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Articles, Correspondence, Reports, Items of News, on all matters of novelty and interest bearing upon the Textile Industries, home or foreign, are solicited. Correspondents should write as briefly as possible, on one side only of the paper, and in all cases give their names and addresses, not necessarily for publication, but as a guarantee of good faith. When payment is expected, an intimation to that effect should be sent with the contribution. The Editor will do his best to return ineligible MSS., if accompanied by the requisite postage stamps, but will not guarantee their safe return.

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### THE FRENCH WOOL TRADE.

The French trade, both in wool and woollens, is of such importance, that a brief reference to some interesting facts brought forward, as the result of enquiries made by the Permanent Customs Commission, will not be out of place. The impetus given to the trade of Dunkirk by the increase in the direct importations of River Plate wools urged some restless spirits in the Republic to propose the imposition of a *surtaxe d' entrepôt* on all foreign wools not shipped direct. This impost, as some of our older readers may perhaps remember, was suppressed in 1860-61, previous to which time it was applied to imports of Australian and Cape wools coming *viâ* English or Belgian ports. The proposition practically (although not ostensibly) implies a Customs duty on a special but important class of the raw material consumed by a French staple industry. Its effect would be to increase by from 2 to 3 per cent. the cost of the 275,000 bales which are at present bought at the London sales by our neighbours, as well as the greater portion of the 175,000 bales purchased in the local Australian markets, at Sydney or Melbourne. Out of this latter quantity only 10,000 bales came direct last season, the conveyance being by the steamers of the Messageries Maritimes which tranship at Marseilles, while 44,477 bales were imported in English or German bottoms, the first port of call in the latter case not being a French one. As a rule, London was the first port, the wool being thence re-forwarded *viâ* Dunkirk or Antwerp. The advocates of the *surtaxe* (3s. per 225 lb.) think that its application will cause French firms to complete all their purchases in London, deserting the London market, and having all their goods sent direct to a French port. The following is the verdict of the French Tariff Commission which has been investigating the matter. It possesses a special interest, seeing that the result is to throw cold water upon the propositions of the *surtaxe* advocates:—

The *surtaxe d'entrepôt* will produce none of these results. Our manufacturers cannot reasonably be asked to relinquish the London market, which will always be the great mart for the wools of the English colonies, and which already absorbs more than one half of the wool produced in Australia and the Cape. Our merchants cannot be compelled to operate in Australia at the period when the wool comes into the markets after shearing, when prices may not appear favourable to them. They cannot be prevented from profiting by the fluctuations of price which are produced at the five series of auction sales in London. To do so would place both French manufacturers and French merchants in a position of inferiority in comparison with their English and German rivals.

These appear strong criticisms, and coming as they do from an official source they should have great weight. Moreover, it seems of little avail to encourage purchases in Australia, seeing that out of the 150,000 bales bought there in 1890, only 10,000 were shipped direct to French ports. The fact is that the freight to France direct is too heavy, and this being so London will continue to hold its own as a distributing centre. Whenever a French buyer can obtain direct tonnage on satisfactory terms he does not hesitate to do so, for it is to his interests to avail himself of such opportunities. When the wool has to pass through the hands of intermediaries, it is burdened with charges for wharfage, transhipment, and other items which eqnal 5 per cent. of the total value. French importers, as it is, have made great efforts to induce the various steamship companies to load for Antwerp direct, and it is interesting to note the results achieved during the season of 1891. Here is a list shewing the names of the vessels which delivered cargoes of wool in French ports during the season of 1891. Up to the present time the Messageries Maritimes is the only company which has proceeded direct to a French port from Australia. It is a substantial corporation, owning a fine fleet, and its chief port of arrival and departure is Marseilles. During the season it imported 25,000 bales, of which 15,000 went to London.

MESSAGERIES MARITIMES, TRANSHIPPING AT MARSEILLES.

| | Bales. |
|---|---|
| Salazie | 1,250 |
| Yarra | 903 |
| Australia | 3,042 |
| Oceanien | 1,070 |
| Polynesien | 3,334 |
| Total in French bottoms.... | 10,479 |

Other companies imported in thirteen vessels, of which eight were British, 44,477 bales into Dunkirk, *viâ* London or Antwerp. From these figures it will be seen that French importers, without the spur of a *surtaxe*, have succeeded, in spite of numerous difficulties, in shipping to French ports in round numbers 55,000 bales, or one-third of their purchases made on the spot in Australia.

### ON THE TRANSFER OF WOOL MARKETS.

Still pursuing the same subject, a word may be inserted concerning the probabilities of changes in the world's great markets. Despite its vast command of capital, its numerous docks and quays, and its extensive warehouse accomodation, the opinion prevails in France amongst thoughtful persons that London will not always exert such a preponderating influence in the wool trade. The tendency is for its importance to diminish, and an opinion of a similar character appears to prevail amongst our neighbours concerning the future of the trade in raw cotton. At a moment when natural causes are powerfully, though quietly, accomplishing the results aimed at by the advocates of the *surtaxe*, it would be folly to interfere with the course of events by the employment of factitious aid. Such arguments as these, used by the members of the Commission in their draft report—of which a copy now lies before us—command attention, for they bear evidence of being the outcome of careful and intelligent thought. We have said a good deal about other phases of this *surtaxe* question, as well as about the matter of new markets; and to what we have previously told our readers interested in the subject, the above view forms a significant addition. There is, moreover, a tendency for that department of commerce engaged in the wool trade, to consist more largely of the purchase and sale of combed wools. It is for this reason, perhaps, that France has become the great market for Plate wools, although the distributing trade of Havre has almost been destroyed. In 1870 the

purchases at the sales, in the Havre docks, were 30,000 bales, while in 1880 they had fallen to 540 only; although that port received in the same year no less than 40,000 bales of wool. The reason is to be found in the fact that this wool was consigned direct to Rheims, where are the gigantic wool-combing establishments of the Holdens, and other centres, only passing through the Seine port; which is, most conveniently situated for supplying Rheims, a town situated beside the sheep pastures of Champagne, a region similar to the English Downs, and which has fostered a trade in wool and woollens from very early times. Roubaix, Tourcoing, Elbeuf, and Amiens are also easily accessible from Havre. The remarkable difference between the destination of Australian and Cape wool on the one hand, and that of Plate wool on the other, is already well known. For the former, the one great market is the British Isles; for the latter, the Continent is the principal outlet, the special machinery necessary to deal with the seed and other vegetable *débris*, which it contains so largely, having been more generally erected on the European mainland than in our own country. By its means French and Belgian firms spin yarns such as are used to make soft all-wool fabrics of high quality. During the period 1881-7, Great Britain received about 94½ per cent. of the whole Australian and South African wool, and less than 4 per cent. of the Plate wool. Our authorities for the statement are the tables of Messrs. Helmuth Schwartze and Co., the reliability of which will be generally admitted. The ve markets for South American wools, therefore, are not the ports of Antwerp, Havre, Bremen, or Hamburg, but the manufacturing centres of Roubaix, Tourcoing, Rheims, Leipsic, or wherever wool combing is carried on. Antwerp, recognising the tendency of the times, has already made an endeavour to prop up its tottering raw wool market, by building alongside a market for combed wools. Combed varieties, therefore, are already sent in large quantities to the Flemish city, which has become a keen competitor in this branch with Roubaix and Tourcoing. These facts permit us to measure the value of the contemplated tax. We have seen that the duty—for as such French consumers would regard it, disguised as it is under a more euphonious name—could not encourage direct importations, although it would seriously injure—the Commission says "inevitably ruin"—the international commerce of France in combed wools, and consequently, the wool-combing industry. A difference of three, of two, nay, even of one per cent. in the cost of the raw material may mean the difference between certain profit and absolute loss. French houses, if the three per cent. *surtaxe* were imposed, would either be compelled to cease dealing in combed wools, in competition with their German and Belgian rivals, or else take over machines in Antwerp or Leipsic. A *surtaxe*, under such conditions, would become a bounty in favour of German and Belgian competitors at the expense of those whom it was intended to benefit. French exports of combed wools in 1889 were valued at over £2,600,000, the decline in the following year being due to a change in fashion, and not to permanent influences. The influence of ill-advised customs regulations upon this vast trade would, of course, be serious, and it is most probable that what London would lose by a *surtaxe d' entrepôt*, would be more than gained by Yorkshire, which, if it stepped out boldly, might secure a larger share of trade in combed wools. After all, the *surtaxe* proposals chiefly affect the London brokers. They can have no permanently injurious influences upon the manufacturing districts of the North of England, and of Scotland. In plain language, the London wool monopoly is a source rather of loss than of gain to the North, which, therefore, must leave London to fight its own battles, and to make its own protests in opposing the *surtaxe* proposals.

### Greek Carpets.

The arts of weaving and embroidery, of which praises were so well sung by Homer, are still flourishing in Greece. In those old Greek poems, which are still among the wonders of the world, expertness and industry in weaving are always included among a woman's highest accomplishments, even if she be a princess: and the ancient feeling still survives in no small measure. Popular songs have invested the loom with a peculiar charm, and in the island of Crete courtship commences with the question, 'Whether the damsel can weave skilfully?' The places of most importance for carpet weaving are Tripolitza, Leonida, Athens, Argos, Corinth, Atalanti, Gortinia, and the province of Thessaly. Atalanti is the place where the modern carpet was first turned out, and Tripolitza the place at which the best work is produced. In the Peloponnesus the manufacture of carpets is carried on the whole year through by the female population; whereas in Thessaly it is on a more restricted scale, being confined mainly to the needs of the families engaged in the industry. The only carpet factories are in Athens, the most important being "a factory for poor women"—an institution founded by the Greek banker, Syngros, who is well known on account of his benevolence. More than 400 women and girls of the poorer classes are there taught, amongst other things, how to weave carpets. For some time "tie" or Oriental carpets have been produced in Greece, as well as woven carpets. These goods are disposed of almost entirely at home.

### Proposed List for Cord-cutting.

We understand that negotiations have been going forward between the operative cord-cutters and employers of Manchester, with the object of arranging a list of prices and conditions which shall regulate the trade. So far as we learn there is no such list at present in operation—at any rate, not as regards uniform rates and conditions. As is usual in things of this kind, the operatives have been the first to move in the matter. We see no great objection—indeed, there are many advantages to be gained from having a thoroughly recognised code of payment and regulations which are binding alike on employers and employed. Such obtains in the cotton trade, and on the whole works remarkably well, but there is always more or less difficulty in coming to agreement with a first list, especially in these days of severe competition, from the fact that the workers shew a strong inclination to get three-fourths, if not more, of the bargain. If we are informed correctly, such is pretty much the case in this instance. To be candid, however, this desire of having too much of their own way does not conduce to, nor in any way aid, but rather hinders the two parties most directly interested, in working harmoniously together and discussing point by point with the judiciousness that should characterise such proceedings. To get a list including the present working conditions is so much in advance of their former position. They each then have a basis to work from, and if the operatives can even get so far, they will have done good work irrespective of obtaining any advances. The result of the negotiations with the velvet-cutter employers must be still fresh in the minds of cord-cutters in Manchester and Salford. Therefore we trust they will learn from the errors of their brethren. The negotiations, we believe, are still going forward, and we earnestly hope they may be concluded satisfactorily and without any breach of good feeling.

### Artificial Silk.

Some of our readers may be interested in the following summary of a lecture which was recently delivered by M. Badet before the Commercial Circle of Lyons: it contains indeed little that is absolutely new, but it gives a number of facts in a clear and compendious form. After having sketched the history of M. Chardonnet's invention, the lecturer proceeded to discuss its principle. Gun-cotton (nitrated cellulose) is dissolved, as everybody knows, in a mixture of alcohol and ether, and furnishes the viscous liquid known under the name of collodion. If with this substance we fill a cylindrical vessel, having a narrow orifice, such as a syringe, and by means of a piston force the liquid to escape through the orifice, we find after plunging it in cold water that the substance, as it flows out by the capillary orifice, gives up to the water the alcohol which it contains. The nitrocellulose thus becomes insoluble, and is precipitated in the form of a fibre, which has a brilliant appearance, and is elastic, tenacious, and comparable in all points to silk, except that its inflammability makes it unfit to be used for the same purposes. The efforts of the inventor since 1887 have been directed to the removal of this inflammability. By the action of feeble reducers he has succeeded in later years in partially denitrating the product down to a proportion of 4 per cent. of nitrogen. The denitrated material is not more inflammable than cotton, and has nevertheless lost none of its desirable properties. M. Badet described the methods of spinning and dyeing this artificial silk. They do not present any difficulty: the dyeing especially succeeds perfectly if care be taken to mordant and dye completely by the cold process. As for the cost of production, it is estimated at about 5s. per lb., without taking into account the boiling-off, which, of course, is not required in the case of artificial silk. The price then in reality is 5s. for 1⅛ lb. The lecturer closed by assuring his hearers that the new product could not be anything but advantageous to the weaving industry: it would be a new resource for textile workers; the consumption of natural silk will evidently be diminished, but the new product would for several reasons not finally dethrone the older staple.

### Employers' and Operatives' Trades-Unionism.

Our Oldham correspondent writes:—"In these go-ahead days of trades-unionism, cautiousness and tact were never more necessary to keep the balance of feeling amongst the working classes. We are moving rapidly, and the old order of things is giving place to the new; but care should be taken that we do not go astray from sound business principles, or swerve one hair's breadth from man's duty to man. Organisation of workmen is being met by organisation of employers; individualism is giving way to collectivism. In the cotton trade more particularly has this development been noticeable for some years, and of late its growth has been exceedingly rapid. The operatives and employers have each their associations and officials to look after their interests and study their welfare. This principle of acting in unison has been recognised in Oldham for years, and it is no uncommon occurrence to see the secretaries of the operatives' organisations and the secretary of the Employers' Association proceeding to mills to investigate grievances of one kind and another. In other districts it seems they have not yet come up to this higher order of things. In common parlance, they 'bang in' a threat or notice to strike, without any warn-

ng to employers, if certain alleged grievances are not forthwith remedied. I do not say this prevails to any large extent. Nevertheless, cases of this description are known to have occurred. Of course the operatives may say they have a good answer to this, and allege arrogance, and so on. But where it is known that the employers have an association and an official, such threats ought to be discarded and common sense let rule the mind. Only this week I heard of a case of this sort transpiring in a district just outside Manchester. There is an employers' association which has a secretary, who, we are informed, has repeatedly asked the officials of one of the operatives' trades-unions to make him acquainted with anything which may occur. But oh, no, it would seem they prefer a disturbance of the working arrangements. Leaders of trades-unions evidently have yet much to learn in business aptitude. If they won't learn, then they must be taught the lesson, however severely. They boast that their organisations are established for 'defence, not defiance,' yet on many occasions they act quite the opposite, and insist, irrespective of others' feelings, rights, or opinions, that if such and such a course is not adopted *all* the hands will be withdrawn. Trades-union leaders, perhaps, never previously have been placed in as great a position of responsibility as that they now occupy; hence their apparent lack of generalship. As said above, we are travelling rapidly, and collectivism will more prominently assert itself in the future. The more strikes there are in the cotton trade and the more hampered it will be, and the less inducement there will be for persons to engage in the business. The leaders can do much to prevent these disturbances, in the way of advising their members to cultivate a spirit of forbearance. The prosperity of a trade must mean the well-being of the workpeople engaged in that industry. The interests of employer and employé are bound together; they are inseparable. This fact, therefore, cannot be too much impressed upon the working population and brought under their notice. Properly-conducted trades-unions are calculated to do much good, especially in the way of bringing unjust employers up to the point of duty. But it becomes more and more apparent that employers can only meet the operatives upon the ground they have chosen—meet organisation by organisation. Therefore it is gratifying to know that employers are moving in this direction, and the more perfect their organisation becomes, backed up with large funds, the better they will be able to check the aggressiveness of the operatives' unions."

## The Board of Trade Returns for January.

The Board of Trade returns for the past month are similar in character to those of several previous months, inasmuch as with an increased value of imports the value of exports has decreased. The latter feature is not, however, so marked as in November and December of last year. The imports amount to £38,485,244, an increase of £4,744,162, or 14 per cent.; and the exports of British and Irish produce to £19,146,704, a decrease of £687,611, or about 3½ per cent. As regards the increase in the imports, £1,444,000 is due to more raw materials for textile manufactures—chiefly cotton, jute, and sheep's wool—having been landed. In January, 1891, bad weather during the month retarded arrivals to some extent. These heavy landings of raw materials suggest that the prospects of trade are more cheerful than they were. The decrease in the value of the exports is chiefly to be found in metals. Yarns and textile fabrics, apparel, and machinery were each in the aggregate shipped more freely. Woollen and worsted yarns appear to be recovering from the depression caused by the McKinley tariff; perhaps, too, the stocks in America have been worked off, and the work of replenishing has set in. The present low prices of sheep's wool are lending much assistance to manufacturers. It is evident that in textile fabrics there has been an effort made to land considerable quantities in France in anticipation of the highly protective tariff brought into force on the 1st inst. Thus of cotton yarn France took 2,502,700 lb., compared with 1,437,400 lb. in the corresponding month of last year; of cotton piece goods, 7,360,000 yards, against 2,766,200 yards; of jute piece goods, 1,590,700 yards, compared with 866,200 yards; of linen yarn, 259,300 lb., against 94,000 lb.; of linen piece goods, 675,400 yards, against 204,400 yards; of woollen tissues, 1,019,200 yards, compared with 497,900 yards; of worsted tissues, 2,673,200 yards, against 1,707,500 yards; and of carpets, 258,200 yards, against 110,000 yards. In other articles a similar tendency is perceptible. These shipments have, of course, caused the exports to appear more favourable than they would otherwise have done; but on the other hand it is evident also that shipments to the United States, especially of woollens, are assuming larger proportions. Thus worsted tissues, which are very severely affected by the McKinley tariff, were shipped to the United States to the amount of 3,776,900 yards, which compares with 2,663,800 yards sent in January, 1891. Below we give particulars of the imports and exports of textiles for the month of January in the past and present year.

I.—Imports of Foreign and Colonial Merchandise for January.

| Principal Articles. | | Quantities. 1891. | 1892. |
|---|---|---|---|
| Cotton, raw | Cwt. | 2,069,126 | 2,493,444 |
| Flax | ,, | 114,607 | 220,739 |
| Hemp | ,, | 161,235 | 190,535 |
| Jute | Tons | 25,400 | 29,395 |
| Silk, raw | Lb. | 138,522 | 196,008 |
| Wool, sheep and lambs' | ,, | 93,092,684 | 110,850,012 |
| Woollen stuffs | Yds. | 6,350,453 | 7,274,796 |

| Principal Articles. | Value. 1891. £ | 1892. £ | Increase or Decrease per cent. compared with Jan., 1891. Quantity. | Value. |
|---|---|---|---|---|
| Cotton, raw | 5,552,173 | 6,208,064 | *20·5 | *11·8 |
| ,, manufactures | 199,597 | 244,920 | — | *22·7 |
| Flax | 194,562 | 333,060 | *92·6 | *71·1 |
| Hemp | 280,346 | 272,055 | *18·2 | †2·9 |
| Jute | 297,684 | 505,171 | *15·7 | *69·6 |
| Silk, raw | 112,458 | 126,776 | *23·7 | *12·7 |
| Wool, sheep, and lambs' | 3,736,897 | 4,245,444 | *19·0 | *13·6 |
| Woollen stuffs | 522,302 | 619,461 | *13·6 | *20·1 |

*Increase. †Decrease.

II.—Exports of British and Irish Produce and Manufacture for January.

| Principal articles. | | Quantities. 1891. | 1892. |
|---|---|---|---|
| Cotton Yarn and Twist | Lb. | 18,823,600 | 19,600,000 |
| ,, Piece Goods | Yards | 412,552,200 | 403,774,500 |
| Jute Yarn | Lb. | 3,266,700 | 2,992,100 |
| ,, Piece Goods | Yards | 22,051,200 | 22,155,500 |
| Linen Yarn | Lb. | 1,060,800 | 1,407,400 |
| ,, Piece Goods | Yards | 17,039,500 | 16,084,800 |
| Wool, sheep and lambs' | Lb. | 999,800 | 767,200 |
| Woollen and Worsted Yarn | ,, | 2,629,800 | 2,889,200 |
| ,, Tissues, heavy and light, broad and narrow | Yards | 5,430,000 | 5,722,400 |
| Worsted Tissues, heavy and light, broad and narrow | ,, | 15,130,800 | 16,893,300 |
| Woollen Carpets | ,, | 886,700 | 920,100 |
| ,, Flannels | ,, | 1,414,700 | 1,437,000 |
| ,, Blankets | Pairs | 151,538 | 146,615 |

| Principal Articles. | Value. 1891. £ | 1892. £ | Increase or Decrease per cent. compared with Jan., 1891. Quantity. | Value. |
|---|---|---|---|---|
| Cotton Yarn and Twist | 893,639 | 863,247 | *4·1 | †3·4 |
| ,, Piece Goods | 4,507,126 | 4,322,951 | †2·1 | †4·0 |
| ,, Other Manufactures | 653,526 | 690,796 | — | *5·7 |
| Haberdashery | 172,509 | 157,368 | — | †8·8 |
| Jute Yarn | 33,978 | 23,838 | *35·9 | *29·8 |
| ,, Piece Goods | 202,197 | 217,294 | *0·4 | *7·4 |
| Linen Yarn | 64,802 | 87,556 | *32·7 | *35·1 |
| ,, Piece Goods | 388,493 | 361,238 | †5·6 | †7·0 |
| Machinery and Millwork | 1,106,326 | 1,191,351 | — | *7·7 |
| Silk Manufactures | 170,304 | 210,153 | — | *18·1 |
| Wool, sheep and lambs' | 41,590 | 32,864 | †23·2 | †20·9 |
| Woollen and Worsted Yarn | 253,515 | 266,232 | *9·8 | *5·0 |
| Woollen Tissues, heavy, light, narrow, broad | 587,959 | 651,863 | *4·9 | *10·9 |
| Worsted Tissues, heavy, light, narrow, broad | 909,174 | 1,061,290 | *11·6 | *16·7 |
| Woollen Carpets | 92,788 | 80,153 | †3·7 | †3·9 |
| ,, Flannels | 50,816 | 52,204 | *1·6 | *2·8 |
| ,, Blankets | 66,173 | 62,846 | †3·2 | †5·0 |

*Increase. †Decrease.

## The Oil-cloth Industry.

It seems that although this cloth is extensively used, the manufacture of it in France is on the decline rather than on the increase. There are two sorts of goods of this kind. One consists of a tissue covered with a substance which renders it impermeable, so that it is particularly suitable for packing purposes. The other consists of a canvas of hemp and linen yarns covered with layers of paint and designs. The latter is for table-covers, hall-cloths, and floor-cloths. There are fifteen works in France which produce linoleum, but their total turnover amounts only to 2,000,000 francs, say £80,000 The exports from France of these articles is insignificant, and have only risen during recent years from 500,000 to 600,000 francs. Quite different is the state of things as regards the imports, which have represented during recent years 5,000,000 to 6,000,000 francs. England, it appears, supplies the largest quantity of oil-cloth to France, Belgium coming next, and then Germany. It seems that the increase in the English imports of this sort of goods have been enormous during the last 24 years, and a patriotic French journalist urges his countrymen to exert themselves to bring about a change. The turnover of the fifteen French factories is indeed very small, and if our authority (*Le Moniteur*) be not mistaken, then we may say that the production of the whole of the French linoleum mills is less than that of a single British concern, such as that of Nairn's, or Barry, Ostlere's, in Scotland, or the Shepley Mills Co. at Guide Bridge. The French industry is quite insignificant in its proportions, and apart altogether from this circumstance, we believe we are correct in saying that in the character of designs our own country leads the way in competition with the best of foreign competitors. Americans have made great strides of late years in the linoleum trade, but the advance is due to assistance from British hands. It is probable that for a long time to come that Kirkcaldy, Staines, and other centres of the linoleum trade will be able to hold their own in the foreign markets, notwithstanding the heavy tariffs against which they have to contend. The trade, however, like many others, is becoming increasingly difficult, and manufacturers have not yet recovered from the serious check received when the McKinley tariff put almost a stop to shipments to the United States. The *ad valorem* and specific duties combined exceed the value of some of the cheaper cloths, and the efforts of the manufacturers are now directed more particularly to the production of designs of the higher class. In addition to the large connections which our manufacturers possess in France, there is a fair trade with Germany. The cheaper oil cloths and baizes are manufactured here to an enormous extent, Lancashire being a large producer of the goods. The business has developed greatly of late years.

## The Linen Trade.

The January returns of the Board of Trade indicate a large increase in the imports of flax. In January, 1891, they amounted to 5,730 tons, and in 1892 to 11,037 tons—an increase of 5,307 tons, or 92·6%. For the same period the increase in value is only 71·2%. The imports from Germany are up 248·9%, from Russia 160·6%, and from Holland 109·3%. This increase is satisfactory, inasmuch as it indicates that spinners are in want of more material. The yarn trade is also more active: the month's exports being 32·6% and 35·1% in quantity and value respectively over those of 1891. The effect of the new French tariff upon the shipping trade is abundantly shewn by the figures referring to exports. Last year, in January, the shipments were valued at 94,000 lb.

only, while this year they amounted to 259,300 lb. In respect to no other country has there been such a large increase, so that we may safely ascribe this result to the rush anticipatory of the increased tariff. Our view is further confirmed by the figures relating to piece-goods, which are appended:

| | Jan., 1891. | Jan., 1892. |
|---|---|---|
| Yards. | 204,400 ..... | 675,400 |

Notwithstanding the large increase in the case of France, there has, on the whole, been a decline from 17,039,500 yards to 16,084,800 yards. It would, therefore, be premature to view with any degree of satisfaction the results of last month's trading, and the abnormally low price to which cotton has now fallen is another factor in the situation which bodes ill to linen, and to a less extent to jute also, especially as the price of the latter fibre is just now extremely high. Cotton, in fact, could not have become so cheap at a more convenient time for both the fibres which compete with it, or rather we fear against which it is the most powerful competitor. If this state of things is continued, the result should greatly benefit Lancashire. Linen manufacturers have of late consumed a much larger quantity of cotton yarns than usual, as the Harbour Returns for the port of Belfast shew. They may for a time, in view of the cheapness of cotton and the dearness of flax, resort to an even still larger use of the former fibre, although in the end we do not think they will benefit, seeing that sellers so frequently offer mixed goods as all flax, to the ultimate disgust of the deceived buyer.

## *THE AGGRESSIVE ATTITUDE OF "LABOUR."*

The most disinterested observer of industrial and social phenomena cannot fail to see that a great change has come over the aspects of the relationship between the upper and lower social circles, and similarly between employers and workpeople. It would be an interesting enquiry to endeavour to discover the origin of these changes, but would lead us too far from our present object. The causes, however, may be briefly indicated. It is almost incontestable that the change began with the passage of the Reform Bill of 1867, which carried the suffrage into every household. This measure was unquestionably one of political justice, and it was the recognition of this that led the then holders of political power to consent to its extension to householders rated below £10 per annum. But, however much in accord with theoretical justice this concession might be, there were not wanting many persons who doubted its prudence, on the ground that working men as a class were not fitted by the state of their education and their political knowledge for receiving such a large trust. Amongst the persons referred to was the Right Honourable Robert Lowe, one of the keenest and clearest thinkers of his time. When, in spite of the resistance of a few influential politicians, of whom he was virtually the leader, the Bill was passed, he said in substance that if the State, meaning thereby the community, were to be saved from destruction, its first duty must be to educate its new masters. During the discussions on the subject many prognostications were made as to what results would ensue, which optimistic theorists set down as mere bogeys conjured up by the terrified imaginations of those who propounded them. It was not long, however, before the seed thus sown began to germinate. The war against existing institutions was commenced by an attack upon the Irish Church, the disestablishment and disendowment of which was alleged to be a necessity of the time, which would, moreover, give peace to an oppressed country. It is to be feared nevertheless that whatever may have been the merits or demerits of that particular case, the new wielders of political power failed to discriminate sufficiently to discover the points involved. The result was that this matter had hardly got legislatively settled when an agitation was commenced in Ireland against the property of the landlords. "If a corporation could be despoiled, why not an individual?" was the question doubtlessly mentally asked, and echo answered: "Why not?" Unscrupulous professional politicians were not slow to discover and pander to the vague desires of the working classes for the betterment of their condition; and, to secure their own advantage in the possession of place, power, and pensions, they have not scrupled to advocate views that, if carried into effect, will inevitably wreck society. It was an easy transition from robbing the Irish landlord to robbing the English capitalist, and the mind of the working man could not see any moral difference in the operations. If the act was just in the case of the former it could not be unjust in that of the latter. Hence is derived the force that has led to the rapid spread of Socialism amongst the industrial communities of the country, and the wild and arrogant demands to the expression of which these views are leading. There can be but little doubt that in these views and those that will be developed further on, we are finding, and shall do so in the future, a realization of the predictions of evil that were spoken and written twenty-five years ago by men whose prevision at the time was not properly appreciated. The politicians who stimulated this new development of the time, it is now becoming clear, knew not what they were doing. They have raised a Frankenstein's monster, which is now escaping from their control. It is already turning upon them, and, like the creator of that abortion, they will probably perish under its attack.

To demonstrate this conclusion it is only necessary to point to the attitude of labour to-day in any and every department. Everywhere the most arrogant demands are being made by organised bodies of labourers, not only upon capitalists, but also even upon workpeople who have not joined their associations. At the moment we write the metropolis is threatened with a coal famine, caused by the organisation of coal porters refusing to let their members work with an old foreman of a leading firm of coal merchants, against whom they had previously offered no objection, but who, having been transferred to another centre of operations, was subsequently brought back, when the men at work threw down their tools. These were the sack fillers. The merchants as a body have no dispute with their men whatever, but the Unions of the men want to make them the tools wherewith they may coerce every man into the union or ostracise him. A great strike has for some time been in progress among the engineers of the Tyne and Wear district, simply because two Unions —those of the Engineers and, we believe, Plumbers—cannot, or will not, agree as to which of them shall perform a certain class of work. The latter proceeded with the task, and, in consequence, the former struck. The matter subsequently assumed such a serious aspect that the employers were compelled to take up a strong position, and announced that unless the dispute was settled, and the men of the firm permitted to resume work, they must close their establishments, which they would do by dismissing 25 per cent. of their employés at a time. The engineers accepted this as a challenge, and gave in their notices all to leave their employment. The colliers of the country, as we write, have just approved a resolution to close all the pits for a week or a fortnight in order to compel the public to pay such prices for coal as will prevent a slight reduction in their wages. Instances such as these could be adduced almost from every industry in the country, and very many from the textile industries. With the latter, however, our readers are already well acquainted, and we need not, on the present occasion, adduce any more.

The only point left to consider—and it can very briefly be stated—is as to how these actions and pretensions of the organised labouring classes shall be met. Already the answer is being given by the organisation of the various bodies of employers, and it is to meet force with force. It is the only method whereby it can be satisfactorily encountered; the clear duty, therefore, of every employer is to join the organisation of the body to which he belongs, and to induce others to do likewise. Beyond this, should there be any class of employers not thus united, their plain and paramount duty is to unite and organise their force as speedily as possible. After all this has been accomplished there yet remains the federation of the employers' associations, and unless this be the ultimate outcome of the movement the remainder will avail but little. Our closing injunction therefore is "Organise, organise, organise!"

# Foreign Correspondence.

## *NOTES FROM THE ANTIPODES.*

(FROM AN OCCASIONAL CORRESPONDENT.)

MELBOURNE, JAN. 2ND.

"WHALLEY" FRAUDS IN SYDNEY.

During the year that has just closed Australia has progressed steadily, though quietly, in the path of commercial progress, despite the demoralising influence of the Shearers' Strike, which, for a time, threatened to reduce Queensland to a condition of anarchy in the sparsely peopled regions of the West, where the now notorious armed camps of the agitators formed a standing menace to the peaceably inclined. The two leading colonies now boast a population of over a million each, Victoria being still ahead of the parent colony of New South Wales. It is a noteworthy fact that the latter is described by Victorians as being the chief stumbling-block in the way of federation. Sir Henry Parkes dropped the federation cry when he found that it was of no further avail for the postponement of the issue between Free Trade and Protection. Now that this colony has fiscally joined the ranks of the majority one of the great stumbling-blocks in the way of the formation of an Australian Commonwealth will be removed. The principle of Australian unity was affirmed at the Inter-Colonial Trades Conference held last year, and the results of the Postal Convention amply justified the action of the supporters of the federation movement. Financially, the past year was a most trying one, especially in Victoria. The exposures which have been made of the gigantic stealings in the South Melbourne Permanent Building Society and the Land Credit Bank have created a feeling of alarm.

The Federal Building Society, which has suspended, was one of the creations of the Victorian Premier, Mr. James Munro. It holds deposits amounting to £452,000, but it is said that these will be returned if time is granted, and there is no pressure. The cause for the recent panic is to be found in the decline in lands and stocks. An instance of the fatal results of land speculation may be quoted. The case is only one out of many, but the moral to be derived applies to all. The schedule of an insolvent printed the other day shewed that the debtor's principal asset consisted of 319

acres of land at Berwick, valued at £300 odd. The 319 acres were bought, of course, for subdivision, but the boom declined; a subdivisional sale is utterly impossible to-day, and the 319 acres has no more realisable value at this conjuncture than if it had no existence. And then there is the drop in all kinds of stocks. Not to mention Real Estate Banks from £9 to 3d., take two notable instances—Tramways from £9 or £10 to 30s., and Mercantile Finances from £10 to about 15s. But the chief sensation has been the disclosures concerning the wholesale stealings from the South Melbourne Permanent Building Society and the Land Credit Bank. In the case of the former society, the investigation by the auditors shews total defalcations by the secretary, Mr. Mathias Larkin, J.P., of £45,232, while in addition to this the society has lost in the ordinary course of business over £9,000, so that the total loss is £54,000. Mr. Larkin, when his frauds were first discovered, confessed to having stolen £10,000; he now confesses to the £45,000, and there is a shrewd suspicion that when everything is cleared up the total will reach at least £70,000. He is now confined in gaol, bail being unprocurable. The facts I have given sufficiently illustrate the character of the crisis which now prevails in Melbourne. The city has passed through panics as serious with safety, and will no doubt emerge triumphantly through its present troubles. But it is to be hoped that bank secretaries who drink champagne freely, and import *articles de luxe* from home will not in future be able to hoodwink their directors for several years as in the Larkin case. Your Northern readers will no doubt note how closely the Larkin frauds resemble those of Whalley, of Blackburn.

VICTORIAN WOOL SALES.

Since the 14th October, 270,759 bales of wool have been offered at the Melbourne and Geelong sales of which 222,490 were disposed of. There was very little decline at the commencement of the season in greasies. Low or faulty clips fell 5 to 7½ per cent. Bright haired and free wools were healthy. Some of the Riverina clips brought splendid prices. Competition for high-class wools for the American market was keen, and this additional element of strength had a considerable effect upon rates. The offerings of washed fleeces have been declining for some time. Parcels from small growers have been offered in increasing quantity. The system of local sales, which are conducted on cash terms, is now a most important feature of the trade. Buyers from all parts of the world are represented, and in the growth of the practice one sees a justification of the prediction that the present amount of business in regard to wool will eventually be diverted into more direct channels.

With reference to the New Zealand demand for bagging, when the last mail was leaving the market was a little excited by receipt of cable advices from Calcutta of an advance in jute goods there. The market has continued to harden, and a distinct advance has been established, sales of good-sized lines of corn-sacks having been made at 5s. 9d. per dozen for 44's. Some holders anticipate even a higher rate being obtained. Although there is not much business doing in woolpacks, prices have also hardened, and they are now held for 2s. per pack, duty paid.

SHEEP AND WOOL IN NEW ZEALAND.

The president of the New Zealand Chamber of Commerce, at the last quarterly meeting of that body, stated that the exports for the year reached £10,000,000 to September 30th, and included frozen meat to the equivalent of 2,000,000 sheep, of which 10 per cent. was frozen beef. The number of sheep in the colony is 17,000,000, and the surplus available for export represents 11 per cent., after allowing for home consumption, as well as a net increase of 633,000 sheep.

A COLONIAL OPINION ON THE TENDENCY OF FASHION IN THE WOOLLEN TRADE.

Mr. John Roberts, C.M.G., of New Zealand, who has just returned from the old country after an extended tour, has been interviewed on his experiences. He says that the course of the wool sales during the past year has been, on the whole, very disappointing. Crossbreds have, during the currency of the present year, very fairly maintained their values, but the enormous shrinkage in value in merinos has now brought prices to a level that has not been known for the last twenty-one years. The owners of merino flocks, at present values, cannot possibly make the production pay. Wools, which two years ago were worth 10d. to 10½d. in London, are now selling at something like 7d. It is manifest, therefore, that if it costs 6d. to grow, when it comes to be sold in London at 7d., it only gives the producer here a margin of 1d. profit or return as interest on his capital, as against 4d. or 4½d. two years ago. Mr. Roberts hopes that these very low prices will not continue long, because if they do he cannot see anything else than disaster staring many in the face. The wool market during the last fifteen years has demonstrated unmistakably that no men or combination of men in England or elsewhere can form the slightest idea as to what is six months ahead of us. Mr. Roberts remembers very well that in 1870, when merino wools were very low, and almost on a par with the prices now current, all the London importers and speculators were distinctly and emphatically of opinion that no rise could be expected. Wools during that same season in the colony were sold at 5½d. and 6d. per lb., and in the face of the expressed opinion of the London people as to the improbability of an increase in values, before those wools could reach the London market wool had risen to double its previous value. Indeed, the result of purchases in the colony that year was that those who had courage enough to speculate in nearly every instance doubled their money. As to the reason of the very heavy drop in the value of merino, the causes seem to be several. First of all, fashions seem to run to a large extent in goods that are made from crossbred wools. These fashions, however, change from time to time, and the authority I am quoting has no doubt that the decreased value of merinos will be a direct stimulus to the manufacturers to again try to tickle the public taste by producing fabrics that will command a ready sale, and which will be made from merino wools. Then, again, the large increase from Australia during the past couple of years of wools of this quality must have had a very appreciable effect. Speaking of the attitude of Yorkshire consumers, he adds that many years ago a manufacturer used once in six months to book orders sufficient to keep his mills going for half a year, and, after booking his orders, if he found at any time that wool was at a price which left him a fair margin of profit, he at once filled up his wool requirements sufficient for his trade. Now, however, this hand-to-mouth system of placing orders—no doubt the immediate production of severe competition—causes the manufacturer to be much more careful than he used to be in the purchase of raw material, as he must month by month be prepared to quote the lowest possible prices. "No one," he concludes, "can foresee what is to happen in wool, and it would be folly on my part to make any indication as to what the probable course of prices will be. The chances are, however, as wool has reached an abnormally low value that prices will rise, but whether that rise will take place this year or next, or another year, I cannot say."

# Bleaching, Dyeing, Printing, etc.

## *METHODS OF WOOL DYEING: THEIR PRINCIPLES AND PRACTICE.—IV.*

*(Continued from page 96.)*

*Fourth Method.*—We now come to the fourth method of dyeing wool. What we are now going to put before our readers is, strictly, perhaps not a single method but a group of methods, which are used to apply a certain class of dye-stuffs to the wool fibre; but as the governing principle depends upon the peculiar property of the dye-stuffs now to be noticed, which underlies all the variations of the process of dyeing, we have thought it better to speak of the fourth method rather than to sub-divide further, in which case the fundamental principle might be lost sight of.

The class of dye-stuffs included in the fourth group of our scheme was named by Bancroft the "adjective" group, because they require the aid of a second body, named the "mordant," to properly develop and to fix the colour on the dye-stuff. It is sometimes known as the "mordant dye-stuff class." This group of colouring matters comprise dye-stuffs of both natural and artificial origin, the latter of which are now getting very numerous and valuable, and bid fair to displace the natural members of the group. With but few exceptions, the adjective dye-stuffs are not colouring matters of themselves, *i.e.*, they will not dye wool or other fibres by themselves. Some are coloured bodies, such as fustic, logwood, Persian berries, anthracene yellow, etc., but many are not so, and some possess but little colour, and which, moreover, gives no clue to the colours that can be developed therefrom.

All the colouring matters of this class possess either a distinctively acid character, or belong to the class of phenols, which, while not true acids, still possess weak acid functions that enable them to combine with bases like acids. These bodies have the property of combining with bases and metallic oxides, such as soda, potash, iron, alumina, chrome, tin, nickel, cobalt, etc., forming a series of salts. Those of soda and potash are usually soluble in water, while those of the other metals are insoluble, and are usually of a strong colour. It is on this property of forming these insoluble coloured bodies—colour lakes, as they are called—that the value of the adjective dye-stuffs in dyeing depends.

The group of adjective colouring matters may be sub-divided into two divisions, not depending upon any differences in the mode of application, but upon certain differences in the results they give. Perhaps the best example of an adjective dye-stuff is alizarine. This body has a faint red colour, but of itself possesses absolutely no colouring power. When, however, it is brought into combination with such metallic oxides as alumina, iron, and chrome, then it forms coloured bodies, the colour of which varies with the metal with which it is in union: thus, with alumina, it is a bright red; with iron, a dark violet, almost black; with chrome, a deep red; with tin, a scarlet, and so on. This is a representative of the true adjective dyes, which comprise most of the so-called alizarine dye-stuffs, and logwood, fustic, and most of the natural dye-stuffs. Another division of the group includes a few colouring matters of recent introduction, like azo-green, alizarine yellow, galloflavine, anthracene yellow, flavazol, etc., which, while forming insoluble colour lakes with metallic oxides, yet do not give different colours with different metals.

This class of dye-stuffs, owing to their forming these insoluble colour lakes, give really fast colours, capable of resisting lengthened exposure to light and air, and resisting washing, acids, and alkalis. Of course there are differences between the various members of the group in this respect, and even the resisting power of an individual member depends a good deal on the metal with which it is combined, and the care with which the process of dyeing has been carried out.

In the dyeing of these adjective dye-stuffs upon the various fibres, and on wool in particular, the object is to bring about in any convenient way the formation on the fibre of the metallic combination of the colouring principle and the mordant, and it is obvious that if a satisfactory result is to be obtained then this must be done in a very thorough manner. There are three ways in which this combination of colouring principle and mordant may be brought about in dyeing wool with these bodies: we may either mordant the wool first and then apply the dye-stuff; or we may impregnate the wool with the dye-stuff first and then fix or develop the colour afterwards; or, lastly, we may carry on both operations in one process. Each of these methods will now be discussed, and their relative advantages pointed out.

The mordanting method is the one most generally useful. It consists in first causing a combination of the metal with the wool fibre. This is carried out by boiling the wool in solutions of the metal, such as bichromate of potash, chrome alum, or chrome fluoride, when chrome is to be used as a mordant; with alum or sulphate of alumina when alumina is required to be deposited on the fibre; and with copperas when iron is to be the mordant. It is best to add a little oxalic acid, cream of tartar, or tartaric acid to the mordanting bath, which addition helps in the decomposition of the metallic salt and in the combination of the metallic oxide with the wool fibre. With bichromate of potash, sulphuric acid is often used, much depending upon the character of the mordant required. Some dye-stuffs, such as logwood for blacks, work best when the wool is mordanted with chromic acid, which is effected when sulphuric acid is the assistant mordant; other dye-stuffs, such as fustic, Persian berries, and alizarine yellow, are best dyed on a basic chrome mordant, which is effected when tartar or oxalic acid is the assistant mordant used, or when some other form of chrome compound than bichrome is employed.

The actual mordanting is done by boiling the wool in a bath of the mordant, the quantity of which should be varied according to the particular mordant that is being employed and to the quantity of dye-stuffs which is to be used. It is obvious that for fixing a deep shade of, say, alizarine on the wool, a larger quantity of mordant will be required than to fix a pale shade; sometimes this point is overlooked, and the same amount of mordant employed for pale or deep shades. The best plan of carrying out the mordanting is to enter the wool in the cold or at a hand heat, and then raise to the boil and continue the boiling for one hour; of course the goods should be kept turned over during the process to facilitate the even mordanting of the wool. A great deal of the success of dyeing with the dye-stuffs now under consideration depends upon the success with which the mordanting has been carried out: if this is at all unevenly done then no amount of care in the succeeding dyeing process will lead to the development of an even dyeing. After the mordanting is finished the goods should be rinsed with water, but it is not necessary to dry them.

*(To be continued.)*

## VALUATION OF INDIGO.

It is an acknowledged fact amongst analysts who have paid any attention to the subject, that the valuation of indigo by the methods most commonly employed is by no means satisfactory, some processes giving results which are below the actual truth, while others are much above it. The method proposed by Leuchs of determining the amount by ascertaining the specific gravity is fairly satisfactory, while that of estimating the indigotin by a sublimation process, even as modified by Tennant Lee, is by no means satisfactory, the results being sometimes too low, at other times too high.

The methods proposed by Rawson, Leuchs, Ullgren and others, based on first the reduction of the indigo, and then a subsequent oxidation, are by no means satisfactory, usually owing to over-reduction, which causes a loss of indigotin from destruction, and the latter cannot altogether be avoided. The process of titration by means of sodium hydrosulphite, proposed by Bernthsen and Drews, also gives too low results.

The methods depending upon the oxidation of the sulphonic acid by means of a solution of potassium permanganate, generally give too high results, with the exception of Rawson's modification, in which the results are a little more regular; but even with this there is a tendency to obtain high figures.

Other oxidation methods, based on the use of other oxidants than potassium permanganate, such as chlorine water or potassium bichromate, are subject to the same defect as the permanganate method, namely, too high results.

It has been proposed to convert the indigo into the sulphonic acid, and to make dye trials against pure indigotin, but it is obvious that this method must be defective, owing to the imperfect or over-sulphonation; some indigoes take longer to dissolve than others, and it is not possible to know how long to carry on the sulphonation, nor when to stop it, and either under or over-sulphonation would lead to low results.

Perhaps the best method of valuing indigo consists in obtaining the indigotin in the pure form and weighing it. A solution of stannous chloride is prepared by dissolving 88 grammes of $SnCl_2 2H_2O$ in one litre of water, which is mixed with a strong solution of caustic soda until the precipitate which is at first formed has just re-dissolved; 10 c.c. of this solution of sodium stannate is then mixed with 0·8 grammes of finely-powdered indigo. The mixture is well shaken up and allowed to stand for one hour, when the reduction will be complete, a yellowish green solution being obtained. The solution is promoted by shaking at intervals. There is now added 15 c.c. of a fresh 10-volume solution of hydrogen peroxide, the mixture being well shaken and then allowed to stand for one hour, after which it is acidified with sulphuric acid, and then boiled and filtered. The precipitate of indigo is well washed, first with water, then with dilute caustic potash, and next with warm alcohol, after which it is dried and weighed. It is carefully incinerated, taking care that most of the indigotin is sublimed, and that the amount of ash which is left is determined. This weight deducted from the weight of the precipitate gives the amount of indigotin in the indigo.

Any attempt to obtain indigotin from indigo by alternate treatments with acid, alcoholic potash, water, and alcohol, will not give satisfactory results.

THE following mixture is recommended by a French contemporary:—Four litres hydrochloric acid of 20° to 22° Be. and one litre liquid sulphurous acid of 4½° Be. are dissolved in 100 litres of water; the solution will stand at about 1° Be. After being scoured, the wool is laid down in this solution for a few minutes and then dried.

SILK may be dyed and printed with alizarine Bordeaux and alizarine cyanine with good results. The dyeing is best done in one bath by using fluoride of chrome as a mordant, entering the silk in the cold bath, and then slowly raising to the boil; or the silk may be mordanted with chloride of chrome as in cotton dyeing, and then dyed in a separate bath of the dye-stuff. For printing, the colour is made with a thickening of gum tragacanth, starch, and a little oil, glycerine, oxalic acid, sulphate of alumina, acetate of chrome, and the dye-stuff, printing and steaming in the usual manner.

# Designing.

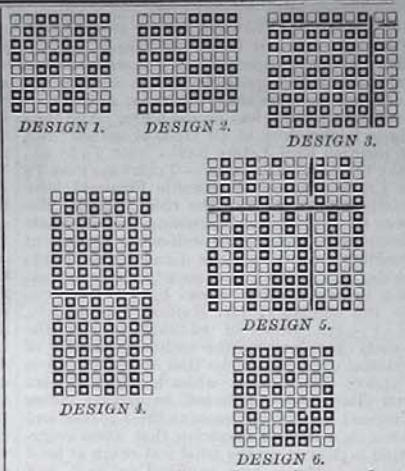
## THE ANALYSIS OF PATTERN.—III.

### WEAVE ANALYSIS.

Since any further calculations than those already dealt with will relate definitely to the cloths that happen to be under consideration, the next step will be to obtain the weave, or order of interlacing of the warp and weft threads, since, as will be shewn later, this may prove of great service in the subsequent analysis, such as determining the threads and picks per inch.

Practically there are two methods of determining the make of cloth, viz., by analysis and synthesis. By the former method is implied pulling a cloth to pieces, thread from thread, pick from pick; and by the latter, building a cloth up, according to the principles of interlacing, which experience enables the designer to detect in the cloth that it is desired to reproduce.

The second method is quite out of reach of the uninitiated. They must fulfil the laborious task of following every end and pick throughout the cloth, whereas the experienced analyst would pull a thread or pick out to confirm his




surmise respecting the make, and proceed at once to build up his cloth. Often the experienced can judge of the make of a cloth from the appearance alone: thus the fallacy of would-be analysts simply pulling cloths to pieces is fully demonstrated. Of *infinitely greater service* is the experience gained by experiment with the various makes of cloth.

Let us now suppose there is before us a pattern which it is desired to reproduce and of which we know nothing. Then the first consideration will be—is it a single, a backed, or a double cloth? This as a rule can readily be decided by pulling out a few threads and picks, and observing whether any of them keep to one side of the fabric or not. If one series, say of threads, form the face and the other the back, while the picks interweave both face and back, then the fabric is backed with warp, and it will be necessary to find not only the face weave but also the backing ties. Weft might be used as backing instead of warp, when there would be two series of weft threads and one of warp, and the interweaving of each must be obtained as in the case of warp backing. Should there be both backing warp and weft, then the fabric will usually be a double cloth, in which case three points must be decided: firstly, the face weave; secondly, the back weave; and, thirdly, the system of tying the back cloth to the face. Since backed and double cloths will be treated at length later, we proceed at once to consider the analysis of single cloths.

#### SINGLE CLOTHS.

In the case of single cloths, as already pointed out, it may not be at all necessary to pull the pattern in pieces, a very effective way of obtaining the weave being to place an ordinary piece-glass on the face of the cloth, when probably the make or makes (should it be a fancy) will be recognized; or, in the case of ordinary worsteds, the threads may even be followed throughout the repeat. In analysing woollens and rough-surface cloths singeing often renders the make clearer. Under any circumstances, however, it is advisable to pull out a few threads or picks, and, since there is a right and a wrong way of doing this, it is worthy of further consideration. All single cloths may be divided into three classes as follows:—

CLASS 1. — *Ordinary Makes*: Plain, hopsack, twills, etc,, which are usually woven on the square, *i.e.*, an equal number of threads and picks per inch.

CLASS 2.—*Weft Rib Makes*: Usually woven with a finer weft than warp, and consequently more picks.

CLASS 3.—*Warp Rib Makes*: Usually woven with slightly finer warp than weft, with a greater number of threads per inch.

#### ORDINARY MAKES, ETC.

Since in this class warp and weft interweave in the same, or nearly the same, order, either warp or weft may be pulled out. *Diagram* 3 is a micro-photographic reproduction of a thread and pick taken out of a two-and-two twill cloth, as shewn in *Design 1*. Notice first that the curves are equal, this being a necessary condition where a thread is up and down an equal number of times; and, secondly, that the

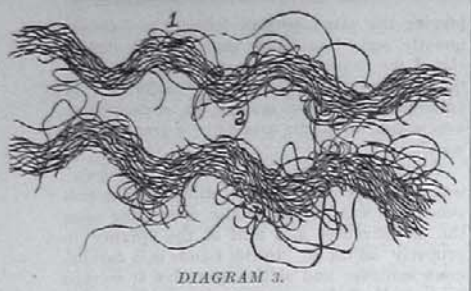



*DIAGRAM 3.*

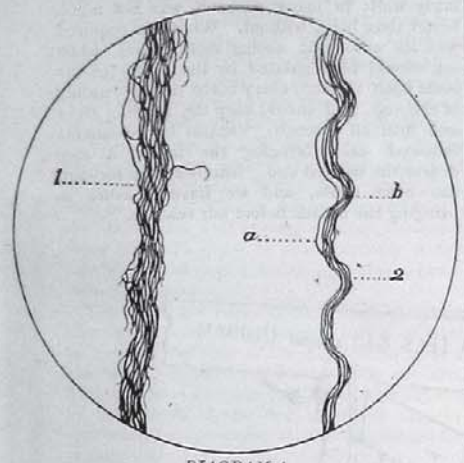



*DIAGRAM 4.*

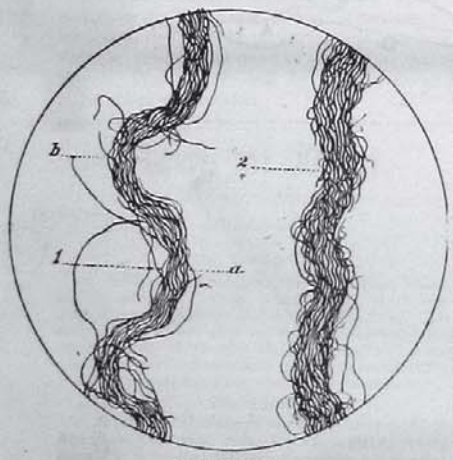



*DIAGRAM 5.*

deflection in warp and weft coincide, thus proving that, whatever the weave is, equal quantities of warp and weft are on the surface. A glance at *Diagram* 4 will shew clearly the possible difference between this class and the other two. There is usually no difficulty in deciding whether a fabric is plain or hopsack, but in the case of so-called ordinary twills a slight difficulty may arise, since, although all should run at an angle of 45 degrees, yet a very considerable variation in this respect is observable, owing to the insertion of rather more picks than threads, or *vice versa*. Recognizing this fact and noting the bending of warp and weft should enable even the uninitiated to arrive at the order of interlacing with little trouble.

### Class 2: Weft Rib Makes.

In this class are included all those fabrics in which the warp lies straight and the weft bends round it. *Design* 2 is a typical weft rib, under favourable circumstances the warp being quite straight, and the weft doing all the bending, thus forming a prominent rib running with the warp. *Design* 3 is the 2 and 1, or cashmere twill, of which a micro-photographic reproduction of actual threads is given in *Diagram* 4. We notice at once the thick warp thread 1, comparatively speaking, straight, and the fine weft 2 practically doing all the bending. The fact that the threads and picks are not up and down for an equal number of picks and threads is clearly indicated by the wave of the pick here represented, (a) indicating the pick floating over two threads and (b) where it is down for one. It is very evident, then, that if there is any doubt as to whether the ribs or twills in a pattern are of the same breadth, a careful examination of the curvature of a pick will solve the question. In this class of goods it will be found expedient usually to dissect the pattern by extracting the picks in preference to threads.

### Class 3: Warp Rib Makes.

The only difference between these and the preceding class is that the warp bends while the weft lies straight *Diagram* 5 shews this clearly, (1) being the warp thread and (2) the weft pick. *Design* 4 is a typical warp rib, but *Design* 5 was employed in the cloth from which this thread and pick were taken, this being practically a 12 end corkscrew weave, (a) indicating the thread up for 7 picks, and (b) down for 5 picks. In this case the structure will be most easily arrived at by carefully pulling out the threads. Should the weft be single yarn, however, it may be impossible to decide how many individual picks the warp floats over or under, each pick becoming merged with its neighbour. Under these circumstances it may be necessary to extract a few weft picks; in fact it is always advisable to do so, for it must be remembered *that it is not upon one circumstance alone that the structure of any cloth will be decided, but by the combination of circumstances, which practice alone will enable the analyst to combine in one harmonious whole.*

The sateens and sateen derivatives are a type of design which have representatives in all three classes, but the sateen twill may be recognised at once by its fine appearance and upright or horizontal angle, while the derivatives may usually be recognised by noting the principal weave feature along with its repeat; for example—the twilled hopsack is remarkably like ordinary hopsack, but when the relative positions of each flush of two by two are noticed the sateen distribution is at once apparent.

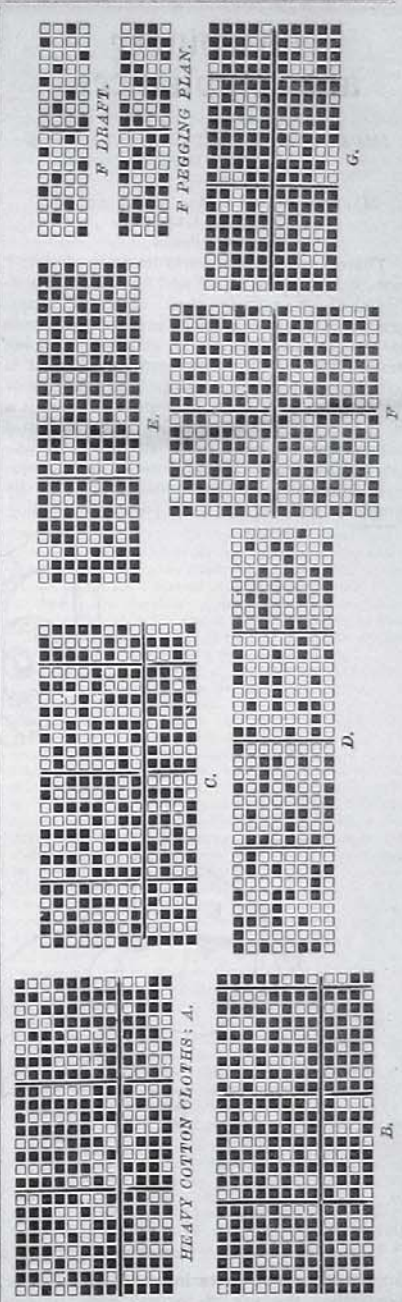
## *NEW DESIGNS.*

### COTTON SUITINGS.

*Designs A, B* and *C* are on 12 shafts, straight-over drafts, 24 to the round, and are so constructed as to form a back without extra material, making them specially suitable for out-door wear. If made from the following particulars a good useful cloth for many purposes can be fabricated. Warp, 2/20's cotton, 60 ends per inch or 15 dents, four in a dent; 50 picks per inch of 8's soft spun cop weft; woven all grey, and piece-dyed in drabs, buffs, stones, or any shade. These designs will be found of advantage to the makers of heavy cotton cloths.

*Design D* is a cotton cloth, having one face pick alternately with a back pick, which will give a fabric of any weight required. The back may be carded, thus providing a lining for cotton garments and giving all the heat of a woollen material; 8 shafts, straight draft, 32 to the round. Where it is not convenient to have drop boxes on each side of the loom, one count of weft will suffice for both face and back, therefore one shuttle will effect this object. On the other hand, with the shuttle boxes, it is possible to make the back with a coarser count, or any material that may be deemed advisable. Let the warp be 2/36's, in 20 dents per inch, 4 in a dent, 60 picks per inch of 12's soft cop.

*Design E*: Nearly same particulars, warp 2/30's, in 20 dents per inch, 4 in a dent, 8's weft, 60 picks per inch. As will be seen by the design, there are two picks of weft for the face to one on the back. We need scarcely draw attention to the fact that end-and-end colour




arrangements can be produced in these goods with the greatest freedom, either in warp, weft, or both combined; but they are generally woven grey and piece-dyed.

*Design F* is in cotton for ladies' jackets, vests, etc., on 4 shafts, 16-end draft, 16 to the round. Warp, 2/24's cotton, 18 dents per inch, 4 in a dent; weft 8's cotton, 60 picks per inch. This cloth, woven in the grey, may be dyed in all the fancy shades, or well bleached.

*Design G* is also a cotton fabric for suitings, on 10 shafts, straight draft, 20 to the round, one pick face, and one for a backing cloth. If a heavier cloth be desired the warp or weft, or both, may be increased, either in the number of ends or picks, by the use of coarser counts; also in the weft the same result may be obtained. The following particulars will furnish some idea of how to obtain a good cloth:– Warp 2/36's, with 20 dents per inch, 4 in a dent; 12's weft, 70 picks per inch; woven all grey and piece-dyed. We have by these designs shewn how this class of cotton goods may be backed in as simple a manner as possible.

# Machinery and Appliances.

## *IMPROVED PATENT SELF-ACTING NOSING MOTION.*

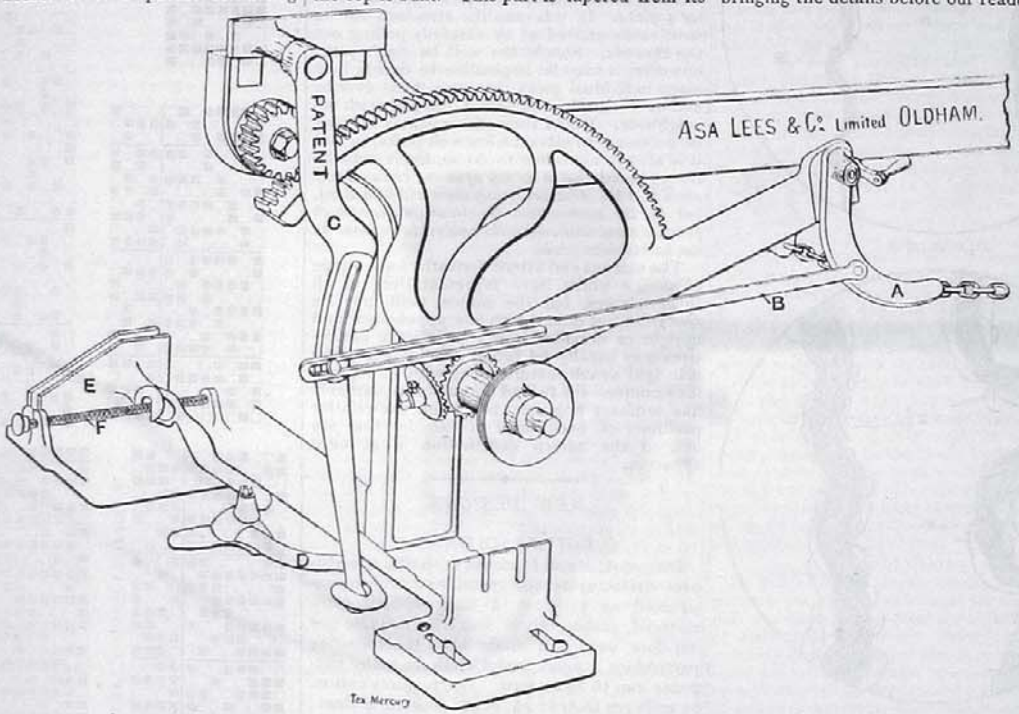
MAKERS: MESSRS. ASA LEES AND CO., LIMITED, OLDHAM.

*Stark's Patent.*

There are many curiosities in "shop" nomenclature that strike and bewilder the non-technical observer by their apparent incongruity. This sort of thing especially abounds in the textile industries, and the "nosing motion," to an improved form of which it is our present purpose to draw the attention of our readers, is a case in point. "What is a nosing motion?" an outsider may ask, and immediately his mind, in the attempt to formulate an answer, reverts to the useful and decorative appendage of the human face, and he wonders whether it is a patent self-acting appliance for manufacturing artificial noses or controlling the use of natural ones. It can hardly be the former, for in his walks abroad he would not observe that there are a sufficient number of people either wanting them or supplied with the artificial article, to justify an inference that the demand would be great enough to repay the ingenious inventor of an improved patented self-acting method of producing them. Therefore he goes further afield, it may almost be said further astray, and at last has to abandon the solution of his own question in despair. Having frankly given it up like other propounders of enigmas in similar circumstances, we may supply the answer.

In the cotton trade by far the largest proportion of yarns are spun upon the mule, a machine the name of which affords another illustration of the singularities referred to in our opening remarks. This was the invention of Samuel Crompton, and was so called because it combined the distinguishing principles of the spinning jenny—another of these curiosities—of James Hargreaves, and the water frame of Arkwright, which will also come into the same list. The spinning mule needs no description. It need only be observed that it was not until its improved form, which was automatic, was invented, that the requirement of an improvement upon the automatic winding arrangement became apparent. Roberts's invention was the quadrant arm, and this at the time was regarded as a great triumph of inventive genius, which was the truth. Still, experience shews that it had serious defects, arising from the form of the mule spindle, which it may be desirable to briefly describe. Mule spindles are carefully constructed of steel, and are from about 14 in. to 18 in. long, according to the kind of yarn they are intended to spin. The diameter varies throughout the length. The lower portion, termed the haft, which extends from the bottom or foot to where it bears upon the bolster, is the strongest, and carries the wharve. The portion that rises above the bolster is called the blade, and it is on this that the cop is built. This part is tapered from its base upward, the diameter diminishing from about ⅞ in. to less than ¼ in. This tapering is necessary in order to facilitate "doffing," or stripping the cops from the spindle on completion. When lifted upwards the cops are easily taken off the spindle. The yarn is wound upon the spindle in the form of a cylinder, having a cone at each end. The extremity of the lower cone is called the cop bottom, and that of the upper the cop nose. It would be more happily named if called the peak of the cop. Here then we have got to the "nose," to which the invention under view relates. In the original form, as the construction of the cop advanced, the winding of the yarn at the nose became gradually slacker owing to the diminishing diameter of the spindle, the latter only making the same number of revolutions as when winding on the larger diameter, and consequently taking up a diminished quantity of yarn. This caused serious defects. The yarn became snarled, and much of the twist ran into any thin places that might exist in each draw, leaving the other portion deficient and consequently soft—two faults that greatly depreciated its value. Next, owing to the slack at the nose, the latter became "halched" or entangled, in such a manner as, especially in weft yarns, led to the making of a great deal of waste.

To remedy these faults the "nosing peg" was first invented, but its utility was limited, because it was not automatic, depending upon the attentiveness and skill of the spinner to properly adjust it. In the hands of a careful, conscientious, and skilful operative it worked fairly well; in many cases it was not much better than being without. What was required was an automatic nosing motion that, when set, should be regulated by the action of the mule itself through every stage of the winding of the cop, and should keep the winding tight and firm all through. Various improvements followed, each bringing the matter a step nearer the desired end. Another step forward has been made, and we have pleasure in bringing the details before our readers.




IMPROVED PATENT SELF-ACTING NOSING MOTION.—MESSRS. ASA LEES AND CO., LIMITED, OLDHAM.

This new or improved nosing motion is being introduced by Messrs. Asa Lees and Co., Limited, Oldham. In most existing nosing arrangements a principal part of the mechanism consists of a ratchet, located somewhere between the arm A and the shaper screw F. In all these the action instead of being perfectly gradual is intermittent, requiring the mule to make ten or twelve draws before moving the wheel a tooth.

In this time the winding has become comparatively slack, and when the movement is made it is tightened so much that the thread sinks into the slackly wound yarn previously put on. Cops in this condition cannot in the subsequent processes of winding or weaving be skewered properly, and the yarn will not come off as it ought. It is claimed that the improvement under notice obviates all this, and in our opinion the claim is perfectly justified.

In the new arrangement a loose arm A is mounted on the quadrant arm, and upon the headstock side is mounted a pendant lever C. These parts are connected by the rod B which

can be increased or diminished in its effective length by a clip and bolt which is fixed at one end. On the foot of the frame is arranged horizontally a hooked lever D, which has its fulcrum in the centre, and the hooked end of which passes around the lower end of the pendant lever C, by which a connection between them is effected.

The opposite end of the lever D is forked and overlaps the shaper screw F. As the shaper plate E is brought inwards it pushes before it the lever D which carries the lower end of the lever C in the same direction, and through the connecting rod B brings down the arm A with a gradually increasing drag upon the quadrant chain, thus steadily and proportionately accelerating the speed of the spindles exactly in the ratio required to meet the change caused by the diminishing diameter of the spindle.

When spinning 40's twist with a shaper wheel of 40 teeth, what may be called the feed of this nosing motion is the 240th part of an inch per draw. This, it will be seen, will insure the most even and regular winding, the effect being obtained draw by draw throughout the building of the cop, a result, we believe, never before achieved.

The parts are adjustable, so that its operation can be made to commence sooner or later by moving the stud of the connecting rod in the lever C upward or downward in the slot. The tension of the yarn in winding is controlled by the length of the rod B, which may be shortened for increasing it, and lengthened for easing.

It will be clear from this description that the invention is a very valuable one, as it is suitable for use with all kinds of yarns, coarse or fine, and can easily be applied to all existing headstocks. The makers will be pleased to give any further information.

# News in Brief.

## *ENGLAND.*

### Bacup.

At the Bacup Police-court, on Wednesday, Messrs. G. D. Shepherd, cotton manufacturers, were summoned for five offences under the Factory Act. Mr. Pearson, inspector, said he visited defendants' mill at 5 45 p.m. on the 2nd ult., and found five young persons at work. Defendants' manager pleaded guilty. Defendants were fined 10s. and costs in each case.

### Blackburn.

An exhibition of students' work is now open at the Blackburn Technical School. The exhibits include drawings from the antique, specimens of weaving, designs of ornamentation, and drawings of machinery—affording the public an opportunity of seeing and admiring the work done by the school. The practicability of the designs is proved by pieces of cloth arranged down the centre of the room, which have been woven from them on the school loom. The design for a damask table cloth, by Mr C. P. Brooks, is prominent amongst these

Last week a meeting between representatives of the employers in the Blackburn cotton trade and the officials of the Operatives' Association took place in the offices of Mr. Joseph Watson, Richmond-terrace. The object of the meeting was to discover some way of improving the relations between employers and employed in case of disputes. The employed brought forward several grievances with regard to the supply of bad material. After a long discussion the representatives of the masters agreed to recommend their members to endeavour to improve the state of affairs in this town, so that the operatives could keep at work without the necessity of having to make constant representations. On the other side, the representatives of the workpeople agreed to endeavour to keep the workpeople at work, under the provision that the masters gave them notice of any change they wished to make, and to advise the workpeople not to turn out on strike without duly giving notice to their officials. It is expected that good will accrue from the conference.

### Bolton.

Messrs. J. Chadwick and Brothers, Limited, of Bolton, have acquiesced in the arrangement lately come to by the Scotch thread manufacturing companies with regard to prices.

### Brighouse.

The dressers at Messrs. Ormerod Brothers, Limited, who three weeks ago struck against a proposed reduction in one class of silk, have not been able to come to terms. On Saturday the firm closed the whole of the Prince of Wales mill, dismissed the overlookers, and retained only one-half of the workpeople employed in some operations at Alexandra mills. About 450 hands are out of employment. At the other silk spinning mills in Brighouse and Rastrick the dressers have been put on short time.

### Burnley.

For a considerable time past a gentleman, who is a native of Austria, and is believed to be from Vienna, has been engaged at one of the weaving sheds here in order to obtain practical knowledge as to the weaving of Burnley goods. A short time since he left this place, and is now reported to be in Manchester learning the "ins and outs" of the Manchester Exchange, preparatory, it is stated, to returning to his native land, where it is understood he intends to commence cotton manufacturing. A gentleman, a native of Sweden, was some time ago also employed here in one of the weaving sheds, in order to gain knowledge of a similar character preparatory to commencing cotton manufacturing in Sweden.

### Bury.

Messrs. N. Worsley and Co. have conceded a slight advance to their grinders, the men having placed their case in the hands of their association.

A breakdown took place at the California Mills, Bury, yesterday week, through some derangement of the running gear. The mill may probably be stopped a fortnight or so.

The Bury Trades Council met on Tuesday evening, and they decided to try to obtain information as to how the Town Council were carrying out their resolution re letting of contracts. They also objected to the raising of the officials' salaries, seeing that advances had been made within 12 months, and suggested that if any further advance were granted it should be to the poorer workmen.

### Cleckheaton.

The newly-erected Town Hall was opened on Wednesday with much ceremony by Mr. Joseph Law. The places of business were closed at an early hour, and the remainder of the day was given up to festivities, the town being illuminated in the evening.

### Darwen.

At the Chancery Court, Manchester, on Wednesday, the Vice-Chancellor made an order authorising the directors of the Albert Cotton Spinning Co., Darwen, Limited, to return £6,000 surplus capital to the shareholders, being 15s. per share on 8,000 shares, £3 5s. per share paid up, the company having no further use for this surplus capital.

Professor R. Beaumont, of the Yorkshire College, Leeds, is giving in this district a series of lectures on textile designing. They are illustrated with diagrams by an oxy-hydrogen lantern, and each lecture is followed by a short lesson and examination if desired. These have been arranged by the committee of our local Science and Technical Schools.

### Halifax.

The men employed at the dyeworks of Mr. David Jagger, West-parade, have struck in consequence of a demand for an advance of wages not having been granted. They ask for ½d. per hour advance to those receiving £1 a week or under, and ¼d. per hour to those earning over £1. An advance of ten per cent. and five per cent. respectively in the two cases has been offered.

### Haslingden.

The federation of cotton operatives are about causing a strike at Hazel Mill, this mill, owing to the management, being able to dispense with the mule spinners. A large quantity of machinery has during the past year been put into the mill by the new limited company, who have purchased same, and, with the exception of the two mule rooms, the mill has been thoroughly put in working order, and has found good work for factory operatives. The management, finding that the old mule spinning machinery was being worked at a great loss, asked the spinners to take a reduction in wages, so that they could find them work instead of stopping the mules. The spinners declined reduced wages, preferring to leave the mill. They left, and, after a fortnight's play, they found that the mill was able to dispense with their services, so they appealed for the support of the Card and Blowing-room Association, which, together with their Spinners' Union, forms the federation. A demand being made to take the spinners back, the managers declined to take them back and work the machinery at a loss to suit the demands of a few operatives, so the federation ordered the whole of the operatives to hand in their notices to leave work.

### Heckmondwike.

The annual meeting of the Heckmondwike Mechanics' Institute was held on Monday evening, Mr. William Humphrey, one of the vice-presidents, in the chair. The report stated that the scheme for enlarging the premises so as to meet the technical instruction requirements of the committee was proceeding apace, and competitive designs of the additions and alterations would soon be ready for inspection. Financially, the institute was in a healthy state. Mr. J. Stansfield urged that a scheme for raising the needful amount for upholding a first-class technical school should be formulated, and he referred to the offers of the Heckmondwike Manufacturing Co. (£100), the Heckmondwike Co-operative Society (£50), etc., and suggested that the ladies of the district might render substantial help by getting up a bazaar in aid of the project. Mr. Jeremy Firth, in supporting the adoption of the report, remarked that if £2,000 could be raised it might be possible to borrow the remaining £1,000 from the Technical Committee of the County Council. The motion was put and adopted.

### Huddersfield.

The Council of the Huddersfield Chamber of Commerce met yesterday week, Mr. J. H. Sykes, the retiring president, in the chair. There were also present Mr. George Thomson, Mr. W. D. Shaw, Mr. W. Wrigley, Mr. G. Midgley, Mr. J. Lowenthal, Mr. E. Fisher, Mr. J. Crowther, Mr. Skillbeck, and Alderman Joseph Brooke. Mr. George Thomson was unanimously elected president for the ensuing year.—Mr. Thomson, on taking the chair, after acknowledging the honour which the Chamber had conferred upon him, referred to the question of foreign tariffs. Notwithstanding the changes which were observable in this matter in different parts of the world, his faith in the principles of Free-trade had not been impaired. He believed that the industries of this country were suffering much more from the disputes which were constantly taking place between capital and labour than from tariffs imposed upon our goods by foreigners. Professor Marshall, than whom there had not been a more able writer on this subject since the days of Adam Smith, had made revelations which might well be considered. There was £400,000,000, he shewed, spent in this country every year on articles that we could very well do without. We could not think of influencing foreign nations to take off their tariffs by any action we might take unless we were to go to the extreme of putting on prohibitory tariffs. A great deal, however, might be done if we took a leaf out of the colliers' book; a refusal to purchase those things which we could very well do without might influence them. The growing use of and improvements in machinery were also largely responsible for the state of things which prevailed today, coupled with the large variety in the make of goods. Some of the former demands for Huddersfield and Yorkshire-made goods had latterly gone to other districts, and Yorkshire manufacturers would have to bide their time till the demand came round again.—Mr. Alfred Walker was elected senior vice-president, Mr. F. Eastwood junior vice-president, and Mr. Alderman Joseph Brooke was appointed treasurer.

### Keighley.

At the annual soirée of the Keighley Chamber of Commerce, held on Friday evening of last week, an address was delivered by Mr. Maclean, M.P., on "Imperial Federation, chiefly in relation to its financial aspects." He deprecated any change in our fiscal arrangements, and said that our policy had made us the chief industrial and commercial nation in the world.

### Kidderminster.

Mr. Charles W. Kent, who has been for the last 22 years with Messrs. John Brinton and Co. (now Brinton's Limited), sailed for New York on Saturday. On hearing of Mr. Kent's intention to venture in the New World, the heads of departments and designers at Brinton's Limited presented Mr. Kent with a purse of gold. The weavers employed on the Old Shed of the company also presented him with a handsome pipe and case, which was accompanied by a letter wishing him health and prosperity in the New World.

### Manchester.

On Saturday the members of Mr. Thornley's cotton classes at Glossop, Hyde, and Droylsden, to the number of 65, accompanied by members of Mr. Hoey's class, Holywell Green, paid a visit to the Junction Ironworks, Newton Heath, a branch works of the firm of Messrs. Brooks and Doxey (late Mr. Samuel Brooks), of Union Works, West Gorton, and used principally for making their patent revolving flat card and bobbin and fly frames. The students were divided into groups, each conducted by some leading official of the firm. A thorough inspection of the various processes and departments was made, most interest, however, being centred upon the card, the chief speciality of which is that the flats rest upon revolving discs; these act as good anti-friction bowls, and thus prevent any wear of the flat ends or flexible or stationary bends. The several parts of the bobbin and fly frames were

examined, and made a favourable impression upon the students, particularly Shaw's new patent differential motion, just being introduced by Messrs. Brooks and Doxey. Soon after five o'clock two omnibuses arrived at the works, specially ordered by the firm, which conveyed the students to the principal works at West Gorton, where other representatives of the firm were ready to escort them about. The inspection of the Union Works included special machine tools, the Union or gravity spindle and also the Rabbeth spindle in sections, spindles and rings in various stages of manufacture, the various parts of the drawing frames, and a large model of a new patent traverse, brought out by Messrs. Cook and Harrison, for the purpose of preventing the wear of the top leather rollers of mules and other preparing and spinning frames. In the evening the whole party were conveyed by omnibuses to the Belle Vue Gardens and were treated by the firm to a substantial repast. The after proceedings took the form of a meeting, with Mr. Fred Goodbehere in the chair. After various toasts and speeches a hearty vote of thanks was accorded to the firm of Messrs. Brooks and Doxey. The representatives of the firm present were Messrs. J. S. Brooks, W. H. Cooke, George Shaw, J. W. Compston, and W. R. Parkin.

### Ossett.

The prizes and certificates gained by students of Ossett Technical School last year were publicly presented on Saturday evening by Mr. William Patterson, president of the Ossett Chamber of Commerce. A report was also read of a very encouraging nature.

### Oldham.

Mr. Joseph Hilton, recently of the North Moor Spinning Co., has commenced his duties as carder of the Pine Mill Co.

Messrs. Buckley and Taylor, of Castle Ironworks, Oldham, have been entrusted with the carrying out of the repairs to the steam engines of the Central Mill Co., and the work is expected to be completed this week to allow of a full resumption of mill operations.

The Werneth Spinning Co.'s extension, which will hold some 40,000 spindles, is about covered in, and the greater portion of the fire proofing finished. The engines are in a forward state, and the engineers are in a position to deliver a considerable portion of their work as soon as the engine-house is covered in. A new lodge is also being made. The directors, it seems, have not yet given out the order for machinery.

The funeral of Mr. George Holden, of Haggate-lane, Royton, took place on Monday. The deceased has for about 20 years taken a deep interest in the limited liability movement of this district, and was at the time of his death a director of the Royton, Star, and Park and Sandy-lane Spinning Cos., the Cotton Buying Co., the Federative Insurance Co., and other concerns. He was also one of the promoters of the Holly Spinning Co., whose mill is about ready for commencing work. The funeral was attended by gentlemen representing the above-named concerns.

### Ramsbottom.

It is stated that Mr. Ashworth, who was one of the partners in the firm of Schofield and Ashworth, of Kenyon-street, Ramsbottom, has leased the Wood-road Mill, Summerseat, near the waggon works, which has been empty for some time. We are informed that new manufacturing machinery will be put in without delay, and the place got to work as soon as possible.

### Rochdale.

Mr. T. Nelson has severed his connection with Messrs. John Smith and Sons, woollen manufacturers, Milnrow. He has occupied the post of salesman to the firm for a long period.

### Rossendale.

Mr. Maden, cotton spinner, the new M.P. for Rossendale, has promised £2,000 and a site, for a Liberal club which is to be erected at Bacup at a cost of £5,000.

### Shipley.

A meeting of the Shipley Textile Society was held yesterday week, when a paper was read by Mr. F. Bradbury on "The Production of Soft-handling Cloths." Mr. Miles Sowden, the president, was in the chair. Mr. Bradbury commenced by enforcing the value of combining theoretical knowledge with practical experience of the materials used in the manufacture of textile fabrics. The first thing to consider was to what use the cloth was to be put, then to adapt the processes of manufacture to the end in view. It was not wise to aim at softness alone, or other advantages would be lost. The three leading points in the production of soft-handling cloths were (1) the materials used; (2) the construction of the design; and (3) the close or open setting of the warp and weft threads. The great diversity in the materials used created an initial difficulty, and great thought and care were necessary to decide which class of materials to adopt. Having described the differences between worsted and woollen cloths and their special peculiarities, he pointed out that the vegetable thread was not suitable for the production of soft-handling cloths, except by introducing special features of manipulation. Dealing with the second branch of the subject, Mr. Bradbury illustrated the designs most suited to the object in view, giving prominence to the sateen basis. With regard to the setting of the warp and weft, he said it was necessary to consider whether the cloth was to have a plain and natural finish, or if it was required to be shrunk or milled. The most satisfactory cloths running in twill form were those which were "set" about 6 per cent. less than their diameters would naturally allow; whereas "corkscrews" and similar designs could be set to the full diameter of the warp threads, regardless of the intersections. In woollen goods the threads were set exceptionally loose, allowing in many instances from 25 to 30 per cent. for shrinkage, and the goods were only made saleable by the processes of dyeing and finishing. The paper was freely illustrated with lantern slides produced by means of the microscope and photographic camera.

## *SCOTLAND.*

### Dundee.

Ladybank Mill, Mid-street, Dundee, has been closed by Messrs. Anderson and Glass in consequence of the short supply of jute this season. The firm employed 100 workers.

The Dundee millworkers met on Monday night to consider the circumstances connected with the short supply of jute. It was resolved to recommend the Trade Committee to stop the machinery at 5 p.m. instead of at 6 on each of the first five days of the week, and that if anything further is necessary the works be also closed on Saturdays.

A meeting of the Executive of the Scottish Bleachfield Workers' Union was held in the Gilfillan Memorial on Saturday evening to endeavour to learn from the non-Unionists their reasons for keeping aloof from the Union. The attendance was small, and those present, instead of raising objections, willingly enrolled their names, and promised to do everything in their power to advance the Union.

A meeting of the committee of the newly-formed Dundee Jute Importers' Protection Association was held in the Royal Exchange, yesterday week. A subcommittee, consisting of nine gentlemen, was appointed to start the work of the Association at once. Matters affecting the importation of jute will come before this committee, and, if they consider steps should be taken in any instance, a report to this effect will be made to the General Committee. It is reported that cargoes now being discharged at the harbour are not in a very satisfactory condition.

### Glasgow.

The death is announced of Mr. Adam Pringle, for many years a leading merchant in Glasgow. Deceased was 79 years of age.

The James Watt anniversary dinner took place on Monday evening in the Windsor Hotel. Mr. Robert Dundas, M.I.C.E., president of the Institution of Engineers and Shipbuilders in Scotland, presided, and the croupiers were Dr. James Colville, M.A., and Mr. W. Paton Buchan. About 100 gentlemen were present.

The following table gives the value and destination of the exports of cotton and linen goods from the Clyde for last week, and also the totals of the previous week. The first line refers to *cotton* goods, and the second to *linen*:—

| | India and China. | U.S. and Canada. | W. Indies & S. America. | Australasia. | Africa and Egypt. | Continent. | Totals. | Totals for year to date. |
|---|---|---|---|---|---|---|---|---|
| £ | 100,250 | 13,541 | — | 3,985 | 2,707 | 316 | 120,799 | 552,301 |
| | 20 | 16,793 | — | 689 | — | 77 | 17,579 | 125,376 |

The following are the total values of the exports for the same six weeks of last year:—Cotton, £543,362; linen, £111,082.

### Montrose.

On Tuesday, at the monthly meeting of the Treasurer's Committee of the Town Council, an application was submitted from Messrs. Gibb, manufacturers, Bervie, asking on what terms the firm could feu a portion of the South Links, their intention being to erect a spinning-mill thereon. The Committee were disposed to comply in the most liberal manner with the request of Messrs. Gibb.

### Paisley.

The half-yearly report of the Co-operative Manufacturing Society shews that the sales for the past six months amounted to £25,547, an increase of £1,076 over the same period of the preceding year. After meeting all expenses there remained a profit of £2,057 6s. 8d. for division amongst the members in payment of dividend on shares, purchases, and wages, and the directors have recommended the allocation of 6d. per £1 to shareholders, and 1s. per £1 to purchasers and servants, carrying forward £156 0s. 10d. to the present half-year. The number of members in the society is 211, holding 7,830 shares, and there are 686 private members with 5,879 shares. In the society's new factory at Colinslee 93 looms are now fully employed.

At a meeting of the Paisley Town Council, on Tuesday, Provost M'Gown stated that Mr. James Coats, jun., some time ago expressed a desire to add considerably to the endowment of the Fountain Gardens Fund. They have now received a communication from Mr. Coats intimating that he was willing to hand over a sum of £3,000 to be added to the Endowment fund of the Gardens. This, continued the Provost, was a very honourable gift, and reflected great credit on the generous donor, whose action was in keeping with the spirit of munificence which his father (Mr. Thomas Coats) had always shewn to the town. Mr. Coats, he was also able to state, was anxious to carry out certain improvements in the Gardens which would likely entail an additional expense of £1 000. It was agreed to accept the offer of Mr. James Coats, and to forward him an excerpt from the minutes thanking him for his gift.

## *IRELAND.*

### Belfast.

Support is still flowing in upon the Linenlappers' Trade Union. They have received £50 5s. from No. 1 Makers-up, Manchester, £8 from the secretary of the Dublin Trades Council, and £20 from Glasgow. Notwithstanding the unsatisfactory result of the conference, they still hope that an amicable settlement will soon be arrived at.

# Miscellaneous.

## *THE SCIENTIFIC VALUE OF LOVIBOND'S TINTOMETER.*

A Paper Read Before the Society of Arts. By F. W. Edridge-Green, M.D.

From the time that colour first commenced to interest scientific men, a method which would enable us to match colours and keep a record of them for further reference and examination has been desired. The present system of colour nomenclature is unsatisfactory, as in fact all arbitrary systems of colour-naming must be, on account of the varying degrees of colour-perception which are met with in different individuals.

Colour is a sensation, and not an unalterable physical quality of bodies. The same substance may vary in colour according to the conditions under which it is viewed. The rays of light which give rise to the sensation are unalterable, and it is the suppression or admixture of certain of these rays that gives rise to changes in the colour of an object.

The tintometer is an instrument consisting of two tubes placed side by side on a stand. Both tubes are open at each end. At one end is an eyepiece through which both apertures in the tubes can be viewed. At the ends of the tubes, opposite the eyepiece, is an arrangement for holding the coloured glasses and the substance to be measured. The coloured substance is matched with coloured glasses which are rose, yellow, and blue. The inventor has taken a glass very faintly tinted with each of these colours as a unit, and then constructed a series of glasses in sequence, in accordance with the number of units of the colour in each glass.

The instrument is used as follows: In the case of transparent substances, a white porcelain plate serves for a background. The porcelain plate scatters white light in all directions, but gives a reflection sufficiently luminous for the purposes of the tintometer. On examining the light reflected from the porcelain plate with a spectroscope, it is found to give a continuous spectrum, the luminosity of the colours being diminished practically in the same degree. It is necessary that the spectroscopic composition of the light reflected from the porcelain plate be known, because a substance may appear white, without reflecting the spectral colours in an equal degree. Two or more of these colours may even be absent from the light reflected by a white substance. This fact may be demonstrated in the following manner: Let a spectrum be thrown on a screen with the aid of a prism. If a lens be inserted in the

course of the rays, so that they will be focussed on the screen, they will be reunited at the point of focus, and again form white light. If an opaque object be interposed, so that one set of coloured rays are cut off, the combination of the remaining rays will form a colour having a hue complementary to that of the intercepted rays. For instance, if the intercepted rays be yellow, the remaining rays will appear blue. If, however, the blue, as well as the yellow rays, be intercepted, the reconstituted beam of light will again appear white. It is evident, therefore, that the removal of one or more pairs of complementary colours from white light will leave the light unaltered with regard to hue, though the luminosity will be correspondingly diminished. A substance, therefore, may be white without reflecting all the rays of the spectrum, provided that equal portions of complementary colours be removed.

In estimating colour there is another point to be taken into consideration, and that is, if a colour be mixed with a large proportion of white light it will not be visible. Captain Abney has shown that the extinction of every colour is effected by white light, which is seventy-five times brighter than the colour. A pale wash of a pigment is not visible on white drawing paper.

When the colours of opaque substances are estimated by the tintometer, the comparison light is obtained from pure plaster of Paris carefully pressed in a small tray.

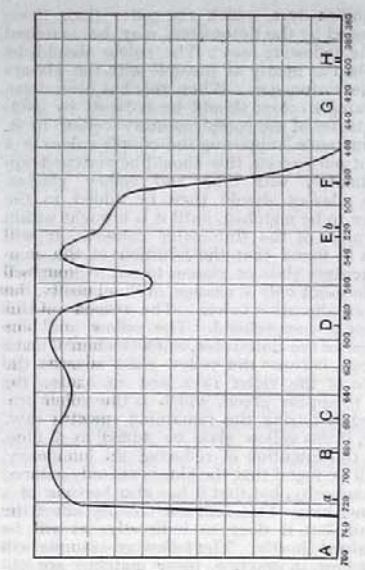



Fig. 2.—Absorption Curve of the Blue Glass to 161°.

### The Rose Glass.

The glasses of the tintometer, therefore, produce their colours as follows. Let us first consider the rose glass. If we take the weakest glass and examine it with a spectroscope, we find that the light is transmitted proportionately to the curve in Fig. 1, that is to say, the green is most absorbed, then the violet, and so on. This glass will then correspond to the apex of the curve, and the resulting colour will be that of light with certain constituents removed in the proportions represented by the curve. Total absorption only takes place at the apex of the curve. It is evident therefore that if we allow the light to pass through two pieces of this glass the second piece of glass can only act on those rays which have passed through the first. As the coloured light absorbed by the second piece of glass is proportional to the heights of the curve, the absorption diagram of both combined may be represented by the curve with a portion of the apex removed. At the point of section there is total absorption. In this way by adding to the number of glasses we pass downwards towards the base of the curve, the sections indicating total absorption becoming larger and larger, and the amount of light transmitted through the glasses smaller and smaller. From this it is evident that a feebly-tinted glass transmits more red light than a glass of a much deeper shade. From the curve it will also be seen that the hue of the transmitted light becomes of a purer red as the number and depth of the glasses are increased, and the violet becomes absorbed.

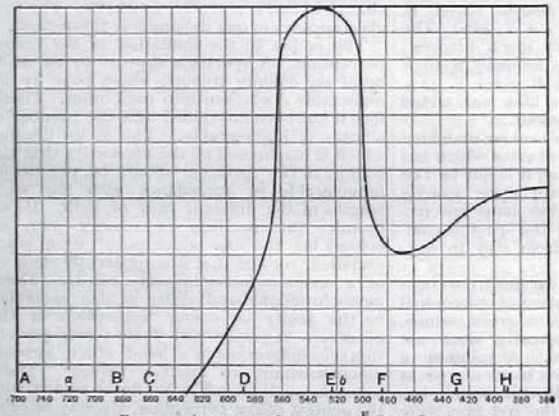



Fig. 1.—Absorption Curve of the Rose Glass to 220°.

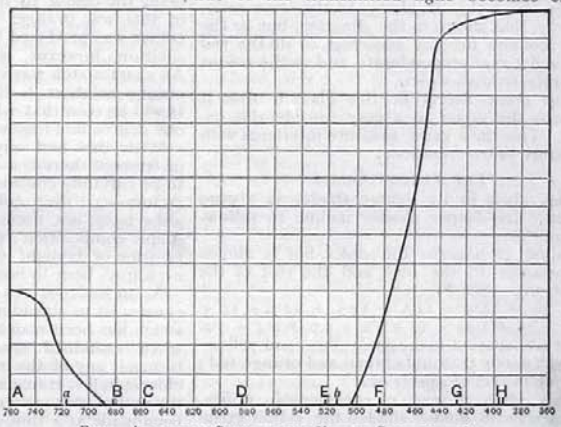



Fig 3.—Absorption Curve of the Yellow Glass to 207°.

The coloured glasses used in the tintometer are of three kinds, rose, blue, and yellow. Coloured glass gives rise to its colour through absorption. When a beam of white light falls on a piece of coloured glass, part is absorbed and part is transmitted. On the screen is a spectrum of the blue glass, No. 16 according to the tintometer scale. It will be seen that there are three definite black bands, one in the orange, one in the yellow, and one in the green. These are called absorption bands, and are due to the fact that blue glass absorbs the rays of the spectrum which previously occupied the position of the black bands. The absorbed rays are probably converted into some other form of energy.

The colour of coloured glass is therefore a colour which has been produced by subtraction of certain constituents from white light. I shewed in the first experiment that if any constituent colour be removed from white light, the residual light will appear of the complementary colour.

I will now draw your attention to the three figures representing the curves of absorption of the three coloured glasses. Absorption diagrams are usually represented by spectra with shaded bands of different depths to represent the absorption bands. It is almost impossible to represent an absorption spectrum in this way when any great degree of accuracy is required. We can more easily represent an absorption spectrum by a curve, the height of the curve corresponding to the degree of absorption. No substance is absolutely transparent to any of the rays of the spectrum. In all cases the absorption is only a question of degree. In the case of the diagrams representing the absorption of light by the tintometer glasses, the absorption by the rose glass is represented to 220° of the tintometer scale, that of the blue glass to 162°, and that of the yellow 207°. We could make the curves quite complete by examining an increasing series until the transmitted light was too feeble to affect the eye. A curve constructed in this way would shew the exact proportion of the constituents of white light transmitted by a coloured glass.

We have now to consider the cause of the difference in hue and shade of light when allowed to pass through several thicknesses of the same coloured glass, from that which it appears when transmitted through a single piece. If a coloured glass or substance absorbed certain rays of the spectrum, and those only, it would appear of the same colour in a thick layer as in a thin layer, because the thin layer would absorb these rays, and the effect of putting another thickness of glass in the course of the transmitted beams would be nil, as it could not affect any of the remaining rays of the spectrum. As I have previously stated, no substance is perfectly transparent to any of the rays of the spectrum, but there are substances which are opaque to certain spectral rays, and almost transparent to the remainder. These substances appear of nearly the same colour in a diluted as in a concentrated solution, in a thick as in a thin layer. Chromate of potash is one of these substances, and it appears very nearly the same colour in a dilute as in a concentrated solution.

Rose 22, when examined with the spectroscope, shews a dark absorption band, occupying two-thirds of the green. The violet is partially obstructed. The glass is almost transparent to the remaining rays of the spectrum.

When high combinations are examined, the hue of the transmitted light first changes to orange-red, and then to a pure red.

R. 22+21. Most transparent to red, orange, yellow, and yellow-green; opaque to green and blue green. Transmits blue and violet partially.

R. 22 + 21 + 20. Most transparent to red, orange, yellow, and yellow-green; opaque to green and blue-green. Transmits a few blue and violet rays.

R. 22 + 21 + 20 + 19. Transmits red, orange, and yellow partially; opaque to rest of spectrum.

R. 22 + 21 + 20 + 19 + 18 + 19·5 + 18·5. Transmits red and orange partially; opaque to rest of spectrum.

R. 22 + 21 + 20 + 19·5 + 19 + 18·5 + 18 + 17·5 + 17 + 16·5 + 16 + 16·5. Transmits red partially; opaque to rest of spectrum.

It will be noticed in all the diagrams that the absorption bands at the red end of the spectrum, as represented by the curves, occupy positions nearer the centre of the spectrum than they do in the corresponding spectra on the screen. This is due to the fact that in a spectrum produced by a prism, the colours at the red end occupy less space than they should, having due regard to their wave-lengths. The

figures in the diagrams indicate the wave-lengths of the various rays in millionths of a millimetre. The letters indicate the positions of the principal Fraunhofer lines.

### The Blue Glass.

This glass is a pure blue in its lighter shades, but the deeper shades incline to violet. In still deeper combinations the hue inclines to reddish violet.

Blue 20 shews a dark absorption band occupying the red-orange, and another in the yellow. The remainder of the orange is nearly absorbed. There is an absorption band of medium depth occupying the central third of the green. The glass is almost transparent to the remaining rays of the spectrum.

In examining the lighter shades of this glass, the absorption bands occupying the red-orange and the yellow are the first to appear. (See Fig. 2.)

B. 20 + 19. Almost transparent to band of red, blue, and violet. Transmits yellow-green and blue-green partially; opaque to rest of spectrum.

B. 20 + 19·5 + 19. Almost transparent to band of red, blue, and violet. Transmits blue-green partially; opaque to rest of spectrum.

B. 20 + 19·5 + 19 + 18·5. Transmits a band of red, blue, and violet partially; opaque to rest of spectrum.

B. 20 + 19·5 + 19 + 18·5 + 18 + 17·5 + 17 + 16·5 + 16. Transmits a band of red and violet; opaque to rest of spectrum.

The absorption is always in the same ratio, namely, that shewn in the diagram, but as the other colours become absorbed, so do the red and violet rays preponderate, and so the colour becomes reddish-violet.

The great defect in this glass is that it absorbs the green to a very considerable extent. This in a great measure interferes with its utility in combinations.

### The Yellow Glass.

This glass in its lighter shades is a pure yellow. Its deeper shades incline to yellow-green.

Yellow 16 absorbs the violet, but is almost transparent to the blue and the rest of the spectrum. (See Fig. 3.)

Y. 16 + 15·5 + 14·5 + 13·5 + 12·5 + 12 + 11·5 + 11 + 10·5 + 10 + 9·8 + 9·6 + 9·4 + 9·2. Most transparent to orange, yellow, and yellow-green; partly transmits green and orange-red; opaque to rest of spectrum.

This glass is one of considerable utility. Though in the deeper shades the yellow-green rays predominate, these are near the yellow, and so do not interfere with the practical usefulness of the colour.

With regard to simple combinations.—B. 16 + Y. 16 = Green. Dark absorption bands are visible in the red-orange and yellow. Absorption band of medium depth in the centre of the green. Very little of the blue and violet can be observed. The yellow-green is seen best. An orange band and the terminal band of red are also seen.

B. 16 + R 16 = Reddish-Violet. Dark absorption bands in the red-orange, yellow, and central green. The yellow green is seen best. The remaining rays are partly visible.

R. 16 + Y. 16 = Orange. The blue and violet rays are absorbed. There is an absorption band occupying the central two-thirds of the green. Blue-green rays partly visible. Almost transparent to rest of spectrum.

The spectroscopic composition of any combination may be ascertained by adding together the absorption bands as represented in the diagrams, and deducting the whole from a complete spectrum. Mixture of the remaining rays gives the colour of the combination.

It will be seen that the best glass for the purpose required is the rose, which chiefly affects the green of the spectrum. The worst glass is the blue, as the absorption is not confined to one portion of the spectrum, and a number of green rays are absorbed. From this it will be seen that it is not possible to obtain a very bright green by combining the blue and yellow glasses.

The inventor claims that any colour may be matched with the instrument, and my experience confirms this. Colours, as, for instance, the aniline dyes, which are purer than those produced by the tintometer, may be matched in the following way: The colour should be matched as nearly as possible with the glasses of the tintometer. When this has been done, the sample colour should be reduced by adding glasses of the complementary colour to it. For instance, supposing the sample colour is a bright pure green, this should be matched approximately with blue and yellow glasses. Rose glasses should then be added to the colour to be matched, until it is brought within the range of the tintometer colours. It will often be found that the addition of the complementary glass or glasses to any colour will produce not only a change in luminosity, but also an alteration in hue. The reason of this is easy to comprehend. The yellow and blue glasses of the tintometer, when combined, make a green, because the yellow glass absorbs the whole of the violet rays, and so causes the blue to appear green, which is the colour produced by mixing the remaining spectral rays. Now, if this yellow glass be added to a blue, with the intention of reducing its luminosity, it will be found that the blue is not only reduced in luminosity, but that it has also become of a greener hue. This does not directly affect the record, but it does so indirectly, as will be explained shortly. The following example will shew how, in practice, these matches are obtained:—

A solution of methyl-orange in a ½-inch cell being the colour to be matched. The colour of this was orange. The nearest match in colour was produced by R. 8·2 + Y. 48·5. The solution, however, was very much brighter. An exact match was made as follows: Methyl-orange solution + B. 3·3 + R. 7·2 + Y. 48·5. It will be seen that when the blue was added one degree less rose was required.

With this and any other colour-matching instrument there is a source of error which has to be carefully considered, and it is due to two factors—(1) that colours appearing exactly alike have not necessarily the same spectroscopic composition; (2) that the spectral composition of daylight varies from day to day, even from hour to hour.

As an instance of a colour varying from these causes, let us consider a solution of chlorophyll which has been matched with a green, which, when examined spectroscopically, does not transmit any of the red rays. A solution of chlorophyll is transparent to a band of red at the end of the spectrum. If this match has been made at a time when the red rays were abundant, as at midday, the two colours would not match later in the day when the red rays were not so abundant. The red rays would be subtracted from one colour and not from the other.

This objection might be overcome if a fixed standard light could be used. I made a series of experiments in order to ascertain what was the effect of this objection in practice. In order that there might be no complication from fading, I obtained a series of coloured glasses, cut to fit the tintometer. The spectroscopic composition of glasses can be easily ascertained. I made a numerous series of experiments with red, orange yellow, pure green, greenish blue, light purple and dark purple glasses. I matched these glasses at different times of the day and on different days. I matched them when the sun was shining, and when it was rainy or misty. There was a slight variation in the matches on different days, but not so great as I expected. On days which appeared similar in regard to the character of the light there was no appreciable variation. I think that, for practical purposes, this source of error might be disregarded, care being taken that the examinations are made under as nearly as possible similar conditions of light.

### The Value of the Standard.

The inventor has employed for a standard a glass very faintly tinted with colour, and all the other glasses of deeper hue are multiples of this standard. For practical purposes the standard is convenient, and within certain limits gives accurate results. An objection to this method of standardising is that a portion of the spectrum having been absorbed by a glass of a given colour, any glass of a deeper shade of this colour must absorb other rays than those absorbed by the first glass. The combination of a number of glasses of a given hue therefore does not necessarily give rise to a deeper shade of this hue, but may produce a colour of quite a different hue. This may be admirably illustrated with a solution of chloride of chromium. A thin layer of this solution appears green, but a thick layer appears red. On examining the solutions spectroscopically, the reason of this is evident. A thin layer of chloride of chromium is more transparent to the red rays at the extreme left of the spectrum than to any other part, but the predominance of the green rays causes the colour to appear green. When a thicker layer of the solution is used, the green rays, as well as the rays absorbed by the thin layer, are absorbed, and so the colour appears red. With the tintometer glasses the deeper shades of the blue incline to violet, and the deeper shades of the yellow incline to yellow-green. In each case this is more marked if several glasses be used in combination.

Most persons, on looking at the diagrams of the absorption of light by the coloured glasses, and noticing how irregular the curves are, will wonder how it is that the inventor, with one kind of coloured glass, has been able to obtain a series which has a nearly uniform hue. As I have previously stated, the deeper shades of yellow incline to yellow-green, and the deeper shades of blue incline to violet. The change in hue is scarcely noticeable. The rose glass appears of one definite hue throughout.

This is due to the limitation of our colour perception. A spectrum appears to be made up of six definite colours, which pass by innumerable gradations into each other. Therefore it has been concluded that the number of colours is innumerable. This is an illusion, which is heightened by the knowledge that the colours in the spectrum should be practically innumerable in accordance with the wave lengths of the different rays of light. If we examine the spectrum in another way, all colours but the one under observation being excluded, we find that it is apparently made up of a series of monochromatic bands. These monochromatic bands differ in size according to the acuity of colour perception of the observer. A person with acute colour perception sees differences in a band which appears monochromatic to another person. These monochromatic bands, even for a person with the acutest colour perception, are very large in comparison with the units of the physical series, that is, rays of light of a definite wave length. Here is a spectroscope which I have had constructed for ascertaining the size of these monochromatic bands. If, for instance, a monochromatic band in the green is being looked at, the observer cannot say on which sides the blue and yellow are situated. These monochromatic bands I have designated absolute psychophysical colour units because they form the units of the psychophysical colour series. As we are now only concerned with colour perception in its bearings on the tintometer, I will refer those who wish to pursue the subject further to my recently published work on "Colour-Blindness and Colour Perception."* If the hues produced by the mixture of red and violet be added to the spectral series, then all known colours will correspond in hue to some point of this series. If we divide this series according to the number of absolute psychophysical colour units seen by a person with normal colour perception, we see that colours may differ considerably, and yet match perfectly, because both are included in an absolute psychophysical unit. It is evident that if we divided a monochromatic patch into a number of different portions, those portions would all match perfectly, though differing in their physical characters.

This fact makes the instrument of much greater utility than would otherwise be the case. The hue of the glasses practically corresponds to one psychophysical unit throughout the series. Though this fact increases the practical value of the instrument, it

* "Colour-Blindness and Colour Perception." International Scientific Series. Kegan Paul, Trench and Co., 1891.

militates against its use for the scientific registration of colour, when we wish to record, as nearly as possible, the wave length of the observed colour.

We have also to consider the influence of the other rays which are transmitted by a glass, upon the colour which the glass appears. With three spectral colours, red, green, and violet, we can match all colours; red and green, when combined, form yellow; green and violet make blue. I have already mentioned the fact that white is formed by the union of the complementaries. Therefore the transmission of rays other than those peculiar to the colour of the transmitted light either intensify this colour, or dilute it with white light.

The instrument is one which would be very useful to those who wish to continually reprodnce objects of a given hue, as, for instance, manufacturers of colours. Its value, from a practical point of view, would be considerably increased if glasses were employed which had, as nearly as possible, the same spectroscopic composition as the substance to be matched. For instance, if a red substance is reqnired in a certain manufacture, and it is necessary to have it always of the same hue, then a series of red glasses, having as nearly as possible the same spectroscopic composition as this substance, should be employed. This will, in a great measure, eliminate the source of error produced by the varying spectroscopic composition of daylight. The instrument might also be considerably improved if it were possible to employ a blue glass which was perfectly transparent to the green rays.

I have employed the instrument to estimate the difference in the perception of colour in the two eyes, and it shews admirably how a colour appearing yellow to one eye, may appear yellow-green to the other.

In conclusion, I am of opinion that the instrument is one which affords everyone who is interested in recording colour for some definite practical object, a simple means of doing so. The colours of glasses have a stability which is not possessed by pigmentary colours. It is obvious that the admirable method of matching colours which has been devised by Captain Abney, and is described in his book on "Colour Measurement and Mixture,"* cannot be generally employed for practical purposes on account of the expense of the apparatus and the knowledge required in using it. The tintometer can be used by anyone who has carefully read the instructions given by the inventor. I thank you for your kind attention, and hope that I have succeeded in shewing the range of utility possessed by this instrument.

## DISCUSSION.

Mr. LOVIBOND called attention to various diagrams on the walls illustrating his method of working. He said he had worked with light of much lower intensity than had been used by Dr. Edridge Green, and he was not prepared to say whether the question could be treated on the same lines in the two cases. This first step was to endeavour to get a base line to start from, and he tried to get a normal light, but soon had to abandon that idea, for whether daylight or artificial light were used, they varied so much that there was no possibility of getting a starting point. Then it occurred to him that a line of absorption could be obtained by means of glass standards, to which all lights could be referred, and after many years he succeeded in getting glass in three tolerably pure colours, red, yellow, and blue, which were represented on the diagrams, and then the whole system fell into beautiful order. Each colour cut off the complementary rays as shewn, and when they were superposed, the red and yellow, by absorbing each other, developed orange; the yellow and blue, by absorbing each other, developed green; and blue and red developed violet; and thus the six principal colours were obtained. He next found that when the three standard colours were combined in equal proportion, a true visual neutral tint was the result with the light of a dull winter day, but in a clear morning or midday they let through the excess of orange and red rays, which he believed preponderated in those lights. In that way he believed he arrived at a normal light, viz., the obscure light of a winter day, which could be gradually absorbed by neutral tint degrees in the three standard glasses; but he recently found that a white sea fog was better, being not only normal to these glasses, but also to the spectroscope, though the latter gave one degree higher readings in all the six colours. Having got the six colours, three in glasses and three normals, made by combination of pairs of glasses, and also a neutral tint from the three standard glasses, he was able to reduce any light to extinction in regular neutral tint degrees; and by reducing any given light in that way you arrived at its base colour, namely, those colour rays which were in excess over the normal light. Sunlight gave red and orange; the blue sky a considerable amount of blue. A curious fact was that the effect of the glasses on the spectroscopic colours was not the same as when applied to the same rays when mixed as in ordinary daylight; and he believed that in daylight there was a sort of combination of rays analogous to chemical combination which produced a different effect. There was a considerable difference in the power of various colours to withstand a definite quantity of normal light. Taking these six colours in uniform degrees, he was able to make the characters which were exhibited, shewing the whole colours of the spectrum divided into two classes, the first red, yellow, and blue, which he called dominants, or standards, being represented by the standard glasses; the others he called "normals," resulting from combinations. Having described the mode of matching and charting colours less pure, as pure, and more pure than the standards, in which latter case he reduced the colour by a neutral tint, not by adding a complementary colour, as Dr. Green described, he said the purity of any colour varied with the light and the substance, and unless there were some fixed light as a standard of comparison, he did not see how the difficulty could be got over. Some of the designs, giving the results of particular experiments, were then described, and illustrated by quantitative sectional areas, shewing in their respective colours the proportion of colour rays of absorbed and unabsorbed light, which together make up the whole beam reflected from various substances, as, for instance, two ultramarines, one pure, the other artificial; different shades of black and white; the exact colour of the various London daily papers; and the colour of various samples of water. Distilled water contained only a little green and yellow; from a chalk well, yellow, green, and blue, and on filtering it lost green and blue, and became yellow. Water from the river Aire was nearly black. With reference to the apparent failure of the glasses to do their duty in cutting out the complementary colours in the spectrum, as they did in daylight, when the rays were brought together in daylight, he believed they combined and acted differently on the glass to what they did when they were taken separately, as in the spectrum. This could be shewn by building up white light with isolated colour rays; that is, with colour rays entirely separated from the excess of light, and overlapping adjacent rays in the crowded end of the spectrum, which appear to be inseparable in experiments made with the spectrum produced by the prismatic spectroscope.

Mr. SEBASTIAN DAVIS said there was a peculiar tint found in water which had been treated by Clark's process, in which a quantity of lime was added to remove the carbonic anhydride, and then precipitated. After that a peculiar blue tint was obtained. This could be well seen at Joynson's Paper Mills, at Dartford, where the system was used. Perhaps Mr. Lovibond could explain how that arose.

Mr. LOVIBOND said he had not experimented on that water.

Captain ABNEY said Mr. Lovibond had perfected this admirable instrument in a manner which not only reflected the greatest credit on him, but shewed the scientific character of his mind, though, as he understood, he had not had a scientific training. It was quite true, he believed, as stated in the paper, that if you had two or three glasses together you could tell the character of the light by deducting the absorption of each glass from white light, and mixing the remainder; but in order to do that, it was necessary, on this plan, that each individual glass should be measured, which would be a work of no small labour. Mr. Lovibond had taken as his standard the minimum colour, and his contention was that for scientific purposes it was rather the maximum which ought to be standardised—for this reason. If you put twelve No. 16 glasses together, though he was quite sure they would not differ appreciably, and if you had the total absorption, you could easily calculate that of each one; but when you came to take the absorption spectrum of a faint colour, the errors you might make were so enormous that, when multiplied by twelve, they would make the readings untrustworthy. A great many yellow glasses together gave orange, and from several blue glasses you got a very different colour from that of a light-tinted glass. On what system, therefore, was it suggested that the absorption spectrum should be deducted from white light so as to get a scientific measurement of colours? Dr. Edridge-Green said two colours which differed considerably in wave length might yet match perfectly, because they were both included in one psychophysical unit. It might be a matter of opinion or of experiment, but he certainly could not accept that statement, which seemed to him erroneous, because he personally could distinguish any slight variation in the colour of the spectrum which lay, he thought, well within the psychophysical unit as defined. He could see plainly that one part of the green patch shewn on the screen was yellower than the other. With the instrument which he had shewn there on more than one occasion, the minutest difference in the position of the slit placed in the spectrum could be detected. If you could divide the spectrum into 100 parts you could tell each one from the other. In looking at a rather impure spectrum, at first glance, he only saw three colours - red, green, and violet; and when he came to examine it, he found an infinity of colours. He therefore could not endorse the statement that you could not distinguish one colour from another if they were situated close together, and his opinion was founded on experiments which numbered thousands, and had been going on many years. As to the glasses, he had already said that this instrument was very valuable, but he could not sanction Mr. Lovibond's heresy that there was any combination of rays in one kind of light more than in another. The great thing to aim at was to have a material perfectly free from banded absorption, which for scientific purposes was a great drawback. The blue glass appeared to be cobalt, but there were other blues which were free from those bands of absorption in the red end; and for scientific purposes it would be preferable to use a glass having general absorption, rather than one with a banded absorption. The normal light from white fog was very interesting. The search for a normal or standard light had gone on for some years, but for his own purposes, and for scientific work, he found nothing to equal the crater of the positive pole or the electric arc. It was always a uniform temperature, and was always equally white, which could be proved thus:—Take a shortish spectrum, and put in two slits, one in the green, and the other in the violet; mix the two lights together in such proportion as to form white, and you might watch alongside of it the white light undecomposed. Put any carbons you liked into the lamp, there would be no variation, shewing that the proportion of green to violet was the same in both. To that standard all lights and all colours might be referred. He was surprised to hear that distilled water was yellow and green. A few years ago he investigated the absorption spectra of colourless fluids in the ultra red by means of photography, which had no personal bias, and registered its own results, so that there could be no mistake, and distilled water he found anything but yellow. He had a tube 6 ft. long, and no ultra red light passed, very little red, slight yellow, and plenty of blue; so that distilled water in its purest form certainly had a blue tint. He did not throw any doubt on Mr. Lovibond's observations, but on the purity of the water he used. The water from the gravel well seemed to bear out the conclusion that pure water would be a blue colour.

Mr. LOVIBOND said there might be impurities in the standard glasses. Even supposing that the impurities were not self-correcting, he did not think they could be so great as to create the difference between the two sets of observations. The water he used was carefully distilled from glass, but you could make such water look any colour you liked by illuminating it with light of that colour. If you looked at it with light from a blue sky, you had a beautiful blue colour, while in the morning light you got a reddish tinge; in fact, the visual colour changed with the light, whilst the measured colour remained constant. There was always a danger of mixing up the measurement of the object with the light it was viewed by. That was why he did not like to rely on measurements made by intense light. No definite statements of visual impressions could be made unless the light employed was quoted.

Dr. THORNE said he had used this instrument for some time in his laboratory for estimating the colours of oils, glass, and so on, and found it very useful for registration and comparison. It gave results which were not to be obtained by any of the easily utilisable forms of colorimeters. From a scientific point of view, as Captain Abney had said, an intense colour would be the best unit, but for ordinary purposes it was necessary to deal almost entirely with low tint colours.

Dr. EDRIDGE-GREEN, in reply, said Captain Abney had answered the objection raised by Mr. Lovibond with regard to the light, and he need only add that it was desirable to choose lights as nearly as possible of the same character. The method he had described of measuring the absorption curve, was the same as that employed by Captain Abney. For the yellow, he took about twenty-two glasses, which gave the highest point, 207°. One could go on adding glasses until all the light was excluded, and thus get a complete curve. It would be very difficult to measure with the spectroscope faintly-tinted glasses. With regard to the psychophysical units, the patch on the green was only approximately monochromatic, but in looking at a pure spectrum, he could see a very large portion which appeared absolutely monochromatic, as did the patches Captain Abney had shewed him, which contained a large number of wave lengths. He had not succeeded in seeing any more colours in a magnified spectrum

* "Colour Measurement and Mixture," by Captain W. de W. Abney, F.R.S., published by the Society for Promoting Christian Knowledge, Northumberland Avenue, W.C.

than in one produced by a good spectroscope. He therefore ascribed this limitation to a limitation in perception, and he found this to differ in different persons. Some could see very minute deficiencies, but even then they saw a unit which corresponded to a large number of wave lengths.

Captain ABNEY said with his instrument you could make the slit as fine as you liked, for instance, as the difference between the two D lines. The spectrum could be made as pure as you liked by closing first the slit of the collinator, and, secondly, the slit in the spectroscope If you had a spectrum of 5 in. length, and made the slit ·01 in , it would not be difficult to calculate within what difference of wave length you got a different colour.

Dr. EDRIDGE-GREEN asked if Captain Abney could distinguish a difference of colour between the two D lines. To him they were absolutely monochromatic.

Captain ABNEY said the only way to compare two colours was to put them side by side in a patch, and he had never done that with the light of the two D lines. You might call a line any colour you liked almost when dim; there must be a certain area, or you could not distinguish it. You would not see any yellow in the sky through a pocket spectroscope, because your vision was confined, but directly you took a large spectroscope and pointed it in the same direction, the yellow appeared. It was a question of size as much as anything else.

Dr. EDRIDGE-GREEN admitted that entirely, but said different persons had different perceptive powers, one would see yellow where another would not. In the case mentioned where the yellow was not seen, the observer was reduced to a condition of imperfect perception: in other words, he saw as if he were partially colour-blind. Orange was the first to go; then blue, then yellow, then green. He did not think a normal-sighted person could succeed in reducing his perception below the three primary points of difference—red, violet, and green; but by reducing the light you could cause yellow, or blue, or orange to disappear. However you magnified the spectrum, you saw no more colours and no less. With defective light you might see five, four, or three, instead of six. He had never succeeded in seeing the seven which Newton described; but there were a few persons who did, and they described them exactly as Newton did. It was only in that sense he used the term psycho-physical units.

The CHAIRMAN, in proposing a vote of thanks to Dr. Edridge-Green, said the deep blue colour of water treated by Clark's process could be very well seen near Caterham, in the tanks of a local water company, where this process was adopted. It had always appeared to him to be analogous to the blue of the sky, and to be due to the same cause, namely, the presence of very fine particles arising from the precipitation process, which had not sunk to the bottom.

The vote of thanks was carried unanimously, and the proceedings terminated.

## *THE LABOUR COMMISSION.*

### THE HOSIERY TRADE.

Group C of the Labour Commission held another sitting on Thursday week, Mr. Mundella in the chair.

### BELFAST EVIDENCE.

Mr. ALEXANDER TAYLOR, vice-president of the Lappers' (linen trade) Union, of Belfast said that the lappers were the only branch of the linen trade in the North of Ireland that was properly organised or had a trade-union, and he believed it was the only branch of the trade that was represented before the Commission. The Union extended over the province of Ulster, but the trade was principally centred in Belfast. There were about 600 lappers in the province of Ulster, and of these 420 to 450 were members of the Union. The work of the lappers was to measure and examine and fold the linen goods after their manufacture was completed. There was great irregularity in the wages that was paid for this work, the rate varying from 15s. to 30s., and in some cases 35s. a week. Lappers were paid by the day, and there was no piecework. Overtime was paid for at the rate of time and a half. At the present moment there was a strike in the trade, about 350 or 400 members of the Union being on strike. The dispute arose from an attempt on the part of the workmen to improve their position. They issued a circular to the employers asking for a minimum rate of wages and uniformity of hours—that is, they asked for 30s. per week for an eight-hour day for every man who had worked at the trade for six years. To this circular the employers made no reply, and after some further negotiation the Union brought out about 80 men, in the hope that that course would gain them some concessions. In reply the masters locked out all union men, and that was the present position of affairs. An attempt had been made to have the question in dispute submitted to arbitration, and the Union agreed to the proposal, but the masters refused, and at present there seemed to be no prospect of a termination of the strike. The employers had not attempted to any great extent to supplant the men on strike by engaging non-unionists, but one firm was employing women, and others were sending a large portion of their goods to Manchester to be lapped. There had not been a single case of picketing, and the police had not so far been called upon to interfere in any way. The men on strike were quite prepared to go to arbitration and to abide by the result.

By Mr. Livesey: Some of the employers were attempting to do the lapping by machinery, but he believed the attempt had not been very successful. He was aware that the folding of the goods in the cotton trade was to a great extent done by machinery. He had seen the machinery at work in Manchester.

### NOTTINGHAM EVIDENCE

Mr. W. H. BONSER, treasurer and chief organiser of the Hand Framework Knitters' Union of Nottingham, Derbyshire, and Leicester, was the next witness. He said his union numbered 1,441 members, out of an estimated total of 5,000 framework knitters. Before the introduction of steam power looms there was a far greater number of workmen. He quite believed there were 30,000 or 35,000 handloom operatives, so that the effect of the introduction of machinery had been to greatly reduce the number of knitters. Payment was now entirely by the piece. Handloom knitting was entirely a domestic industry, and was carried on in the villages at the operatives' own homes or in small workshops. The handloom operatives produced the best and highest-priced goods. He thought the handloom industry might be revived, for if the products of the handlooms could properly be put before the public, and they could be taught the difference in the quality of the hand-made goods as compared with the steam-made goods, he believed there would be a far larger demand for the hand-made article. He did not, of course, expect that handlooms would ever supersede steam power looms for the production of ordinary goods, but there were some departments of the hosiery trade—such as silk and lace goods and fancy articles—that would always have to be made by handlooms. His Union wished that there should be a compulsory stamp put upon all hand-made goods, so that they might be distinguished from the machine-made goods. He admitted that on the Continent as well as in this country steam power looms were superseding handlooms, but he did not admit that, taking the present rate of wages in the steam power trade, wages had been increased by the introduction of steam power looms. Wages had fallen very much during the last few years.

Mr. SAMUEL OSCRAFT, treasurer of a branch of the same Union, who was examined jointly with the last witness, corroborated his evidence, and further complained of the system of sweating that prevailed in the handloom trade. The work was given out by subcontractors, who had a commission on the work, and who, whenever they could, reduced the remuneration of a workman in order to increase the amount of their commission.

### LEICESTER EVIDENCE.

Mr. W. TYLER, hosiery manufacturer, of Leicester, said he employed about 360 workpeople in the plain hosiery trade. A few of these were handloom workers, but handlooms were employed only for very special work. Handloom knitting was a dying industry. He did not agree with the last witnesses that anything could be done to revive it, and indeed he did not think it desirable that any attempt in that direction should be made. On the whole, the introduction of steam machinery in the hosiery trade had improved wages, and had given employment to a larger number of hands, though probably the proportion of female workers was greater than formerly was the case.

Mr. O. TABERER, fancy hosiery manufacturer, Leicester, said his firm employed 900 hands, of whom only about one-fifth were men, the rest being women and young persons. No half-timers were employed. Since a dispute with their workpeople some six years ago they had declined to employ any person who was a member of a trade-union, and of late years their relations with the workpeople had been very comfortable. He agreed with the last witness as to the advantages that had resulted from the introduction of steam power looms in raising the rate of wages and increasing the amount of employment. His firm had a few handloom workers employed, but there was no doubt handloom work was a dying industry, the steam power looms fast superseding it.

Other witnesses connected with the Leicester hosiery trade and the boot and shoe trade were examined, and the Commission adjourned.

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ABOUT nine months ago the Governor (Henriquez) of the State of Vera Cruz procured from New Orleans a supply of the seed of the plant called vegetable wool and had it sown on the coast of Sotavento, where it has done very well. Every specimen produces 9 lb. of excellent fibre, as white as cotton and more tenacious. *La Bandera Veracruzana* predicts that in course of time the new plant will be for the State of Vera Cruz what henequen is for Yucatan.—*Moniteur des Fils.*

## *SERICULTURE IN ASIA MINOR.*

Mr. William Cochran writes to the *Journal* of the Society of Arts, from Overdale, Dunblane, Perthshire, as under:—

In May, 1885, the writer was enabled, from personal observation on the spot, to report upon the silk harvest of Bournabat, near Smyrna, Asia Minor, which report was printed in the *Journal* (vol. xxxiii., p. 852). The sericultural industry was then in a state of slow revival from a condition of almost utter collapse, caused by the deadly effects of the various silkworm diseases which had long devastated, and nearly ruined, the "magnaneries" of France and Italy. Subsequently, in 1887, in an extended and illustrated form, the report was reproduced, with additional sericultural and other information, in the volume entitled "Pen and Pencil in Asia Minor," published by Sampson Low and Co. On both these occasions the writer endeavoured to interest the public in the story of an effort, on the part of an English gentleman, to benefit the Turkish peasantry and revenue of the country, which had more of the romantic element in it than is usually to be found in ordinary industrial operations. For nearly half a century, Mr. John Griffitt, of Bournabat, a village near Smyrna, has devoted most of his leisure hours, well seconded by his accomplished Greek wife, to combating the maladies of silkworms, experimenting with the various known races, and endeavouring to improve the quantity and quality of their silken produce. Long before M. Pasteur, the distinguished French physiologist, took the field, Mr. Griffitt had been working at the same problems, the solution of which brought the great Frenchman afterwards so much well-deserved honour; but while the one was rewarded, the other has hitherto been neglected. The first enjoyed the wealth and influence of his Government to encourage him in all his efforts; the second has had to struggle on unaided throughout his long career of philanthropic endeavour against the inertia of sluggish or hostile officials, the childishness of a prejudiced peasantry, and a horde of unscrupulous native and foreign parasites, ever ready to appropriate his methods without acknowledgment, to claim or dispute his discoveries, and to defraud him in every possible way. From the first, Mr. Griffitt welcomed and applauded the remarkable results of M. Pasteur's investigations, and became his acknowledged disciple; but, being himself a practical silk-farmer, which M. Pasteur was not, was soon in a position to shoot ahead of his master, to modify, supplement, and stamp with his own genius many of the suggestions of the great chemist, for which he never received either credit or reward. Probably in no other country in the world, except Turkey, could a native, or even a foreigner, accomplishing the revival of a staple industry as Mr. Griffitt has done, have escaped recognition, or being loaded with honours. He has rescued sericulture, upon which so many thousands, perhaps millions, depend in Turkey, from extinction, and been a means of replenishing the usually collapsed Ottoman exchequer, and enabling the Porte to offer British bondholders -if it chooses to do so—substantial dividends, instead of mere polite excuses.

Still more recently the writer had a paper in the *Journal* of 23rd August, 1889 (vol. xxxvii., p. 772), when further information was given regarding Mr. Griffitt's continued successes, particularly in open-air sericulture. On the present occasion, he would add the latest facts, which are quite as interesting as those already communicated.

At the beginning of 1891 a report by the "Chambre des Deputés" was presented to the French Government, in which it was said that sericulture was not progressing in France in consequence of the reappearance of the dreaded disease known as "flacherie," along with some minor maladies, and that the nurseries were being decimated. M. Pasteur's discoveries had enabled the silk-farmers to vanquish the other distemper "pebrine," but "flacherie" was working havoc everywhere, so a grant of several millions of francs was asked to be expended in trying to crush the disorder.

Meanwhile, Mr. John Griffitt, with no Government money or help of any kind, had thoughtfully built up a system of scientific silk farming at Bournabat, near Smyrna, in which he combined the most notable of M. Pasteur's discoveries with the invigorating method of M. Roland, of Switzerland, and his own experiences, with the result that his worms acquired such robustness that he had had no deaths among them for years, while all the races, subjected to the process, yielded a larger crop of better silk than before. So marked was this improvement that a comparison will shew it at a glance. In the first report already alluded to, made in 1885, Mr. Griffitt's yield of cocoons—considered a splendid return at the time—was 78 kilogrammes (171 lbs. avoird.) per ounce of eggs set to hatch, while in 1890 the harvest was 91 kilos. (200 lbs.) per ounce of eggs. These figures have been vouched for by M. E. Charmand, chief of the Smyrna branch of the "Direction Generale de l'Administration de la Dette Publique Ottomane, â Constantinople," who reported his observations, gathered from time to time in Mr.

Griffitt's factory at Bournabat, to his superiors at the Turkish capital.

Following up these efforts, and stimulated by the ill-success of the French sericulturists, Mr. Griffitt last year achieved an additional triumph, his latest crop showing an advance to 92 kilos. (202 lb.) of cocoons per ounce of eggs. This harvest had likewise been watched through all its stages, and reported upon to the Constantinople authorities by the same gentleman already named, who added that as the yield from foreign eggs had been *nil* at Bournabat, their importation into Turkey ought to be stopped.

It will be evident to the readers of the above and former communications that Mr. John Griffitt's single-handed and almost phenomenal success in sericulture, in the face of the utter failure of the best silk-farmers of France, point to Bournabat as the future sericultural school of the world, and as the *entrepôt* for robust graine. If further figures be required, they are to be found in the circumstance that during the last four or five years the finest French eggs hatched at Bournabat have only yielded from 10 to 12 kilos. (22 to 26 lb.) of cocoons per ounce, as compared with Mr. Griffitt's 92 kilos. (202 lb.) per ounce of eggs; while last season, according to M. Charmand, the French eggs laid out at Bournabat did not hatch at all.

In a word, if this industry is an important financial consideration to Mr. Griffitt, it can be no less so to the Turkish Government; and the British bondholder of the Turkish debt ought to have every inducement in stirring up the sluggish officials of Constantinople to encourage and befriend a gentleman who is now, and has been so long, working for all their interests.

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THE official returns of live stock just published at Sydney shew that over 60 millions of sheep are depastured in the colony.

THE total sheep stock in Great Britain at the end of last year exceeded by three million head the flocks of two years ago, and by more than four millions the flocks of 1881.

THE position of German jute manufacturers gets more and more difficult. Since the beginning of 1892 prices have risen 25 to 30 per cent., and are now double what they were last year. More than this, the upward movement seems by no means over. Prices for manufactured goods have not, however, risen in anything like the same proportion, and makers find remunerative profits almost impossible. There is a desire in many quarters to limit the production by agreement.

MR. HERMON HODGE, who moved the Address in the Commons, married the daughter and heiress of the late Mr. Hermon, M.P., and thus became possessed of a huge fortune and the superb residence of Wyfold Court, Henley. As a young man Mr. Hermon became a junior clerk in the office of Messrs. Horrockses, Crewdson, and Company, and in time became managing clerk, then London partner, and finally sole partner of that enormous business. The factories at Preston, which cover an area of 30 acres, and employ 5,000 men, are now carried on by Mr. Hermon's nephews and other partners.

THE wonderful collection of Eastern embroideries now on view at Chesham House, London, affords a somewhat discouraging proof of the hopelessness of attempting to compete with such a race of artists as the Japanese, for instance, in the production of this kind of work. The best embroidery is still done in Japan, and in richness of stuffs and beauty of colour and design the modern specimens fall little behind the antique panels and robes exhibited, some of which are more than 200 years old. Nearly all the robes, or *kimonos*, as they are called, bear elaborate mythical and fantastic designs, and are wrought in wonderfully coloured silks and gold thread on pale backgrounds. In addition, there are a number of Chinese and Turkish brocades, notably among the latter some fine examples of the celebrated 17th century Broussa, the gold thread of which is pure metal; also some reproductions, admirably carried out, of the "Suzini" embroidery, intended for piano backs.

THE following is the full list of accepted tenders for canvas, linen goods, etc., as now posted at the Admirality:—*Linen, etc.*: Thomas Adair and Son, Baxter Brothers and Company, A. Blyth and Company, W. and J. Don and Company, D. and R. Duke, The Greenmount Spinning Company, T. Lenty and Company, W. Lumsden and Son, Richards and Company, R. Taylor and Company, the Ulster Spinning Company. Of *sailcloth* the leading qualities and quantities tendered for were: 540,000 yards Royal Navy Sailcloth and 192,000 yards Merchant Navy Sailcloth. Of these, the larger portion has gone to Messrs. Baxter Brothers and Company, and the balance to The Boase Spinning Company, Limited. Of the *hammock cloth*, 141,000 yards, the latter firm have received a large proportion, and Mes rs. Baxter the rest. For coal *bag cloth* the tenders of the Boase Spinning Company and Messrs. Baxter were accepted. For *twines* the contractors are:—Messrs. W. Barbour and Sons, Paisley; Baxter Brothers and Company; Thomas Briggs; and Salt and Company.

THE Chicago Exposition will open its doors to the public on May 1st, 1893, and close them on October 30th of the same year.

THE new tent about to be issued to the German Army is divided into two parts, each of which can be worn as a great coat. The whole tent weighs less than 3½lb.

FOREIGN CLOTHES IN JAPAN.—Japan is not just now a favourable market for manufacturers of European ready-made clothes. It seems that the sellers of foreign-cut clothes in Tokio are doing very poorly just now, partly from a change of fashion and partly from general trade depression. The pawnbrokers alone are thriving. Their shops are stocked with suits of clothes which are almost new, and which they can afford to sell at a ridiculously cheap rate.

PROFESSOR KRALL, of Vienna, in examining the bands of a mummy, probably of the age of the Ptolemies, which for the last 40 years has been preserved in a museum, has found a strip of linen with several hundred lines of Etruscan writing. In this text, which is the longest we possess in that language, some words occur that are to be found in Etruscan inscriptions known to us, but the whole cannot, in the actual state of Etruscan studies, be deciphered. The cloth has, no doubt, been written on for some other purpose before being carried by ship to Egypt, and there used for the wrappings of a mummy. The publication of the text by the learned discoverer is awaited with the keenest interest.

A CIRCULAR has been issued by the Decimal Association pointing out that, according to Colonel Howard Vincent, a recommendation is about to go forward from a high authority that China should adopt, as Japan has already done, the metric system of weights and measures. Colonel Vincent urges that there may be a loss of valuable business to English makers, for although "Chesterman's Sheffield Measure" renders feet and inches in metres and millimetres with the utmost nicety, foreigners contend that there is sometimes an inevitable *plus* or *minus* which upsets calculations. Even if there were no actual source of error, it goes without saying that in countries where the metric system is used the Government and other officials naturally prefer to buy the foreign machines, etc., required from countries having the same weights and measures as themselves. China is feeling more and more the want of Western mechanical appliances, and unless British manufacturers adopt the metric measures their Belgian, French, and German competitors will stand the best chance of securing orders.

FACTORY FIRES ABROAD.—A large woollen factory in the Vale of Coggiola, in Italy, belonging to Giovanni Maria Tonella, was totally destroyed by fire a few weeks ago. This is the fourth large factory fire in this valley in the course of one year. First the establishment of Quirico Loffi, then a part of the factory of Giacome Lesna Tamellino, after that the works of Lora Marze, and now the factory named above. All these places were insured.—The great cloth factory Kafka, in Brünn, became a prey to the flames the other night. The damage is estimated at £50,000.—A very serious fire is reported from Bergen. The spinning department, which was but recently erected, in the tricot factory of Petersen and Dekke got on fire, the flames spreading to the whole establishment. Several lives were lost and the damage done is estimated at 1 500,000 kronen.—The hosiery factory of Julius Bertram, in Neuminster, has also been burnt down, but it was comparatively small.—At Lodz the extensive factory premises of Lekowicz, which contained the wool-spinning works of Tykociner, the cotton spinning works of Olscher, and the power-loom weaving shed of Brauner, was completely destroyed by fire on January 22nd. Three hundred persons have been thrown out of work in consequence.

FACTORY LEGISLATION IN FRANCE.—A bill to regulate the employment of children and females in factories has been for some years before the French Parliament. It was first voted by the Chamber, then amended by the Senate, next re-amended by the Chamber, then modified afresh by the Senate, and sent back to the Chamber, before which it has come again and been read in its revised form a first time. It is proposed to extend inspection to all manufactories and workshops, whether public or private, to religious and charitable institutions, and even families where steam or any mechanical power is employed. Children are not to work before they have completed their thirteenth year, or their twelfth, if they have passed a school examination; up to the age of 17 they must also possess a medical certificate of physical fitness. In orphanages and benevolent institutions in which manual or professional instruction is given to children under age, they must not be employed more than three hours daily. Boys under 18, girls under 21, and married women are not to be employed more than ten hours, nor between nine at night and five in the morning, but exceptions to the latter rule may be authorised. There must be one day's absolute rest weekly, but the day will be optional. M. Leon Say tried to induce the Chamber to fix the Sunday, shewing that if different days were chosen in the same locality, all the members of a family could never be united; but the Deputies refused, fearing to appear to make a concession to clericalism. Females are not to be employed in any underground work, and boys only under regulations. The Bill contains 32 articles, but the above are its principal provisions.

A LETTER recently appeared in the *Economist* above the signature "Another Calcutta Merchant," in reference to the controversy on the effects of the restriction of the manufacture of jute goods in India. He says—"It is news to me to hear that immediately on the Calcutta agreement being discontinued 'in both quarters (Dundee and on the Continent) the cry was raised for short time in defence of local interests.' I may tell your correspondent how Dundee answered the 'cry.' Messrs. John Sharp and Sons added to their already large productive power by starting the Edward Street works, which had been silent for a dozen years or more, and a French firm commenced to erect in that city a new mill to carry on a branch of trade which hitherto was not found profitable by Scotch spinners."

# Textile Markets.

## *COTTON.*

MANCHESTER, FRIDAY.

The tone of our remarks in last week's report was amply and speedily justified by the course of events. The dulness of the outlook at the moment of writing was immediately intensified to such an extent as to bring about a heavy fall in the cotton market in both spots and futures. The large movements of cotton in the Southern States was the principal cause of this, it having an effect upon holders of the "bull" section of the market that could hardly be described as less than terrifying. The spectre of a nine millions crop is gradually assuming shape in their imaginations, and will probably before long attain a very tangible character. The manner in which Liverpool merchants and dealers in cotton have persistently refused to look facts in the face and draw the lessons they involve may be extenuated by circumstances. Holding great quantities bought at higher than current prices, such facts meant to them terrible disasters—enormous losses and possibly financial difficulties of a kind they were exceedingly loth to contemplate. Nevertheless, facts, as we are told by the old adage, are stubborn things, and do not change their character, whatever sentiments may be hurled against them; the latter are broken upon them like waves upon the iron rocks. This we fear is becoming an experience that almost every portion of the trade is realising, and to its great discomfort if not distress. As prices descend they seem to demoralise the market more and more, and out of proportion to the actual importance of the successive declines made. This arises largely from the fact that to-day conditions are quite outside the pale of the experience of the generation now actively engaged in the trade. Notwithstanding this, we venture once again to affirm that for spinners and manufacturers there ought to be a good time, and we believe there will be in the early future. When cotton ceases to decline there is no reason why it should rapidly advance. It ought now for several years to remain steady upon a low basis, so as to be obtainable by spinners and manufacturers at a price that, with an average fair demand for yarn and cloth, ought to enable them to get a good margin of profit and recompense them somewhat for the losses, trials, and the harass of mind experienced in the conduct of the trade for a good number of years past.

COTTON.—The week opened on Saturday with no improvement in cotton, the market remaining flat and depressed. Futures dropped heavily, the fall amounting at one moment to 6 points, but afterwards a slight rally took place, and prices closed 4½ to 5 points down. For spots there was hardly any demand, and under the pressure of holders to effect sales the official rates declined 1/16d. Egyptian was only in limited enquiry, and declined 1/32d. The other growths were dull and easier. The above decline on Monday brought out buyers in rather more force, and under the better demand prices steadied a little, with a moderate business in spot and gradual delivery contracts. East Indian declined 1/32d, and other growths being neglected were the turn easier. Futures fluctuated, and eventually closed with a gain of 1½ on near and 2 points on the most distant positions. On Tuesday the nerves of the Liverpool cotton market were again distressingly shaken by the large crop receipts. Futures fell until they had made a descent of 6 points, when they subsequently rallied a trifle, and closed with a loss of 4 points from the previous night's close. For spot cotton there was a moderate enquiry, but

sellers had been so frightened that they willingly accepted a reduction that brought down the official quotations $\frac{1}{16}$d. East Indian followed to the same extent, whilst the other growths were easier. On Wednesday the market recovered slightly in tone, and prices became steadier in both departments owing to the fuller operations of the trade and more encouraging American advices. Both spot and gradual delivery business was done on a rather more extensive scale than of late. Brazilian was reduced $\frac{1}{16}$d., the other growths remaining unchanged. Futures closed with a gain of 2½ to 3 points on the day. Yesterday, under the influence of a good demand for American, the market was steady, with a slight tendency to harden. It may be quite prudent and wise on the part of spinners to replenish their stocks on the basis of current values, but it would hardly be wise for them to rush their buying to such an extent as to give "bulls" the opportunity they are anxiously looking for of driving prices upward, and whilst they are there unloading their dear stocks upon spinners, after which the market would droop again, as it has already done so many times in like cases. Let the trade remember that without the great strength derived from their assistance, prices cannot be driven up; and further, that if the cotton is not in their warehouses they will find it in Liverpool, owned by willing sellers, when they want it. Other growths were unchanged. Futures were steady, closing with a gain of ½ to 1 point.

The following particulars of the business of the week are from the official report issued by the Liverpool Cotton Association:—

| | Import. | Forward. | Sales. | Stock. | Actual Export. |
|---|---|---|---|---|---|
| American | 80,503.. | 65,657 | 51,900 | 1,433,450.. | 3,403 |
| Brazilian .. | 3,724.. | 2,082.. | 750.. | 41,460.. | — |
| Egyptian .. | 9,476.. | 10,963.. | 1,750.. | 119,880.. | 780 |
| West Indian | 64.. | 487.. | 590.. | 27,610.. | 128 |
| East Indian | 69.. | 1,039.. | 1,120 . | 46,670.. | 548 |
| Total .. | 93,836.. | 80,228.. | 56,110 | 1,669,070.. | 4,859 |

The following are the official quotations from the same source:—

| | G.O. | L.M. | Md. | G.M. | M.F. |
|---|---|---|---|---|---|
| American..... | 3⅜ .. | 3 9/16 .. | 3¾ .. | 3 11/16 .. | 4 9/16 |
| | | | M.F. | Fair. | G.F. |
| Pernam..... | | | 4 9/16 .. | 4 9/16 .. | 4 11/16 |
| Ceara ..... | | | 4¼ .. | 4½ .. | 4¾ |
| Paraiba ..... | | | 4¼ .. | 4½ .. | 4⅞ |
| Maranham ..... | | | 4⅜ .. | 4⅝ .. | 4⅞ |
| | | | Fr. G.F. | F.G.F. | Gd. |
| Egyptian ..... | | | 4½ | 4¾ | 4⅞ 5 9/16 |
| Ditto white ..... | | | 4¾* | 4⅞* | — 5¼* |
| | Fr. F.F. | G.F. | F.G.F. | Gd. F. | G. Fine. |
| M.G. Broach .. | — — | — | — | 3 5/16 3½ | 3¾ |
| Dhollerah .... | 2 13/16 2 15/16 | 3 1/16 | 3 3/16 | 3 7/16 3 5/8 | 3 11/16* |
| Oomra ..... | 2⅞* 3 | 3⅛ | 3¼ | 3⅜ 3½ | 3 13/16* |
| Bengal ..... | — — | 2¾* | 2⅞* | 3 1/16 3¼ | 3 7/16* |
| Tinnivelly .... | 3 3/16* — | 3⅜ | 3⅜ | 3 1/16 — | — |

* Nominal.

The following are the values of futures at mid-day on each day of the week—American deliveries—any port; bases of middling; low middling clause; (the fractions are in 64ths of a penny):—

PRICES OF FUTURES AT 1.30 P.M. EACH DAY.

| | Saturday. | Monday. | Tuesday. | Wednesday. | Thursday | Friday |
|---|---|---|---|---|---|---|
| February.. | 3·46 s | 3·48 b | 3·47 b | 3·47 s | 3·47 b | 3·51 v |
| Feb.-Mar.. | 3·46 s | 3·48 b | 3·47 b | 3·47 s | 3·47 b | 3·51 v |
| Mar.-April | 3·49 s | 3·51 s | 3·45 b | 3·49 50 | 3·49 50 | 3·53 b |
| April-May. | 3·52 s | 3·54 v | 3·48 49 | 3·53 s | 3·53 s | 3·56 57 |
| May-June. | 3·55 v | 3·57 b | 3·51 52 | 3·56 s | 3·56 b | 3·59 60 |
| June-July.. | 3·58 b | 3·60 b | 3·55 s | 3·59 60 | 3·59 60 | 3·63 v |
| July-Aug.. | 3·61 b | 3·63 b | 3·58 s | 3·62 63 | 3·62 63 | 4·2 b |
| Aug.-Sept. | 4·0 v | 4·2 v | 3·61 s | 4·1 2 | 4·1 2 | 4·5 v |
| September. | 4·2 3 | 4·5 s | 4·0 s | 4·4 5 | 4·4 5 | 4·8 v |
| Sept.-Oct.. | 4·2 3 | 4·5 s | 4·0 s | 4·4 5 | 4·4 5 | 4·8 v |
| Oct.-Nov.. | — | 4·7 | — | — | — | — |
| Nov.-Dec. | — | — | — | — | — | — |
| Price of Mid. American. | 3 13-16 | 3 13-16 | 3¾ | 3¾ | 3¾ | 3 13-16 |
| Estimated Sales including Spec. and Export. | 6,000 500 | 10,000 1,000 | 7,000 1,000 | 12,000 1,500 | 12,000 2,000 | 12,000 1,500 |

YARNS.—The sum of last week's business was decidedly below the production, and stocks had undisputably grown larger in first hands. The current week opened with great depression, which was not rendered any less acute by the heavy decline in cotton. In hardly any department could it be said on Saturday that any business was in progress. On Monday yarns were again dull in every department, and prices lower, producers in most cases being ready to accept a reduction corresponding to that in the raw material. Very little business, however, was forthcoming in any section of the trade. On Tuesday spinners looked in vain for any signs of an improvement, and readily offered their production at a decline of ½d. from Friday's rates. This, however, did them little good, as buyers were only forthcoming in the rarest cases. Stocks were almost everywhere increasing, and the day's business did very little to relieve them. On Wednesday there was no improvement in yarns, manufacturers buying only for the most urgent necessities. In the shipping demand there was no change. There was no improvement to report yesterday. Spinners are anxious sellers and would be glad to meet with buyers of weight who would take prompt delivery. Such could no doubt buy on good terms.

CLOTH.—The results of last week's business in the several cloth sections of the market totalled up badly, and in numerous cases manufacturers left the market with the conviction that the best, if not the only, course open for them in the immediate future was to stop machinery. The depressed state of cotton caused buyers to hold persistently aloof. On Saturday, under the all-pervading influence of this sentiment, hardly any business was attempted. Manufacturers on Monday experienced a renewed confirmation, now well impressed upon them, that whenever cotton declines cloth buyers insist upon having all the advantage. Wherever business was previously promising it was either withdrawn or further concessions were demanded, and these in only the rarest of cases could be made. Only the most retail sort of transactions were put through, and the total was very small. On Tuesday the business in cloth might almost be said to be quite at a standstill. With the incertitude, buyers will not offer to operate beyond the smallest and most absolute necessities. Present conditions are quite outside the range of the personal experience of buyers, and they are waiting for guidance from the light of facts. On Wednesday there was not the slightest improvement discoverable in the demand for cloth. Yesterday buyers made a few more tentative enquiries, but these rarely led to business. If the market would only remain steady for a week it is probable some considerable business might be put through.

To-day cotton is stronger, and has advanced $\frac{1}{16}$d. In yarns sellers meet with more disposition on the part of buyers to operate. In cloth the improvement is not quite so marked, but still there is more enquiry, and at the lowest point more business could be put through.

## *WOOLLENS AND WORSTEDS.*

BRADFORD.—No change is visible in the wool market this week. Business can be had in yarns, but only readily at a concession. But spinners don't see any necessity to yield, and therefore business is slow. Some classes of goods are a shade easier, such as merino tops. Alpacas are in little request. There has been a little demand for dress goods for the home market, but exporters have few offers to make. Linings and all-wool fancy goods are in fair request, but the plain and cashmere trade remains in the same depressed state which has existed for some weeks past.

HUDDERSFIELD.—A few buyers from France, Canada, and home houses have made purchases during the week of a fairly satisfactory character. German houses have also placed some orders of respectable amount. High-class goods have been enquired for for the United States. Orders generally are fairly numerous, but small in amount.

LEICESTER.—The wool market is quiet, but notwithstanding this the consumption is large and the turnover is equal to sustaining prices. The Colonial wool sales are still largely attended, and shew no further change. In the yarn market the turnover is about of an average all round. As regards the local consumption this is usually the quietest period of the year; still, spinners of reputation have enough business in hand to prevent any need of further slaughtering of prices. The fancy hosiery manufacturers are late with their samples, which should be shewing by the end of this month. The plain hosiery trade finds steady employment all round.

LONDON.—Messrs. H. Schwartze and Co., in their report dated 9th February, say:—The following gives the total available and the quantities catalogued and withdrawn up to yesterday:—

| | Available. Bales. | Catalogued. Bales. | Withdrawn. Bales. |
|---|---|---|---|
| Sydney ..... | 93,000 .... | 46,497 .... | 4,004 |
| Queensland .. | 59,000 .... | 37,450 .... | 1,242 |
| Port Phillip .. | 71,000 .... | 31,984 .... | 3,008 |
| Adelaide..... | 23,000 .... | 9,714 .... | 996 |
| Tasmania .... | 300 .... | 263 .... | 3 |
| Swan River .. | 2,700 .... | 2,008 .... | 25 |
| New Zealand.. | 25,000 .... | 15,843 .... | 605 |
| Cape ..... | 38,000 .... | 20,113 .... | 4,961 |
| Total .. | 312,000 | 163,872 | 14,844 |

Since the sales opened on the 26th ultimo, with prices at par to ½d. below December, the market has gradually lost some further ground, and may at present be said to stand for greasy wools ½d., sometimes 1d., and for scoureds fully 1d. below the closing rates of last series. As regards grease, the decline applies to the bulk of Australian wools, to short Riverina sorts which depend entirely on Continental demand, to good Sydney grease, which are in small request and difficult of sale, and above all to inferior Queensland, which shew the fall most prominently. But an exception is formed by superior Western flocks and by all deep grown and sound wools where American competition comes into play, and where in most cases former rates are fairly maintained. Among scoureds the decline is proportionately not heavy for the best wools, but inferior sorts are very cheap and sell irregularly. Lambs' wool meets with good competition at steady prices. Crossbreds of the lower grades do not shew much change from December rates, while the finer qualities have given way ½d. to 1d. per lb. Capes, like Australian wools, have grown weaker since the opening and stand now for good snow whites 1d., for medium ¼d. to 1d., for fleece and grease a full ½d. below the December level. The sale room is well attended and at the current prices there is good competition, the Continent taking its full share in the purchases. The series is to close on the 20th inst. Bank rate 3 per cent.

GLASGOW.—Messrs. Ramsey and Company, wool brokers, in their report dated Feb. 9th, 1892, say:—*Wool*: There has been a moderate business doing in the wool market this week since the sales. At the public sales, however, the attendance was limited, and only a small proportion of the wools catalogued were taken up. White-faced wools were easier, black-faced are steady. *Sheep-skins*: The supply continues at a full average for the season, with a large proportion of prime sorts. Quietness both in skin wools and pelts make competition rather irregular, and changes are mostly in favour of buyers.

ROCHDALE.—As the wool sales in London are proceeding practically without change as to price, nothing has occurred either to stimulate or retard the demand for flannel. The business that is being transacted is about on a par with what is customary in February. Two or three merchants from distant towns have made preliminary visits for the purpose of making enquiry respecting goods for the coming season, but nothing definite is likely to take place until next month. The Yorkshire goods trade was dull. Prices unchanged. If anything, perhaps there is rather more enquiry for wool. At the same time actual transactions are few. Prices keep without change.

## *FLAX AND JUTE.*

DUNDEE, WEDNESDAY.—The market here remains inactive. There is less doing in jute, although the prices are quite as firm as ever. In face of the alarming figures shewing a diminishing supply from day to day it seems difficult to believe that jute will not advance still further. But in the meantime buyers act with great caution and refuse, except for assortment, to buy at the extreme rates now current. Yarns are a shade easier to buy. From day to day a few looms are stopped and this tends to make stocks of yarn accumulate. Common cops were done yesterday at 1s. 10d. for 8 lb., a drop of ½d. on the week, and fair 8 in. warp at 1s 11d. Hessians are in a peculiar position. They cannot be made except at a loss at the current prices, and the list prices cannot be got. On all hands one hears of the curtailment of production. The movement to secure short time does not make progress. The interests of millowners with heavy stocks of cheap jute and contracts for cloth differ so entirely from the wishes of those who have no jute that it seems almost impossible to arrange general short time, nor can such an arrangement in the circumstances be expected. Unless the price of jute falls, and that quickly, it is clear as day that cloth must rise, and rise a great deal, or looms must stand. Flax remains firm, and a good business is passing. Tows are also dearer, and sellers withdraw the better kinds expecting better prices further on. There is more doing in flax and tow yarns and the tone of the market is decidedly firm. Linens are wanted. All the looms in Fife and Forfar are busy on orders. The Dundee fancy jute trade is quiet. A small failure, Duncan Thomson and Company, has taken place in this trade, but the amount is not important. The stoppage, however, indicates the unprofitable nature of the business in consequence of the rise in the value of jute. Twines and cords, notwithstanding the advanced lists, are in excellent demand, and all the makers are well engaged.

## *DRY GOODS.*

MANCHESTER.—There has been a more animated enquiry this week in several departments, but the fancy branches are quiet, and there appears to be no immediate prospect of a revival. In support of this statement it may be mentioned that both cotton and silk laces have for some time been exceptionally dull, and there is a very poor outlook for the season. Yarns are not being bought with freedom, either in this country

or on the Continent. With reference to the Calais trade, the competition of Plauen houses has been severely felt for some time. These German competitors copy the better varieties of Calais designs, as well as other qualities. They even sell them with unblushing effrontery in the French market itself, and the result has been injurious to Calais, which is now taking steps to put a stop to the practice as far as the French laws will permit. The print trade has been rather more active, but the general position is unsatisfactory. Linens are slow, prices being in many instances higher than merchants care to pay.

# Gazette News.

## PARTNERSHIPS DISSOLVED.

T. and E. Harris, Newton Heath, Manchester; and Runcorn; trading as the Union Acid Company, chemical agents and drysalters; as regards E. Harris.

C. and J. Rhoyle, Keighley, machine makers.

J. and B. Heaton, Bradford, slubbing combers; as regards B. Heaton.

C. Lye, J. S. Webb, and J. Butcher, Fore-street Avenue, London, woollen warehousemen; as regards C. Lye and J. Butcher.

R. Whitehead and R. J. Linton, South-street, Manchester, merchants; as regards R. Whitehead.

J. Butler and H. E. Hodgson, Halifax, machine tool makers; as regards H. E. Hodgson.

T., J. W., and R. Bateson, Rochdale, manufacturers of English and Welsh roller skins; as regards R. Bateson.

J. Moore and C. Korte, Leeds, mechanical engineers; as regards J. Moore.

# Joint Stock and Financial News.

## *NEW COMPANIES.*

CHARD LACE COMPANY, LIMITED.

Registered by Hamilton and Warner, 300, Winchester House, E.C., with a capital of £15,000 in £1 shares. Object, to carry on the business of lace and net manufacturers and warehousemen. With slight modifications, the regulations contained in Table A apply.

FORD SILK SPINNING COMPANY, LIMITED.

Registered by C. Doubble, 14, Serjeants' Inn, E.C., with a capital of £20,010 in £15 shares. Object, to acquire the undertaking of a silk spinner now carried on at Ford Mill, Horbury, near Wakefield, and generally to carry on and extend the same. The first directors are J. Threlfall (managing director), Robert Threlfall, J. W. Atkinson, and A. Cockroft. Qualification, holding shares. Remuneration, not specified.

OLDHAM TRUST COMPANY, LIMITED.

Registered by J. Brierley, 7, Clegg-street, Oldham, with a capital of £10,000 in £10 shares. The objects for which this company is established are sufficiently indicated by the title. Registered without articles of association.

W. SUMMERSCALES AND SONS, LTD, KEIGHLEY.

Capital £50,000 in £10 shares. Object, the acquisition of the undertaking of a machine maker, etc., now carried on under the style of W. Summerscales and Sons, at Coney-lane Works, Phœnix Foundry, and Phœnix Steel Works, Keighley, and generally to carry on the business of iron founders, mechanical engineers, millwrights, etc. Subscribers:—

| | Shares. |
|---|---|
| J. Summerscales, Keighley | 1 |
| H. Crofts, Longsdon, Keighley | 1 |
| F. G. Gilliard, Keighley | 1 |
| J. Weatherhead, Keighley | 1 |
| C. Schilling, Keighley | 1 |
| R. E. Thomas, Keighley | 1 |
| T. G. Newton, Keighley | 1 |

The first directors are Joseph Summerscales and H. C. Longdon. Qualification, £1,000. Remuneration to be determined.

# Patents.



## *SPECIFICATIONS PUBLISHED.*

1890.

16,259 CROPPER. Twist lace machines. 6d.

1891.

1,935 GAUNT. Slubbing, etc., boxes. 8d.
3,087 MCGEE, W. & D. Thread-winding machinery. 6d.
3,375 HERNANDEZ. Breaking and decorticating ramie, etc. 8d.
3,926 WILLEY. Marking patterns on fabrics. 11d.
3,981 DUESBERG-DELREZ. Card teeth. 8d.
4,260 YOUNGJOHNS and HUGHES. Carpets. 1s. 6d.
4,283 CHARNLEY. Looms. 8d.
4,498 HOYLE and DOBSON. Ring spinning frames. 8d.
4,965 LORD and others. Opening, scutching, and carding machines. 6d.
6,294 DAW. Dyeing mats, carpets, etc. 6d.
11,763 DEATH. Scutching and cleaning fibrous stems. 6d.
13,072 BLAYE. Treating ramie, fibre etc. 6d.
13,788 PADMORE and PEET. Knitted fabrics. 6d.
19,189 SHACKLETON and others Looms. 6d.
19,459 THOMPSON (*Morison*), Breaking flax, etc. 8d.
20,249 TAYLOR. Tubes, spindles, etc. 6d.

SECOND EDITIONS.

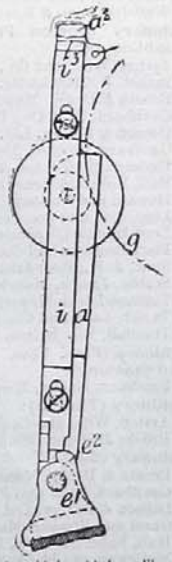
166 (1878) ABBOTT. Waterproof fabrics. 4d.
20,563 (1890) WILLCOX (*Farbenfabriken vorm. Fr. Bayer and Co.*). Indigo carmine. 6d.
4,543 (1891) JOHNSON (*Badische Anilin and Soda Fabrik*). Dye-stuffs. 6d.

## *ABSTRACTS OF SPECIFICATIONS.*

**12,386.** August 7, 1890. **Naphthoxy-acetic acid derivatives.** J. Y. JOHNSON, 47, Lincoln's Inn Fields, Middlesex.—(*Badische Anilin and Soda Fabrik.*)

Relates to the preparation of derivatives of naphthoxy-acetic acid for use as materials in the manufacture of dye-stuffs. *Alpha*-amido *beta*-naphthoxy-acetic acid is prepared by acting upon *beta*-naphthoxy-acetic acid with nitric acid, and reducing the nitro compound thus produced by means of stannous chloride and hydrochloric acid. The anhydride of the amido acid which first results is converted into the sodium salt of the amido acid by treating it with caustic soda solution. The nitro compound may also be prepared by nitrating the ether of naphthoxy-acetic acid and saponifying the nitro ether. *Beta*-naphthoxy-acetic-*beta*-sulpho acid is obtained by heating in a water-bath a mixture of Schaeffer's *beta*-naphthol mono-sulpho acid and mono chlor-acetic acid in alkaline solution. *Alpha*-amido *beta*-naphthoxy-acetic *beta*-sulpho acid is prepared by nitrating the above sulpho acid, reducing nitro compound thus obtained by treatment with iron and acetic acid, and converting the anhydride of the amido acid into the sodium salt by means of caustic soda solution. 6½d.

**12,473.** August 9, 1890. **Spinning.** W. T. and J. H. STUBBS, Mill-street Works, Ancoats, Manchester.



*Winding machines.*—The bobbin cradle *a*, which is normally pressed against the driving drum *g* by a weighted cord, is held away from the drum when desired for piecing and other purposes by means of a sliding bar or rod *f* which, when the cradle is drawn away from the drum, falls by gravity or is forced by a spring, etc., behind a projection $e_2$ or into a notch in the frame $e_1$. Both the cradle and the bar are provided with handles $a_2$, $i_3$ by which the bar may be raised and the cradle returned to its working position. 8½d.

**12,513.** August 11, 1890. **Preserving fabrics.** J. WILLIAMS, Willesden Paper Mills, Willesden Junction, London, N.W.

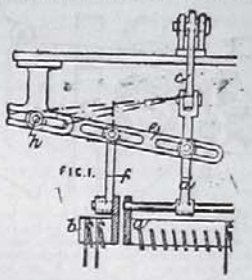
*Canvas and other fabrics are rendered not proof* by impregnating them with sub-sulpho-cyanide of copper. The fabric is first soaked in a solution of sulphate, acetate, chloride, or other salt of copper, or in an ammoniacal solution of oxide of copper, then dried and passed through a solution of ammonium or other sulpho-cyanide containing sulphurous acid or a bisulphite. As the fabric passes through the bath, sulphuric acid is added to liberate sulphurous acid and form white sulpho-cyanide in the fibres of the fabric. Other reducing agents, such as an acid solution of proto sulphate of iron or proto chloride of tin, may also be employed. The fabric is afterwards washed and dried. 4½d.

**12,522.** August 11, 1890. **Looms.** W. and H. A. FIELDING, Sycamore-street, Oldham-road, Manchester.

**12,528.** August 11, 1890. **Knitting.** W. J. JAMES, Green End House, Stafford.

*Circular machines; welting.*—In order to produce welts and slack courses automatically, the stitch cams in the cylinder and ribbing dial are altered in position by gearing from star-wheels, which are operated by the inner ends of pivoted levers. Details are given. 1s. 2d. *Drawings.*

*Jacquards.*—In weaving figured leno or cross woven fabrics, the jacquard is formed with two griffes *a* and *b* (Fig 1) of which *a* lifts the doup and middle harnesses, whilst *b* lifts the slackening harness. The griffe *a* is lifted by an ordinary lever *c* and link *d*, which latter is connected to a lever *e* centred at *h* and lifting the griffe *b* by a link *f*. For turning back the cylinder a sliding hooked bar *i* (Fig. 4), mounted between guides *k* on the batten *s*,

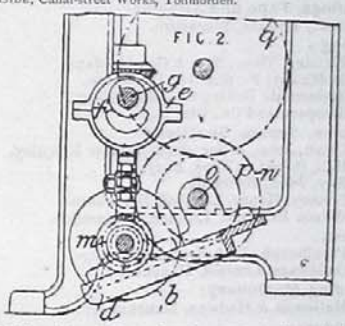



is drawn down and, by means of projections *t*, *u*, is made to engage with and turn back the lantern *p* and cylinder, a spring *m* returning the bar. The invention may be modified. 8½d.

**12,576.** August 12, 1890. **Yarns, treating for weaving.** J. SUTCLIFFE and J. GREENWOOD, both of Canteen Mill, Todmorden.

Steam is applied to the yarn in the winding-on frame by means of perforated steam pipe beneath the yarn beam, the stop-tap being controlled automatically or by hand. 6½d. *Drawings.*

**12,595.** August 12, 1890. **Spinning.** W. LORD and S. GARSIDE, Canal-street Works, Todmorden.

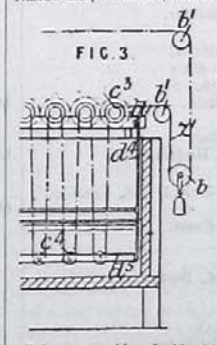


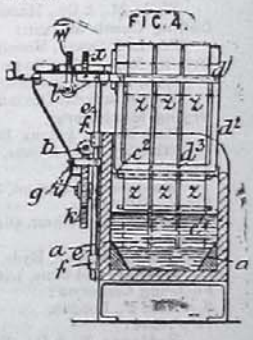

*Slubbing, intermediate and roving frames.*—In order that the driven cone *b* may be moved towards or from the driving cone as required, and also that the tension of the driving strap may be adjusted, the shaft of the driven cone *b* is mounted in bearings in a cradle *d* which can turn about the shaft *a* and is suspended by eccentrics *f* and straps *e* from a shaft *g* operated by hand; *m*, *n*, *p*, *q* represent spur wheels connecting the driven cone with the working parts of the machine. The eccentric straps *e* may be made in two in two parts connected by right and left handed screw couplings, etc., whereby the tension of the cone strap may be adjusted. 6½d.

**12,604.** August 12, 1890. **Spinning.** E. P. DRAPER, 116, Dwight-street, Holyoke, Massachusetts, U.S.A., and J. A. LYON, Hotel Continental, Paris.

*Driving spindles.*—The spindles are driven by a band 10, which is passed alternately round the driving drum and round the wharve of each spindle in succession, and is kept at the required tension by a weighted pulley 14, which is mounted upon a frame 15 formed of a single piece of wire. 6½d.

**12,652.** August 13, 1890. **Bleaching, etc.** S. SPENCER Narrow-lane, Whitefield, near Manchester.

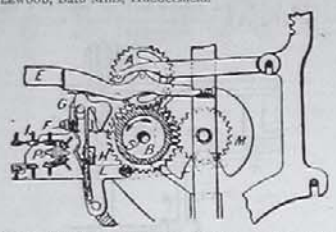



Relates to machines for bleaching, dyeing, sizing, and scouring yarn in the hank or warps, and fabrics. The faller frame *d* is mounted on rods *x* passing through guides *x*, and carrying a rail *g*, which rests upon crank pins *i* in worm wheels *h*, whereby the frame is alternately raised from and lowered into the vat. The shaft *b* is connected by a chain and chain wheels not here shewn with the shaft *t*, which by worm gearing $w_1$, $w$ rotates one of the faller shafts, the motion of the latter being transmitted to the other faller shafts by pinions *x*. Fixed to the faller frame *d* is a frame $d_1$ $d_2$, carrying rods $d_3$ for separating the hanks *z*, etc. Rods $c_1$ pass through the lower parts of the hanks *z* and rest in their lowest position upon bevelled pieces $a_1$, while in their highest position they come against weighted rails $c_2$, whereby the hanks are stretched. In Fig. 3, warp or fabric $z_1$, is shewn passing continuously over upper rollers $c_3$ on the movable frame *d*, and lower rollers $c_4$ mounted on a frame $d_3$, $d_4$, fixed to the frame

d, and thence by the guide rollers *h* to squeezing rollers, not here shewn, and back again into the vat. 8½d.

**12,662.** August 13, 1890. **Looms.** I. S. Lodge and G. Littlewood, Bath Mills, Huddersfield.



*Dobbies; change-box motions.*—Relates to jacquard mechanism in which toothed discs A carried by levers E are made to gear with one of two oppositely revolving toothed segment wheels (of which only the lower one, B, is shewn) for the purpose of operating the usual levers. The levers E are set by slotted and weighted bell-crank levers F mounted on a shaft G, and acted on by peg lags I. When a lever F is pressed forward by a peg it engages with a lifting bar H and raises the corresponding lever E and wheel A. The bar H is operated by a lever L and cam M, suitable springs returning the parts. The cylinder P may be driven by spur gearing from the shaft S. 8½d.

**12,689.** August 13, 1890. **Spinning.** K. Trobach, Berlin, and G. J. Bruck, Leipsig, Germany.

The gum, etc., is removed from fibrous plants, and the fibres are also bleached by boiling in a soap solution, washing with hot and cold water, then treating with permanganate of potassium or sodium, and removing the manganese deposit formed on the fibres by means of a bath of sulphurous acid and washing. 4½d.

**12,715.** August 13, 1890. **Dyes.** B. Willcox, 47, Lincoln's Inn Fields, Middlesex.—(*The Farben/abriken vorm. F. Bayer and Co.; Elberfeld.*)

¶Relates to the manufacture of new derivatives of alizarine and its analogues. Consists in treating the intermediate product in the production of alizarine bordeaux, which is described in Specification No. 8,725, A.D. 1890, and is now found to be a sulphuric ether of tetrahydroxyanthraquinone, with ammonia for about twelve hours, then diluting and acidifying, whereby a new blue colouring matter is precipitated. In a similar manner the intermediate products obtained from purpurin, flavo-purpurin, anthrapurpurin, anthragallol, or a compound termed rufigallic acid bordeaux obtained from rufigallic acid by acting upon it with fuming sulphuric acid at a low temperature, may be converted into colouring matters by treatment with ammonia. Consists also in converting alizarine bordeaux and its analogues into oxidation products termed alizarine cyanines, the product from alizarine bordeaux itself being a pentahydroxyanthraquinone. The oxidation is effected by dissolving the bordeaux in sulphuric acid, and adding manganese dioxide. The product dyes material mordanted with alumina a splendid violet, and chromium mordanted goods a greenish blue. Consists further in converting alizarine bordeaux and its oxidation products into sulpho acids, which are soluble wool dyes, by heating the dry substances with fuming sulphuric acid containing 20 per cent. anhydride, to 100°—120° C. Sulpho acids are also obtained from the mixture of alizarine and fuming sulphuric acid of high percentage described in Specification No. 8,725, A.D. 1890, by mixing it with sulphuric acid monohydrate, and heating the mixture to 100°—120° C. Alizarine bordeaux sulpho acid is also obtained by the action of fuming sulphuric acid of high percentage upon ordinary alizarine monosulpho acid. 6½d.

**12,739.** August 14, 1890. **Finishing Italian cloths, etc.** J. Kirk and B. Lee, Woodhouse Dye Works, Leeds.

The fabric, after being dyed and pressed, is wrapped around a perforated cylinder, situated in a chamber surrounded with a steam casing. Steam and air are injected or passed into the chamber by pipes at a higher pressure than the steam in the casing, and escape by an outlet at the bottom. 6½d. *Drawings.*



## TEXTILE MACHINERY, APPLIANCES, &c.—DIRECTORY OF MAKERS.

**Auctioneers:**
Rushton, Edward, and Son, Blackburn, and Manchester.
Salisbury & Hamer, Blackburn and Manchester.

**Bandings, Tape and Tubular:**
Hart, Thomas, Blackburn.

**Belting:**
Fleming, Thos., Son, & Co., Halifax.
Reddaway, F., and Co., Pendleton.
Rossendale Belting Co., Manchester.
Sampson and Co., Stroud.

**Bobbins, Spools, Shuttles:**
Dixon, John, & Son, Steeton, near Keighley.
Hall, Robert, & Sons, Bury.
Kay, John, Rochdale.
Livesey, Henry, Limited, Blackburn.
Wilson Brothers, Limited, Todmorden.

**Boilers:**
Fernihough, J., & Sons, Stalybridge.
Galloways, Limited, Manchester.

**Braiding Machinery:**
McGowan & Hadwen, Manchester.

**Calenders:**
Hall, Robert, & Sons, Bury.
Hoyle, E., and Sons, Limited, Halifax.
Riley, J. H., and Co., Bury.

**Card Clothing:**
Sykes, Joseph, Brothers, Huddersfield.
Wilson & Ingham, Liversedge.

**Card Grinding Machinery:**
J. Jones, Dukinfield.

**Cement, Mineral Fusible:**
Fox and Williams, Manchester.

**Chaining Machine:**
Hurst, W., & Co., Rochdale.

**Cop-Tubes:**
Jagger & Co., Oldham.

**Cop-Tubing Apparatus:**
Jagger and Co., Oldham.

**Cotton Driving Ropes:**
Hart, Thomas, Blackburn.

**Crystoleine:**
Wells, M., & Co., Manchester.

**Doffing Comb Motion:**
Brooks & Doxey, Manchester.

**Driving Ropes, Bandings, &c.:**
Hart, Thomas, Blackburn.
Kenyon & Sons, Dukinfield.

**Drying Machinery:**
Hall, Robert, & Sons, Bury.
Whiteley, Wm. & Sons, Huddersfield.

**Electric Lighting:**
Woodhouse & Rawson, United, Ltd., London.

**Emery Filleting:**
Dronsfield Brothers, Oldham.

**Engines:**
Goodfellow, Ben., Hyde.
Musgrave and Sons, Ltd., Bolton.

**Filtering Cisterns:**
Nell, F., London.

**Fire Hose:**
Reddaway, F., & Co., Pendleton.

**Fire Pumping Engines:**
Worthington Pumping Engine Co., London and Manchester.

**Fustian Cutting Machines:**
Lockwood and Keighley, Huddersfield.

**Humidifyers:**
Howorth, Jas., & Co., Farnworth.
Matthews and Yates, Manchester.
Parsons, P., Blackburn.

**Hydraulic Presses:**
Dickinson, Wm., & Sons, Blackburn.
Hall, Robert, & Sons, Bury.
Livesey, Henry, Limited, Blackburn.

**Hydro-Extractors:**
Broadbent, Thomas, and Sons, Huddersfield.
Watson, Laidlaw & Co., Glasgow.

**Indicators:**
Orme, G., and Co., Oldham.

**Jacquard and Card Cutting Machinery:**
Ayrton, Wm., and Co., Manchester.
Devoge & Co., Manchester.
McMurdo, James, Manchester.

**Knitting Machinery:**
Harrison, W., Manchester.
Rothwell, W. & Co., Limited, Bolton.

**Lattices, Pegs, Jacquard Slips, &c.:**
Livesey, Henry, Limited, Blackburn.

**Looms, etc.:**
Butterworth and Dickinson, Burnley.
Dickinson, Wm., & Sons, Blackburn.
Hacking and Co., Bury.
Hall, Robert, and Sons, Bury.
Hutchinson, Hollingworth, and Co., Doboross, Oldham.
Livesey, Henry, Limited, Blackburn.
McGowan and Hadwen, Manchester.
Platt Brothers and Co., Limited, Oldham.
Tattersall & Holdsworth, Burnley.

**Machinery (Bleaching, Dyeing, Printing, &c.):**
Hawthorn, John, & Co., New Mills, Stockport.
Dickinson, Wm., & Sons, Blackburn.
Heppenstall, E., Huddersfield.
Hall, Robert, & Sons, Bury.
Mather and Platt, Manchester.
Riley, J. H., and Co., Bury.
Whiteley, Wm. & Sons, Huddersfield.

**Machinery (Cotton Preparation, Spinning, Doubling, etc.):**
Ayrton Wm., and Co., Manchester.
Bethel, J., Manchester.
Brooks & Doxey, Manchester.
Coulthard, T., & Co., Preston.
Dobson & Barlow, Ltd., Bolton.
Guest and Brookes, Manchester.
Hetherington, John, & Sons, Ltd., Manchester.
Hall, Robert, & Sons, Bury.
Howard and Bullough, Ltd., Accrington.
Lees, Asa, and Co., Limited, Oldham.
Lord Brothers, Todmorden.
Platt Brothers and Co., Limited, Oldham.
Stott, J. H., Rochdale.
Stubbs, Joseph, Manchester.
Tattersall & Holdsworth, Burnley.
Taylor, Lang and Co., Stalybridge.
Threlfall, Rd., Bolton.

**Machinery (Flax, Tow, Jute, &c., Preparation and Spinning):**
Fairbairn, Naylor, Macpherson & Co., Leeds.

**Machinery (Thread):**
Ayrton, Wm., and Co., Manchester.
Brooks & Doxey, Manchester.

**Machinery (Silk):**
Brooks & Doxey, Manchester.
Coulthard, T., & Co., Preston.
Dobson & Barlow, Ltd., Bolton.
Guest and Brookes, Manchester.
Hall, Robert, & Sons, Bury.
McGowan and Hadwen, Manchester.
Platt, Brothers and Co., Limited, Oldham.
Stubbs, Joseph, Manchester.
Sykes, John, and Sons, Huddersfield.
Taylor, Lang and Co., Limited, Stalybridge.

**Machinery (Sizing, Filling, &c.)**
Dickinson, Wm., & Sons, Blackburn.
Hall, Robert, & Sons, Bury.
Livesey, Henry, Limited, Blackburn.
Whiteley, Wm., & Sons, Huddersfield.

**Machinery (Soaping, etc.):**
Mather and Platt, Manchester.

**Machinery (Woollen and Worsted):**
Brooks & Doxey, Manchester.
Coulthard, T., & Co., Preston.
Dobson & Barlow, Ltd., Bolton.
Guest and Brookes, Manchester.
Hetherington, John, & Sons, Ltd., Manchester.
Hall, Robert, & Sons, Bury.
Lees, Asa, and Co., Limited, Oldham.
Platt Brothers and Co., Limited, Oldham.
Stubbs, Joseph, Manchester.
Sykes, John, and Sons, Huddersfield.
Taylor, Lang and Co., Stalybridge.
Tattersall & Holdsworth, Burnley.
Whiteley, Wm., & Sons, Huddersfield.

**Needles for Hosiery, &c. Machinery:**
Ellis, Philip, Lenton, Nottingham.

**Oil:**
Wells, M. & Co., Manchester.

**Oil Cans and Oilers:**
Jagger & Co., Oldham.

**Oilcloth Machinery:**
Ayrton, Wm., and Co., Manchester.

**Patent Agents:**
Dutton & Fulton, Manchester.
Thompson, W. P., & Co., Manchester, Liverpool and London.

**Pickers:**
Bromley, Thomas, Bolton.

**Pistons:**
Lancaster and Tonge, Pendleton.

**Pulleys:**
Richards, Geo., and Co., Broadheath.
"Unbreakable" Pulley and Mill Gearing Co., Limited, Manchester.

**Pumping Engines:**
Worthington Pumping Engine Co., London and Manchester.

**Roller Leather:**
Meredith-Jones, J., and Sons, Wrexham.

**Rust Preventives:**
Wells, M., & Co., Manchester.

**Shuttles:**
Kay, John, Rochdale.
Livesey, Henry, Limited, Blackburn.
Wilson Brothers, Limited, Todmorden.

**Shuttle Swells:**
Hall, Robert, & Sons, Bury.
Livesey, Hy., & Co., Ltd., Blackburn.
Whalley, J., Blackburn.

**Sizing and Filling Preparations:**
Adley, Tolkien, and Co., Blackburn.
Eastwood, James, Manchester.

**Smoke Consumers:**
Automatic Smoke Prevention Syndicate, Ltd. Manchester.
Greaves, W. McG., Manchester.

**Sprinklers, Automatic:**
Dowson, Taylor & Co., Ld., Manchester and London.
Witter & Son, Bolton and London.

**Steam Traps:**
Lancaster and Tonge, Pendleton.
Whiteley, Wm., & Sons, Huddersfield.
Crowley and Co., Ltd., Sheffield.

**Temples, etc.:**
Blezard, James, and Sons, Padiham.
Brooks, Samuel, Manchester.
Hall, Robert, & Sons, Bury.
Lupton Brothers, Accrington.

**Tools (Machine):**
Hetherington, John, and Sons, Manchester

**Ventilation:**
Matthews and Yates, Manchester.
Parsons, P., Blackburn.
Pickup, J. H., & Co., Ltd., Bury.

**Warping Machinery:**
Bethel, J., Manchester.
Hall, Robert, & Sons, Bury.
Livesey, Henry, Limited, Blackburn.
Stott, J. H., Rochdale.
Whiteley, Wm., & Sons, Huddersfield.

**Waste (Cotton) Picking Machinery:**
Brooks, Samuel, Manchester.

**Wool Extractors:**
Jarmain & Son, Huddersfield.

**Yarn Testing, &c., Machine:**
Wallwork, Henry, and Co., Manchester.