)—Drying and Conditioning.

Yarn Drying Cabinets. Spooner Drying and Engineering Co. *Textile Weekly*, 1938, **21**, 821-3.

An illustrated description is given of new drying cabinets for yarn on cheeses or in hank form. C.

(G)—Bleaching.

Pulp: Bleaching with Chlorine. W. R. Carmody and J. S. Mears. *Paper Trade J.*, 1938, **106**, *TAPPI*, 292-4.

The bleaching of pulp with chlorine was investigated under conditions of constant H-ion concentration. Two separate reactions were noted: (1) a very fast reaction, the rate of which is proportional to the first power of the " active lignin " concentration and (2) a much slower reaction of the second order involving " inactive lignin." In alkaline solution both reactions are oxidation processes but in acid solution they appear to be mixtures of oxidation and chlorination. The second-order reaction is shown by the straight lines in the graphs prepared by plotting the reciprocal of the available chlorine against time. The time necessary for the completion of the initial rapid reaction varies from less than one minute on the acid side to as much as 60 minutes on the basic side and is shown on the curve before it approximates to a straight line. No exact analysis of the nature of the reaction or of the factors that determine the rate can be made from these data. The lignin being attacked varies from run to run, and the buffers used add foreign ions, the effect of which on the rate is unknown. The oxidising factor at *p*H 8·6 and above is evidently the hypochlorite ion. On the acid side the reactant appears to be the hypochlorous acid molecule, the reaction being catalysed to some extent by the H-ion. It appears that 16 units or molecules of chlorine unite with one unit or empirical molecular weight of lignin. C.

(I)—Dyeing

Colour Matching Lamps: Optical Properties. C. E. Foss and N. Macbeth. *Rayon Textile Monthly*, 1938, **19**, 255-6, 322-3.

A simple explanation is offered of the optical factors involved in colour matching, including the characteristics of lamps. C.

Cotton and Viscose Rayon Dyes: Level-dyeing Properties. W. Weltzien and K. Windeck-Schulze. *Monatsh. Seide u. Kunstseide*, 1938, **43**, 156-162, 189-194.

Two extensive series of dyeings are described. In the first, nine different sorts of viscose rayon (coarse and fine filament) were woven as warps with 2/120's cotton weft into 4-shaft twills, giving fabrics with cotton and rayon predominating on different faces, and these were dyed for half an hour at 60° C. Half of the piece was then rinsed and dried and half returned to the bath and kept for a further half an hour at 100° C. The pieces were then graded for (*a*) levelness as between the various rayons, (*b*) levelness as between rayon and cotton, and (*c*) alteration, if any, on raising the temperature. The results are tabulated for 79 blue, 69 red, 30 yellow, 57 brown, 33 green and 25 black dyes. The work is intended to indicate which dyes will give level results without special precautions ; it must not be inferred that a dye with a poor grading will not give a level shade if suitable measures are taken. In the other series of dyeings, small skeins of viscose staple fibre and cotton yarns were dyed together in pairs in the same bath for half an hour at 70° C. or one hour at 95° C., with or without the help of Peregal O. The apparatus is shown in a drawing. The skeins were graded for (*a*) levelness as between cotton and staple fibre, (*b*) penetration of dye, and (*c*) alteration on raising the temperature. The results are tabulated for 47 blue, 39 red, 24 yellow, 19 orange, 28 brown, 10 grey, 16 violet, 15 green and 15 black dyes. The following points are emphasised. (1) Equality of shade between cotton and rayon is generally more easily secured in hank dyeing than in piece dyeing. (2) Some dyes give darker shades on cotton than on staple fibre; these are indicated in the table. (3) The variations in penetration are remarkable and without relation to levelness, but in almost all cases penetration is equally good when Peregal O is added to the bath. (4) The temperature effect appears to be quite haphazard. C.

Fast Orange Salts: Application. J. Hassmann. *Textilberichte,* 1938, **19**, 440-441.

Orange shades of improved fastness can be obtained with recent additions to the range of dye salts in combination with products of the Naphthol AS series. Fast orange salt LG gives yellowish orange shades of very good fastness to light on Naphthols AS-OL and AS-LT. Fast orange salt RD gives redder shades and the best fastness is obtained on Naphthols AS, AS-OL and AS-RL. Fast gold orange salt GR gives golden orange shades of very good fastness to light, and Fast orange salt GGD gives somewhat redder orange tones. Applications of these salts in dyeing and printing and the fastness characteristics of the products are discussed. C.

Dyed Textiles: Incidence of Dermatitis. *Silk J. Rayon World,* 1938, **14**, No. 168, 24.

Some cases of alleged dermatitis due to wearing dyed or bleached textiles or furs that have been taken to law are reported as evidence of the unsatisfactory position of the dyer and finisher. It is said that the Joint Standing Committee on Dermatitis, representing bodies concerned, intend to take a test case through to the highest courts. C.

Fibre Mixtures: Preliminary Treatment and Dyeing. K. Jochum. *Textilberichte,* 1938, **19**, 433-435.

The differences in properties of staple fibre, cotton and wool, and the dyeing of mixtures of fibres, especially staple fibre-wool mixtures, are discussed. It is pointed out that faults becoming evident on dyeing may have their cause in preliminary treatments and the importance of the selection of suitable fibre mixtures and of the use of suitable oils and sizes is emphasized. Breaking load and extension data are given for staple fibre yarn before sizing, after sizing with Tylose TWA and with potato starch, and after desizing, and the advantage of the use of Tylose TWA is pointed out. The results of tests on Vistra yarn and fabric after washing with soap, Igepon T, and Igepal W are also given. The advantages of the use of Igepon T and Igepal W instead of soap are pointed out. C.

Lace Curtains: Dyeing and Finishing. *Textile Recorder,* 1938, **56**, No. 662, 41-3.

A general account of the processing of white lace curtains, tinting, selection of dyes and finishing, including suggestions about transparent effects. C.

Naphtol AS Dyeings: Fastness to Kier-boiling. R. B. Forster, P. R. Mehta and K. Venkataraman. *J. Soc. Dyers and Col.,* 1938, **54**, 209-215.

Some 35 combinations between 12 of the Naphtols and the stabilised diazo salts (or bases) Reds TR, RBE, KB, and ITR, Bordeaux GP, Blue BB and Variamine Blue B have been dyed on cotton under similar conditions and the dyeings submitted to (1) an open boil for 6 hours at 70-75° C. with 0·5 per cent. soda ash, and (2) a boil for 5 hours with 0·25 per cent. caustic soda and 0·25 per cent. soda ash under 15 lb. pressure in an experimental kier. The loss of dye was calculated on the basis of Kjeldahl determinations of nitrogen. The results are summarised in tables, I placing the dyeings in order of decreasing fastness to the open boil, II arranging the combinations in five grades of fastness to both boils, based on the N determinations and on visual judgment, III giving the actual data and remarks on the shades, and IV comparing combinations with Naphtol AS of Fast Red Base TR, Fast Bordeaux Base GP and Fast Blue Base BB on the one hand, and the corresponding diazo salts on the other. Among the combinations with Fast Bordeaux GP, which contains a nitro group, those with Naphtols AS-BS, AS-TR and AS-D appear to be safe for the open boil and bleach usually given to coloured goods. C.

Naphtol AS Dyeings: Fastness to Rubbing. R. B. Forster, S. R. Ramachandran and K. Venkataraman. *J. Soc. Dyers and Col.*, 1938, **54**, 216-225.

Weighed leas of yarn dyed with various combinations of Naphtols and fast diazo salts or bases were submitted to a rubbing test on the arms of a Kleinewefers hank mercerising machine, the rubber being a pad of bleached longcloth pressed on the yarn as it passed over one roller (cloth covered) by means of a weight on a lever. The leas were stretched to the same amount and rubbed for 2 hours, and the whole of a lea was then used in a Kjeldahl determination. Loss of dye is calculated from the loss of nitrogen. The influence of various after-treatments was examined. The results are summarised in tables. Table I records the loss of N for 18 dyeings, Table II arranges them in order of fastness and Table III places the various combinations in six grades of fastness as judged by loss of N and also by the " marking off " colour in a simple rubbing test. The analytical and visual gradings are not concordant but the visual test was used in most of the subsequent work. Tables V and Va record the fastnesses when the trough of the mercerising machine was supplied with hot or cold water or soap solution ; " wet rubbing " was more severe on most of the cotton yarns. Table IV, Va, and VI-XIV record observations on the effects of auxiliary agents in the Naphtol bath and of various after-treatments and Table XV shows that dyeings on viscose rayon are generally more fast to rubbing than dyeings on cotton. C.

Rayon Staple Fibre Fabrics: Dyeing and Finishing. R. M. Stribling. *Amer. Dyes. Rept.*, 1938, **27**, 269-274.

A report of a lecture and discussion ; many practical points are raised, such as the pre-treatment with alkali, the effect of drying spun rayon fabrics on cans and so forth. C.

Rayon Yarns: Dyeing. J. Carat. *RUSTA*, 1938, **13**, 125-127.

Some general precautions to be taken in the dyeing of rayon yarns in hank form are described and an account is given of procedures for dyeing with basic and direct dyes. C.

Wool-Staple Fibre Yarns: Dyeing. W. Hahn. *Textilberichte*, 1938, **19**, 437-8.

When dyeing wool-staple fibre yarns it is usual to dye the staple fibre first with diazotisable direct dyes or Immedial leuco dyes and then dye the wool with chrome dyes. If suitable dyes are selected it is possible to apply direct and chrome dyes to the mixture yarns simultaneously by a single bath process. Suitable black chrome dyes for this method are Diamond black PBB, PV and PG and Chromogen black ETOO, and a suitable black dye for the staple fibre is Oxydiaminogen OT. Samples of mixture yarns dyed with baths containing Diamond black PBB and Oxydiaminogen OT are given together with details of the procedures and the dye-bath compositions. The diazotising and developing treatments are briefly described. C.

Dyeing: Theory. K. Eckardt. *Klepzig's Textil Z.*, 1938, **41**, 154-7, 169-170, 178-9, 190-1, 200-1, 242-3, 251-3, 340-3.

A comprehensive review of modern theories of the structures of fibres and dyes in relation to dyeing. C.

Dyeing and Finishing Machinery: Developments. G. Lane (Van Vlaanderen Machine Co.). *Amer. Dyes. Rept.*, 1938, **27**, 294-8.

A report of a lecture and discussion on recent developments in (1) the continuous rayon scouring or silk boiling-off unit, (2) the constant-speed tensionless jigger dyeing machine and (3) the decating machine. C.

Benzidine Dyes: Constitution and Substantivity. W. Schramek and H. Rümmler. *Kolloid-Beihefte*, 1938, **47**, 133-195.

The theories of substantive dyeing are discussed and substantivity is defined, according to Ruggli, as equal to the absorption power minus the stripping capacity of the colour. The two components, absorption of material through the fibres and attachment to the fibre are clearly separated and the attachment of the dye is defined as a condition of equilibrium between cellulose, dye and water, this equilibrium being dependent on the constitution of the dye molecule. The views of Mark and Meyer and of Schirm are discussed in detail and extended in the sense that the dipole positions in the dye molecule are made responsible for the extent of the adsorption and that the strength of the attachment is not attributed preferentially to the end groups of a conjugated system. Experiments were carried out to test Mark and Meyer's theory of the polar end groups, as follows:—(1) Benzidine dyes, coupled on both sides, were prepared by modifying the polar groups at the end. (2) A series of one-sided polar dyes were prepared as follows: benzidine was converted into the mono-acetyl derivative, this was diazotised and coupled with *p*-xylidine, the free amino group thus introduced was exchanged for Cl by the diazo reaction and then the acetyl group was removed, leaving 4′-aminodiphenyl-4-azo-[1-chloro-2:5-dimethyl]-benzene,

$$Cl \cdot C_6H_2Me_2 \cdot N:N \cdot C_6H_4 \cdot C_6H_4 \cdot NH_2,$$

which was diazotised and coupled with various agents. (3) Dyes were produced from *p*-aminodiphenyl and *p*-aminoterphenyl by diazotising and coupling with substantive dye components. The numerous dyes were dialysed and the products dyed on purified cotton and tested according to Ruggli's method. From the substantivity numbers, relationships were sought between influences of constitution and the dyeing power. The following conclusions are drawn. (1) The region of substantivity of a soluble dye lies between the limits characterised by the beginning and supression of the solvatation of the dye. (2) The absence of polar groups on one side is not accompanied by a lowering of the substantivity, since the diminution in the number of groups capable of hydration reduces the solubility and thus raises the affinity for cotton. (3) Dyes produced from diphenyl have a very low substantivity, due to the shortness of the conjugated chain and small number of dipole points. Ruggli's theory of substantivity is thoroughly examined and a new equation is proposed in which the dipole positions of the dye that are neutralised by the dipole positions of the cellulose are related to the hydratable dipole positions of the dye molecule. From the equation it is seen that by diminishing the number of hydratable groups a decrease in substantivity results and that with an equal number of hydratable groups a rise in substantivity is obtainable by lengthening the conjugated chain, this causing increase and strengthening of the dipole positions. Measurements of particle size on some of the dyes show no clear relationship between substantivity and degree of dispersion. C.

Dyed Sheet Cellulose: Absorption Curves. D. Krüger. *Zellstoff und Papier*, 1938, **18**, 241-4.

Transparent sheet cellulose (Feldmühle " Heliozell " and Bemberg " Cuprophan ") were washed free from glycerol and cations, dyed with direct dyes (some purified) and the absorption curves obtained and compared with those for aqueous solutions of the dyes. The absorption maximum is shifted towards the long-wave range and the curves sometimes exhibit a " hump " or two maxima. The maxima coincide for the two forms of sheet cellulose but there are slight differences in the height of the " hump " and in the way this is affected by the temperature and salt content of the dye liquor. C.

Dyeing Wollstra. I. G. Farbenind. A.-G. *Zellwolle*, 1937, **3**, 78-79 (through *Chem. Abs.*, 1938, **32**, 3967).

A survey of chemical and mechanical operations. Various dyes suitable for wollstra dyeing are listed. W.

Acid Wool Dyestuffs: Application to Cellulose and Rayon. J. Wakelin. *Textile Colorist*, 1938, **60**, 227-230.

Methods by which cellulosic fibres (i.e. staple fibre) may be dyed with acid wool dyes include (1) treatment with *p*-toluene sulphonyl chloride, followed by ammonia ; (2) incorporation of casein into the viscose prior to spinning (E.P. 438,199 and 440,449) ; (3) treatment of cotton with a solution of nut-seed globulin in urea solution, and coagulation in an inorganic salt bath, followed by formaldehyde (E.P.467,704) ; treatment in a solution of derivatives of ethylene diamine, e.g. N-stearyl-N′-N′-diethyl-ethylene diamine ; (5) Treatment with quaternary ammonium derivatives of benzidine (E.P.462,290) ; (6) treatment of viscose before removal of sulphur in ethylene imine vapour (E.P. 476,431). W.

(J)—Printing

Continuous Steaming and Ageing Machine. Mather and Platt Ltd. *Textile Manufacturer*, 1938, **64**, 197-8.

Illustrations are given of a new all-metal machine that can treat prints requiring various periods of exposure and widely different conditions of atmosphere and temperature. It is specially suitable for vat colours and aged and steamed styles can be treated together in the same machine. C.

Screen Printing Stencils: Construction. A. Franken. *Textilberichte*, 1938, 19, 370-372, 442-445.

The author describes the stencils used in the screen printing process, points out the advantages of phosphor-bronze screens over silk screens, describes methods of making the stencils and the apparatus used, and reviews the development of stencil fixing and adjusting devices and doctors for use in screen printing processes. C.

Locust Bean Flour: Application in Printing. G. Tagliani. *Textilberichte*, 1938, 19, 438-439.

Attempts to increase the stability towards alkalis of locust bean seed thickenings for printing pastes are briefly discussed and it is pointed out that a stable thickening can be obtained by mixing the ground seed with a ferment, " Helisol," and converting to a paste with lukewarm water. Helisol is a ferment obtained from certain parts of the locust bean and similar seeds. The viscosity of the thickening depends on the amount of Helisol used and the temperature and time of action. Helisol baths may be used for the removal of locust bean sizes and finishes and for removal of this type of thickening from the fabrics after printing. C.

" Aridye " Prints: Production. Aridye Corporation. *Textile World*, 1938, 88, No. 6, 60-2.

The " Aridye " printing pastes for direct application to textiles have been developed out of research on inks for colour printing on paper. The fixation of the colour is merely physical so that uniform shades are obtained on mixed fibres. Pale shades are secured by adding a " clear " to the paste ; this consists of a white resin compound. Discharge styles are not yet obtainable and pastes for " through and through " printing are in the experimental stage. The cost is comparable with that for vat colours. The engraving of the rollers may be shallower and the pressure lighter than in the usual styles. Illustrations are given of shirtings, silk, rayon and delustred acetate prints and a " through " print. C.

Cotton and Rayon: Printing; Detection of Faults in ——. *Textilberichte*, 1938, 19, 442.

Three methods are briefly described for making visible faults, such as doctor stripes and irregularities due to damaged rollers, when printing cotton and rayon fabrics with dyes, such as Rapid fast and Rapidogen dyes, and Indigosols, which are applied in the form of colourless printing pastes. The first method depends on addition to the printing paste of dyes having no affinity for the fibre ; suitable alkali-stable acid dyes are mentioned. The second depends on the use of a strip of filter paper or calico dyed with an alkali-sensitive dye, e.g. Brilliant yellow. The strip is run through the printing machine with the goods or sewn between the ends of two pieces. The third process depends on addition of Flourescence salt GD or RD to the printing paste and observation of the printed goods in ultra-violet light. C.

Cotton and Rayon: Printing with Indanthrene Blue Dyes. *Textilberichte*, 1938, 19, 441.

In the printing of cotton with Indanthrene blue KRS paste, Indanthrene printing blue FRS paste, Indanthrene blue GCD Suprafix paste and Indanthrene blue BCDN double paste, the brightest shades are obtained when reduced quantities of Rongalite are used. Addition of Glyecin A to the printing paste is recommended when printing cotton and rayon with these dyes, with the exception of Indanthrene blue KRS paste and Indanthrene printing blue FRS paste. Indanthrene brilliant blue 3G paste fine and R double paste fine are used for coloured discharge effects. Indanthrene blue KRS paste and Indanthrene blue BCDN double paste give level results on rayon. The composition of a suitable stock thickening for Indanthrene blue KRS paste is given. C.

Cotton and Rayon: Printing with Vat Dyes. *Textilberichte*, 1938, 19, 439-440.

The influence of pressure, depth of engraving, wettability of the goods, and the composition of the printing paste in the printing of cotton and rayon goods with vat dyes in such a way as to obtain a fabric having the same appearance on both sides is discussed and the conditions giving the best results are described. The pressure should be as high as the goods and machine will permit. The depth of engraving and number of lines should be selected so that as much printing paste is brought on to the goods as they can take up. Preliminary moistening of dried goods is recommended and Nekal BX may be added to the water. The printing paste should be as thin as possible. A suitable printing paste recipe is given. C.

Lacquer Printing. M. A. Dorian. *Rayon Textile Monthly,* 1938, **19**, 169-170, 251-252.

The development of lacquer printing and the selection of printing lacquers are discussed, the various types of lacquer prints are outlined, and photographs are given showing the diversity of effects obtainable. The advantages of lacquer printing are described and the few drawbacks are pointed out. C.

Silk Screen Printing. F. W. Mackenzie (Selactasine Silk Screens Ltd.). *J. Soc. Dyers and Col.,* 1938, **54**, 196-201.

A report of a lecture on the development of silk screen printing, and of a long discussion on practical points. C.

" Sparkling " Damage in Prints: Causes and Remedies. *Textile Manufacturer,* 1938, **64**, 209, 210, 214.

A general account is given of the defect due to the " sparking " of the print colour on to unprinted portions of the cloth. In roller printing, the defect may be due to the interaction of the temper of the doctor blade, the angle of the engraving lines and the speed. The use of brush furnishers with small diameter rollers is another cause. The composition of the printing paste is also important, in roller, block and also screen printing. C.

Calico Printing: History. G. Schaefer. *Ciba Rundschau,* 1938, **2**, 854-860, 862-874.

Illustrated accounts are given of the art of calico printing (1) from 2000 B.C. to 800 A.D., and (2) on the Continent in the Middle Ages. C.

Calico Printing: History. G. Schaefer. *Ciba Rundschau,* 1938, **2**, 882-883.

A map shows the extent of calico printing in the year 1500, the chief producing countries being India, Egypt, Peru, Germany, with Venice, Sicily and the south of France. C.

Calico Printing: History. R. Haller. *Ciba Rundschau,* 1938, **2**, 875-880.

An illustrated account is given of early methods of calico printing. C.

Fabrics: Printing and Dyeing Problems. B. Verity. *Amer. Dyes. Rept.,* 1938, **27**, 290-4.

A report of a lecture and discussion of various printing and dyeing problems, such as (1) printing Indigosol blue IBC, (2) chrome colours on silk and rayon, (3) scrimp marks developed in drying goods prepared with Naphthol AS, (4) vat dyeing difficulties, (5) development of uneven prints and (6) dyeing of pigmented rayon. Mercerisation after dyeing is said to cover defects due to dead cotton in Naphthol styles. In padding aniline black on soft fabric printed with a resist, good results are obtained if the cloth is friction-calendered before printing. C.

Indigo Dyeings: Discharging with Nascent Chlorine. R. Haller. *Chem. Ztg.,* 1938, **62**, 239 (through *Brit. Chem. Abstr.,* 1938, B501-2).

The dyed fabric is printed with a paste containing gum (50), K nitrate (50), lead chloride (50 per cent., 280 parts), and water (100), passed rapidly through sulphuric acid (*d* 1·38) at 80° C., rinsed, and dried. C.

(K)—FINISHING

Gamsa Fabrics: Finishing. P. Lebrun. *Textile World,* 1938, **88**, No. 6, 71.

" Gamsas " are satin-backed crepes, usually of viscose rayon but often with acetate warps. Originally they had a rough, sandy feel on one face and a smooth, satiny feel on the other but the trend is to softer, fuller handle. A general account is given of their processing from the boil-off to the Palmer finish. C.

Glycerin: Application. Georgia Leffingwell and M. A. Lesser. *Rayon Textile Monthly,* 1938, **19**, 318-9, 379-380.

A comprehensive review is given of the uses of glycerin in dyeing, printing, sizing, softening, control of shrinkage, preparation of staple fibre, rubberising, coating of fabrics and testing of fibres. A list of 52 references to the literature is supplied. C.

Tylose 4S Finishes: Stability to Washing. Staatliches Materialprüfungsamt Berlin. *Textilberichte,* 1938, **19**, 445-448.

The results of a study of the effects of 1, 5 and 10 washes on the breaking load and extension, bursting strength, resistance to rubbing, weight and handle of an unfinished staple fibre fabric and a staple fibre fabric finished with Tylose 4S are tabulated and discussed. In general, Tylose 4S-finished fabrics have higher strength, especially wet strength, than unfinished fabrics. In the tests, the finished fabric showed a lower loss in strength in the warp direction than the unfinished fabric on washing. The two fabrics had approximately the same initial bursting strengths but, on washing, the loss in bursting strength, especially in the wet state, was much smaller in the finished than in the unfinished fabric. The resistance to rubbing of the two fabrics were practically the same before washing but after washing the finished fabric showed a higher resistance to rubbing than the unfinished fabric. Shrinkage on washing was greater in the unfinished fabric. The washed Tylose 4S-finished fabric had a better handle than the washed unfinished fabric. C.

Staple Fibre Muslin: Increasing Wet-strength by Thiourea-formaldehyde Resin. Y. Konisi. *J. Soc. Chem. Ind. Japan,* 1938, **41**, 107-8 B.

By steeping in a solution of thiourea, formaldehyde, a certain optimum amount of ammonium chloride, and ethylenediamine (as catalyst) and heating the expressed cloth at 100° C, the author has increased the wet-strength of viscose staple fibre muslin (2-cm. strip) from 7·2 to 16·9 kilog. (dry strength 14·7 kg.). C.

Difficult Setting of Fabrics. *Dyer,* 1938, **79**, 403-404.

To avoid faults, especially watering or embossing, in the setting of cloths, e.g. charmelines, in which the face and back of the fabric differ in appearance, a special steaming and crabbing process is recommended, using a steam pressure not higher than 9 lb. per sq. inch. A 2 per cent. solution of ordinary borax added to the liquor in the crab bowl assists setting. Special precautions are necessary as regards the tension of the goods. The use of long crabbing wrappers checks any tendency to slip. W.

Shrinkage Properties of Wool Mixture Materials. "Technologist." *Textile Mercury,* 1938, **98**, 523-524.

Shrinkage of wool mixture fabrics in washing is affected by the manner in which the wool fibres are separated by the diluent fibres. In general, prevention of shrinkage is better obtained by mixing the wool and the diluent fibres before spinning. The presence of viscose staple fibre has no special influence on the shrinkage. The finer the denier of the rayon fibres, the less is their effect in preventing felting. The effectiveness of the diluent fibre is also dependent on the absence of plasticity. Felting is retarded by the formation of synthetic resins in wool, but no commercial success has been obtained in this direction. The distribution of the diluent fibre influences the uniformity of shrinkage. W.

Rayon Staple Fibre Fabrics: Dyeing and Finishing. *See* Section 4I.

Lace Curtains: Dyeing and Finishing. *See* Section 4I.

(L)—PROOFING.

Waterproof Fabrics: Production. *Silk J. Rayon World,* 1937, **14**, No. 162 (Nov.), 27-8; No. 163 (Dec.), 30-2; 1938, **14**, No. 164, 42-5; No. 165, 38-40.

A review of recent patented products for waterproofing under the headings (1) emulsions of wax, fatty acid and metallic soap, (2) metallic salts of high-molecular compounds, (3) rubber, (4) crease-resistance and water-repellency, (5) chemical compounds with the fibre, (6) polymerides, and (7) miscellaneous. The review concludes with a chapter on testing. C.

" Cerol " Waterproofing Emulsions: Application. R. Lindenmaier (Sandoz Chemical Works, Inc.). *Amer. Dyes. Rept.*, 1938, **27**, 286-9.

A report of a lecture and discussion on waterproofing. Mention is made of the increased wearing properties and decreased shrinkage of rayon that has been waterproofed. The " Cerol " emulsions are frequently mentioned and the results of drop tests on a heavy cotton gabardine after treatment with 0·25, 0·5, 0·75 and 1 per cent. solutions of Cerol T are stated. C.

Rubber Latex: Application. J. C. Bongrand. *Gummi Ztg.*, 1938, **52**, 180-1 (through *Brit. Chem. Abstr.*, 1938, B 506).

The difficulties in the complete impregnation of textiles with latex are discussed and methods for overcoming them are suggested. It is recommended, for example, that the *p*H of the cloth should be increased to that of the latex. C.

Viscose Fabrics: Waterproofing. H. Suyama. *J. Soc. Chem. Ind. Japan*, 1938, **41**, 107 B.

The effects of the impregnation of viscose fabrics with various materials, including urea-formaldehyde resin, were compared by the drop test and by measurements of moisture absorption, with the following results. (1) The drop test gave results that were not proportional to the quantities of water absorbed. (2) The speed of drying was proportional to the water absorption. (3) Urea-formaldehyde resin protects the fabric against creasing but is not suitable for waterproofing. (4) Treatment with paraffin emulsion and an aluminium salt gave good results. (5) The best results were obtained by impregnating the fabric with urea, formaldehyde and Turkey red oil, exposing it to acetic acid vapour, and then treating it with aluminium acetate solution. C.

PATENTS

Dyeing Wool. Imperial Chemical Industries Ltd. F.P.821,992 of 17/12/1937 (through *Chem. Abs.*, 1938, **32**, 3981).

In dyeing wool by the metachrome process the dyeing is carried out in the presence of a quaternary ammonium compound the molecule of which contains an aliphatic radical of at least 8 C atoms, e.g. cetyl- or stearyl-trimethylammonium bromide or chromate, dodecyloxymethylpyridinium chloride, cetoxymethylpiperidine methosulphate or dicetylpiperidinium bromide. W.

Dyeing Artificial Fibres made from Casein. " Montecatini " Società Générale per L'Industria Mineraria ed Agricola. F.P.822,668 of 5/1/1938 (through *Chem. Abs.*, 1938, **32**. 4354).

Fibres obtained from casein are made more apt to dye with chrome colours by treating the fibres with a dilute solution of an acid such as H_3PO_4 or glycolic acid. W.

Bleaching Wool Yarn. Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler (W. Hundt, inventor). D.R.P.656,782 of 15/2/1938 (through *Chem. Abs.*, 1938, **32**, 4357).

Dried wool yarn on cross spools is bleached without pretreatment by treatment with an alkaline H_2O_2 solution at raised temperature. The apparatus is made of cast or wrought iron. W.

Dyeing Animal Fibres. Soc. pour l'ind. Chim. à Bâle. D.R.P.657,065 of 25/2/1938 (through *Chem. Abs.*, 1938, **32**, 3982).

An improvement is described in the dyeing of animal fibres with the Cr compounds of the azo dyes obtainable by coupling diazotized *o*-aminonaphthol-monosulphonic acids, not containing a nitro group, with α- or β-naphthol. The improvement consists in adding the Cr compounds to the dyeing bath in portions. Examples are given. W.

Depilating Hides and Skins. Studienges. der deutschen Lederindustrie, G.m.b.H. D.R.P. 657,464 of 4/3/1938 (through *Chem. Abs.*, 1938, **32**, 4377).

Bacteria from sweated hides are used for depilating hides and skins. Thus, the hides and skins may be brought into contact with sweated hides, or with hair or epidermis residues obtained therefrom, or with water which has been used for washing sweated hides. The hides and skins to be treated may first be softened and treated to make them slightly alkaline (*p*H 8-10). Examples are given. W.

Mercerising Lye Wetting Agent. Chemische Fabrik Pott & Co. D.R.P. 660,135 of 17/3/1930:21/4/1938.

The wetting power of caustic lyes is increased by impregnating the fibrous material before passage into the alkali with small quantities of esters of the lower monohydric alcohols with higher fatty or naphthenic acids, which may be applied in the form of an emulsion. C.

Fireproofing Composition Suitable for Use on Wood, Paper, Cloth, etc. J. Sumichrast and S. A. Molnar. U.S.P.2,111,704 of 22/3/1938 (through *Chem. Abs.*, 1938, **32**, 3870).

Al sulphate 5 g., ammonium sulphate 15 g., borax and boric acid 1 g. each, dissolved in water, are used with K silicate 5 g. and CCl_4 and $C_2H_4Cl_2$ 5 c.c. each. W.

Textile Materials of Mixed Fibres. H. Platt (to Celanese Corp. of America). U.S.P.2,112,303 of 29/3/1938 (through *Chem. Abs.*, 1938, **32**, 3986).

A method of making textile materials formed of a mixture of wool fibres and artificial fibres containing an organic ester of cellulose so that both components thereof may be dyed with a direct cotton dye, comprises treating the textile material for from 1-15 min. at from 0° to 20° in a 2-6 per cent. NaOH solution, whereby the cellulose ester fibres of the textile material are at least partially saponified. W.

Heat-producing Composition for Use in Hair Waving. C. J. Lewit (to Industrial Development & Research Laboratories). U.S.P.2,112,674 of 29/3/38 (through *Chem. Abs.*, 1938, **32**, 3868).

A composition adapted on contact with water to produce heat sufficient permanently to wave hair contains about equal amounts of Cu acetate and Cu oxide, and sufficient finely divided metallic Mg successively to react with the Cu acetate and Cu oxide. W.

Rubberising Composition: Preparation and Application. A. F. Burgess (Marathon Paper Mills Co.). B.P.481,426/7/8 of 6/6/1936.

(1) A thermoplastic composition is prepared by dissolving rubber, gutta-percha or the like (6-30 per cent.) in a molten bath of wax, asphalt or the like 94-70 per cent.) under such conditions that the product can be formed into thin films and has a viscosity of at least 16,000 centipoises, that is 8,000 seconds in the Scott viscometer (preferably 300,000 to 1,000,000 seconds). Pigments, fillers etc. may be added. (2) The composition is used to form a water- and gas-proof film on fabric, paper, etc. (3) The composition is used to unite sheets of fabric, paper, etc. C.

Rubber Solutions: Reduction of Viscosity. E. I. Du Pont de Nemours & Co. B.P.481,523 of 11/9/1936 (Conv. 11/9/1935).

The viscosity of solutions of rubber in aliphatic hydrocarbon solvents is reduced by the addition of an alcohol, polyhydric alcohol or related compound and an asymmetrically substituted hydrazine (e.g. phenylhydrazine) and/or derivative thereof. C

Rubberised Printer's Blanket. Dewey and Almy Ltd. B.P.481,587 of 11/6/1936.

A number of plies of napped twill are impregnated with rubber latex, pressed together and vulcanised. The surface of the blanket may be smooth, coated with oil-resisting compounds, provided with a layer of sponge rubber, finished with minute indentations by pressing on it a wire screen or cotton duck during vulcanisation, or reinforced by cotton flock held in a matrix of rubber. C.

Metal Corrosion-preventing Fabric: Rot-proofing. Winn & Coales Ltd. and F. B. Coales. B.P.481,606 of 17/9/1936.

Fabrics for wrapping metallic articles are rot-proofed by impregnation with a dichromate or permanganate before filling with the agent (e.g. petroleum jelly or mineral oil residue) that is used to protect the metal. (The provisional specification also refers to flavine). C.

Nitro Dyes: Production. A. Carpmael. (I.G. Farbenindustrie A.-G.). B.P.481,633 of 9/1/1937.

Nitro dyes are made by condensing 1:2-dinitrobenzene or its substitution products with aminosulphonic acids of the diarylamine, cycloalkyl-arylamine or carbazole series in the presence of acid-binding agents, such as sodium acetate, lime or calcium carbonate, in water or organic solvents or mixtures of water and solvents, under a reflux condenser or under pressure. Nitrous acid is split off in the condensation, any halogen in the dinitrobenzene being unaltered. The products dye wool, silk and leather fast brown shades. C.

Azo Dyes: Production. W. W. Groves (I.G. Farbenindustrie A.-G.). B.P. 481,747 of 18/9/1936.

Water-insoluble azo dyes are manufactured by coupling the diazo compound of a 1-amino-4-nitrilobenzene, substituted in 2- and 5-positions, in substance, on the fibre or on a substratum for the production of lakes, with an *o*-hydroxyarylcarboxylic acid arylamide or a β-ketocarboxylic acid arylamide, the components being free from solubilising groups. The production of the dyes on the fibre, e.g. on native or regenerated cellulose fibres or animal fibres, may be effected by the ice-colour method or by one of the usual printing methods, e.g. by direct printing or by the use of nitrosamines or diazoamino compounds. C.

Chrome Mordants: Application to Cotton and Rayon. Durand & Huguenin A.-G. B.P.481,854 of 16/7/1937 (Conv. 18/7/1936).

Cotton and rayon from regenerated cellulose are dyed by mordanting with a chrome mordant, consisting of a chromic chromate or mixture of a chromate and a chromic salt, and dyeing, with a mordant dye, in the same bath. In order to avoid precipitations in the dye bath it may be necessary to add an alkali salt of an oxy-carboxylic acid of the aliphatic series. The acid may be introduced as its chromic salt, e.g. chromic lactate or chromic tartrate. C.

Anthraquinone Dyes: Production. I.G. Farbenindustrie A.-G. B.P.481,897 of 19/9/1936 (Conv. 21/9/1935).

Anthraquinone dyes are prepared by condensing 2 mols. of a 1-amino-4-halogenanthraquinone-2-sulphonic acid with 1 mol. of a diaminodiphenylmethane or a diaminotriphenylmethane in an aqueous alcoholic medium. An acid-binding agent is preferably present and a catalyst such as a cupric or cuprous salt may also be added. Preferably, diaminodiphenylmethanes are employed wherein the amino groups are in *p.p'*-positions; the hydrogen atom of the methane carbon atom may be substituted, for instance, the carbon atom may be a member of a cyclohexane ring. C.

Cellulose Esters and Ethers: Improvement of Resistance to Solvents and Heat. Soc. Rhodiaseta. B.P.481,927 of 28/7/1937 (Conv. 31/7/1936).

Cellulose esters and ethers and materials containing them are rendered more resistant to solvents and to heat by treating them with halides of di- or multivalent organic acids. Cellulose derivatives specified are the formates, acetates, propionates, benzoates and nitrates of cellulose; methyl-, ethyl- and benzyl-cellulose; and mixed esters and ethers. The cellulose derivatives may be in the forms of films, threads, fabrics or plastic masses, or powdered, or in the form of a solution and the products subsequently used for the production of moulded articles. Halides specified are the oxalyl-, malonyl-, and succinyl-chlorides .The halides may be used in the form of a solution or in the gaseous state and catalysts for the esterification of cellulose, e.g. pyridine, may be used. C.

Cellulose Acetate Dyes: Production. W. W. Tatum and Imperial Chemical Industries Ltd. B.P.481,942 of 17/9/1936.

Dyes for cellulose acetate rayon are made by reacting halogenalkylamino-anthraquinones with tertiary nitrogen bases, to give the corresponding quaternary anthraquinonylaminoalkylammonium halides. The anthraquinone nucleus may contain substituents such as halogen, methyl, hydroxy, amino, or substituted amino, the alkyl radical may be ethyl, propyl or butyl and may carry one or more hydroxy substituents, and the tertiary bases may be acyclic, homocyclic or heterocyclic. The products dye or print cellulose acetate rayon shades which are fast to light, washing, acids and burnt coal gas fumes. C.

Textile Assistants: Preparation. J. R. Geigy A.-G. B.P.482,018 of 22/3/1937 (Conv. 21/3/1936).

Condensation products containing phosphorus are prepared by heating with a phosphorus halide at a temperature above 120° C. (*a*) a phenol sulphonic acid alone or in admixture with an unsulphonated phenol, or (*b*) an unsulphonated phenol, with simultaneous or subsequent sulphonation. If the products are not water-soluble they are rendered so by treatment with alkali. The products are useful for the manufacture of insecticidal or bactericidal compounds such as disinfectants, compounds for expelling or combating pests, textile assistants, and tanning agents, e.g. for the production of leather withstanding mildew or insects. C.

Azo Dyes: Production. I.G. Farbenindustrie A.-G. B.P.482,131 of 23/9/1936 (Conv. 4/10/1935).

Azo dyes are made by treating in alkaline solutions with an oxidising agent, particularly a cupric oxide compound, an azo dye obtainable by coupling a N-acetyl or N-benzoyl-3-aminophenol unsubstituted in the 4-position, with a diazo compound containing at least one sulphonic or carboxylic group lending solubility but no group capable of forming a metal complex. They yield clear yellow-brown tints. C.

Acid Monoazo Dyes: Production. J. R. Geigy A.-G. B.P.482,171 of 4/3/1937 (Conv. 5/3/1936).

Acid monoazo dyes are made by coupling an acyl-, aroyl, aracyl- or arylsulphonyl-2-amino-5-naphthol-1:7-disulphonic acid with a diazo compound of an *o*- or *p*-aminophenol aralkyl or aryl ether or a derivative thereof, substituted in *m*- or *p*-position to the ether group by a further aralkoxy or aryloxy group and which may be further substituted in the nucleus by a halogen, alkyl, acylamino, aroylamino, aracylamino, sulphonic or sulphonamide group. They yield bright reddish shades on wool and silk. C.

Textile Materials: Dyeing and Printing. Society of Chemical Industry in Basle. B.P.482,184 of 17/8/1936 (Conv. 17/8/1935, 1/10/1935 and 21/12/1935).

Materials are coloured by dyeing or printing them with a dye derivative (obtainable by the process described in B.P.480,358) of the general formula $R_1.O.R_2$, where R_1 is the residue of a dye containing at least one group which forms a salt with a base (including a group in the form of such salt) or at least one quaternary ammonium group, and subsequently or simultaneously treating the materials with a saponifying agent, preferably one having an alkaline action, e.g. alkali metal hydroxides, carbonates or phosphates. The dye derivatives may belong to the azo, anthraquinone, triphenylmethane, azine or oxazine series. The process is applicable to the colouring of animal or vegetable fibres, e.g. wool, silk or cotton, or artificial fibres, e.g. regenerated cellulose or cellulose derivatives, or artificial masses. If there are used derivatives of dyes capable of forming metal complexes, a treatment with an agent yielding a metal may be applied before, during or after the saponification on the fibre, in the dye bath or in lacquers or artificial masses. C.

Monoazo Dyes: Production. W. W. Groves (I.G. Farbenindustrie A.-G.). B.P. 482,198 of 21/9/1936.

Water-insoluble monoazo dyes are manufactured by coupling in substance or on a substratum for the production of lakes, the diazo compound of an amine of given general formula with an arylide of 2:3-hydroxynaphthoic acid of given general formula. The products may be used for the manufacture of colour lakes or for colouring cellulose esters and ethers, natural and artificial resins, high molecular organic plastic masses and rubber. Specified diazo compounds include those of 1-amino-2:5-diethoxy-4-benzoylaminobenzene, 1-amino-2-methoxy-4-acetylaminobenzene, and 1-amino-5-methoxy-4-benzoylaminobenzene and specified coupling compounds include 2:3-hydroxynaphthoyl-1′-amino-4′-methylbenzene-5′-sulphoethylamide and 2:3-hydroxynaphthoyl-1′-amino-2′- and 4′-methylbenzene-5′-sulphodiethylamide. C.

Gummed Tape: Finishing. Creed & Co. Ltd. B.P.482,225 of 19/4/1937 (Conv. 22/4/1936).

Gummed tape is protected against atmospheric moisture by a layer of aliphatic amine salt of a higher fatty acid (e.g. triethanolamine palmitate) applied by spraying or dusting as the tape is passing through the drying mechanism. C.

Trisazo Dyes: Production. J. R. Geigy A.-G. B.P.482,240 of 28/6/1937 (Conv. 13/7/1936).

Primary trisazo dyes are made by combining resorcinol in an alkaline solution, firstly with a diazotised negatively substituted *o*-aminophenol of the benzene series (1 mol.), secondly with a nitrodiazo compound (1 mol.) and finally with a diazotised nitroaminodiphenylamine sulphonic acid (1 mol.). The copper compounds of the dyes are made by treating with a copper salt in substance, in the dye bath or by after-treatment of the dyeings. The dyes and their copper compounds yield clear neutral brown shades on silk and leather. C.

Rayon: Dyeing. N.V. Onderzoekingsinstituut Research. B.P.482,324 of 23/3/1937 (Conv. 31/3/1936).

In dyeing regenerated cellulose rayon in the form of a wound package by treatment with an alkaline dye liquor, swelling of the rayon tending to reduce the permeability of the package is restricted by adding to the liquor an organic water-soluble liquid in an amount of less than 25 per cent. of the volume of the liquor. Specified alkaline dye liquors are those containing naphthol coupling components, sulphur dyes and leuco vat dyes and specified organic liquids are methyl, ethyl and propyl alcohols and glycols. C.

Laminated Filter Cloth: Production. Johnson & Johnson (Gt. Britain) Ltd. B.P.482,343 of 24/9/1936 (Conv. 25/10/1935).

Filter fabric is made by superposing filmy sheets or webs of carded fibre, applying a light size solution (e.g. glucose) to the surface, and embossing between rollers. C.

Cotton and Rayon Yarn: Aniline Black Dyeing. R. W. Moncrieff and A. W. M. Cooke. B.P.482,344 of 25/9/1936.

Colourations of the aniline black type are produced upon textile materials, e.g. regenerated cellulose, cellulose esters or ethers or cotton, in wound package form, by impregnating with a liquor, of which at least 60 per cent. is a volatile organic liquid containing a suitable aromatic amine and subsequently oxidising the amine upon the material. The organic liquid, which should have a boiling point approximately equal to or less than that of water, may be, for example, acetone, lower boiling alcohols and ethers, dioxane or methylene ethylene ether or a mixture of two or more of such liquids may be used. Some water may be included to aid in the solution of the ingredients. The oxidising agents may be chlorates and as catalysts copper sulphate, cupric chloride, potassium ferrocyanide and ammonium vanadate are specified. C.

Formaldehyde-aminotriazine Condensation Products: Application in Dyeing and Printing. W. W. Groves (Society of Chemical Industry in Basle). B.P.482,345 of 25/9/1936.

Condensation products of formaldehyde with aminotriazines are used in the production of dyed and printed materials. The aminotriazines specified include melam, 2:4:6-triamino-1:3:5-triazine, 2-chloro-4:6-diamino-1:3:5-triazine and 2-hydroxy-4:6-diamino-1:3:5-triazine. Products of any degree of condensation may be used, the highly condensed products being dissolved by mixtures of water and ethyl alcohol or acids, such as hydrochloric or formic acid. Various types of dyes may be fixed, even on materials which normally have no affinity for the dye. The dye may be made soluble in water or an organic solvent, by salt formation, by formation of leuco compounds, or by esterifying hydroxyl groups. Intermediates in a soluble form may similarly be fixed on the fibre. The solutions may be true or colloidal. At some stage in the process the condensation product is hardened and the affinity of the hardened product for acid or basic dyes may be increased by incorporating basic or acid substances, e.g. ethylene diamine, triethanolamine, ethylamine, oxalic, citric or gallic acid, phenols, tannin or quebracho. Specified materials dyed or printed are cotton, ramie, jute, hemp, sisal, viscose and cellulose acetate rayons, ordinary and tussore silks, wool, paper, cellulose films, etc. C.

Textile Assistants: Preparation. G. W. Johnson (I.G. Farbenindustrie A.-G.). B.P.482,367 of 8/7/1936.

Non-pulverable synthetic textile assistants containing at least one lipophilic radical comprising an aliphatic group with at least 8 carbon atoms and at least one hydrophilic group are obtained in the form of powder by applying them in a finely divided state to fine powders and effecting intense mixing. Washing, wetting, softening, levelling, stripping and dispersing agents are included. Specified examples include octylphenol polyglycol ether, triethanolamine monostearic acid ester, and condensation products of alkylene imines or polymerised alkylene imines with fatty acids or high molecular alkyl halides. Suitable powdered materials are common salt, sodium sulphate and urea. C.

Stocking Liquid Treatment Apparatus. British Schuster Bates Machine Co. Ltd. (F. Schuster). B.P.482,522 of 2/10/1936.

Textile articles, such as stockings, mounted on shaping forms carried by a conveyor, are impregnated with a dyeing, scouring, rinsing, dulling, stiffening, or softening liquid by creating a stream of the desired liquid down or along the nip of a pair of rollers on that side of the rollers into which the articles are passed. The stream of liquid may be forced into the nip of the rollers from inside the rollers, in which case they are perforated, or from outside the rollers from pipes. The rollers may be arranged with their axes vertical, and are preferably covered with a resilient soft material, such as sponge rubber, soft rubber, or felt. C.

Polynuclear Aryl Polysulphonamide Reserving Agents: Preparation. I.G. Farbenindustrie A.-G. B.P.482,524 of 3/10/1936 (Conv. 5/10/1935 and 12/10/1935).

Processes are described for the preparation of compounds containing at least five aryl nuclei linked by at least four -SO_2NH- groups; the compounds contain also at least two sulphonic acid groups, and when more than five aryl nuclei are present the linkages between them may include -CONH- groups. The products are useful as reserving agents for animal fibres against coloration with substantive dyes, as precipitating agents for basic dyes for dyeing lacquers, and, in some cases, as mordants for basic dyes. C.

Hydroaromatic Amine Wetting Agents: Production. W. J. Tennant (Henkel and Cie., Ges.). B.P.482,580 of 28/8/1936.

Nitrogenous hydroaromatic compounds (amines) are obtained by the action of ammonia or an amine on saturated hydroaromatic compounds substituted by (*a*) at least one aliphatic hydrocarbon radical containing at least four C atoms and (*b*) a hydroxyl or ketonic group or halogen atom. C.

Leuco Dyes: De-hydrogenation. G. Lord and G. Reeves. B.P.482,582 of 26/9/1936.

A wide claim is made for the use of hydrogen " acceptors " for the " oxidation " of leuco compounds. The first 34 examples relate to treatments of leuco compounds in substance, mostly involving the use of an autoclave, but the 35th example reads " cotton fabric impregnated with the leuco compound of Hydron blue G is subjected to an atmosphere of ethylene oxide at 100° C.". C.

Treating Textiles. Chem. Fabr. Grunau, Landshoff & Meyer A.-G. B.P. 482,656 of 1/10/1936.

The process for reducing the felting capacity of wool and other animal fibres by treatment with chlorine, hypochlorites, etc., is controlled and rendered more uniform by adding to the bath ammonia or a substance containing amino or imino groups. Suitable substances are primary and secondary amines, amino or imino carboxylic acids such as amino acetic acid or the acids obtained by the hydrolysis of proteins, other protein degradation products such as lysalbinic acid, acid amides such as acetamide, and taurine. The amino and imino groups may be substituted with higher fatty acid or aliphatic alcohol radicles or with aliphatic radicles substituted with aromatic groups, for instance, there may be used the reaction product of lysalbinic acid and oleyl chloride or lauryl alcohol chlorocarbonic acid ester or benzyl chloride. Generally there is an amount of the added substance which produces the optimum effect. W.

Elastic Air-permeable Fabrics: Production. F. F. Schwartz and M. A. Chavannes. B.P.482,679 of 15/12/1936; 482,683 of 28/1/1937; 482,767 of 16/12/1936.

(1) An elastic, air-permeable fabric, is produced by embossing or otherwise deforming the surface of a fabric to form projections and spraying these with latex. (2) One surface of an extensible fabric is sprayed with latex and, while the rubber is capable of being compacted, pressure is applied along continuous lines. (3) A porous elastic fabric comprises an extensible fabric base having on one or both sides a foraminous covering of rubber, adhering substantially only to projections without connecting the threads at their points of intersection. For example, latex is deposited in drops and allowed to dry between successive sprayings. Multi-layer fabrics may be built up. C.

Thiourea-acetaldehyde Resin: Application in Crease-resistant Finish. W. Clark and Sons Ltd. and W. Graham. B.P.482,746 of 1/10/1936.

Mercerised yarn or cloth is impregnated with an aqueous solution of thiourea and acetaldehyde and dried rapidly at a temperature not exceeding 110° C. C.

Cleansing Wool and Other Animal Fibres. W. E. Fitzpatrick. B.P.482,748 of 2/10/1936.

Wool, sheepskins, and like animal fibres are cleaned by an aqueous scouring liquid containing pyridine or a homologue or derivative thereof, ammonia, and an emulsifier such as soap and/or soda ash. Fatty matter not emulsified may be removed from the scouring liquid by a centrifuge, a skimmer, or by other mechanical means. Additions of pyridine, ammonia, and emulsifier may be made to the scouring liquid periodically. Suitably, the wool is passed through 3 bowls containing respectively: (1) 2 lb. soda ash, 6 lb. soap, 1 gallon 0·880 ammonia, 150 c.c. commercial pyridine, and 1,500 gallons water at 100-120° F.; (2) 1 lb. soda ash, 3 lb. soap, 0·5 gallon 0·880 ammonia, 75 c.c. pyridine, and 650 gallons water at 80-100° F.; (3) rinsing water at 70-80° F. W.

Slubbing or Roving Packages: Preparation for Dyeing. J. Brandwood. B.P. 482,817 of 4/7/1936.

An ordinary wooden bobbin is fitted with rubber rings that support a rigid, polished paper tube encased in a sleeve of stockinette. The slubbing or roving is produced on a fly-frame and when ready for dyeing the polished paper tubes are slipped out and the packages are placed on perforated tubes. C.

Fabric Rubberising Apparatus. F. F. Schwartz and M. A. Chavannes. B.P. 482,844 of 18/12/1936 (Conv. 30/10/1936).

The cloth is secured by an adhesive to an apron which is clipped or nailed to an endless belt that travels on drums through spraying and drying chambers. Rubber latex is fed under pressure to spraying nozzles and the rate of travel is arranged so that the latex layer is dry by the time the cloth emerges from the hot air chamber. C.

Cellulose Ester or Ether Stiffening Fabric: Production. British Celanese Ltd. B.P.482,849 of 30/4/1937 (Conv. 5/5/1936).

Stiffening material is made by impregnating flannel, felt, leather or paper with a solution of a thermoplastic cellulose derivative that is nearly at the point of precipitation and completing the precipitation by removing solvent. For example, the cloth is impregnated with a warm solution of cellulose ester or ether in a solvent like acetone mixed with a non-solvent such as water, and then led past scraper blades into a steam chest. C.

Alkali-soluble Cellulose Ethers: Preparation. E. I. Du Pont de Nemours & Co. B.P.482,885 of 4/8/1936 (Conv. 1/8/1935).

Cellulose ethers of a low degree of etherification, insoluble in water but soluble in alkali, are prepared by continuously impregnating with a liquid etherifying agent pulp sheet that has been treated with caustic alkali, continuously expressing the excess of etherifying agent, and allowing the impregnated sheet to undergo reaction. Alternatively, the alkali and etherifying agent are applied together. C.

Cellulose Ester or Ether Rayon: Dyeing. J. H. Rooney and B. Shaw. B.P. 483,242 of 9/10/1936.

In the dyeing of cellulose ester or ether filaments or films containing plasticisers, the dye is applied in a saturated solution of a plasticiser that is preferably a solvent for the dye. A number of dyes and plasticisers are specified by name. C.

Sulphated Nitro-amino Cellulose Ester Dyes: Preparation. G. H. Ellis and H. C. Olpin. B.P.483,278 of 12/10/1936.

Dyes for cellulose esters or ethers are obtained by sulphating an aromatic compound (other than an azo or an anthraquinone compound) containing a hydroxyalkyl group linked to an aryl nucleus, directly or through O, S, or NR (where R is H or alkyl) and containing at least one nuclear amino group and at least one nuclear nitro group. A typical member is the sulphato ester of 4-chloro-2-nitro-1-(β-hydroxyethyl)-aniline. C.

Sulphonated Hydroxyalkyl Polysulphide Wetting Agents. H. Lederer. B.P. 483, 301 of 10/8/1936.

Wetting, washing and lathering agents are obtained by the sulphonation of hydroxyalkyl polysulphides containing at least 16 C atoms in the molecule. For example, 10-chloro-octadecanol is treated with alkali thiocyanate in alcohol under pressure and the product is converted by hydrolysis into octadecanol-10-disulphide ; this is sulphonated with oleum in carbon tetrachloride. C.

Betaine Amide Dyes and Assistants. Deutsche Hydrierwerke A.-G. B.P. 483,324 of 16/10/1936 (Conv. 16/10/1935).

Carboxylic acids containing a quaternary ammonium group (e.g. betaine) are converted into amides by reaction with compounds containing one or more primary or secondary amino groups in the presence of a dehydrating agent. For example, *n*-dodecylamine and betaine yield an assistant for making dyeings fast to water, or for stripping vat dyes. *m*-Nitraniline and betaine yield betaine *m*-nitroanilide, which may be reduced to an amine and then converted into an azo dye. C.

Urea-aldehyde Resin Coating Composition: Preparation. E. I. Du Pont de Nemours & Co. B.P.483,399 of 7/1/1937 (Conv. 7/1/1936).

Urea (or related compounds), formaldehyde, and more than one molecular proportion of a primary butyl alcohol for each mol. of urea are condensed, the water formed being removed by distillation until 2 mols. have been eliminated. A catalyst may be used. For example, *n*-butyl alcohol is warmed with para-formaldehyde and caustic soda, mixed with phthalic anhydride, urea and toluene, and distilled so that water is removed but other volatile liquids are returned to the mixture. The resins may be blended with similar agents for coating textiles. C.

Knitted Cotton Fabric: Bleaching. W. R. Cooke. B.P.483,471 of 15/10/1936.

Knitted cotton fabric is washed with a weak detergent, treated with caustic soda, oxidised or bleached, and finally degreased with a solvent. The fabric is rendered absorbent, soft and unshrinkable. C.

Protein Finishing Compositions: Production. E. I. Du Pont de Nemours & Co. and C. J. Wernlund. B.P.483,550 of 11/9/1936.

Protein compositions containing potential hardening agent comprise a glue, casein, or soya bean protein, an insoluble organic compound capable of reacting with an acid to form a hardening agent (e.g. colloidal aluminium hydroxide) a substance capable of forming acid on heating and/or drying (e.g. an ammonium salt of a fatty acid) and a volatile alkali in amount sufficient to prevent solution of the insoluble compound. The composition may be used for sizing paper or fabrics. C.

Rubber and Polymerised Olefine Compositions: Application. Standard Oil Development Co. B.P.483,563 of 17/10/1936.

Polymerised iso-olefines of M.W. 800-30,000 are incorporated as plasticisers with rubber and the like in compositions that may be calendered or frictioned on to fabrics or spread on fabric for making adhesive tape. (Addition to B.P. 479,478, 1938, A356.) C.

Wool and Viscose Rayon Mixtures: Mordant Dyeing. G. W. Johnson (I. G. Farbenindustrie A.-G.). B.P.483,564 of 19/10/1936.

Mixed fabrics of wool and viscose rayon are dyed with substantive azo dyes capable of being chromed, or mixtures of such dyes and chromable wool dyes, by using an alkali chromate and, towards the end of the dyeing process or in an after-treatment, a salt of trivalent Cr, e.g. the fluoride, sulphate, formate, etc. Improved fastness to washing, fulling, sea-water and perspiration are secured with dyes containing salicylic acid groups and with *o*-hydroxyazo dyes. C.

Anthraquinone-hydropyridine Dyes. Society of Chemical Industry in Basle. B.P.483,940 of 19/2/1937 (Conv. 19/2/1936).

Anthraquinone derivatives containing a hydropyridine ring are manufactured by the action of an acid condensing agent (e.g. sulphuric acid or aluminium chloride) on an α-arylaminoanthraquinone, unsubstituted in the β-position ortho to the arylamino residue. The arylamino residue is an α-naphthylamine system, substituted in the β-position, thus, $(\beta)X \cdot C_{10}H_6 \cdot NH-(\alpha)$. The products are vat dyes or intermediates for them. C.

1-Amino-4-anilinoanthraquinone Derivative Dyes. Chemical Works formerly Sandoz. B.P.483,950 of 16/6/1937.

Violet dyes for wool or silk are obtained by treating with sulphuric acid at 0-30° C. derivatives of 1-amino-4-anilinoanthraquinone substituted in position 2 by a hydroxyalkoxy or alkylated hydroxyalkoxy group, and in the ring of the anilino group by alkyl or halogen. C.

Silk and Rayon Fabrics; Production of Lustre Patterns on——. C. Wirth (Zurich, Switzerland). B.P.485,559 of 20/10/1936:20/5/1938.

A process for producing lustre patterns on fabrics of silk or rayon is characterised in that the fabric is treated with a weak aluminium chloride solution and is thereupon pressed at raised temperature in accordance with the required pattern whilst the fabric still contains the solution. C.

Yarn Dyeing Machine. G. W. Steiger (New York). B.P.485,866 of 27/11/1936: 25/5/1938 (Conv. 27/11/1935).

A machine for circulating dye or other liquor alternately in reverse directions through yarn on perforated tubular supports has an auxiliary feed-on tank in which the liquors can be thoroughly mixed and a pair of expansion tanks connected to means for creating and breaking vacuum in them. C.

Acid-amide Derivative Water-proofing Emulsions: Application. W. W. Groves (for I.G. Farbenindustrie A.-G.). B.P.486,026 of 28/11/1936:30/5/1938.

A process of imparting hydrophobic properties to textiles employs a solution or emulsion of a condensation product of an amide, having at least one replaceable H-atom, attached to N, of a carboxylic acid with at least 8 C atoms, obtained by reaction with paraformaldehyde and sulphur dioxide in the presence of a tertiary amine. (See B.P.466,853.) The impregnated and dried material is, if necessary, " ripened " by heating at above 70° C. The first example mentions the product obtained by the reaction of stearamide, paraformaldehyde and sulphur dioxide in pyridine. Ten parts are dissolved in 50 parts of hot, 50 per cent. alcohol and poured into 2,000 parts of water. Cotton goods are steeped in the emulsion for 10 minutes, centrifuged, dried and heated at 100° C. for one hour. Rayon is preferably " ripened " at 130° C. The water-repellent finish is stable to washing. C.

Printed Cloth Steaming Apparatus. W. Gerber (trading as Maschinenfabriken Tillm. Gerber Söhne and Gebr. Wansleben, Krefeld). B.P.486,029 and 486,070 of 28/11/1936:3/5/1938 (Conv. 28/11/1935).

An apparatus for treating cloth in open width with vapours or gases, particularly for steaming prints, comprises a main chamber with a tunnel-like passage, these having in cross-section the shape of a roofed house, an inlet chamber in the " roof " of the tunnel, an outlet chamber adjacent to one of the outer walls of the main chamber, and a system of rollers by which the cloth is taken off a pile in the inner chamber and conveyed in a spiral path through the outer chamber. C.

Titanium Dioxide: Application in White Finishing. National Titanium Pigments Ltd. (Luton). B.P.486,316 of 2/12/1936:2/6/1938.

Considerable increases in brightness are claimed from the incorporation of titanium dioxide in the usual mixtures for white finishing. C.

Tin-delustred Rayon and Silk: Lustre Printing. Calico Printers' Association Ltd. and J. R. Whinfield. B.P.486,334 of 6/2/1937:2/6/1938.

Regenerated cellulose rayon or silk that has been delustred by sodium stannate as in B.P.455,209 is printed with a thickened solution of sodium hexametaphosphate (10 parts to 100 of paste) and steamed. Lustre patterns are obtained. The paste may contain a vat dye so that a coloured lustrous print is obtained. C.

Silk and Wool Yarns: Steaming to Increase Electrical Resistance. R. J. Tugwood (for Dominion Silk Mills, Ltd., Toronto). B.P.486,369 of 20/7/1937:2/6/1938.

The resistance of wool or silk is increased many times by treatment with dry steam under conditions in which condensation is prevented (e.g. 220° F.). Silk that has already been treated with acid to remove mineral matter is further improved (e.g. 4½-fold) by the treatment. C.

Electrical Insulating Fabric Varnishing Machine. British Thomson-Houston Co. Ltd. B.P.486,635 of 1/9/1937:8/6/1938 (Conv. 3/9/1936).

Instead of the usual tall tower for drying varnished insulating fabric, a horizontal machine is proposed in which the cloth, held by one edge from an endless conveyor, passes to and fro in a vertical plane and is exposed to hot air, part of which is continuously removed to prevent accumulation of solvent vapour. The cloth is coated on both sides with an oxidisable compound (e.g. linseed oil varnish) containing a volatile solvent (e.g. light naphtha). A typical chamber is 90 ft. long, 23 ft. wide and 9½ ft. high, permitting 16 passages for the cloth, that is, holding about 1,700 ft. of cloth. A suitable temperature is 350° F., and a rate of production 60 ft. per minute. C.

Partially Acetylated Rot-proof Cellulose Fibres and Fabrics. A. C. Thaysen (London). B.P.486,901 of 14/12/1936:13/6/1938.

To minimise the production of soluble esters and breakdown of the catalyst (e.g. perchloric acid) in the process for the superficial acetylation of cellulose so as to render it resistant to micro-organisms, to the electric current, and to direct cotton dyes, the process is applied at a temperature between -10 and 15° C. and sufficient acetic acid anhydride is employed to prevent freezing. It is said that flax and jute are more readily acetylated than cotton. For cotton, a temperature of 10° C. is suggested, with a 0·3 per cent. concentration of perchloric acid and 20 per cent. of acetic anhydride. For flax or jute, -5° C., 0·6 per cent. of perchloric acid, and 60 per cent. of acetic anhydride are recommended. C.

Cloth Expander. J. H. Wrigley, A. Melville and S. Kellett. B.P.486,925 of 9/12/1936:9/6/1938.

The patent is granted for " the method of expanding a fabric, which consists in leading it over a continuous surface constituted by a sleeve or band of resilient material, such as rubber, moved or capable of moving therewith, and which is extended laterally during the leading of the fabric thereover by a force applied to it substantially normally to its surface." The device thus avoids lateral tension on the fabric and " bowing " of the weft. The expander consists essentially of a cylindrical core built up of rings with surfaces inclined (in opposite directions on either hand of a middle dead-space), and having the notches filled in with rubber and finished as a smooth rubber roller. The core may also be of screw-thread form. Preferably, the expander is used in conjunction with a hard roller (e.g. a calender roller). As the cloth is pressed on the rubber (by reason of its tension or by the extra roller) this works side-ways and the cloth is expanded. A number of claims are made, including the use of the expander with a mercerising range and a dyeing machine. C.

Latex—Artificial Resin Crease-proofing Products: Application. Tootal Broadhurst Lee Co., A. E. Battye, J. Tankard and F. C. Wood. B.P.486,926 of 9/12/1936:9/6/1938.

The addition of rubber latex or an artificial dispersion of rubber to a resin-forming reaction mixture is claimed to give crease-resisting materials with improved wearing properties. If the effect is to withstand washing, an acid must be present during the final hardening of the resin and coagulation of the latex is prevented by the use of a catalyst that only develops acid under the influence of heat (e.g. ammonium tartrate) and/or protective agents (e.g. sulphonated fatty alcohols). Examples are given. C.

Nitrated Oleic Acid Mercerising Liquor Wetting Agent: Application. A. Carpmael (for I. G. Farbenindustrie A.-G.). B.P.486,973 of 21/12/1936:14/6/1938.

Reaction products of nitric acid on unsaturated fatty acids (or fats) are claimed as additions to phenolic wetting agents in caustic alkali. Thus 76 parts of crude cresol, 4 of cyclohexanol and 20 of nitrated oleic acid form a mixture that may be used to the extent of 15 gm. per litre of mercerising lye. The nitrated oleic acid may be reduced by treatment with sulphurous acid. Shrinkage tests on cotton yarn are recorded. C.

Light-weight Air-permeable Waterproof Fabric: Production. Textilwerk Horn A.-G. (Switzerland). B.P.487,379 of 15/12/1936:15/6/1938 (Conv. 25/5/1936).

Addition to B.P.427,686. In the original patent, the pores of a light-weight fabric were closed before water-proofing by mercerisation. This step is now dispensed with by specifying that the cloth shall be equivalent in density to one made of 70's warp and weft, 40 ends and picks per quarter of an inch. C.

Correction. B.P.481,459. See *J.T.I.* 1938, No. 5, A297, 1st item. The name of the patentee is Heberlein & Co. A.-G. C.

5—ANALYSIS, TESTING, GRADING AND DEFECTS

(A)—Fibres

Chinese Cotton: Classification. Y. C. Lee. *Int. Cotton Bull.*, 1938, **16**, 322-5.

A table of Chinese Cotton Standards is given and the methods of classification are described. Standards of variety are Chinese-American, long and short staple, and four types of Native cotton. Standards of grade range from Middling Fair to Good Ordinary. Standards for length rise by sixteenths from ½ to 1¼ inch. Uniformity is classed as "uniform" (92·5 per cent. or more), "medium" (85-92·4) and "irregular" (84·9 or less). Strength is classed as "strong" (average fibre breaking load 10·5-7.5 gm.), "medium" (7·4-4·5) and "weak" (4·4-1·5). C.

Cotton Hair: Dark-field Microscopy. B. Rabinowitsch. *Contrib. Boyce Thompson Inst.*, 1937, **8**, 401-3 (through *Exp. Sta. Rec.*, 1938, **78**, 467).

In hairs of *G. hirsutum*, 7 to 55 days after flowering, cellulose particles were seen to predominate as uncombined units in young hairs but as chains in older hairs. Chemically-treated ripe hairs showed the reverse process of membrane layers disintegrating into fibrils and these into particles. C.

Young Cotton Hairs: X-ray Examination. W. A. Sisson. *Contrib. Boyce Thompson Inst.*, 1937, **8**, 389-400 (through *Exp. Sta. Rec.*, 1938, **78**, 467).

Cotton hairs 5-50 days old were examined by the X-ray method, in the raw state and after extraction with chloroform or treatment with 1 per cent. caustic soda and 2 per cent. sodium hypochlorite. Crystalline cellulose was indicated at about 30-35 days in the raw hairs, at 15-20 days in the extracted hairs and at 5 days in the purified hairs. The masking of the X-ray diagram is ascribed to wax and an amorphous substance removed by bleaching. Cellulose does not appear to undergo a crystalline modification during growth. C.

Damaged Viscose Rayon and Staple Fibre: Examination. W. Köhler. *Kunstseide*, 1938, **20**, 158-163.

The presence of irregular, deformed, and mechanically damaged fibres in viscose rayon or staple fibre can be detected by observation under the microscope. The shape of the fibre ends varies according to whether the fibres have been torn or cut and whether the damage occurred in the wet or dry state. Mechanical damage and over-stretching can be confirmed by staining with Neocarmine W, injured portions acquiring a blue colour whilst undamaged material is dyed violet. If the damage occurred in the wet state, the fibre ends show broad blue zones but if the damage occurred in the dry state, only the immediate neighbourhood of the tear is coloured blue. Chemical damage may be detected by observation of swelling in 10 per cent. caustic soda solution. Photo-micrographs of undamaged fibres and fibres containing hydrocellulose and oxycellulose, after treatment in caustic soda solution, are given. Swollen, mechanically damaged fibres show smooth and definite ends whereas the swollen chemically damaged fibres have irregular indistinct ends. When preparations of fibres embedded in caustic soda are left for some time in the air alkali-soluble cellulose constituents began to separate out in spherical deposits round the edges. C.

Fibre-identification Stains. *Rayon Textile Monthly*, 1938, **19**, 313-4.

A stain similar to Neocarmine is made by mixing Direct Blue 2B (2 parts), Alizarin Red WS (2), an Ionamine (1), and salt or Glauber's salt (5), dissolving in hot water and diluting to 1,000 parts with cold water. Cotton, mercerised cotton and ramie are stained various shades of blue, viscose rayon blue-violet, cuprammonium rayon a deep navy blue, acetate rayon bright golden yellow, tussah silk dull rose, gum silk plum colour, degummed silk a rust shade, chlorinated wool deep henna, and ordinary wool a peach shade. The addition of two parts of Stilbene Yellow would improve the differentiation between cotton and viscose rayon but give deep greens instead of the blues on the cellulosic fibres. A mixture of Direct Blue 2B and Xylene Red B affords a sharp distinction between cellulose and animal fibres. C.

Fibre Sectioning Device. *Textile Recorder*, 1938, **56**, No. 662, 52.

A simple pocket device is described for cutting fibre sections. The bundle of fibres is held in position in a hole and slot in a steel plate, spotted with collodion solution and cut with a safety-razor blade. The plate has, on a swivel arm, a micrometer screw for advancing the bundle for the next cut. The head of the screw is graduated so that sections may be cut to a definite thickness. C.

German Rayons: Photo-micrography. B. Hauptmann. *Kunstseide*, 1938, **20**, 178-180.

Photo-micrographs of filaments and cross-sections of German Kasema, Kasumma and Kasultra viscose rayons are given. C.

" Lanital ": Attack by Micro-organisms. W. H. Glover (for Messrs. Snia-Viscosa). *Nature*, 1938, **141**, 1057.

The manufacturers of " Lanital " report, with reference to a note by Smit and van der Heide on the destruction of " milk-wool " by micro-organisms, that they have never experienced a case in commercial practice. Nor is " Lanital " attacked by moths. C.

Textile Testing Bibliography. H. A. Mereness. *Rayon Textile Monthly*, 1938, **19**, 298-300, 362-4.

Official and semi-official (chiefly American) methods of testing are classified into 39 groups and references cited to known tests under each heading. References are also given to unofficial tests for thermal transmission, hosiery, carpets and various qualities of serviceability. C.

Effect of Dry Heat on Wool. S. Saito and H. Utida. *J. Soc. Text. Ind. Japan*, 1937, pp. 266-288 (through *Rayon Text. Monthly*, 1938, **19**, 340).

Worsted yarn was heated in a vertical cylindrical thermostat ($\pm 0 \cdot 5°$ C.) at temperatures from 80 to 250° C. and for times from 0·5 min. to 48 hrs. The results show that the colour change of wool is the most marked effect of heat. Deterioration in strength and elasticity are gradual with no boundary mark. Above 170° C. the effect is very pronounced, but prolonged action of heat causes damage only when deterioration occurs in a short time. Relationships are given between temperature and time for 10 per cent. decrease in breaking strength and elongation, and for visual yellowing. The scales appear unaffected even after heavy discolouration. W.

(B)—YARNS.

Cotton Yarns: Twist Data. P. Luc. *Revue Textile*, 1937, **35**, 549-551, 605-9; 1938, **36**, 4-11, 89-99, 115-121.

A series of tables and graphs of the twists per metre for cotton yarns in French counts 0·5 to 200, originally published in 1924, are reproduced. C.

Knots: Testing. W. Frenzel and H. Bach. *Textilberichte*, 1938, **19**, 413-416.

Types of knots used in the textile industry and their requirements are discussed. The results of tests of the influence of weaver's, cloth maker's, bird's head (or dog), and worsted yarn knots on the strength and extensibility of viscose and cuprammonium rayons and on cotton yarns are tabulated and discussed. The data show that cloth maker's knots had very little influence on the strength and extensibility of the viscose rayon in the dry state and practically no influence on the rayon threads in the wet state. The worsted yarn knot was the most suitable for the cuprammonium rayon tested. The different knots had practically no influence on the strength of unsized single cotton yarn. In the case of sized yarn, the smallest number of breaks at the knots was observed with weaver's knots. Worsted yarn knots gave the best results with 2-fold cotton yarns and weaver's knots with 4-fold cotton yarn. Worsted yarn knots were the most suitable type for tyre cord and sewing cotton. C.

Textile Testing Bibliography. *See* Section 5A.

(C)—FABRICS.

Clothing Fabrics: Heat-insulating Power. O. Mecheels. *Textilberichte*, 1938, **19**, 422-424.

The influence of air motion on heat insulation by textile fabrics is discussed and a wind tunnel for tests at high air speeds is briefly described. Measurements were made of the loss in heat of water, of initial temperature 37° C., contained in a glass cylinder clothed with various fabrics. A formula for calculating heat-insulating power is given. The results are tabulated together with weight per square metre and air permeability data. Results are given for sheepskin, imitation fur fabrics, and various clothing fabrics made from staple fibre-wool mixtures. Sheepskin with the wool inside gave the best insulation. An imitation moleskin of cellulose acetate showed a fairly high insulating power and high permeability to air. Mixture fabrics containing cellulose acetate staple fibre had higher insulating powers than similar fabrics containing viscose staple fibre. Impregnation with water-repelling preparations reduced permeability to air and increased heat-insulating powers. Twill fabrics showed higher heat-insulating powers than plain-weave fabrics of similar composition. It is pointed out that the heat-insulating power of clothing materials depends on the thermal conductivity of the fibre used and on the power of the material to maintain a layer of air between the body and the external world. The conductivity of the fibres can be modified by finishing and chemical treatments. The thickness of the air layer and the air motion in it vary with the structure, density, etc., of the fabric and may be modified by fulling, raising and other treatments. C.

Cotton Dress Fabrics: Properties. Lucile Marker and Katherine Cranor. *Amer. Dyes. Rept.*, 1938, **27**, 257-260, 284.

As a contribution to the study of the wearing qualities of cotton dress fabrics, the following data are recorded for waffle, plissé, middy twill, percale, madras, broadcloth, piqué, poplin and shantung fabrics:—price, width, weave, thickness, weight per sq. yard, breaking load (warp and weft way), counts and twists of warp and weft, shrinkage in boiling water, thickness after 3,000 double rubs on the Wyzenbeck abrasion machine and number of rubs until deterioration was indicated. The cloths are compared in a series of diagrams. C.

Fabrics: Testing. J. H. Skinkle. *Amer. Dyes. Rept.*, 1938, **27**, 109-115, 144-6, 160-4, 236-8, 247-251.

A continuation of a comprehensive review. Under *fabric testing* the following qualities are discussed: (1) thermal properties, (2) handle and draping qualities, (3) serviceability and wear, and (4) strength and stretch testing of fibres, yarns and fabrics, including a survey of testing instruments. C.

Worn Cotton Fabrics: Strength. S. Davison and A. E. Ginter. *J. Home Econ.*, 1937, **29**, 333-5 (through *Exp. Sta. Rec.*, 1938, **78**, 432).

Particulars are given of 33 plain-woven cotton fabrics and their strengths when new and when "worn out." Deterioration was more marked in the weft than in the warp. C.

Doped Airplane Fabric: Tautness. G. M. Kline and C. G. Malmberg. *Indust. Engng. Chem.*, 1938, **30**, 542-549.

A variety of cellulose derivatives and synthetic resins have been applied to airplane fabric to study the relation of tautness to the type of plastic base used in the dope, the percentage of acyl or alkyl substitution in the various cellulose derivatives, and the viscosity of these derivatives. Tautness measurements were made on the fabric panels conditioned at 70° F. and 65 per cent. R.H. by means of the spring-loaded tautness meter. It was observed that the most important single factor involved in the initial tautening property of a dope is the solvent composition. To obtain a maximum tautening effect, it is necessary to formulate a dope so that a minimum of active solvent is present during the final drying stage. The highest initial tautness values were obtained with cellulose tri-esters, such as cellulose triacetate and an almost completely acylated cellulose acetate-butyrate. Varying the acyl or ethoxyl content of partially hydrolysed cellulose derivatives did not have a pronounced effect on the ability of the compounds to tighten the fabric and the initial tautening property is also apparently independent of the size of the cellulose molecule. Exposure tests to rain and sun were made and the results are discussed. C.

Textile Testing Bibliography. *See* Section 5A.

(D)—OTHER MATERIALS.

Pigment Dyes: Detection by Micro-sublimation. A. Kutzelnigg and E. Franke. *Mikrochimica Acta*, 1938, **3**, 33-36, 37-45.

(1) Many pigment dyes can be identified by the characteristic form of the sublimate obtained by heating for a short period at 210-300° C. in a grooved

object glass, covered by a cover slip and resting on an aluminium heating block. (2) Typical appearances are described, with photographs, for a number of pigment dyes. C.

Pulp and Paper: Reflectivity and Colour Measurement. *Paper Trade J.*, 1938, **106**, *TAPPI*, 289-291.

"Tentative Standard" methods are described for measuring the spectral reflectivity and colour of (1) pulp and (2) paper, relative to magnesium oxide, by means of a spectrophotometer of the visual or photo-electric type. C.

7—LAUNDERING AND DRY CLEANING

(A)—CLEANING

Muslins: Laundering and Durability. A. E. Ginter and others. *J. Home Econ.*, 1937, **29**, 319-326, 326-332 (through *Exp. Sta. Rec.*, 1938, **78**, 432-3).

(1) Five plain-woven muslins were laundered, without soiling, by seven different procedures for 1, 5, 15, 30, 45, 75 and 100 times and tested for strength, weight, thickness, yarn counts, and shrinkage. Commercial laundering caused less weakening than home methods in the first 15 washes but more thereafter. Ironing appeared to be responsible for much of the weft-way damage in commercial laundering but in the home most of the damage after the first few washes was due to washing. The shrinkage was similar in all methods. (2) Night-dresses made from various muslins were submitted to the above launderings and examined at intervals after 5-130 washes and when worn out. The effect of body wear is considered to be greater than that of laundering. The signs of damage due to wear were greatest under the arms and across the shoulders, whereas those due to washing were greatest along the folds and the edges of heavy seams. C.

Detergent Solutions: Properties. J. Powney and C. C. Addison. *Trans. Faraday Soc.*, 1938, **34**, 625-627 and 628-634.

(1) The solubility in the organic phase of the fatty acids has been measured in connection with work on the surface activity of long-chain fatty acids at liquid- liquid interfaces. Liquidus curves were obtained for mixtures of benzene with a series of fatty acids having widely different chain lengths. No evidence was obtained for the existence of eutectic points for stearic, palmitic, myristic, and lauric acids, but for acids having a chain length of less than 13 C atoms, the curves exhibit very definite eutectic points, which shift towards higher acid concentrations with decreasing chain length. At higher acid concentrations the temperature coefficient of solubility remains the same as for the longer-chain acids. Extraction by crystallisation from benzene of those shorter-chain acids capable of forming eutectics with benzene at appreciable fatty acid concentrations thus becomes increasingly inefficient as the chain length decreases. It appears that, with respect to bulk as well as surface properties, unsaturated acids frequently behave in a manner similar to that found for saturated acids of much shorter chain length; thus the oleic acid-benzene system gives a eutectic curve similar to that of caprylic acid. Linoleic and ricinoleic acids were only partially miscible and conform to a partial miscibility system similar to that of phenol and water. The curves indicate that ricinoleic acid is miscible with benzene over a much smaller concentration range than is linoleic acid, which can probably be attributed to its more strongly hydrophilic nature. (2) The interfacial tension of aqueous soap solutions against solutions of various long-chain fatty acids dissolved in xylene were studied, particularly in relation to the influence on interfacial activity of chain length and degree of unsaturation. When both the oil and aqueous phases contain an interface-active species, the nature of the resulting adsorbed film and the lowering of interfacial tension are dependent upon various factors, such as degree of unsaturation, *p*H gradient at the interface and relative concentrations of the two species. The introduction of one or more double bonds into the hydrocarbon chain decreases the elaeophilic and increases the hydrophilic nature of the chain, thereby facilitating the migration of fatty acid from the xylene and decreasing the tendency of the corresponding soap to migrate from the aqueous phase. Although ricinoleic acid, like oleic acid, has only one double bond, the additional hydroxyl group decreases the elaeophylic nature of the paraffin chain to an extent comparable with that of a second double bond. From the curves it can be seen that the change in the

hydrophilic character of the soap due to increasing unsaturation does not produce such a profound change in interfacial activity as did a similar change in the fatty acid molecule, since in the case of the soap, increasing unsaturation tends to withhold the long-chain ions from the interface. C.

Oily Waste Recovery Plant: Operation and Costs. Fr. Heinrich. *Chem. Fabrik,* 1938, **11**, 320-4.

An illustrated account is given of the construction and operation of an extraction plant for oily waste at a German foundry. The solvent used is trichloroethylene. When the extract runs clear, the solvent adhering to the charge is removed by steam and the waste is then removed to a machine where it is rinsed with warm water (e.g. water at 30-35° C. from the condenser). The plant is designed to treat 350 kg. in 8 hours and costs are scheduled. Mention is made of the problem presented by wastes that contain staple fibre. Some sorts withstand the extraction well but others not. C.

PATENT

Rubberised Laundry Net Bags. W. Pusey. B.P.481,677 of 23/9/1936.

Laundry bags of cotton, hemp or linen net-work are impregnated or coated with vulcanised rubber. C.

8—BUILDING AND ENGINEERING

(A)—CONSTRUCTION OF BUILDINGS

Stainless Steel: Application. G. W. Hinkle. *Cotton (U.S.),* 1938, **102**, No. 4, 72-74.

A general article on the advantages of stainless steel for bleaching and dyeing plant. Typical analyses and physical properties are recorded for steels of the 18-8, 18-8-S and 18-8-S-Mo groups (approx. 18 per cent. Cr, 8 per cent. Ni). The 18-8 type is useful for table tops or riveted structures ; 18-8-S can be welded and is recommended for dyeing plant and for peroxide bleaching ; 18-8-S-Mo (2-4 per cent. Mo) is preferred for acid liquors or hypochlorite bleaches. C.

Textile Machinery: Repairing by Welding. British Oxygen Co. *Textile Manufacturer,* 1938, **64**, 202-3.

A number of illustrations are reproduced to show the possibilities of oxy-acetylene welding in the repair of textile machinery. C.

(B)—FIRE PREVENTION

Olein-impregnated Cotton and Wool: Spontaneous Ignition. W. Manecke and G. Lindner. *Klepzig's Textil Z.,* 1938, **41**, 129-132.

Several outbreaks of fire in bales of carbonised, chrome-dyed, re-manufactured wool in the Forst-in-Lausitz district during the summer of 1937 have led the authors to make a systematic study of factors conducive to the generation of heat in oleins in contact with wool or cotton. The report discusses the chemistry of the oils and the influence of " iron soaps " in the Mackey test. It is then shown that neither the dust remaining from the carbonisation nor the chrome has any appreciable effect in the development of heat. The addition of linseed oil to the olein, however, has a marked effect, especially on cotton, where even 0·25 per cent. causes a quicker rise of temperature. The influence of iron is shown in a series of tests in which cotton and wool were steeped in ferric chloride of different concentrations, dried and tested with the same technical, non-dangerous olein in the Mackey apparatus. Quite small amounts of iron had very striking effects, especially on cotton, but with higher concentrations the effect tended to be nil. C.

(C)—STEAM RAISING AND POWER SUPPLY.

Steam Condenser: Heat Transfer in ——. Margaret Fishenden. *Engineering,* 1938, **145**, 643-5.

Recent experimental work on heat transfer in steam condensation is reviewed. Earlier discordant results are largely due to the condition of the metallic surface on which condensation takes place. If the surface is wettable, a film is formed. If not, condensation takes place in the form of droplets and heat transfer may be as much as twenty times as fast. C.

(D)—Power Transmission.

" Oilite " Self-lubricating Bronze Bearings: Advantages. D. Brownlie (for Manganese Bronze and Brass Co. Ltd., Ipswich). *Textile Weekly*, 1938, **21**, 797.

" Oilite " bearings are described as composed of 89-90 per cent. Cu and 10-11 per cent. Sn, cast with a porous structure and charged with lubricating oil, amounting to 25-40 per cent. of the volume. Oil exudes if the metal is squeezed in a vice or heated. Advantages for spindle and roller bearings are claimed. C.

Aluminium Stearate Greases: Properties. F. J. Licata. *Indust. Engng. Chem.*, 1938, **30**, 550-553.

An account is given of aluminium stearate types of grease and their use on account of " customer appeal," heat resistance and stability. Their properties and applications are enumerated and data are presented to show how the properties can be modified by control over the viscosity and type of oil, rate of cooling, time of compounding and moisture content and use of fluxes. C.

(F)—Lighting

Textile Mills: Lighting. H. B. Jordan. *Cotton* (*U.S.*), 1938, **102**, No. 4, 75-7.

An illustrated account of modern lighting systems in the winding, weaving and cloth-inspection departments of American mills. Brief particulars are given of the spacing of the lamps and illuminations provided in a number of mills. The use of tubular mercury lamps is a noteworthy feature. C.

(G)—Heating, Ventilation and Humidification

Hygrometry: Review. H. Ebert. *Die Physik*, 1938, **6**, 47-54.

A review of the literature published in the period 1934-1937. C.

Thermoelements and Resistance Thermometers: Applications. A. Rossié. *Monatsh. Seide u. Kunstseide*, 1938, **43**, 3-6, 41-46, 87-92.

The general principles of thermoelements and resistance thermometers are outlined, their relative advantages and disadvantages are pointed out and applications in textile operations and in textile research are discussed. Practical constructions for use in measuring air and gas temperatures, surface temperatures, e.g. of fabrics, rollers, insulation, steam pipes, etc., temperatures in fabrics, wood, insulation, etc., and the influence of air motion on heat transfer, in measurements of thermal conductivity and heat transmission, and in determinations of boiling and freezing points and other breaks in heating curves, are described. C.

Drying and Air Conditioning Equations: Review. E. R. Gilliland. *Indust. Engng. Chem.*, 1938, **30**, 506-514.

The basic equations for the rate of heat and mass transfer are reviewed, with special reference to drying and air conditioning. The mass transfer coefficients are considered in the light of the film and turbulent-core concepts and on the basis of empirical equations. Owing to the lack of knowledge of the mechanism of fluid motion through solids, the application of the diffusion equation in drying problems is questionable. C.

Heating, Ventilating and Air Conditioning Plant Motors. B. S. Weaver. *Gen. Elect. Rev.*, 1938, **41**, 223-228.

The author surveys the service requirements and power supply necessary for successful motor performances and briefly describes single-phase, direct-current and polyphase motors. In the four major divisions of air conditioning, the control of temperature, movement, cleaning and humidification, the types of motor drives may be generally classified as stoker, compressor, pump and fan drives. Each is discussed in turn and the various types are summarised in a table. Enclosures and bearings are then described and speed control and tests discussed. It is not advisable to use a motor of the " long annual service " classification where the operation is infrequent and a motor for short annual service would meet the requirements. Low-torque motors should not be used on belted drives, or tapped winding and transformer speed control in place of multi-speed motors for centrifugal drives. C.

PATENT

Wool Fat. Metallgesellschaft A.-G. D.R.P. 656,556 of 11/2/1938 (through *Chem. Abs.*, 1938, **32**, 4370).

Wool fat is split up into fat acids and alcohols by (*a*) subjecting to a long steam-distillation at atmospheric pressure and about 400°, (*b*) saponifying the distillate with NaOH and steam-distilling at reduced pressure or high vacuum at low temperature to distil off the nonsaponifiable part, i.e. the alcohol. The residue is fat acid in the form of soap. The fat acid is recovered by treatment with H_2SO_4. W.

9—PURE SCIENCE

Cotton Plant: Metabolism. E. R. Collins and N. E. Rigler. *Soil Sci.*, 1937, 44, 217-229 (through *Exp. Sta. Rec.*, 1938, **78**, 329).

The roots and tops of cotton plants have been analysed periodically during the growing season for the usual nitrogen fractions, inorganic phosphate and calcium. A method of electrodialysis for obtaining the extract was developed. The separate N fractions gave a better indication of soil conditions and the changes in the plant than total N. Thus nitrate N decreased from a high concentration early in the season to a low one at boll formation. Plants on soils dressed with N, P and Ca fertilisers contained higher concentrations of the various N fractions and of P, but not of Ca. C.

Ultra-violet Luminescence Analysis Lamps. A. Van Wijk. *Philips Tech. Rev.*, 1938, 3, 5-9.

Two pieces of apparatus for luminescence analysis are described and possible applications in the examination of textiles are mentioned. The ultra-violet light is supplied by the " Philora " high-pressure or the " Biosol " quartz mercury lamp and the visible light is absorbed by a filter made of a special kind of glass, " blackened " with nickel oxide. C.

Starch: Volumetric Determination. W. Whale. *Analyst*, 1938, **63**, 328-331.

A new volumetric method of determining starch is based on the fact that starch iodide is insoluble in $N/5$ potassium acetate solution (or $N/2$ sulphuric acid) and that the composition of starch iodide varies with the excess of iodine left in solution in contact with the precipitate, a chart covering the range 0·025 to 0·20 g. of starch being used to choose the factor. The starch must be gelatinised and excess iodine used. Iodine is titrated in a portion of the supernatant liquid and in the precipitate plus liquid ; hence, by difference, in the precipitate. The method compares favourably with four established methods. Examples are given of analyses of starch in milk products and meat and fish pastes. C.

Nitrocellulose: Hydrolysis by Dilute Acids. J. Desmaroux. *C. R. Acad. Sci.*, 1938, **206**, 1483-4.

Nitrocellulose (nitrated ramie) has been treated with hydrochloric, sulphuric and nitric acids (4·7 *N*) and the loss of weight or of N measured to test the effect of the size of the anion in hindering penetration and therefore hydrolysis. Nitric acid has by far the greatest effect. Hydrochloric acid has a small effect because the Cl ion is spherical, with a diameter greater than the thickness of the disc formed by the nitrate ion. Sulphuric acid has scarcely any effect ; the sulphate ion is tetrahedral and much larger than the other ions. C.

Graded Cellulose Acetate Ultra-filters: Production. J. Duclaux and M. Amat. *C. r. Acad. Sci.*, 1938, **206**, 1475-7.

Films of graded porosity can be obtained by dissolving cellulose acetate (2-20 per cent.) in concentrated magnesium perchlorate solution, spreading a definite amount of the solution on glass, filter paper, fabric or metal, and plunging the whole into water. Films varying from 0·06 to 6 mm. in thickness can be obtained but their porosity depends almost entirely on the original concentration of the cellulose acetate; a 1,000-fold range of porosity is possible. Magnesium perchlorate also dissolves starch, gelatin and gliadin so that mixed membranes are possible. C

Capillary Systems: Permeability to Gases and Solutes. E. Manegold. *Kolloid Z.*, 1938, **82**, 269-302 ; **83**, 146-162, 299-319.

The author has examined available data on the permeability of various materials and presents a systematic summary in which the data are expressed as far as possible in c.g.s. units. The systems considered are as follows. I. *Permeation in homogeneous systems.* (A) *Diapermeation :* (1) passage of hydrochloric acid, alkali chlorides, alkali salts and non-electrolytes through collodion membranes, (2) gases and gypsum, (3) gases and soil, (4) water vapour and wood, leather, sheet cellulose, etc., (5) water vapour and leather. (B) *In- and Ex-permeation:* (6) non-electrolytes and gelatin, (7) tannins and hide, (8) evaporation from " canals " and holes, (9) drying of sand, etc., and (10) emanation. II. *Permeation in heterogeneous systems.* (A) *Diapermeation:* diffusion of gases through (1) gelatin gel, (2) rubber and balloon fabrics, (3) covering layers for balloon fabrics, (4) cellulose ester membranes, (5) lacquer films, (6) glasses, (7) sheet cellulose, gelatin, celluloid, etc., (8) minerals, (9) metals, (10) specially prepared porous metals, and (11) protective covers for thermo-elements. (B) *In- and Ex-permeation:* (12) gases and agar gel, (13) vapours and zeolites. III. *Diapermeation through phase-boundary layers.* (1) Gases and vapours with soap and linseed oil films, (2) liquid boundary layers, (3) liquid/gas boundary layers, and (4) plant cells. C.

Mono-layers: Overturning and Anchoring. I. Langmuir. *Science,* 1938, **87,** 493-500.

A report of a lecture on recent work by the author and his colleagues on the formation of X- and Y- films of barium stereate and " skeleton " films of Pb, Cd or Ba stereate, the " overturning " of layers, the " anchoring " of fatty acid mono-layers to glass or chromium, and the significance of the " zipper angle " as a measure of the adhesion of a layer for an underlying surface. C.

Coagulating Sols: Emission of Radiation. A. Rabinerson and M. Filippov. *Acta Physicochimica, U.R.S.S.,* 1938, **8,** 419-440.

Radiation is detected by means of (1) the Geiger counter and (2) yeast cells, when sols of ferric hydroxide, vanadium pentoxide, or sodium oleate, but not arsenious sulphide, are coagulated by electrolytes. No emission is detected when the sols or electrolytes are merely diluted with water. C.

Soaps: Colloid Properties. P. A. Thiessen. *Angew. Chemie,* 1938, **51,** 318-324.

A review of recent results and problems in the field of colloids, under the headings (1) ultra- and super-microscopes, (2) aerosols as the primary system of inorganic colloids, (3) directed aggregation and magnetic influences in the coagulation of iron and nickel clouds, (4) soaps as the type of organic micellar colloids, (5) genotypic transformation in soaps and (6) electron diffraction studies of fatty acids. C.

Emulsions and Protective Colloids: Theory. H. M. Cassel. *J. Phys. Chem.,* 1938, **42,** 475-482.

Deductions based on Gibbs' theory of capillarity are made concerning the change of the potential of an adsorbed substance as a function of the curvature of the adsorbing surface. No direct experiments seem to be available that might allow of a verification of the theory but an indirect test is possible in the field of emulsions. The main idea is that emulsions can be stable only if the interfacial density of the emulsifying films is greater for surfaces of larger than for those of smaller curvature. It seems to be permissible to extend the theory to the inhibiting action of " protective colloids " and " peptizing agents " in general. C.

Liquid Surfaces; Reactions at——. E. K. Rideal. *Science Progress,* 1938, **32,** 625-637.

A review is given of the reactions in mono-layers at liquid surfaces as influenced by molecular orientation. C.

Solid/Liquid Surface: Measurement of Electrical Moment. Mlle. N. Choucroun and M. Arditi. *C. R. Acad. Sci.,* 1938, **206,** 1462-4.

In order to measure the electrical moments of surfaces that may be coloured by adsorbed substances, an electrophoretic apparatus previously used for electrophoresis studies on bacteria has been modified to permit of lateral illumination of the cell for microscopic observation. Surface electrical moments were determined for pyrex and quartz tubes containing suspensions of gamboge and mastic and for the suspended particles themselves. The media were water, *N*/500 hydrochloric acid and *N*/500 sodium hydroxide. Substantially constant values for the electrical moments were obtained for the surface of the tube in one medium, independently of the particles in suspension, and for the surfaces of the particles independently of the nature of the tube. The results were in agreement with Perrin's rule that the potential of a surface is increased by addition of H ions and decreased by OH ions. C.

Starch Gel: Staling. C. H. F. Fuller. *Chemistry and Industry,* 1938, 562-8.

The problem of the staling of bread is discussed under the headings (1) study of the changes by measuring (*a*) the absorption of water by the Farinograph and (*b*) the amount of soluble polysaccharide, (2) the connection between gelatinization and staling, and (3) the chemical composition and constitution of starch, work by Katz, Haworth and others being reviewed. Staling is ascribed to a reduction in the hydration capacity of gelatinized starch, resulting in a change in gel structure. It could be controlled by a radical alteration in the ratio of α- to β-amylose which appears to reach a definite value at any one temperature. Thus, storing bread at 60° C. or $-20°$ C. is effective, if difficult in practice. Acetaldehyde also prevents the molecular re-aggregation that results in staling and it may be that a permissible, edible substance of similar properties may ultimately be discovered. C.

Lubricating Oils: Chemical Structure and Viscosity. B. Yamaguchi. *Rep. Aero. Res. Inst., Tokyo,* 1934, **8**, 229-252; 1938, **13**, No. 162, 213-235.

(1) The viscosities of benzene solutions of various high-molecular liquids were measured and calculations were made of the " viscosity association," by means of Staudinger's equation. A linear relationship was found between these viscosity associations and the temperature coefficients of viscosity. (2) In order to obtain an empirical equation for this relation, studies have been made on benzene solutions of two naphthenic and two paraffinic oils at 25, 45 and 90° C. The results establish the equation $(1/d)[(\eta-\eta_0)-1]=K_p \cdot C_p$, where d is density, K_p is a characteristic constant of the solute, independent of concentration, and C_p is the percentage concentration. A straight-line relationship is also found between the viscosity-temperature coefficient ($\Delta\eta/\Delta t$ for the range 25-45° C.) and the viscosity association, $A_v=4\cdot5+1230(\Delta\eta/\Delta t)$. Viscosity characteristics of viscous solutions of polystyrenes and high-molecular-weight hydrocarbons are also studied in relation to the effect of (1) length of side chain, (2) straight chains as compared with branched chains, (3) ring structure, (4) olefinic linkages in the side chain and (5) the presence of a cyclic nucleus in the molecule. C.

" Philiphane " Glass: Colour Reproduction. P. J. Bouma. *Philips Tech. Rev.,* 1938, **3**, 47-49.

" Philiphane " or " Neophane " glass, used as an envelope for an electric lamp bulb reproduces most colours and particularly blue with greater saturation on account of its absorption band in the yellow region of the spectrum. Various disadvantages in the use of incandescent light, such as the faded appearance of blue and the shift of green toward yellow-green, are partially overcome, and the most important advantages of electric light such as the high saturation of colours in the neighbourhood of orange, the greater intensity of red, etc., are retained. C.

Electron Microscope: Application. D. Beischer and F. Krause. *Angew. Chemie,* 1938, **51**, 331-5.

A brief description is given of the magnetic electron microscope and examples are discussed of its application in the study of more or less cubical particles, filamentous systems, and lamellar systems. C.

Cellulose Acetate: Absorption and Diffusion of β-Rays. R. Arnoult. *J. Physique et Radium,* 1938 [vii], **9**, 145-8.

An apparatus is described for the study of the absorption and diffusion of electrons in thin layers of cellulose acetate which works by magnetic focussing of the electrons and in conjunction with Geiger-Muller light counters. The coefficients of transmission and diffusion of cellulose acetate are shown in graphs, and compared with those for aluminium. C.

Multi-molecular Films: Electron-diffraction Study. L. H. Germer and K. H. Storks. *J. Chem. Phys.,* 1938, **6**, 280-293.

Electron diffraction studies have been made on layers of molecules of barium stearate and of stearic acid built up on surfaces by the Langmuir-Blodgett method. The hydrocarbon chains of barium stearate molecules were found to form hexagonal arrays with their axes normal to the supporting surface and separated by distances of 4·85 A. Stearic acid molecules form crystals of monoclinic form with $a=8\cdot27$ A, $b=4\cdot96$ A, $\beta=70°$, the a and b axes lying in the plane of the supporting surface. It is suggested that the methods of the experiments can probably be applied to fundamental studies of boundary lubrication, and that interpretable diffraction patterns might be obtained from single layers of molecules that are considerably shorter than stearic acid, and comparable in scattering power with films of adsorbed gas. C.

Cetyl Palmitate and Dicetyl Ether: Crystal Structure. R. Kohlhaas. *Z. Kristallographie*, 1938, **98**, 418-438 (through *Sci. Abstr.*, 1938, A.**41**, 325).

An X-ray examination of cetyl palmitate and dicetyl ether is reported. The unit cells appear to contain two double molecules. C.

Denitrated Nitrocellulose: X-ray Structure and Solubility. M. Mathieu and T. Petitpas. *C. R. Acad. Sci.*, 1938, **206**, 1485-6.

Nitrocellulose (nitrated ramie) has been denitrated in stages by dilute nitric acid, and the X-ray diagrams and solubility of the products in ether-alcohol of 56° Bé. are discussed. The diagram of dinitrocellulose is obtained from about 10·5 per cent. of nitrogen and the diagram of trinitrocellulose from about 13 per cent. upwards. The dinitrocelluloses are completely soluble but the solubility decreases as the percentage of nitrogen increases, the completely nitrated product being almost insoluble. C.

Fibre Diagram: Intensity Distribution. Y. Go, S. Nagata and J. Kakinoki. *Bull. Chem. Soc. Japan*, 1938, **13**, 198-210 (through *Sci. Abstr.*, 1938, A.**41**, 412).

The intensity distribution in the fibre diagram has been investigated and an attempt made to derive a general mathematical function for the distribution in the ideal spiral fibre structure. Such a function must include the intensity distribution for the ring and the simple fibre structures as special cases, whilst the real structure may be regarded as a superposition of many ideal spiral fibre structure diagrams. A formula has been derived and the different possible types of diagram are systematised. C.

Long-chain Carbon Compounds: Crystal Structure. Th. Schoon. *Z. physikal. Chem.*, 1938, B.**37**, 385-410.

The crystal structure has been studied, by means of electron diffraction and X-ray diagrams, of the following compounds—stearic acid (in two forms), margaric acid, palmitic acid, cetyl alcohol, dicetyl ether, cetyl palmitate, the paraffin $C_{30}H_{62}$ (in two forms), the paraffin $C_{31}H_{64}$, sebacic acid and hexadecanedicarboxylic acid. The crystallographic data, supplemented by published figures, are tabulated. It appears that three elementary cells are frequently repeated; they have the dimensions $a=5\cdot0$, $5\cdot6$, $9\cdot5$ A, $b=7\cdot5$, $7\cdot5$, $5\cdot0$ A, $\beta=90$, 60, 54 degrees, respectively. On the assumption that there must be minima of free energy for stable and metastable forms, a system of feasible structures can be derived from a basic form corresponding with a rhombic, parallel arrangement of the chains in the crystal. All the measured structures for the *n*-hydrocarbons and their derivatives are included in the calculated scheme. If the crystal linkage is determined by ionic as well as dispersion forces, there are slight deviations from the system. The experimental results offer simple explanations for the various transformations of the paraffins. C.

Experimental Data: Law of Error and Combination of Observations. H. Jeffreys. *Phil. Trans. Roy. Soc.*, 1938, A**237**, 231-271.

The limitations of the theoretical grounds for accepting the normal law of errors of observation are discussed, and seven series of observations capable of providing tests of its truth are examined. It is found that the χ^2 test, as usually employed, is not sufficiently sensitive to establish departures from the normal law. A wider grouping, however, reduces the random error of χ^2 sufficiently to show the departures clearly, though it is still less sensitive than the ratio of the maximum likelihood solution for the departure to its standard error. It appears that no form of the test is of much use when the law to be tested implies very small expectations in some of the groups. An approximation to the method of maximum likelihood for certain types of Pearson laws is developed and methods of combining observations following such a law and determining their uncertainties are provided. C.

Gelatin: Amino-acid Analysis. N. I. Gawrilow and M. A. Poulounina. *Bull. Soc. Chim. France,* 1938 [v], **5**, 454-9.

Blanchetière in 1927 proposed a method for separating the diketopiperazines from the amino- acids in a protein digest by means of the barium salts of the carbamates of the latter. Some doubt exists about the behaviour of proline and oxyproline in this scheme. The authors have studied this point with reference to the hydrolysis of gelatin (containing about 30 per cent. of the prolines), and report that, like the α-amino-acids, the prolines are recovered almost quantitatively in the precipitated barium salt, the anhydride fraction containing a mere trace. C.

Glycerol: Detection. O. Frehden and Chen-Hua Huang. *Mikrochimica Acta,* 1937, **2**, 20-23.

Two micro-tests for glycerol are described. (1) The liquid is heated with crystalline oxalic acid and the carbon dioxide evolved is detected by means of a phenolphthalein and sodium carbonate test paper. (2) The monoformin obtained in the oxalic acid reaction is mixed with alcoholic hydroxylamine hydrochloride, made alkaline with alcoholic alkali and heated to form the hydroxamic acid salt, and this is detected as the violet ferric salt on adding acid and ferric chloride. C.

Pentosans and Pentoses: Detection and Determination. A. J. Bailey. *Mikrochimica Acta,* 1937, **2**, 35-46.

Qualitative tests depending on crystal habit, optical properties and physical constants of pentoses and their derivatives are suggested as the basis of a scheme of identification. The pentosan determination that depends on conversion into furfuraldehyde and precipitation of this with thiobarbituric acid is developed as a micro-procedure. C.

Cellulose: Heterogeneity. H. Lachs and Co-workers. *Chimica e Industria,* 1938, **20**, 341.

In order to test the heterogeneity of different kinds of cellulose, cotton cellulose, various kinds of wood pulp and bleached linters were acetylated, the acetates fractionated by addition of water to the solutions in glacial acetic acid-acetone mixture, and the viscosities of the chloroform solutions of the precipitates measured. The individual fractions of cellulose acetate showed considerable specific viscosity differences. The most uniform products (12 per cent. variation) were those from linters; wood pulp acetates varied by 31-80 per cent. C.

Cellulose: Hydrolysis. M. L. Wolfrom, L. W. Georges and J. C. Sowden. *J. Amer. Chem. Soc.,* 1938, **60**, 1026-1031.

A 5 per cent. solution of cellulose in fuming hydrochloric acid was kept at 16° and the course of the hydrolysis followed polarimetrically up to 3 hours. Samples were also removed at various intervals and mercaptalated with ethyl mercaptan. Precise sulphur analyses were made on the products and they were also hydrolysed and the viscosities of the regenerated celluloses in cuprammonium solution were determined. An exactly similar set of experiments was then performed on another lot of the same cotton linters, except that the mercaptalation was omitted. The copper numbers of the mercaptalated hydrolysed celluloses ranged from 1·8 to 5·5 and of the non-mercaptalated hydrolysed celluloses from 5·0 to 28·4. The degrees of polymerisation in glucose units are calculated from the sulphur analyses on the mercaptalated products and also from the cuprammonium viscosities; the results are tabulated. A determination has also been made of the viscosity changes taking place at 16° in a 5 per cent. cellulose solution in fuming hydrochloric acid with increasing time of hydrolysis. C.

Cellulose Ethers: Physical Properties. E. J. Lorand. *Indust. Engng. Chem.,* 1938, **30**, 527-530.

A review is given of published information on the dependence of the physical properties of cellulose ethers on the following factors: (1) nature of the ether group (alkyl, aralkyl, hydroxyalkyl, other substituted alkyl); (2) relative numbers of etherified and free hydroxyls ; (3) chain length (viscosity) of the product; (4) uniformity as regards length and degree of substitution of the single chains. C.

Celluloid: Use in Chemical Apparatus. U. R. Evans and R. S. Thornhill. *Chemistry and Industry,* 1938, 593-595.

The making of apparatus from wax-covered celluloid sheet is described. Pieces of celluloid can be rapidly cemented by nitrocellulose adhesive (Durofix), since the solvent of the adhesive (amyl acetate) is absorbed into the celluloid. Disadvantages of the use of waxed celluloid are that the apparatus cannot be cleaned from sparingly soluble matter adhering to the walls; it cannot be heated or used for reagents which would dissolve or attack either wax or celluloid and it is inflammable. The last disadvantage has been overcome by using " acetate " celluloid. For long-continued experiments, " nitrated " celluloid appears to be more suitable. Celluloid can be used for the mounting of metallic specimens intended for experiments on corrosion and for joining the metallic components of apparatus. C.

Starch: Composition. M. Samec and M. Blinc. *Kolloid Beihefte,* 1938, **47**, 371-472.

Work on the composition of the starch grain by the authors and others during the last twenty years is exhaustively reviewed under the following headings: (1) fractionation of the granule constituents; (2) phosphoric acid systems; (3) phosphoric acid-nitrogen systems; (4) fatty acid systems; (5) the silicic acid system; (6) comparison of the amylo- and erythro-substances; (7) the amylopectin question and (8) details of experimental work cited in the foregoing discussion. C.

Starch and Cellulose: Periodic Acid Oxidation. E. L. Jackson and C. S. Hudson. *J. Amer. Chem. Soc.,* 1938, **60**, 989-991.

Glyoxal and *d*-erythrose are obtained when corn starch and cotton cellulose are oxidised by periodic acid and the products are hydrolysed, the $C_6H_{10}O_5$ units being broken between carbon atoms 2 and 3, in agreement with the accepted structure. C.

Chinese Silk Wax: Composition. W. Bergmann. *Textile Research,* 1938, **8**, 221-5; also *J. Biol. Chem.,* 1938, **123**, No. 3, ix-x.

Samples of Chinese white raw silk were refluxed with 80 per cent. and 95 per cent. alcohol and then with ether. The alcoholic extract was concentrated and diluted with water, and the precipitate then extracted with ether. The combined ether extracts yielded a brown wax, amounting to 0·54 per cent. on the weight of the silk. The wax was resolved into a mixture of primary alcohols and acids C_{26}-C_{32}, paraffins C_{25}-C_{31}, and liquid fatty acids, resembling the mixtures obtained from plant cuticle by Chibnall and co-workers (1931-4). C.

Silk Fibroin: Properties. H. Kaneko (and Y. Nakazawa). *Bull. Agric. Chem. Soc. Japan,* 1937, **13**, 1215-1230 (through *Brit. Chem. Abstr.,* 1938, B. 494).

Fibroin-A components adsorb inorganic acids, acid dyes, iodine and heavy metal salts to a greater extent than the B-form but organic acids and basic dyes are absorbed more strongly by the latter. Fibroin adsorbs nitric acid to form yellow nitro-fibroin, the A-form acquiring a deeper yellow than the B-form. Fibroin components can also be diazotised and coupled to form azo dyes. C.

Raw Silk Sericin: Fixation by Chromium Salts. M. Oku and Z. Hirose. *Bull. Agric. Chem. Soc. Japan,* 1937, **13**, 1257-1267 (through *Brit. Chem. Abstr.,* 1938, B.494).

Sericin is " fixed," or rendered insoluble in boiling water and firmly bound to the fibroin of raw silk, by treatment with Cr salts. Adsorption of 1 per cent. of Cr_2O_3 greatly facilitates fixation. The amount of Cr taken up by white raw silk is equal to or greater than that taken up by yellow raw silk. Strength and extensibility are not impaired by fixation with Cr salts but the surface of the silk acquires a woolly appearance. C.

Alginic Acid: Constitution and Properties. G. Lunde, with E. Heen, E. Oy and H. Kringstad. *Kolloid Z.,* 1938, **83**, 196-202, 202-203, 204-210.

(1) The preparation from sea-weed of pure alginic acid and its Na salt is described and analyses are recorded, especially of the amount of carbon dioxide evolved by distillation with 13-18 per cent. hydrochloric acid. (2) X-ray diagrams are reproduced of powdered alginic acid (and pectic acid for com-

parison) and of a stretched filament of the acid obtained by extruding the sodium salt into an acid bath. A fibre-molecule is revealed. (3) Viscosity measurements on solutions of Na alginate in water and in sodium hydroxide are recorded and Staudinger's rule applied to them. C.

Plastics: Production. F. Sproxton. *Chem. and Ind.*, 1938, 607-616.

A report of a lecture, beginning with a historical survey of the rise of the plastics industry, outlining the production of the thermoplastic cellulose derivatives, the thermo-setting phenol- and amine-formaldehyde resins, and the vinyl and acrylic polymerides, and discussing actual and possible applications. C.

Protein Hydrolysates: Adsorption Isotherms. A. Lottermoser and K. Edelmann. *Kolloid Z.*, 1938, 83, 262-278.

In the hope that the chromatographic method might offer a means of fractionating a protein digest, the authors have made a systematic study of the adsorption isotherms of ammonium salts, amine hydrochlorides, and amino-acids. Preliminary work on various aluminas and clays showed that an alumina produced by Messrs. Merck according to Brockmann's standardised procedure was the most satisfactory. The isotherms are discussed in detail but the final conclusion is drawn that they do not offer a basis for predicting the behaviour of a mixture of protein hydrolysates in the chromatographic adsorption column. The problem must be tackled by direct trials with a number of mixtures. C.

Paraffin Soap Solutions: Gelation. A. S. C. Lawrence. *Trans. Faraday Soc.*, 1938, 34, 660-677.

A systematic examination has been made of dispersions of alkali and heavy metal soaps in " Nujol " by means of melting and cooling curves. Details of the preparation and purification of the soaps are given. The soap-Nujol gels were found to exist in three forms: (1) true solution, (2) true gel and (3) pseudo-gel paste of micro-crystals suspended in oil. Solution in Nujol and melting of the dry soap are thermal disruptions of the—COOM groups. In the plastic and gel stages, the hydrocarbon tails are in kinetic agitation which prevents the molecules of the soap from forming into their regular lattice. The behaviour of a given soap depends on both kation and hydrocarbon tail. Gels of the oleates have much lower rigidity than those of the corresponding stearates. With some kations, the oleate gives gel and plastic forms while the stearate does not. The gels of the alkali metals and of the alkaline earths are sensitive to small additions of certain polar substances with which they seem to form complexes. The theory of gels is discussed and the various possible types reviewed. C.

Foams: " Foaminess " Measurement. J. J. Bikerman. *Trans. Faraday Soc.*, 1938, 34, 634-638.

A method for measuring a unit of " foaminess " is described. A measured volume of air, about 1,000 c.c. is forced through a porous glass membrane and an overlying layer of solution, the lather formed being measured in the calibrated tube attached to the porous glass membrane. As the average foam volume is proportional to the rate of streaming of the air, $vt/V=f$, where v is the average foam volume, V the volume of air forced through the septum in t secs. and f a factor independent of the rate of streaming and shown to be the life-time of a bubble in the foam. It is also shown that vt/V is independent of the air pressure, the porosity of the septum, the size of the septum and tends to a limit when the amount of liquid increases. As the value of vt/V observed for large quantities of liquid is independent of the size and shape of the apparatus, of the rate of flow of air and of the amount of the specimen under investigation, it is taken as the unit of foaminess. In the C.G.S. system it is of the dimension of the second and the symbol Σ (from the greek saponos = lather) is suggested for it. For 1 per cent. n-butyl alcohol at room temperature $\Sigma = 4\cdot7$ sec. C.

Organic Solvent Dispersions: Stability. J. C. Carruthers. *Trans. Faraday Soc.*, 1938, 34, 646-649.

A table is given of emulsifiable and non-emulsifiable substances with certain of their properties, from which it can be seen that emulsifiable organic compounds are those of high molecular weight and high boiling point, whereas those of small molecular weight are, in general, not emulsifiable in the absence of a chemical stabiliser. Electrophoretic mobility determinations were made on liquid mixtures of hexane and octadecane. The dispersions were prepared cold by means of a mechanical homogeniser, and the mobility determinations were carried out by the moving boundary method in a U-tube apparatus, in 0·01 M. sodium diborate buffer at *p*H 9, and at 25° C. The behaviour of these liquid droplets consisting of hexane and octadecane in different proportions indicates that the heavier constituent immobilises the surface molecules of hexane. An emulsion can be obtained by droplets each of which contains as much as 90 per cent. of hexane although no emulsion can be obtained with pure hexane. A similar behaviour has been observed in mixtures of hexane and decalin, which also show that the immobilised hexane molecules have a greater intrinsic capacity for adsorbing negative charges than the decalin molecules themselves. C.

Cellulose Acetate and Methylcellulose: Diffusion Constants and Molecular Weights. A. Polson. *Kolloid Z.*, 1938, **83**, 172-180.

Measurements of diffusion constants were made on methylcellulose in salt solutions and on cellulose acetate in acetone by Lamm's refractive index method, which is described. The preparations were fractionated and each fraction measured separately. The dependence of the diffusion constants on the concentration is treated theoretically with respect to the swelling pressure. The calculations show agreement with an evaluation of a non-ideal diffusion curve, in the case of a high concentration of a high-molecular cellulose acetate. The diffusion constants of the methylcelluloses were used to calculate molecular weights from various data obtained by Signer and co-workers with the ultracentrifuge. The molecular weights calculated from the sedimentation and diffusion constants agree with those derived from the sedimentation equilibrium. Attempts are being made to estimate the ratio of the axes of the ellipsoidal molecule of methylcellulose from the magnitudes obtained. C.

Colloidal Solutions: Influence of Ultrasonic Waves on Viscosity. H. Freundlich and D. W. Gillings. *Trans. Faraday Soc.*, 1938, **34**, 649-660.

The effects of ultrasonics on colloidal solutions of various types have been tested, with the following results. (1) The effect of ultrasonics, if any, is to reduce the viscosity; this occurs when the viscosity is "anomalous" or "structural." (2) The mechanism of the viscosity reduction is not the same in all cases, but in the main the collapse of cavities is essential; no reduction occurred when solutions of gums, cotton yellow or soap were irradiated under high external pressure. (3) With gum tragacanth solutions, the viscosity increases after standing for a time after irradiation; with gelatin the recovery is rapid. (4) In cotton yellow solutions irradiation caused a destruction of rod-shaped particles present in the original solution, the reduction of viscosity being accompanied by a disappearance of streaming double refraction and a corresponding change in the ultramicroscopic view. (5) In sodium stearate solutions, the viscosity reduction was parallel with the appearance of a number of rod-shaped particles, better defined than those originally present, and a disappearance of the background of small particles. (6) In gelatin and agar solutions the viscosity reduction was not entirely prevented by avoiding a collapse of cavities. (7) Anomalous viscosity was not markedly affected by ultrasonics in vanadium pentoxide or benzopurpurin solutions and the normal viscosity of concentrated sodium oleate solutions is also unaffected by ultrasonics. C.

Nitrocellulose: Properties. H. M. Spurlin. *Indust. Engng. Chem.*, 1938, **30**, 538-542.

Nitrocellulose was systematically fractionated by precipitation with heptane from acetone solution and stress-strain curves and fold resistance were determined on films from such fractions by the Schopper fold tester. Results are compared with those from unfractionated nitrocellulose and from certain blends of high- and low-viscosity nitrocellulose. A definite relation exists between viscosity and Schopper fold resistance and there is a sharp limit of viscosity below which the product does not withstand folding. The fractions gave higher fold values than unfractionated material of the same viscosity and this in turn was better than blends of high- and low-viscosity nitrocellulose. There seems to be no commercial advantage in securing a greater degree of uniformity for products to be used in protective coatings and plastic masses, but adhesion seems to be improved by blending high- and low-viscosity material. Certain of the blends lifted the surface of the glass on which films were dried in the same manner as gelatin.

Physical properties are thus a function of homogeneity, other fractions being constant. C.

Plastic Fluids: Flow. W. Philippoff. *Kolloid Z.*, 1938, 83, 163-172.

The rate of flow/driving pressure curves of a number of systems have been obtained by means of a capillary viscometer with exchangeable capillaries, and, by mounting the viscometer in the optical path of a polarising microscope, observations have been made at the same time of the streaming double refraction. Photographs are reproduced of the phenomena presented by mercurosalicylic acid, vanadium pentoxide, cotton yellow and soap sols. The non-Newtonian Na oleate and vanadium pentoxide (2 days old) sols exhibit true laminate stationary flow. Gels of mercurosalicylic acid, Cotton yellow and cellulose acetate ("Cellite," in benzyl alcohol) exhibit a type of flow that is called "pseudo laminate" and consists in the flow of gel particles. The flow depends on the apparatus and is conditioned by the smallest capillary and greatest pressure employed. Hence, until the breaking up of these particles in the capillary has been treated statisically, it is impossible to use the viscosity data in calculations of material constants. C.

Cellulose and Cellulose Derivative Solutions: Depolymerisation by Light. E. Montonna. *Chimica e Industria,* 1938, **20**, 317.

The action of light on solutions of cellulose in cuprammonium hydroxide and on cellulose nitrate and acetate in various solvents has been studied. In all cases a remarkable reduction in the viscosity of the solutions took place without evidence of chemical action. The general effect of light on solutions of cellulose and its derivatives seems to be a marked depolymerising action accompanied by slight amounts of chemical degradation. C.

Linseed Oil Paint: Effect of Artificial Light on Drying. D. G. Nicholson and C. E. Holley. *Indust. Engng. Chem.*, 1938, **30**, 563-565.

Experiments on bodied linseed oil paint films showed that an increase in weight takes place sooner with an intense light than a less intense light. White lead pigments showed the least effect, zinc oxide pigments greater and titanium dioxide pigments the greatest differences in drying time as the light intensity was varied. It appears that the light is a catalyst favouring the removal of natural anti-oxidants present in the oil. C.

Sheen Glossmeter. E. E. Jelpke. *J. Sci. Instr.*, 1938, **15**, 181.

A "Sheen Glossmeter" for comparative measurement of the gloss or mattness of paint, varnish, lacquer or other surfaces is described. The device consists of a lamp unit with condenser and diaphragms, the base casing which is arranged for accurate location of test samples irrespective of size, and a photo-cell tube, containing a special photo-cell. A standardised test-plate is supplied, which represents 100 per cent. gloss. The "Sheen Transformer" to be used with the glossmeter gives very fine control of voltage to the lamp and tends to reduce voltage fluctuations in the mains. C.

Visual Purple: Role in Vision. R. J. Lythgoe. *Proc. Phys. Soc.*, 1938, **50**, 321-339.

A lecture on the structure of the retina and the role of the visual purple, with 58 references. No role for visual purple has been found in vision at high illuminations, but there is some indication of its presence and that it must be undergoing continuous bleaching in the living eye under high illuminations, though vision shows no scotopic components under these conditions. Further, even though the cones are numerically far inferior to the rods in the peripheral retina, the responses of these regions are of the pure photopic type. Visual phenomena are therefore interpretable under conditions of scotopic vision but no material basis for phenomena of photopic vision and the mechanism of colour vision has yet been found. C.

Statistics for the Veterinarian. II. H. N. Turner. *Australian Vet. J.*, 1938, **14**, 2-11 and 60-67.

Continuing her previous paper (see *J. Text. Inst.*, 1937, A108), the author discusses statistical methods appropriate to qualitative data. After some fundamental definitions, an account is given of data which can be classified into categories and treated either by calculation of exact probabilities, or by the χ^2 test. A number of typical examples are worked out, and certain pitfalls discussed. W.

Simplified Method of Preparing Histidine. L. E. Gilson. *J. Biol. Chem.*, 1938, **124**, 281-285.

A study is made of the precipitation of histidine from a blood protein hydrolysate as the mercuric chloride complex and a procedure developed for obtaining an excellent yield of very pure histidine dihydrochloride with a minimum expenditure of time and materials. A new method of removing iron, as ferrous sulphide, is given, and the crystallisation of histidine dihydrochloride from a dioxane-water mixture described. W.

Micro-determination of Arsenic. A. E. How. *Ind. Eng. Chem. Anal. Edn.*, 1938, **10**, 226-232.

A modified Gutzeit procedure capable of determining as little as 0·1 microgram of arsenic with a probable error of 5 per cent. and sensitive to 0·01 microgram of arsenic is described. W.

Importance of Threshold Characters in Animal Breeding. L. J. Cole. *Rec. Procs. 30th Annual Meeting of the Amer. Soc. Animal Production*, 1937. pp. 291-296.

A clear explanation of the practical importance of those characters which may have a hereditary basis, but which are often not expressed except under some special combination of environmental stimuli. These principles operate in breeding practice more often than is always realised. W.

Tea-seed Oil. C. van de Koppel and P. A. Rowaan. *Indische Mercuur*, 1938, **61**, 167-169; *Ber. Afdeel. Handlsmuseum Koninkl. Ver. Koloniaal Inst.* No. 121 (through *Chem. Abs.*, 1938, **32**, 4366).

Seeds of *Thea sinensis* contain 16-45 per cent. oil; the Assam varieties contain the most. Kernels of the seeds of *T. japonica* and *T. sasanqua* contain up to 60 per cent. oil. The physical and chemical properties of these oils are practically indistinguishable from each other or from those of olive oil, except that tea-seed oil appears to contain slightly more oleic acid. No method has yet been found that will detect adulteration of olive oil with tea-seed oil. [Attention is drawn to paper by Barritt, *J. Text. Inst.*, 1938, **29**, P47-P59.] W.

PATENTS.

Colloidal Graphite Lubricants. R. R. Ducas. B.P.482,630 of 1/2/1937.

Colloidal suspensions of graphite in oils, suitable for use as lubricants, are stabilized by the addition as protective colloids, of "elektrionized" or "voltolized" vegetable oils. Graphite is ground with the oil vehicle and a small quantity of a vegetable oil which has been treated electrically with a high tension discharge in the presence of an ionizing gas is added as a protective colloid. Subsequently, after dilution with mineral oil, a small quantity of petroleum oil with a high tar content, rich in natural colloids, may be added. The grinding is preferably effected in a rotary colloidal grinder cooled to maintain a temperature below 110° C. W.

Torsion Viscometer. British Thomson-Houston Co. (London) Ltd. and G. R. R. Bray. B.P.485,300 of 21/12/1936: 18/5/1938.

An instrument for measuring the viscosity of a liquid comprises a constant speed motor, a body carried by the rotor shaft of the motor and arranged to be immersed in the liquid, a support pivotally carrying the stator of the motor, an indicating device arranged on the stator, and a spring arranged between the stator and the support to oppose angular displacement. C.

Powders: Dielectric Measurement of Grain Size. A. E. O'Dell (for Haardt & Co., A.-G., Düsseldorf). B.P.487,232 of 14/12/1936: 14/6/1938.

A method for determining grain size and size range of fine powders depends on measuring the changes in dielectric constant of a layer of a fluid (of a dielectric constant different from that of the powder and of suitable density and/or viscosity to permit of complete sedimentation in one or two minutes) bounded by the electrodes, e.g. a plate on which the deposit falls and a grid at a sufficient distance above it. C.

10—ECONOMICS

Cotton Stocks: International Consumption Statistics. N. S. Pearse. *Int. Cotton Bull.*, 1938, **16**, 372-382.

Figures returned in the census of cotton consumption by various countries for the half-year ended 31st January, 1938, and of cotton mill stocks and cotton spinning spindles are tabulated. The total mill stocks of all kinds on January 31st were 5,061,000 bales, as against 5,900,000 in 1937. Total spindles declined from 149,524,000 in July, 1937, to 147,219,000 in January, 1938. British spindles are given as 20,494,000 twist and 16,846,000 weft. Average hours worked in the various countries are given and figures showing the consumption of cut rayon by the cotton spinning industry. C.

Japanese Rayon Industry: Development. Mitsubishi Economic Research Bureau. *Annales Sciences et Arts, Appl. Ind. Text.* (*Verviers*), 1938, **1**, 111-114.

Tables are given of Japanese exports of rayon and rayon fabrics for 1930 and 1934 to 1937 according to destination, production of rayon fabrics classed according to kind for 1930 to 1937, consumption of rayon thread in Japan from 1930 to 1937 and the maximum and minimum prices for rayon in the years 1927 to 1937. The export of rayon fabric reached 528 million square yards (value 149 million yen) in 1936, following close on cotton (484 million yen) and raw silk (387 million yen). This is ten times the quantity of the 1929 export and five times its value. C.

Japanese Spinning Mills in China: Statistics. H. Higuchi. *Annales Sciences et Arts, Appl. Ind. Text. (Verviers)*, 1938, **1**, 85-88.

Figures are given to show the growth of Japanese spinning mills in China from 1925 to 1936. The first factory was built in 1895. The industry flourished during the War on account of the preoccupation of the European powers and survived the difficult years following. The Japanese now have half or more of the total mills in China, but the number is only 17 per cent. of the mills in Japan. C.

Persian Cotton Industry: Organisation. J. Michel. *Annales Sciences et Arts, Appl. Ind. Text. (Verviers)*, 1938, **1**, 99-109.

An account is given of the cotton industry in Persia with statistics for 1933-34 and 1935-36. Graphs show the imports of cotton thread and fabric from 1926 to 1936 in quantity and value. C.

Textile Price Indices, May, 1938. W. H. Slater. *Textile Weekly*, 1938, **21**, 829.

The Index numbers for May are:—Raw cotton: American, 65·47; Egyptian, 69·00. Yarns: American, 109·2; Egyptian, 98·5. Piece goods: 119·0. "All cottons": 100·8. Wool group: 127·1. Other textiles: 72·6. "All commodities": 121·4 (1913 = 100). C.

Textile Wholesale Prices, May, 1938. *Board of Trade J.*, 1938, **140**, 790, 793.

The Index numbers for May are:—Cotton 82·7 (the lowest since December, 1933); Wool, 102·3; Other textiles, 67·9; "All articles", 102·0 (1930 = 100). Average monthly prices for the main lines in raw cotton, yarns and cloth, wool and other textiles show declines in the cotton industry but an upward trend in wool. C.

Raw Cotton Prices: Influence of Finance. J. A. Todd. *Empire Cotton Gr. Rev.*, 1938, **15**, 105-112.

The influence on cotton prices of the valuation and devaluation of the various national currencies, and American crop restriction, are discussed. C.

Raw Silk: Supply and Consumption 1937-8. H. T. Gaddum & Co. *Textile Weekly*, 1938, **22**, 44-5.

A table shows estimates of British consumption of raw and waste silk, and imports of silk piece goods from Japan and other sources. Raw silk prices, month by month from July, 1936, to June, 1938, are plotted on a graph. The trends are discussed. C.

Textile Production Statistics: May, 1938. *Bd. Trade J.*, 1938, **140**, 882.

Monthly averages are given for raw cotton delivered to mills, wages paid in the wool industry, percentages of insured workers unemployed in the cotton and wool industries, production of rayon yarn and waste and deliveries of silk for home consumption in 1930, 1936, 1937, January-March, 1937, to January-March, 1938, May, 1937, and April and May, 1938. Raw cotton delivered to mills in May, 1938, amounted to 93 million lb. and the percentage of insured workers unemployed in the cotton industry was 29·8. Production of rayon yarn and waste in May was 13·39 million lb. and silk deliveries amounted to 493,000 lb. C.

Textile Wholesale Prices, June, 1938. *Bd. Trade J.*, 1938, **141**, 43, 45.

The Index numbers for June are Cotton 80·9, Wool 100·3, Other textiles 67·5, All commodities 100·7. Monthly average prices for the main lines in raw fibres, yarns and fabrics are tabulated for June, 1937-June, 1938. A general downward trend continues. (The figures for April given on p. A 458 of the *Journal* should be corrected to Cotton 85·2, Wool 102·2, Other textiles 68·1, All commodities 103·1. Inadvertently, the figures for 1937 were given.) C.

World Cotton Crops: Statistics. J. A. Todd. *Empire Cotton Gr. Rev.*, 1938, **15**, 136-141.

Statistics are tabulated of the Indian crop (to February, 1938), the Sudan crop (estimates for 1936-37 and 1937-38), U.S. consumption of cotton by varieties (to February, 1938), World's carry-over of American cotton (to February, 1938), highest and lowest future prices and Liverpool spot prices of American with other varieties as percentages (August, 1936, to February, 1938). The figures are discussed. C.

World's Cotton Industry: Structure and Orientation. F. Magri. *Bollettino Cotoniera*, 1938, **33**, 173-189.

Statistics and graphical charts are given of (1) world production of cotton, (2) consumption, (3) percentage of cotton spindles, (4) percentage of yarn spun, (5) percentage of looms and (6) percentage of cotton fabrics produced, in the principal countries. The cotton trade from the raw material to the manufactured article is reviewed and trends in the industry are discussed, with reference to controls in certain States. C.

The Government Flax Grant. Scutchers air their Views. *Irish Text. J.*, 1938, **4**, No. 6, 1-9.

At a meeting of the North Derry and North Antrim scutch-mill owners an association was formed for the purpose of nominating a representative for a place in the specially appointed committee, which will administer the Government's grant of £150,000 for the development of home grown flax fibre in Northern Ireland. The contemplated scheme was criticised and several suggestions were made regarding the best method of increasing flax production and quality. L.

Replacement Cost of a Flax Spinning Mill. *Irish Text. J.*, 1938, **4**, No. 6, 10.

Compares the replacement cost of a flax spinning mill for pre-war and post-war periods. It is stated that under present or probable future trading conditions, it would be impossible to erect a new mill in Ireland to-day, and pay a fair dividend on the capital invested, even taking into account the advantages yielded by improved layout and the latest types of machinery and equipment. The replacement value of a flax spinning mill has been estimated as follows:—Period 1910-1914, £7 all-in-all costs for spindle. Period 1937-1938, £15 plus 10 per cent. all-in-all costs for spindle. These figures are based on the erection and equipment of a flax spinning mill containing from 15,000 to 20,000 spindles, including land, buildings, machinery, furnishings, etc. L.

11—INDUSTRIAL WELFARE, INDUSTRIAL PSYCHOLOGY, AND EDUCATION

Indian Jute: Research in Manufacture. S. G. Barker. *Textile Industry and Exporter*, 1938, **18**, No. 122, 13-16.

An abstract of a lecture on the need for research in the jute industry under the following sub-titles:—(1) The botany and chemistry of the fibre; (2) X-ray examination; (3) influence of lignin on jute processing; (4) conversion of fibre into yarn and fabric and (5) finishing processes. C.

Silk Weavers: Efficiency Analysis. *Textile Weekly*, 1938, **21**, 792-3.

The output of four weavers operating two Ruti looms each on fine silk dress goods is recorded as a graph and the " peaks " are discussed. The first hour of the morning and after dinner were peak periods and a third peak is ascribed to the practice of serving a cup of tea at 4 p.m. while the weavers are still at the looms. C.

Indian Central Cotton Committee: Activities. Sir Bryce Burt and D. N. Mahta. *Empire Cotton Gr. Rev.*, 1938, **15**, 93-104.

A review of progress in the improvement of Indian cotton supplies. C.

ALPHABETICAL INDEX TO ADVERTISEMENTS

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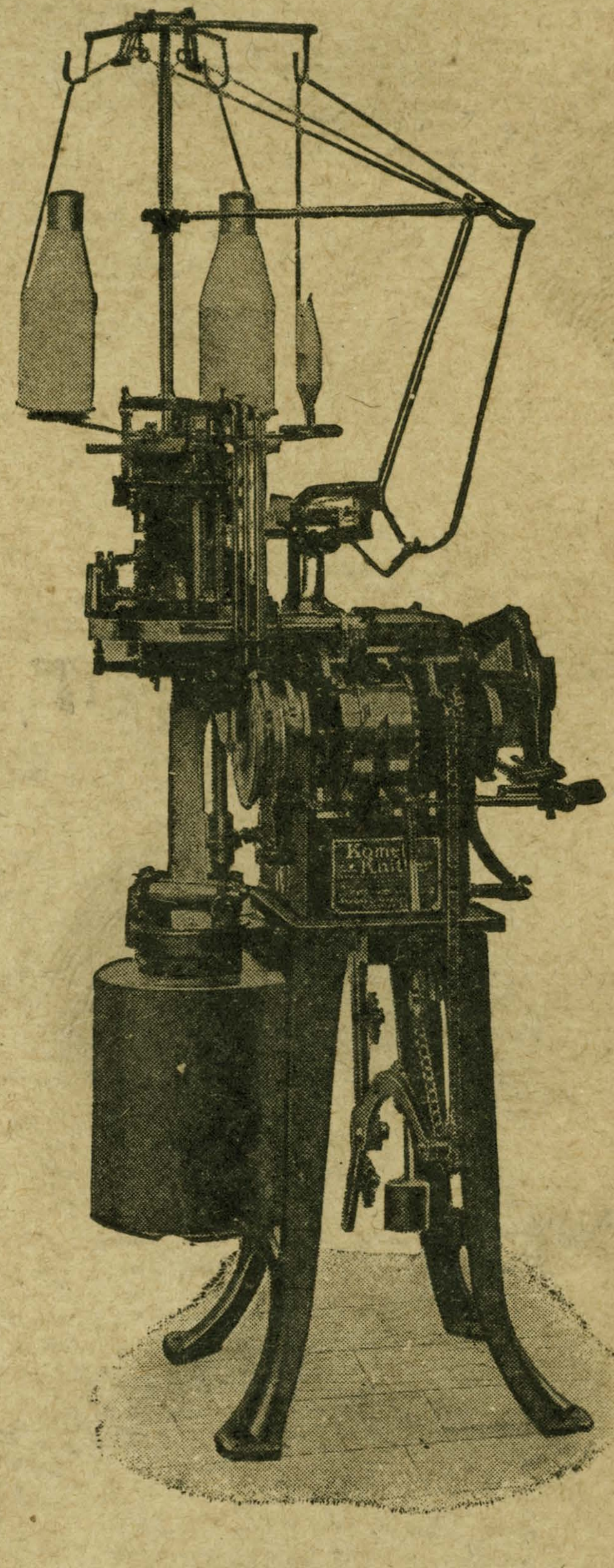

GENTS' HALF HOSE

1/1 Top, Plain Leg and Foot.
1/1 Top, Plain Leg and Foot, High Spliced Heel, Sole and Toe.
1/1 Top, Broad Rib, any pattern Leg and Foot, with plain foot bottom
1/1 Top, Check pattern Leg and Foot, with plain foot bottom.
1/1 Top, Tartan pattern Leg and Foot, with plain foot bottom.
1/1 Horizontal Stripe, plain Leg and Foot.
1/1 Horizontal Stripe Leg and Foot.
1/1 Cashmere Top, Silk Plated on Cotton, Leg and Foot, plai Cashmere Heel and Toe.
1/1 Cashmere Top, Heel and Toe, and Silk Leg and Foot.

GOLF HOSE

Broad Rib, any pattern. Check design. Tartan design.

BOYS' THREE-QUARTER HOSE

3/1 Rib or any other rib.

LADIES' HOSE

Plain top, Broad Rib any pattern Leg and Foot, and Plain Sole.
Plain Top, Checked Leg and Foot, with plain foot bottom.
Plain Top, Tartan pattern Leg and Foot, with plain foot bottom.
Plain Cashmere Top, Silk Plated on Cotton Leg and Foot, Cashmere Heel and Toe.
Plain Top, Solid Striped Leg and Foot, plain Heel and Toe.
Plain Cashmere Top, Heel and Toe, and Silk Leg and Foot.

CHILDREN'S SOCKS

1/1 Top with plain Leg and Foot.
1/1 Top with ribbed Leg and Foot and plain foot bottom.
1/1 Horizontal Stripe Top, plain Leg and Foot.
1/1 Cashmere Top, with solid horizontal striped Leg and Foot, Cashmere Heel and Toe.
1/1 Cashmere Top, Silk Plated on Cotton Leg and Foot, Cashmere Heel and Toe.
1/1 Cashmere Top, Heel and Toe, and Silk Leg and Foot.

The Bentley Engineering Company

Komet Works

New Bridge Street LEICESTER England

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