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Canadian Journal of Fabrics

THE JOURNAL OF THE *Textile Trades of Canada.*

Vol. XIX. TORONTO AND MONTREAL, NOVEMBER, 1902. No. 11.

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A Monthly Journal devoted to Textile manufactures and the Dry Goods and kindred trades.

Subscription: Canada and United States, $1.00 per year. Great Britain, 5/ Advertising rates on application.

Offices 18 Court St., cor. Church, Toronto, and the Fraser Building, Montreal

BIGGAR-SAMUEL, LIMITED, Publishers

TRAVELLING REPRESENTATIVE: A. W. SMITH.

Toronto Telephone, Main 4310 | Montreal Telephone, Main 2589

Business correspondence should be addressed to Montreal; but cuts, news items and editorial correspondence to Toronto; cuts from abroad should be sent by post wherever possible, not by express Changes of advertisements should be in our hands not later than the 10th of each month to ensure insertion.

CONTENTS OF THIS NUMBER.

—Apparently the experiment of the German Emperor, in sending a party of negroes from the Southern States of America to the German colonies of Africa, has proved satisfactory, as he is negotiating for the despatch of a second party there. An account of the Kaiser's first experiment recently appeared in this journal from a letter from one of the pupils, who were all selected from Booker T. Washington's celebrated negro school at Tuskegee, Ala.

—A sign of the times, pointing to the early introduction of the metric system of weights and measures, was the resolution adopted by the conference of the Colonial Premiers, in London, as follows. "Resolved, that it is advisable to adopt the metric system of weights and measures for use within the Empire, and the Prime Ministers urge the Governments represented at this conference to give consideration to the question of its early adoption." Each month some chamber of commerce or other commercial or scientific body in Great Britain endorses this simple system of weights and measures, and there is a prospect that that most conservative of bodies, the British public, will put its convictions into action.

—The production of artificial indigo from naphthaline continues to increase, and is giving the indigo planting and manufacturing industry of India much anxious thought. As before mentioned, the substitute is sold much cheaper, and those concerned with the production of the real article will not only have to produce it much cheaper, but the planters must improve methods at the agricultural end if the Indian trade is to hold its own. It is said that one German firm alone—the aniline and soda factory at Ludwigshafen—has invested 18,000,000 marks, or about two and a quarter million dollars, in an indigo-making plant. The German methods of manufacture are kept secret as far as possible. As for the reception of the artificial article on the market, it seems to be preferred by small dyers, because it can be had in small quantities, and does not, like natural indigo, have to be carefully stored. It is also easy to prepare for use, is vivid in coloring, and yields uniform shades. The points in favor of the natural indigo are that it gives more solidity to the cloth, and the colors stand sun and rain better, and is best for dyeing large quantities of cloth that are intended for out-door service. The French Government, for instance, still insists on the natural dye for military uniforms, but the German Government, influenced by the makers of the artificial product, who are so far all Germans, accepts both dyes. During the past year the price of natural indigo has fallen over ten per cent. owing to the competition of the new product.

—Hon. J. I. Tarte, having retired from the Government, his influence in favor of high protection, so far as his official position is concerned, has no effect. It is to be regretted that he has not completed his investigations among the textile mills, in which he was engaged when brought to task for his utterances. It is to be hoped the event will not prevent the Government giving such relief as the woolen men at least are entitled to. As for Mr. Tarte, he will no doubt advocate protection more vigorously than ever from the editorial chair.

—During the past eight years, out of the total exports of Indian cotton, the proportion sent to the United Kingdom was 23.7 per cent, as against 71.7 per cent. to the Continent of Europe, 2.5 per cent. to Japan and China, and 2.1 per cent. to Calcutta and the Indian coast generally. For the cotton year 1901—2, the proportion to Great Britain was 0.7 per cent only, to the Continent of Europe, 41 per cent., to China and Japan 57.3 per cent. The tendency, therefore, is for India to become a source of supply for raw cotton for the far East rather than for Great Britain.

—On the occasion of the visit of Hon. J. I. Tarte to the Dominion Cotton Mills, at Magog, A. F. Gault, president of the company, said that unless increased protection was granted, the mills would close down. Referring to the matter, the Moncton Transcript points out that the mills in that town enjoy in addition to 35 per cent. protection, exemption from municipal taxation, and have until this year been paying 9 per cent. on, in some cases, watered stock. This year, because of the enormous outlay on capital account in increasing their plants on borrowed capital the banks insisted that the companies pass their dividends for one year and reduce the liabilities. Thus, the Transcript alleges, the necessity of reducing the liabilities caused by outlay justified through increasing business is presented as an evidence of undue foreign competition instead of being that which it really is—a proof of expanding output. It says, further, that the Moncton mill is run largely on orders given by American dealers, and its output stamped with American brands is shipped to China and sold there as American cottons in competition with the world. If these things are so, the grievance of the cotton men, as to the tariff, does not begin to compare with that of the woolen manufacturers.

—The Indian Textile Journal, referring to the proposed travelling exhibition of United States manufactures, which it is intended to send through the Eastern seas, visiting India, China, Russia, Japan, the Philippines, South Africa, etc., warns Indian manufacturers that an "Indian invasion" is threatened by our ambitious neighbors. Our contemporary points out that British direct trade with India is slowly declining, and that United States methods of cotton manufacturing have so improved of recent years as to put them in a position to get a foothold in India, just as they have been able to increase their hold on the cotton trade of China and Japan. The Journal goes on to say: "England seems to have forgotten that golden counsel Cobden gave it years ago. That far-sighted seer said: 'Our only chance of national prosperity lies in the timely remodelling of our system so as to put it on an equality with the improved management of the Americans. Unfortunately, England is still behind in remodelling its system. It is still conservative in one of the greatest and most profitable branches of industry, namely, cotton manufacture. The delegate whom the Manchester Guardian sent a few weeks ago to the United States to make his report on the industry, said, in one of his interesting and most instructive letters, that if he were asked to attempt in a single sentence definition of 'the improved management of the Americans,' as he had seen it in their cotton mills and print works, he should say that it was this—'unceasing study and close analysis of the cost of production, and unresting endeavor to diminish any and every element in them by any departure from existing routine or by any outlay of additional capital, which close calculation may show to be probably advantageous.'"

—Fall River, Mass., has hitherto been the leading centre for print cloths in the United States, but its sun is on the decline. Many of the mills are said to be struggling for existence, and there are indications that the South is steadily drawing away the cotton manufacturing industry which was at one time centred in the New England states. An English manufacturer who recently visited the United States writes to this effect.

DEATH OF WM. MITCHELL.

Wm. Mitchell, proprietor of the matting factory at Cobourg, Ont., died somewhat suddenly of heart disease on the 26th of October, aged 74. He was born in Alva, Stirlingshire, Scotland, and educated at the celebrated Dollar Academy. He served an apprenticeship to the dry goods business at Alloa, afterwards going to Glasgow and Stirling. He came to Toronto between 50 and 60 years ago, and was engaged in business there till about 18 years ago, when he purchased the matting factory established by Longmore & Clark, and then the only one of its kind in Canada. For some time he continued to reside in Toronto, but about 14 years ago removed to Cobourg, where he continued to carry on the factory successfully till his death. When business was dull he kept running for the sake of his employees, keeping as many as possible at work. Mr. Mitchell was of a most kindly and charitable disposition, respected by all, and beloved by his employees. His remains were interred in Toronto. He was unmarried, and leaves behind an aged sister, with whom he had always lived. The business will in the meantime be continued as usual.

Foreign Textile Centres

Bradford.—The demand for crossbreds is the principal feature of this market, the finer sorts being mostly in request. The run on crossbreds militates against merino wool, the value of which has not improved, which is largely due to the fact that botanies are somewhat neglected, and it remains as difficult to secure 2s. for a good sixties top as was the case a month ago. Consumers are waiting for developments at the manufacturing end.

Belfast.—There is little change of consequence in this linen market; the tone is perhaps slightly improved, but buying is restricted. The spinning end is steady. Fine yarns are in quiet request at late rates. Rather more is doing in tows; prices are without quotable change, but an advance is probable with any increase in buying. The manufacturing branch shows signs of some improvement, and for tow goods there is a little more enquiry. Damasks keep brisk; unions and dress linens sell fairly; bleaching cloths are quiet. White goods for home markets are still dragging. The export trade keeps steadily increasing, and prospects are good.

Dundee.—Jute is no cheaper. There is no marked change in values, but the fall upon which some buyers acted has not taken place. Calcutta mills, persuaded at last that the crop is not large, are buying, and on the whole the jute market is the turn firmer. Jute yarns and heavy yarns are without change in value. The demand continues fair, but for the best spins for cable purposes there is an active demand. Jute 40 in. 10½ oz. hessians are quiet. There seems a prospect of a better demand. The price is so low and indeed unprofitable that buyers begin to convince themselves that prices have touched bottom.

Kidderminster.—There is a little more animation in the local carpet trade, although the season opens out somewhat slowly. While some revision in price lists has here and there been made, raw materials remain firm. A healthy trade is being done, though not so large as usual at this season.

Leeds.—The woolen trade shows little change, the demand in most departments being fairly satisfactory, considering that prices have still an upward tendency. The prices of fine worsteds and similar goods are now about equal to the rates current for the finer wools. Most of the old wool contracts having expired, there is a much better demand for fine crossbreds, but the enquiry for botanies and other of the finer grades is strictly regulated by actual needs, as the piece market is not disposed to encourage the higher values. The demand for winter goods is in some sections active and in others hardly up to the average. Fabrics for the women's trade are in large request, grays and black and white effects being still preferred for mantles and jackets. Fancy tweeds find a ready market for costumes. For the mantle trade delivery gray friezes and cheviots cannot be obtained with sufficient promptness. The low woolen branch has somewhat improved. Producers are busy with patterns for next winter's trade in men's goods, and samples are being delivered to woolen merchants for next spring. In the wholesale clothing branch winter orders have increased, but the turnover is not as yet up to the average. The Canadian demand is satisfactory, and winter repeats are now coming in for clothing, though to a large extent the run is on low class stuff. At present Australian requirements are not large.

Leicester.—Yarn is active, with cashmere quoted at high rates. There is a full turnover of hosiery for home and colonial markets.

Manchester.—There is a moderate demand for cloth, which seems to be gradually swelling, though orders booked for China and India are rather deficient in bulk, owing to the more urgent ones having been placed, and low prices offered In the Mediterranean markets business was slow. South American markets showed very little change, though that was in favor of an improvement. The home market continued moderate. Prices are low but the impression is that considerable business is not far away and sellers are disposed to wait for it. Yarn sellers hold firmly to quotations, and there is a fair demand.

Nottingham.—The demand for lace and curtain yarns is less active, and orders have been sparingly placed. Quotations are unaltered. There is a good demand for merino yarns. Cashmere yarns are steady, and sellers adhere firmly to list prices. Bobbin nets are a trifle easier for speculative buyers. The fancy cotton lace branches are well engaged, but the silk lace branches are depressed. There is a good demand for wool and mixed hosiery.

THE PENMAN MANUFACTURING CO.

Paris, Ont., is not only the headquarters of the Penman Mfg. Co.'s group of mills—the largest knitting mills under one management in Canada—but is the birthplace of the knit goods industry of Canada, as carried on under modern conditions. The names of Clay, Hackland and Adams are associated with the beginning of the hosiery and underwear trade of Canada, but all these pioneers are now dead, and were they to take up the burden of life again they would scarcely realize that the great business now carried on in Paris was the same they had a hand in creating. The small water-power used in those days was more than sufficient for the knitting business carried on by Adams, Hackland & Co., while now one of the mills of the Penman company could utilize a yearly average of twice the power furnished at this point by the Grand River, though the modern turbine extracts much more power from a cubic foot of water than the wheels of those days. At this moment the Penman Company are installing in No. 2 mill a 200-h.p. Wheelock engine from the works of the Goldie & McCulloch Co., to ensure sufficient power at times when the river is low, there being not enough from the turbines alone to keep all departments in operation at all seasons. A new steam heating system has been installed in this mill also, and each season sees some new machinery in place to cope with the changing demands of the time. The mills have their own machine shops where repairs can be made, but what is more important new machines are designed for special work. Some of the most intricate machines at work in the mills are designed and built by the company's own men, and taken as a whole the machinery in the Penman mills is not surpassed by any knit goods mill in the United States or Europe. The company has over a thousand varieties of goods on the market this season, and anyone examining the samples, no matter what their preconceived ideas of Canadian goods, would be forced to admit that no foreign goods could excel them in finish or quality. A traveling exhibition of samples from such a concern would work wonders in educating Canadians as to the style and quality of goods that are produced by our own mills. There are 750 hands employed in the two mills in Paris, while the company has mills also at Port Dover and Thorold in Ontario, and at Coaticook in Quebec. Under the general management of Mr. J. B. Henderson and the local superintendence of Mr. Thompson, the mills have reached such a state of efficiency that they are able to run to full capacity in spite of foreign com-

petition and adverse tariff conditions. As with the tweed trade, the tariff on knit goods is not in a satisfactory state, and the competition of German goods partially made or finished in England sweeps away the profits that might be made in this branch of textiles. The large output of this company's goods is placed on the market by D. Morrice, Sons & Co., Montreal and Toronto.

THE COTTON MARKET.

Theodore Price, of New York, a well-known cotton expert, states that the reaction in the market has about spent its force. It has been predicted entirely upon reports that in the absence of frost the development of the top crop would add substantially to the yield. Such reports are always current at this season, and they nearly always prove misleading. His advices do not lead him to expect much from the top crop, and his belief in an exceptionally short crop is fully confirmed.

FABRIC ITEMS.

R. A. Fisher, dry goods, Frank, is closing out and moving to Claresholme.

The Toronto city council again vetoed the proposal to tax laundries $50.

T. H. Logan, of Carberry, Man., is closing the dry goods department of his business.

The manufacturers of Rooster brand shirts, overalls, etc., at Montreal, have made their factory a union one.

The Novi-Modi Costume Co., of Montreal, have amalgamated their business with Boulter & Stewart, Toronto.

Pearl buttons are selling in enormous quantities and there are predictions that prices will advance sharply before long.

The directors of the Canadian Colored Cotton Mills Company paid a quarterly dividend of 1 per cent. on Oct. 15th.

Silks are entering more than ever into every class of wear, from the light-weight dust coat to skirts, waists, petticoats, etc.

Dress goods are in large demand for fall and winter business. Evening dress fabrics show particularly good demand.

Canadian woolen fabrics are becoming increasingly popular for women's skirts and jobbing houses report a good trade in this line.

For men's overcoats of the better class this season's trade in Canada is running largely to cheviots, llamas, vicunas, meltons and beavers.

The wholesale millinery firm of J. W. Pennock & Co., Toronto, is in financial difficulties, and offers to compromise. The liabilities are $16,000.

The Handy mending tissue is used for repairing kid gloves, lace curtains, silks, or torn clothing of any description. It mends the article perfectly, leaving no rough places.

The George B. McNeill Co., Winnipeg, has applied for incorporation. The capital is $3,300, and the object is to take over the business conducted by McNeill & Irwin, tailors.

A by-law is to be submitted to the ratepayers of Peterboro to borrow $2,500 to assist the Colonial Weaving Co. The agreement with that company provides that it shall within 90 days commence the erection of a brick building, and shall have completed the same and employ at least 30 hands by the 1st of October, 1903. A by law to assist the Shelton Mfg. Co. will also be submitted.

Malcolm & May, tent manufacturers, Winnipeg, have dissolved partnership and the business will henceforth be conducted by John May.

Flax binder twine, made under patents owned by the Deering Harvester Company, Chicago, has been tested with good results in the grain fields of North Dakota this season.

Waterproof clothing manufacturers complain that United States firms have no regular market in Canada, but at times flood the country with cheap goods sold at about the cost of the cloth. They ask for more protection.

The Canadian Importing and Jobbing Co. is asking for incorporation with a capital of $45,000. The applicants are Carl Rosenberg, Bernhard Gardner, Michael Gardner, A. J. Andrews and F. S. Andrews, all of Winnipeg.

The corset manufacturers of Quebec city and other places in that province have decided to consolidate their manufacturing and business interests in one large concern in Quebec. A large part of the production is made in that city.

J. J. Turner & Sons, of Peterboro, recently shipped a large hospital tent to the Cleveland, Ohio, health authorities for use in a smallpox outbreak there. It is a double tent, 15 by 30 feet outside, and 14 by 20 inside.

The cotton manufacturers of Canada met at Montreal on Oct. 31st, and formed their interests into a section of the Canadian Manufacturers' Association. Every cotton company in Canada was represented. A. F. Gault, of Montreal, was elected chairman.

A cloth known as knickers will be a feature in the spring dress goods trade; also snowflake mixtures, shown in such weaves as tweeds, hopsacks, canvas, voiles, mattings, etc., in all the leading colors. Prices of all kinds of dress goods promise to be firm.

It is stated that the Storey Cotton Co., of Philadelphia, has acquired a tract of land for growing cotton in the Transvaal, experiments having shown that that staple can be grown more cheaply in South Africa than in the United States.

It was thought when A. J. Goldner, clothier, of Barrie, offered to compromise at 25 cents on the dollar, that he could pay more, so the creditors stood out. He has since offered 35 cents, 25 cents cash, balance in 60 days, secured. This offer has been accepted.

Canadian makers of blankets say that they are overcrowded with orders, and have enough business now booked to keep them busy until after the first of the year. They report a particularly large sale of fine goods suitable for children's coats and other like uses.

Mrs. Edmund Rice, wife of the colonel of the Twenty-sixth Regiment United States Volunteers in the Philippines, has put in a claim on the War Department for one million dollars as royalty on a device for rolling up and carrying shelter tents used by the army since the Civil War.

One of the novelties in material that bids fair to be popular are gowns of London twines. This stuff more nearly resembles hopsacking in many colors than anything else. It is not so loosely woven as to be transparent, but gives an opportunity for the display of handsome linings, and it has a decided appearance of airiness.

The International Rubber Co. has been incorporated in Canada, with a capital of $50,000. The parties named are John J. McGill, manufacturer, William Strachan, manufacturer; Adolphe V. Roy, engineer and manufacturer, of Montreal; Walter W. Allen, engineer, of New York, and Benjamin K. Hotchkiss, accountant, of East Orange, New Jersey.

At the annual fur sale in London in October more than one million skins were sold. Skunk, sable, beaver, otter and red fox sold lower, and most other skins higher than at the March sales.

Stobart, Sons & Co., wholesale dry goods, Winnipeg, have made arrangements for the erection early next year of a new warehouse, their business having outgrown their present quarters.

The lavishness of trimming which has prevailed for the past season will continue into the next, and all articles of feminine dress will be elaborately decorated. Irish and other laces will be extensively used.

An explosion took place in the laundry of A. J. Bowman, Toronto, and caused a fire, which did damage to the building to the extent of about $400, and to the contents $150. The explosion arose from soft coal burning in a stove.

A Sydney, N.S.W., despatch says the Naraddera meat preserving works has purchased 120,000 sheep at from 6d. to 1s. a head, the sheep owners being unable to maintain their flocks, owing to the absence of fodder caused by the great drought.

One portion of the King's dress at the recent Coronation consisted of a magnificent ermine robe which was a masterpiece of human skill. Thousands of skins had to be picked over before a perfect match could be attained, and it is safe to say that owing to the great scarcity of the better quality of ermine it would be impossible to duplicate the robe.

The gray and white cottons which supply the Manitoba and Northwest markets are principally of Canadian manufacture. Jobbers say they have not handled more English white cottons since the preferential tariff came into force than before. The difficulty with home manufacturers is slow delivery. In Canada orders have to be placed three or six months ahead, while in ordering from the United States thirty days is sufficient.

Some of the fur houses are offering the advice to trappers not to trap too early in the season while furs are of poor quality. The only furs of much value caught between the first and the middle of November are beaver, muskrat and skunk; Muskrat grade full, and the beaver and skunk No. 2 or No. 3. After the middle of November, it does not take much cold weather to improve the quality of mink and skunk, so that some will grade No. 1.

Though the market for staples is quiet there is a very firm undertone in the markets for cottons and woolens. The mills are not very zealous in the pursuit of new business; in fact some are very indifferent about booking business at present value, and apparently would like to see orders rather slower in coming forward. The inference is that business at current prices is not any too profitable, and that there is a feeling in favor of higher prices. It is not considered likely that prices would be long maintained at the present level if it were not that the mills are afraid of outside competition.

For the King Edwar Hotel, Toronto, 5,600 sheets and 5,600 pillow cases have been made specially by an English firm, who are the largest cotton manufacturers in the world. There have been purchased 6,400 linen bedroom towels, besides many bales of lower grade crash, etc., for kitchen use. Of the bed quilts, 600 were made after special designs, some of them costing as high as $10 apiece. As to table cloths and napkins, we have not the exact figures, but their number may be inferred from the above. The total cost of the napery and bed furnishings is said to be between $25,000 and $30,000. The carpets and upholsterings are also the best obtainable.

Twine is now made from grass at Superior, Wis., in a factory where 300 hands are employed. The American Grass Twine Co. engaged in that business pays a dividend of 6 per cent. Why can't they also use sweet clover?

Among the Mills

Co-operation is one of the guiding principles of industry to-day It applies to newspapers as to everything else. Take a share in "The Canadian Journal of Fabrics" by contributing occasionally such items as may come to your knowledge, and receive as dividend an improved paper.

It is proposed to establish a woolen mill at Wiarton.

The directors of the Canadian Woolen Mfg. Co. have passed a by-law increasing their number from three to five.

The old cotton mill premises in Dundas will soon be a busy beehive of industry, but only one of them of a textile character.

The Maple Leaf Woolen Mills Co., of Markham, has secured the services of Mr. Despard, late of the Toronto Carpet Co., as secretary-treasurer.

The works of the Canadian Cordage Mfg. Co., at Peterboro, resumed full operations the middle of last month, when power was furnished for the first time by the Otonabee Power Company.

The Dundas Banner says a car load of machinery has arrived for the felt works which are to be established in the old screw factory in that town by John F. Morley, late general manager of the Canada Woolen Mills, and that they will soon be in full operation.

The capital of the Oxford Woolen Mills at Oxford, N.S., is to be increased from $100,000 to $150,000, to provide for new plant and stone buildings referred to in the last issue of the Journal. Frank Nelles has been appointed the company's agent for the province of Quebec.

The foundation of another large addition is now being laid at the R. Forbes Co.'s woolen mill at Hespeler. The old wooden barn has been removed, and an extensive brick structure to be used as a store house will be built in the spring. It will measure 80 by 120 feet, and will be three stories high.

A meeting of citizens was held at Rapid City, Manitoba, for the purpose of considering a proposition to re-open the woolen mill just outside of that town, which has been closed for a number of years. J. A. Cowan, of Qu'Appelle, is at the head of the scheme. Most of the capital stock of the proposed company has been subscribed.

A few days ago the large elevator in the Canada woolen mills at Hespeler dropped three stories, with Thomas Draplin and E. Burnett on it. Draplin jumped and sustained a concussion of the spine. His companion escaped with a bad shaking up. Willis Brewster, the millwright, was doing some repairs to the elevator in the pit when it fell, and but for a heavy beam lying across the pit he would have been crushed to death. He received a few cuts about the head.

C. Leslie Norton, president of the Albany woolen mills of New York, is making a trip over Ontario, especially those cities in the district covered by the plans of the Niagara Falls Power Company, to which electrical energy will be supplied for manufacturing purposes. His company propose to establish a small branch in Ontario, to manufacture a line of goods for Canadian consumption, which he hopes will develop into something large later on. Some Toronto capital is said to be interested in the movement.

The foundation for a very large addition to Rumpel's felt boot factory, Berlin, has been laid.

The Lace and Braid Co., Toronto Junction, have put in a lighting dynamo at their factory.

Parkin & Somerville, machinists, Hamilton, have been awarded the contract for the elevators to be placed in the new building of the Hmilton Whip Company.

The Union Hat Works, of St. John's, Que., which was recently given a bonus by Brockville, has closed its works at the former town and removed to its new quarters. The formal opening will take place Nov. 21.

J J Turner & Sons have built a handsome new brick building for their tent and awning works at Peterboro. They recently received an order for $500 worth of tents from the Northwest

J E. Heaslip, formerly of Lansdowne, is now employed in the cotton mill at Kingston. Recently in company with the superintendent he went to Lansdowne to try and engage a number of girls and young women to work in the factory, it being difficult to obtain hands in Kingston.

The Truro Knitting Co., Truro, N.S manufacturers of unshrinkable underwear, contemplate adding another wing, though their factory building is six times as large as it was five years ago. Frank Stanfield, one of the company, has been in the United States in connection with the matter.

The Maritime Hat and Cap Co., are establishing a new industry, the making of caps, at Truro, N.S. They have installed an electric motor to drive the sewing machines and other machinery, and expect to have thirty or forty machines in operation shortly. W. P. Walmsley is the projector of this enterprise.

Hamilton is to have a new industry, the Dominion Cotton Belting Co. A brick building, 50 by 150, two stories high, is to be erected. It is promoted by United States capitalists, and will employ 100 hands, with provision for future enlargement. A later report states that the company finds a larger building necessary, and is getting out new plans.

The Bulletin says that T. E. Blake, manager of the Crown Whitewear Company, of Toronto, has been at Collingwood looking into its advantages for the establishment of a factory for the manufacture of whitewear, etc The factory will employ at least 300 women and girls, and if the company can be assured that it will be possible to obtain the requisite female help, Collingwood will have the first call for this industry.

A rumor got abroad recently that Alex. Gibson was about to sell his extensive cotton mill and other industries at Marysville, N.B., to a Nova Scotia syndicate. It turns out to be without foundation. What probably gave rise to the rumor is that Mr. Gibson is contemplating making extensive improvements to his property and issuing preferred stock in order to furnish him with additional capital for the increased expenditure.

Before the Union Hat Works at St. Johns, Que., closed preparatory to removing to Brockville, Edouard Dupuis, engineer, met with a serious accident. He was caught in the belting and hurled with such force against the floor that his chest was pressed in and an arm and collar bone broken.

Hamilton parties have been in correspondence with the carpet firm of E. Hughes, Son & Co., of Kidderminster, England, with a view to getting the firm to establish a branch in Hamilton for supplying the Canadian tapestry carpet trade. Percy Hughes, who represents the firm in Canada, says that if he could get one-fourth of the Canadian trade he could successfully operate a factory employing at least 500 hands.

The Boston Hat Company will engage in the manufacture of hats at Vancouver, B.C., with William Taylor as manager.

The proprietors of the Perth woolen mills, besides making extensive alterations on the interior of the mill, have found it necessary to re-roof the main portion of the building, and are using the best of materials in doing so.

R. A. Sebastian, a horse blanket manufacturer of Toronto, had some trouble with his employees, and when he refused to raise their wages a number of them returned to the factory and ran the water off the boiler so that when the engineer fired up an explosion would result. The plot was discovered in time to prevent such a catastrophe. Not content with this, a number of the dissatisfied employees assaulted a young hand in the factory who refused to leave work with them, and a man who went to the rescue was severely maltreated. The offenders are likely to suffer for their conduct.

Judgment has just been given by Judge MacMahon in the case of the Crompton and Knowles Loom Works vs. Hoffman. The action was tried without a jury at Stratford, and was brought by a company carrying on the business of manufacturing looms and attachments at Worcester, Mass., against J. D. Hoffman, of Stratford, and W. J. Shaver, of Toronto, carrying on business as the Maple Leaf Elastic Webbing Company, to recover $564.65, balance of the price of a loom and attachments sold and delivered to defendants as alleged. The defendants set up that the goods were shipped to them in sections, and that portions had not yet been delivered, that the goods delivered were worthless, and they counter-claimed for damages. The offer of plaintiffs to furnish a loom and the necessary fittings for running the same was contained in a letter which mentioned the various articles and their prices. The defendants accepted the offer by letter, with a variation, not ordering some of the articles mentioned in plaintiffs' letter. Plaintiffs contended that the order for the loom was one contract, and the other items in the offer to plaintiffs, which was accepted by the defendants' order, formed a separate contract, or contracts. Held, that the order formed one entire contract. The terms of the sale were: One-half cash payment, balance in two notes of equal amount; "our customary lien to cover all machinery purchased." The lien agreement was forwarded for defendants to sign, but they did not sign it. Held, upon the evidence, that the machine was mechanically well built, and similar in construction to a number manufactured by plaintiffs, regarding which no complaints were received. Alterations were necessary to make the loom efficient to manufacture elastic webbing. The property in the loom had not passed to defendants, for it was sold subject to the customary lien contract used by plaintiffs, and it remained in their possession, subject to the lien upon which it was sold by plaintiffs. The defendants, notwithstanding the existence of the lien, were entitled to show that the loom was not as warranted, and so reduce plaintiffs' claim by the difference between the value of the loom as warranted and the value as it was shown to be, as evidenced by the cost defendants were put to in remedying the defects found to exist. This cost amounted to $69. Even if defendants were entitled to recover consequential damages, they could not do so while the goods remained the property of plaintiffs. Even if the consequential damages claimed were not too remote the defects in the machine were such as might have been remedied in a few days at the cost of a few dollars, had a competent mechanic been engaged for the purpose. Judgment for plaintiffs for $395.63, with interest from 1st October, 1900, and costs. Counter-claim dismissed with costs.

The Almonte Knitting Co. has put in a 100 lamp electric plant.

Walter H. Parker's shoddy mill at New Toronto is closed. The engine and other machinery, which appears to be owned by his mother, is for sale.

The William Firth Co., Equitable Building, Boston, are making very heavy shipments of roller skins to various mills who do their own roller covering, and to establishments who cover rolls and clearers. These skins are from Joshua Kershaw & Sons, of Stockport, Eng., for whom the Wm. Firth Co. are sole agents in Canada and the United States.

J. P. Murray, of the Toronto Carpet factory, was elected president of the Employers' Protective Association recently formed in Toronto largely as a result of the strike in the carpet factory. When trouble arises with employees about wages, hours, etc., a board of arbitration will investigate, and if the employer has a good case the association will support him, if not he will be advised to make terms. Employees who violate an agreement will be unable to obtain employment from any member of the association.

Alfred Parker has given up his garnetting business at New Toronto, and has joined A. M. Morrison, late manager of the Canada Woolen Mills at Carleton Place, in starting a shoddy mill in the dyehouse of the old cotton mill at Dundas, Ont. The premises are rented from Geo. Reid & Co. The machinery, which consists of three pickers, a garnett machine and cards, is to be operated by electricity from the Cataract Power Co.

Dronsfield Bros., Ltd., Atlas Works, Oldham, Eng., have issued an instructive pamphlet on card grinding and roll covering, the aim being to describe the best present day methods of grinding revolving flat cards, and of covering spinning rollers with cloth and leather. After an experience of half a century in the business this firm may fairly claim authority as an instructor in the business, and the result is a valuable and well illustrated handbook, which, we understand, will be sent free to those interested.

The Dominion cotton mills at Montreal had a strike on their hands a few days ago from a trivial cause. The mill authorities asked for contributions for city hospitals, and later posted up two lists, one of those who contributed, and one of those who did not. The latter was pulled down, and a man named Geo. Page was discharged. The employees got up a petition asking to have Page re-instated and threatened to strike if this was not done. Mr. Cook, the manager, who said Page had only been laid off, and without reference to the incident, tore up the petition and discharged Fred. Reid, whose name headed it.

We are indebted to a *Sherbrooke correspondent for an* interesting sketch of the life of S. R. Platt, of the well known Oldham firm of textile machinery makers. He was a typical Lancastrian—blunt, plain, shrewd and practical, and was known throughout Oldham as "Sam Platt" "He were not what yer would caw exactly an Owdham roughyead, but he were one of us." was the eloquent, if quaint, description given by an Oldhamite, and now he has gone the people of the bustling cotton centre feel that they have lost perhaps their best known public man; certainly one of the largest employers of labor With all the advantages of wealth, a broad, practical training, and an early introduction to the people, the late Mr Platt had unique facilities for occupying a high position in public life But the glamor of publicity, the fascination of politics, the inducement to follow his father as the Parliamentary representative of the town never took hold of him He was a generous friend of technical, as well as general, education, and was a strong financial supporter of the Manchester ship canal.

Lee & Taylor have added another shoddy carder to their plant.

The Perth Woolen Mill, at Perth, Ont., has changed from cassimeres, tweeds and flannels to felts, and is running full time

The Canada and Stormont mills of the Canadian Colored Cotton Mills Co., Cornwall, are running full time. The former has installed 44 cards, new drawing frames, and two spinning frames.

An eastern man is willing to purchase or rent a woolen mill in Manitoba or the Northwest, provided reasonable terms can be arranged. The parties can be put into communication through the Canadian Journal of Fabrics.

The Mississippi Woolen Mill, Appleton, Ont., has installed a new English napper. W. H. Boyle is its superintendent. This mill manufactures cheviot suitings, trouserings, overcoatings and fine dress goods, homespuns, traveling rugs, Pullman rugs and fleece wool blankets. It was closed for two weeks for repairs, but is again in full operation.

The following is the position of the print works at Magog, according to the statement made by A. B. Mole, the general manager, on the occasion of the recent visit of Hon. J. I. Tarte: The mills at Magog were built in 1884, and were enlarged in 1898. The cotton mill has 50,000 spindles and 1,234 looms. It uses 6,000 bales of cotton per year, and produces 13,000,000 yards of cloth, not including 5,560,000 yards of goods printed from outside mills, making a total product of 18,500,000 yards. The number of hands employed is 1,000, and the average wage in the print works, including men, women and children, is $6.90 per week. The capital invested is $2,000,000, and the coal consumed is 10,000 tons per annum. Incidentally it may be mentioned that of the 324 shareholders, no less than 117 are women and children. Those in charge at Magog are Messrs. A. B. Mole, general manager; J. H. Hindle, superintendent print works, and Geo. H. Wilson, superintendent cotton mills.

Readers of the Journal will remember the Saxe case, which came before the courts in Montreal last May. It has again been up and the grand jury has returned a true bill against Henry Saxe and David Levy on a charge of conspiracy. A similar bill was returned in May, since which time Henry Saxe has been in jail awaiting trial, and under capias proceedings as well. The charges against Saxe and Levy are the result of the methods they adopted to raise money on the eve of their insolvency. Saxe, it will be remembered, was sentenced to imprisonment under the capias proceedings. He is still in jail, but Levy is on bail. The case is in the hands of the Crown, but the inspectors have appointed a lawyer to watch their interests.

The following additional facts respecting Breslin Bros., shirt manufacturers, Toronto, whose collapse we noted last month, will be of interest. They began manufacturing shirts in 1887. Previous to that time they had been clerks for The T. Eaton Co., and the firm of Alexander & Anderson. Less than a year ago, a signed statement of their affairs was submitted to the trade in which their assets were stated to be $12,662.56, and their liabilities, $8,849.53. Finding themselves financially embarrassed, they recently sold out to Simonsky for $3,300, which is considered by creditors to be about one third of the amount they should have sold for The Breslins have left for parts unknown, and it has been ascertained that they owe about $20,000. At a creditors' meeting, the wife of one of the firm attended and talked of the honesty of purpose which had always characterized their business dealing An offer of compromise was made and refused by creditors

Personal

F. J. Lander, manager of the Dominion Carpet Company, Sherbrooke, has gone to England on a visit.

J. M. Masson, of Lowell, Mass., for some years a citizen of Carleton Place, and engaged in the woolen industry, has been on a visit to his old home there.

Arthur Everitt, formerly a prominent dry goods merchant of St. John, N.B., and recently a customs appraiser, died suddenly in that city.

Robt. H. Dowler, on the occasion of his removal from Guelph to St. Thomas to conduct a dry goods business, entertained the members of St. Patrick's Society and a few invited guests to dinner.

A. B. Craig, a London woolen merchant and investor, has been on a visit to Canada for the first time, investigating, with four other capitalists, the Sturgeon Falls Pulp Works, of which they are the proprietors.

H. T. Ballard, formerly of Toronto, now representing the McMichael & Wildman Mfg. Co., of Norristown, Pa., manufacturers of circular rib knitting machinery, paid a visit to his family and friends in Toronto, recently.

Archibald Webster, who died recently at Preston, Ont., after an illness of nearly three years, came to Canada from Paisley, Scotland, when about 28 years of age, and settled in Galt, where he worked in James Thompson's woolen mill for six years. Then he moved to Preston, where he followed his occupation as boss dyer in the woolen mill, which position he fielld until a year ago last August, when he was forced through ill-health to resign, much to the regret of Mr. Pattinson, who entertained a high opinion of his ability.

John Moodie, who died at Hamilton, Ont., October 19th, founded, along with his two sons, J. R. and John, the Eagle Knitting Company. The knitting business proved a paying venture. About eight years ago he retired, and his sons continued the knitting factory, which is now conducted by J. R. Moodie. He was also one of the founders and original directors of the Cataract Power Company, and at the time of his death was one of the large shareholders in the various enterprises connected with the Cataract Power Company, and till recently its treasurer.

James Lockhart, of the firm of James Lockhart & Sons, manufacturers' agents, Toronto, died somewhat suddenly on November 4th. Mr. Lockhart was for years head of the firm of Lockhart, Millichamp & Co., Toronto, one of the leading commission houses representing Canadian woolens, and sold the products of many of the best mills in the country, notably in the blanket and flannel line. On the dissolution of this partnership the business was carried on as James Lockhart, Son & Co., but failing health forced Mr. Lockhart into retirement. Mr. Lockhart was always a strong advocate of the interests of Canadian woolen manufacturers. He was father of Reginald Lockhart, sales agent for Toronto district for the Paton Mfg. Co.'s woolen mills of Sherbrooke.

Godfrey Bird, representative of John Crossley, Sons & Co., carpet manufacturers of Halifax, England, was instantly killed on the morning of Thanksgiving Day by falling a distance of 80 feet from the upper story window of the Rossin House, Toronto. Whether his fall was an accident or deliberate is not known. Mr. Bird had charge of the Crossley's business in Canada. He made his first trip here in 1872, and has been in Canada every year since. The firm's customers in Toronto include the T. Eaton Company and John Kay, Sons & Co. In company with Victor Buetell and Arthur Mannison, also travellers for the carpet company, he arrived in Toronto a few days before his death. He was not well, and had arranged to go to England on the Parisian which, as it turned out, took his body thither for interment.

Thos. Dunnet, for many years in the wholesale dry goods trade, but latterly retired, died at Toronto, October 25th, aged 54 years. He was born in Wick, Scotland, and came to Canada in 1866. He taught the Barriefield school, adjoining Kingston, and afterwards became purser on one of the R. & O. steamers. In 1880, Mr. Dunnet came to Toronto, and in partnership with Mr. Briggs began the business of hat and fur manufacturers. Mr. Briggs retired in 1886, and next year Malcolm McPherson was taken as a partner. At the time of the Osgoodby fire, Mr. Dunnet was completely burned out, but soon opened the business of Dunnet, Crean & Co., retiring about three years ago from active business. Mr. Dunnet was a warm-hearted, energetic, impulsive Scotchman, who did much for his countrymen in the Old Land, as well as here.

—The new Hewson woolen mill at Amherst, N.S., is almost ready for the machinery which Mr. Hewson has been purchasing in the United States.

—John McFadden has resigned as finisher at the Canada Woolen Mill, Carleton Place. He had been at the Hespeler mill and the Paton mill at Sherbrooke. Wm. Fairgrieve succeeds him.

—A False Sign.—"Satan Died Here." is the sign hanging before an establishment in Topeka. But old Beelzebub is not dead. The proprietor was trying to say, "Satin Dyed Here."

—The carding at the Gillies and Hawthorne woolen mills, Carleton Place, is under the superintendence of T. E. Ainley, late instructor at the Lowell textile school. Wm. Sampson is the new overseer of weaving at the Hawthorne mill.

—Hamilton is likely to have a new knitting factory in addition to the Eagle and the Chipman-Holton Co. already there. An offer has been made for the building which the Howell Lithographing Company is about to vacate, either to purchase or to lease for ten years. The line of knitting to be undertaken will be different from the product of either of the present knitting factories.

There is a prospect of the Ker & Harcourt bobbin factory being removed from Parry Sound to Owen Sound. Mr. Harcourt has been in the latter town, and interviewed the Mayor and several prominent citizens towards moving, if he can get enough encouragement to do so. The reasons given are the high price at which property is held, the impossibility of obtaining comfortable houses to rent at a fair rental, and the very heavy freight charges.

—Warden Henry Wolfer, of the Minnesota State Prison Stillwater, has preferred charges against a number of merchants in Minnesota for selling prison binder twine at higher prices than permitted by the law of Minnesota. Under the law a dealer may sell the prison product at a profit of one cent per pound—no more, and for a violation may be fined from $25 to $300. It seems a very peculiar law

TWO CHAPTERS IN THE HISTORY OF AN INDUSTRY

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The art of dyeing began with the first attempts of men to ornament their bodies by staining them with the juices of plants and the few minerals of striking colors which were easily obtained and did not require much skill in preparation. The North American Indians painted themselves with yellow and red ochres, while some of our ancestors in the British Isles stained their bodies with woad, the blue coloring matter formerly used in place of indigo. Doubtless, as soon as men began to wear clothes "capable of artistic treatment," these colors were transferred from the natural covering to the fabrics. It is not astonishing, then, to find that the craftsmen of the capital of Phœnicia were famous for their magnificent dyes—the Tyrian purples—fourteen or fifteen centuries before the Christian era. But while this art is interesting from its great antiquity and from the frequent references to it in the most ancient literatures, it also attracts attention on account of its intimate connection with the development of many of the sciences. Like other arts, it was at first purely empirical, its advances were mostly by accidental discoveries—jealously guarded as trade secrets by the guilds, and progress which might have been made by the aid of the developing sciences was hindered by the ignorance and the prejudice of the artisans or by the indifference of the learned to the bearing of their studies and investigations upon the lowlier life around them. The two chapters referred to in the title relate instances of what can be done by a people who have bridged over this chasm between the student and the artisan.

The improvements in the manufacture of dyes have in the remoter past been mostly in the purification of the natural material from those substances which sullied the purity of the color, or rendered the dye more difficult to fix upon the fabric. Later began attempts to isolate the "active principles" of the vegetable and animal dyes, i.e., the particular chemical compounds which give the colors to the dyes. When success crowned such efforts, the final stage of improvement was entered upon, viz., to replace by laboratory methods the natural processes by which these active principles of dyes are produced in plants and animals. This last stage became possible only when organic chemistry had begun its wonderful career of synthesis. The chemical molecular theory has pointed the way to discoveries which have revolutionized the art. The revolution, while bloodless, has not been unaccompanied by those distresses which are incidental to the more rapid changes in industries; and just now it has brought India and Great Britain face to face with an economic problem of no small importance, viz., the almost certain loss of the trade in indigo, and the probable loss of a large part of the dyeing industry depending on that trade. This chapter is not yet complete, and it will be interesting to follow out first one which has been finished, viz., the history of the madder dye.

Madder is the dried and crushed roots of Rubia Tinctorum and related species. It has been used for thousands of years The fine linen cloth found on Egyptian mummies has in some cases been dyed with madder; and so fast is this color that these ancient fabrics still show it distinctly. It was the ereuthedknon used for dyeing the cloaks of the Libian women in the days of Herodotus.* and the ereuthrodknon of Dioscorides, in whose lifetime the plant was cultivated in Caria. But it is probable that the original source of this, the fastest and, except the purple of Tyre, the most beautiful of ancient dyestuffs, was in the mountainous districts of India, where Rubia Munjista grows wild. Its use was brought westward by the migrations of the Aryan races, and several European species of the plant were found to yield the dye. Among these, Rubia Tinctorum was found to be best, and came to be cultivated exclusively It has been grown extensively in France, Holland and Italy, and to some extent in the United States. Rubia Peregrina, or Alizari, was the species cultivated in the Levant; and the root (Turkey roots) was formerly imported into England in large quantities. This dye was thus evidently very widely used, even in early times; and later it came to be so extensively used for red, pink, purple, lilac and chocolate dyeing, that it was considered by far the most important material of the dyer's art. In 1828 Daniel Kœchlin-Schouch writes, "Of all the dye-materials in general use, none exceeds in importance madder, which has become the basis of almost all our dyes." Crookes, quoting this in his Hand-book of Dyeing and Calico Printing, adds, "These words are scarcely out of date, even at the present day" (1874). In 1900 we find this statement in Sadtler's Industrial Organic Chemistry, "The importance of madder, and madder preparations, has almost entirely disappeared with the development of the artificial alizarin manufacture." Thus, during the last quarter of the nineteenth century, this great industry which gave profitable employment to whole districts in Europe and Asia, was replaced by manufactures of a purely chemical nature. To trace the course of events which led to this remarkable result it will be necessary to go back to the beginning of last century, when the finest madder was that grown in the calcareous soil (palus) around Avignon, (where its cultivation had been introduced by Colbert); that cultivated in Alsace being much inferior in quality, the difference being due to the lack of lime in the Alsatian soil. In Ure's Dictionary of Arts and Manufactures is an account of one of the first steps towards an understanding of the madder dyes "Before the time of Haussmann, an apothecary of Colmar, the madder bath was subject to many risks, which that skilful chemist taught dyers how to guard against, by introducing a certain quantity of chalk into the bath. A change of residence led Haussmann to this fortunate result. After having made very fine reds at Rouen, he encountered the greatest obstacles in dyeing the same reds at Logelbach near Colmar, where he went to live. Numerous trials, undertaken with the view of obtaining the same success in his new establishment, proved that the cause of his favorable results at Rouen existed in the water, which contained carbonate of lime in solution, while the water of Logelbach was nearly pure. He then tried a factitious calcareous water by adding chalk to his dye bath. Having obtained the most satisfactory results, he was not long of producing as beautiful and as solid reds as he had done at Rouen. This practice soon became general among the calico-printers of Alsace, though in many dye works the chalk is now replaced by lime, potash or soda. But when the madder of Avignon is used, all these antacid correctives become unnecessary, because it contains a sufficient quantity of carbonate of lime; an important fact first analytically demonstrated by that accurate chemist, M. Henri Schlumberger of Mulhausen or Mulhouse. Avignon madder indicates the presence of carbonate of lime by effervescing with dilute acids, which Alsace madder does not." M. Haussmann's name would indicate that he, too, had come from that fusion of Gaul and Teuton on the banks of the Rhine, and that he was returning to the home of his fathers when he made the long journey across France, from Rouen to Logelbach in Alsace. Not far

* Book IV., Chap. 189.—The passage is as follows, "The vestments and the ægis characteristic of the statues of Athene were borrowed by the Greeks from the Libyan women. The only difference is that the robes of the latter were made of leather, and with them the tassels of the ægis are not snakes but straps. In all other respects the style of garb is identical. Indeed the very name betrays the Libyan origin of the equipment of the statues of Pallas. The Libyan women wear over their dress bare goat-skins (aigeai) with tassels dyed with madder, and it is from these goat-skins that the Greeks have derived the word ægis."

from the place where he settled was this same Mulhausen, famous then, as now, for its enterprise in arts and manufactures. Here was the Societe Industrielle, which in 1826 offered large prizes for the best analytical investigations of madder. The existence of this enterprising Societe in France was the natural outcome of the appointment by the French Government of a succession of eminent chemists, men of the first rank, like Macquer and Berthollet, to superintend the arts and manufactures, and particularly to improve the art of dyeing. The various competitions for the prizes offered by the Mulhausen Societe led finally to the discovery by Robiquet in 1827 of alizarin, the most valuable of the coloring substances of madder. The same investigator showed that the carbonate of lime, which rendered the Avignon madder so much superior to that from other districts, acted by combining with the inferior dyeing principles so as to prevent their precipitation in the fibres of the fabric. Attempts were next made to prepare from the madder root as nearly pure alizarin as possible. After many failures, Robiquet and Persoz succeeded in making a material of such constant dyeing power that it came largely into use, and in 1864 it was used about equally with madder. In the preparation of this impure alizarin, a solution of sugar was obtained which yielded on fermentation enough alcohol (which, the writers of that time are careful to tell us, was not potable) to pay the cost of the whole process.

It was in the middle years of the century that the classical researches of Gerhardt, Laurent, Williamson, Frankland, Kolbe, Wurz and Kekule on the molecular constitution of carbon compounds led to a general activity in enquiries of this kind. One by one were solved problems about the probable arrangements of the atoms in the molecules of complicated compounds. Dalton's vivid conception of atoms as real things was expanded at this time into a theory which, in the hands of these masters and of those who succeeded them, guided research with a certainty hitherto unknown and truly marvellous in results. It was a happy combination of the spirit of research with practical knowledge of the industrial applications of chemistry which now led Bronner, Graebe and Liebermann to the discovery of the molecular constitution of alizarin and very soon after to a practicable method of synthesizing it from a substance present in coal tar.

In 1868 Graebe and Liebermann noticed that pure alizarin could easily be converted into anthracene, a substance then known to be present in coal tar to the extent of about one part in one thousand. In January, 1869, they succeeded in reversing the process, and anthracene was converted into alizarin, which was found to be identical with the natural compound, and to dye all the colors obtainable from it. The colors were also purer and the process of dyeing more certain than when madder or any of its preparations was used. This was the first instance of the artificial production of a vegetable coloring matter.

It will be interesting at this point to note the course of events in Great Britain in connection with madder dyeing. Presumably she was especially interested in the art, as, according to Dr. Ure, "Alumed wool takes, in the madder bath, a red color, which is not so bright as the cochineal, but is faster; and as it is far cheaper, it is much used in England to dye soldier's cloth." To which he adds, "The Turkey-red dye of Monteith & Co., of Glasgow, is celebrated all over the world" In 1662 the Royal Society asked Mr Haak to translate Pli tho del Arte dei Tintori by Giovanni Ventura Rosetti (1548), and on the same day (April 30th). Sir William Petty laid before the society "An Appendix to the History of the Common Practices of Dyeing" Boyle, Hooke and others, followed up with contributions, one investigator (Hooke) even showing the society specimens of cloth dyed in a new way by himself. But for a century and a half after this no important scientific investigation seems to have been made to improve the arts of dyeing and calico-printing in England, the men of science of that time being perhaps discouraged by the lack of connection between their work and that of the dyers. Early in the nineteenth century, Watt and Higgins investigated the coloring principles of madder, but the chemists of Great Britain seem to have contributed little, either to the improvement of the natural dyeing material, or to the researches which led immediately to the synthesis of alizarin. Immediately after the publication by Graebe and Liebermann of their remarkable and important discovery, they pushed on to devise a cheaper method, which might be applied commercially. W. H. Perkin, sr., the English pioneer in the production of coal tar colors, engaged in a similar research. The field reached the goal almost simultaneously. Perkin's application for a patent in England was one day behind that of Graebe, Liebermann and Caro. Curiously enough, according to the German patent laws the process could not be patented in Germany, as the discovery had been published. Thus, while the manufacture of alizarin was free in that country, in England where nearly all the raw material, anthracene, was produced, alizarin could be manufactured only under the patents.

The importance of this discovery can be estimated when it is known that before 1869 the yearly crop of madder roots was about 70,000 tons, worth about $15,500,000. Of this, Great Britain consumed about one-third. In 1883 madder was no longer grown (Journal of the Society of Chemical Industry, Vol. II., p. 214). In 1882 Germany manufactured $9,000,000 worth of alizarin, only $1,000,000 worth being produced in other countries. The raw material, anthracene, still came almost altogether from England, but the production of anthracene in Germany was increasing, and manufactures of chemicals used in the alizarin process had been built up to the annual value of about $2,500,000. At first the chromates required were imported altogether from Scotland, but in 1882 Germany was producing her own supply, of an annual value of about $2,500,000. At first the chromates required were imported altogether from Scotland, but in 1882 Germany was producing her own supply, of an annual value of $500,000. Thus the discovery of Graebe and Liebermann concentrated in Germany in a few years the lion's share of an industry from which France, Turkey, Italy, Holland and India had long been drawing large revenues.

Indigo is another dye the use of which goes back to the beginnings of civilization. As its name shows (the indichon (Greek) of Dioscorides and the indicum* of Pliny) it comes from India, where the best indigo is still procured from various species of Indigofera. But the dye has also been long used in China; and in some districts (Chin Kiang, for example) the plant is cultivated by each farmer as part of his yearly crop, very much in the way in which the habitants of Quebec grow tobacco. The dye is manufactured and used for dyeing the family's cottons. Any surplus is put upon the market for sale. There is an odd superstition connected with the extraction of the dye in this Chinese province. The women constantly wear flowers in their hair, and while the

*Natural History, xxxiii., 1367 and xxxv., 626. The passages are as follows, "Indigo (Indichon) is a kind of sky-blue dyestuff not very long imported for the first time from India; the use of which in painting is for insertions, that is, to divide the shades from the light. There is another kind of indigo, older and better known to the Romans and more expensive, coming from the same place in clay adhering to the pith of reeds. When it is rubbed, it is black, but on dissolving, strange to say it becomes a mixture of purple and sky blue. There is another kind in the purple factories, floating in the caldrons, and it is the foam of the purple. . . . . Those who adulterate it color the dung of doves or Selinusian chalk with the true indigo; or they steep in woad a white preparation made from chalk. It is tested on charcoal; for it affords, when it is genuine, a fine flame of purple, and, while it smokes, the smell of the sea."

indigo is being extracted, no woman adorned in this way is allowed to come near, as it is believed that the quality of the dye might be injured by their presence.

The ancient Egyptians used indigo dyes, and the negroes of West Africa extract the dye by a process very similar to that in use in India and China. In Europe, blue dye was formerly made from the woad plant (Isatis Tinctoria); and the blue compound is identical with that extracted from the indigo plant. Woad dyeing was, however, much more difficult than the art as practised with indigo. When the Cape route to India was discovered, indigo was introduced into Europe. There was an outcry from the woad planters and dyers, and prohibitory legislation was enacted—with the usual results. The dyers' foreman of Nuremburg had to make oath before the syndic of the town not to use indigo. But when the town was taken by the French in 1798 many tons of the forbidden dyestuff were found there. Indigo made its way, and the indigo vat came to be an essential part of the dyer's outfit.

In later times indigo planting has centred in certain provinces of British India. In 1877-78, there were under cultivation in the provinces of Madras, Bombay, Scinde, Punjab and British Burmah 254,700 acres; and indigo was then spoken of as the foremost staple produced by European capital. The exports of indigo from India amounted in 1878-79 to 105,051 cwt., of the value of £2,960,463. In 1891 the output for the whole world was about 200,000 cwt., of the value of about £4,500,000. These figures indicate sufficiently the magnitude of the prize for which the chemist was tempted to compete. The problem has proved to be a much more difficult and complex one than the artificial production of alizarin. The first step was taken as far back as 1826, when Unverdorben found, among the products of the destructive distillation of indigo, aniline (indigo was called anil by the Portuguese), which is interesting as the substance from which the first of the coal tar dyes was manufactured. But no certain knowledge of the chemical constitution of indigo was obtained until half a century later, when Professor Bæyer of Munich began a remarkable series of researches, the results of which were the complete elucidation of the chemical character of indigo, and the discovery of several processes by which it could be made from coal tar products. Bæyer began his investigation of indigo in 1865. His first practicable synthesis of indigo was made in 1880. In 1882, in a letter to Professor Roscoe, he writes: "The manufacture of artificial indigo depends on the preparation of ortho-nitrophenyl-propiolic acid—a body known in commerce by the shorter name of propiolic acid. . . . The manufacture on a large scale has, however, been surrounded by many serious practical difficulties, but these have been overcome by the chemists of the Baden Aniline and Soda Works in a manner which constitutes an era in the history of color manufacture. Propiolic acid is at this moment made at Ludwigshafen with the same degree of certainty as is attached to the preparation of any inorganic compound. . . . Artificial indigo is not itself manufactured in the works, the coloring matter being deposited by the printer himself in the fibre of the cloth from propiolic acid. . . . It is found to be fast, and exhibits the characteristic tints of indigo in both light and dark shades. . . . On my visit to Ludwigshafen last November, I found the manufacture of indigo in full activity, 200 kilos* of propiolic paste, containing 25 per cent. of the dry acid, were produced every day, and this is sold at the price of 10s. the kilo."

Professor Roscoe adds: "It appears that the consumption of propiolic acid is at present limited to a few print works whose chemists have successfully overcome the difficulties of its application. Let us hope that the great majority of English calico printers will soon follow in the wake of the pioneers." (Journal of the Society of Chemical Industry, 1882, p. 17).

It is a significant fact that our enterprising "alizarin" friends at Mulhouse were the principal users of artificial indigo in 1885. In this year Perkin in his presidential address before the Society of Chemical Industry, said: "Hitherto this artificial formation of indigo has not met with much practical success. This does not arise from difficulties in its manufacture, but from its cost compared with natural indigo, which is a very cheap dyestuff."

Many of the works chemists in Germany were now engaged in indigo research, and it would seem that Professor Bæyer, seeing that this stage was reached, left the completion of his brilliant work to those who could devote their whole time and energies to the one problem. In 1890 Heumann and Lederer discovered a new and simple synthesis of indigo, which seemed very promising; and since that time Heumann has been an active and successful investigator in this field. Since 1891, when the Baden Company patented the process which uses phenyl-glycocoll ortho-carboxylic acid, investigators have turned their attention principally to the manufacture of this and the simpler compound anthranilic acid, both of which have served for the synthesis; and the method at present mostly in use is a modification of that discovered in 1891. Naphthalene (from coal tar, etc.), is the starting point; and the intermediate steps are phthalic acid, phthalimide, anthranilic acid, and phenyl-glycocoll-ortho-carboxylic acid, the latter yielding indigo when heated with an alkali.

Natural indigo is being rapidly replaced by the artificial color, and the German manufacturers are confident of displacing it completely. The course of events in England in the meantime can be best described in the words of several recent writers there. "This country has a two-fold interest in this question. In the first place we are the principal producers of natural indigo, the annual output of which represents a value of about four millions sterling; and, secondly, we are one of the largest, if not the largest, consumers of this coloring matter." (Levinstein, Journal of the Society of Chemical Industry, 1893, p. 907). In the same year (p. 989) Watson Smith, in referring to a new synthesis made in the works of Kalle & Co., Biebrich, writes: "It has been stated that now would probably commence the death blow to the natural indigo, upon which so much of our Indian revenue depends. But may I with all diffidence point out that while from Germany comes this practical threat, from Germany also comes much consolation and encouragement in the shape of new, powerful and cheap antiseptics, and the best ways of employing them in the vats in which the indigo is extracted. Our hitherto rule of thumb and wasteful methods have largely ignored excesses of fermentation, whereby indigo once formed is further destroyed again in those vats. Who therefore can predict what our total yields of the natural product may yet be increased to, through the adoption of thoroughly scientific methods, both in growth and extraction, and consequently what price our Indian planters and makers can yet afford to accept under such improved conditions?"

This seems a startling commentary on the attitude of the British manufacturer towards scientific competition! The hope of India and of the British dyer is in improvements originating in Germany and to be worked out and adopted by a people who have already let the aniline dye trade slip through their fingers! Serious competition between natural and synthetic indigo began in 1897. The following figures, quoted

*About 220 lbs. The price quoted is rather higher than that for natural indigo, which, however, contains about 70 per cent. of the coloring matter.

from a paper by Dr. J. M. Matthews, show the course of events since that date:

Imports of natural indigo to Germany first six months of 1899, 1,771,805 lbs.; first six months of 1900, 961,837 lbs. Showing a decrease of about 45 per cent.

Exports of synthetic indigo from Germany first six months of 1899, 1,191,700 lbs.; first six months of 1900, 2,085,447 lbs. Showing an increase of about 75 per cent. Of the amount of synthetic indigo exported from Germany during the first six months of 1900, the United States took 695,149 lbs.

Imports of natural indigo to England in 1899, 5,897,700 lbs.; value, $4,930,450; in 1900, 3,351,800 lbs.; value, $2,610,445. Showing a decrease of about 40 per cent. in one year.

According to a recent publication of the Indian Government, the exports of indigo from the provinces of Calcutta and Madras have been as follows: 1895-1896, 17,242,000 lbs.; 1899-1900, 9,777,900 lbs. Showing a decrease of about 43 per cent.

"These figures are very significant in their meaning. We can but behold in them the rapid extinction of the natural indigo industry, which forms one of the bulwarks of eastern trade and commercial activity. It is the case of the madder root versus synthetic alizarin over again, and we can have no doubt as to the outcome of the strife. It is merely one more step in the progress of industrial chemistry, and this problem having been solved, the time is ripe for the development of other fields." (Journal of the Society of Chemical Industry, 1901, p. 555).

TECHNICAL EDUCATION.

(Continued from October number).

The apothecaries, who formed an organized guild, considered it advisable about 250 years ago to erect chemical laboratories which gradually grew into chemical works. Laboratories for instructional purposes are of much later date; these laboratories were for the manufacture of drugs. The large consumption of sulphuric acid and alkalies caused the erection of works specially for these chemicals and these must be considered the foundation of the chemical industries of to-day. Britain was able for a long time to compete successfully with Germany and on account of cheap raw material, coal, and cheap conditions of transport, could even undersell her in her own market. The main factor in Germany's pre-eminence at the present time is her technical education.

Some idea of the magnitude of the German chemical industry is gained when it is learned that in 1897 the production was worth between 235 and 240 million dollars. It may be well to examine a few of these chemical industries somewhat in detail.

Liebig in 1840 published some of the results of an investigation upon the application of chemistry to agriculture. He proved that the growth of plants removes certain salts from the soil which becomes thereby impoverished. An acre of potatoes requires for example 90 lbs. of potash salts, an acre of beet roots requires 150 lbs. This work of Liebig's had wide reaching results. It showed why wood ash and the refuse of beets and wool are valuable manures, the reason being that they contain potash which came from the soil and must be returned to it. It had great influence in developing the salt mines of Germany. Some of these mines had been worked for the common salt in them, other salts being thrown away as useless. In 1860 Prussia began to mine potash salts. Afterwards Anhalt followed and the total value of the product between 1860 and 1890 was over sixty million dollars. The raw salts were used for the production of a number of compounds and the value of these obtained from the Starsfurth mines in Prussia was in 1898 between seven and eight million dollars.

The discovery of Liebig was of great importance to agriculture in general and it is altogether doubtful whether the beet sugar industry could have reached to anything like its present position had Liebig's work been undone. The beet sugar industry is one of immense magnitude, and of late years has grown enormously. In 1877-78 the amount of raw sugar produced from beets in Germany was 378,000 tons; in 1898-99 it was 1,700,000 tons. In 1840 the percentage of sugar yielded by the beets was less than six, now it is as much as thirteen. This increase in the percentage of sugar yielded is due in part to improvement in the beets themselves and in part to improved chemical methods employed in its extraction.

The Badische Anilin und Soda Fabrik is the largest chemical works in the world. It has over a hundred chemists, graduates of universities or technical high schools. Many of these chemists are engaged entirely in research work. Year after year is spent in endeavors to discover some new compound of value or to render commercial some process for the manufacture of a substance already known. More than seventy years ago a process was patented in England for making sulphuric acid by the union of sulphur dioxide and the oxygen of the air. But many practical difficulties lay in the way, the process was not commercially successful and sulphuric acid has been made by a process theoretically not so simple but more easily carried out. But as the result of very diligent and persevering work carried on largely in the Badische Anilin und Soda Fabrik the process has within very recent years been made industrially successful. Sulphuric acid is a very important substance employed in a large number of industries, among which may be mentioned the manufacture of gun-cotton, nitro-glycerine and many dyes and an improvement in its manufacture is of immense value. The dyeing industry is one in which the value of technical training in chemistry is shown pre-eminently. The first aniline dyes were made in England, but the English allowed their industry to pass to Germany. In this latter country scores and hundreds of trained chemists engaged in research, thousands of different dyes have been manufactured, and England has had the humiliation of supplying to Germany large quantities of coal tar, the raw material from which aniline dyes are made, and of importing the dyes as the finished product.

These artificial dyes were additional to the natural dyes which still continued in use. One of these natural dyes was alizarin obtained from the madder root. One of the most important colors produced by alizarin is scarlet, and Napoleon encouraged the growing of madder root in France by introducing red as the color of the trousers of the French infantry. But in 1868 Graebe and Liebermann prepared alizarin artificially and artificial alizarin can be prepared more cheaply than natural alizarin. France gave up her madder root industry estimated as worth over eight million dollars yearly and though the French infantry still wear red yet by the irony of fate France is not benefited thereby, but Germany.

Artificial indigo has been known for a considerable length of time, more than twenty years. But the processes were costly and natural indigo held its ground. Continuous research has been carried on however, and finally the artificial product is made as cheaply as the natural. There was a prejudice against artificial indigo, which was said not to be so good as the natural product. But since 1898 the Bavarian

Government has been using cloth dyed with artificial indigo for military uniforms, and the verdict is in its favor as compared with the natural indigo. Germany instead of importing indigo has begun to export it, and India, in which the indigo plants have largely been cultivated, is falling off in its production. In Bengal the area cultivated in 1899 was 33,000 acres less than in 1898, and the price of natural indigo has fallen about 20 per cent. The patents for the artificial production of indigo are in the hands of the Badische Anilin und Soda Fabrik. It is stated that in this works five million dollars has been expended in the endeavor to establish the manufacture of indigo on a commercial basis. An investigation such as has been carried on there would probably be possible in no other country, no other country having the trained men available.

Numerous other examples might be given illustrating the effect of Germany's extended technical education upon her chemical industries, but I desire not to make this article too long.

MOTORS.

The operation of motors from alternative circuits is the most fruitful source of variations, both in the quantity and the character of current, and consequently the selection of motors and their methods of operation are of importance to central station managers and other distributors of alternating currents.

Alternating current motors may be divided into two general classes, synchronous motors and induction motors. These two types are quite different in their principle of action, and are adapted to different uses.

ROTARY CONVERTERS.

Practically all that has been said concerning the effects of synchronous motors on regulation also applies to rotary converters, since these machines start and run as synchronous motors. The rotary converter has virtually no armature reaction, the different currents in the armature being distributed in such a manner as not to appreciably affect the field. They can consequently be operated at all loads with fixed excitation and practically without idle current. Like the synchronous motor, the rotary converter is capable of raising the voltage at its alternating terminals when its field is strengthened under suitable conditions. By this means the effect of compounding can be obtained when the direct current from the rotary converter is carried through a series field winding. To obtain such an effect, however, there must be a suitable amount of reactance somewhere in the circuit.

SELECTION OF INDUCTION MOTORS.

When an induction motor is purchased the manufacturer should be informed as to the starting torque required, and as to the conditions of load, speed and voltage under which the machine is to operate. He should in turn inform the purchaser as to the starting current and its power factor; he should also give the efficiency at all loads. If the speed is to be variable, the torque, efficiency and power factors obtainable at different loads and different speeds should be carefully studied with due regard to the effects which the motor will produce on the circuit from which it is to be operated. Good power factor can be obtained in an induction motor by using a very small clearance between armature and field; this is obviously undesirable. The practice of many purchasers has been to consider price alone in purchasing induction motors; this must in many cases lead to very uneconomical results.

INDUCTION MOTORS.

There are several types of motors of this class in use having different methods of start and control. When an induction motor is to be connected to a distributing circuit it is important both to persons selling the current and to those buying it that the motor be in all respects as well adapted to the work as possible. The results obtained from different induction motors are widely different, and different types are suited to different purposes. We will not attempt to explain the peculiarities and possibilities of the different types, but will simply state some of the distinguishing features and explain some of the matters which should be investigated when induction motors are purchased. The service to which induction motors are best adapted is operation at constant speed at or near full load. Under this condition their power factor and efficiency is best, and there are no fluctuations which may have bad effects on regulation at the lamps.

This condition is, however, seldom met and in practice we find that the actual power used on a circuit is generally less than half the capacity of the motors connected. It is also often necessary to stop and start motors frequently and with various loads, and it is also often desirable to operate motors at variable speeds. These different kinds of service make desirable various forms of design for different cases.

STARTING.

There are wide differences in the starting properties of different induction motors. Some motors start with full load current and full load torque, while others sold for similar purposes require three times full load current in starting under similar conditions, these large starting currents are always highly inductive and have very bad effects on regulation. It is often possible to start an induction motor with a torque much below that required at full load; in such cases the starting current can generally be reduced by lowering the voltage at starting or by inserting armature resistance. With the same windings, resistances and voltages, the first rush of starting current will be the same, whether the motor is opposed or not.

STEP UP AND STEP DOWN TRANSFORMERS.

The fact that very high electrical pressures may be unsafe and inconvenient, both in generators and distributing circuits, makes the use of these transformers sometimes necessary where power is to be transmitted long distances. There is no difficulty in building transformers that will stand very high pressures, and will transform them in any desired ratio. Since the efficiency of transformation is little less at high pressures than at low, we see that practically the only limit to the distance to which energy can be economically transmitted is the limit of potential difference to which transformers can be adapted and for which lines can be insulated.

It must always be borne in mind that with periodic currents the pressure shown by the voltmeter is the square root of the mean square of the potential differences, and the maximum strain to which insulation is subjected is equal, with simple periodic currents, to this voltmeter reading multiplied by 1.414. We cannot say just what the practical limits of

dynamo and transformer pressures are, but present practice seems to indicate that 10,000 volts mean is about as high as is ever desirable in a dynamo, while lines and transformers have been successfully worked with pressures of 20,000 and 30,000 volts.

In making the wiring determinations for any installation we naturally must assume the conditions which will exist at maximum load when loss is greatest. The transformers on distributing lines at times of maximum load are not, on the average, fully loaded, which fact increases the lag angle of the circuit and reduces its power factor. With step up and step down transformers the case is different, since they can be proportioned so that they are fully loaded at times of maximum load, these transformers are generally of large size and modern design; consequently the losses they introduce are relatively small.

PERSIAN RUG EFFECTS.

Remarkably fine high-art effects can now be obtained in specially woven rugs to fit in with elaborate decorative schemes. An example of this is shown in a recent number of the Carpet Trade Review, which describes an exquisite oval rug, designed by Marshall Field & Co., and specially woven for them on the hand looms of the Persian Rug Co., New York. Its extreme dimensions are 15 by 22 ft. 7 in., and thirty colors were employed in the design. The rug is estimated to contain about one million four hundred thousand tufts, and seven girls were steadily employed for over two months in the weaving alone.

ART HOSIERY—HAND-PAINTED AND JEWELLED STOCKINGS.

Hosiery has passed the stage of the ordinary commercial commodity, and while as such it represents one of the material adjuncts to textiles, nevertheless a field has been opened where art enters into its manufacture to the ultimate advantage of the industry. Taking the latest novelties in hosiery, some startling effects and values are found, the cost of which runs well up the scale of dollars to the point where the art object is purchasable, thus in price the finest hosiery of our time has already reached the money appreciation found in the realms of art. And as to the art itself, it is apparent to anyone who examines a line of highest class hosiery in any retail establishment catering to the wants of the exclusive trade. Thus the question arises as to the timeliness of the term art hosiery, distinguished from what is ordinarily known as fancy hosiery.

The originality of the day is so decidedly pronounced that it justifies the claim to art. For instance, hosiery of fine texture of a filmy, fleecy lace is found in hand-painted and jeweled designs, each pair of exclusive pattern. Then there are the monogram and initial letter stockings, some showing the embroidering upon a diamond or varied shaped piece of net inserted over the instep and others the letters worked into the fabric by different means. Usually both stockings and net are black, the embroidered initials being worked in white or some other delicate shade. In other stockings only the single letter is used, which is embroidered directly upon the fabric over the instep. Another novelty is shown in flowers being worked into this character of hosiery, the floral decoration being usually placed above the initial, consisting of sprays of small flowers artistically designed. In silk goods the best effect is obtained along these lines. The higher priced hosiery has the monogram in white lace letters when the stocking is black and in black lace letters when it is white or cream, other colors not being used to any extent. High priced silk hosiery will frequently have a small monogram sewed upon the stocking just above the knee, merely for the purpose of marking, these little monograms are embroidered on sheer linen or else the letters are of lace.

Next in line comes the hand-painted stocking. Naturally of French origin, it is the most frivolous of all. They usually show a well-known artist's work, and are only obtainable on order, ranging in price from $100 to $300 per pair, although higher prices have been reported, especially where the design is interwoven with jewels. In fact, over a thousand dollars recently represented the cost of a pair of such stockings. Where hand-painted hosiery is sold through shops it is found that beads are substituted for jewels, the highest price being $50 per pair, while some attractions in this line are obtainable as low as $12 per pair. In order that the stockings may be washable they pass through a process after being painted whereby no injury will result from careful cleansing. The favorite designs in this class of hosiery run toward cupids, often combined with flowers, birds and scrolls where delicate shades are used. The designs extend below the instep. In black hosiery autumn leaves and foliage designs are mostly found.

In lace hosiery the popular trend is reached and most demands are satisfied in this line. Certainly no daintier effects are found in any other variety of fancy or art hosiery, and the wide range of offerings, extending from the most exclusive designs to ordinary patterns, permit of other than the wealthy classes enjoying them. Lace hosiery having the most open work seemingly enjoys the preference. The many intricate ways in which lace is introduced shows the fertility of manufacturers and justifies still further the claim to art hosiery. Among the varied attractions of this class in silk is found the bow-knot of lace on the instep and the lace and silk stripe. In using lace for either of the above effects the silk is cut away beneath it. A striking novelty consists of white silk appliqued with white lace. Among other attractive designs are black lace butterflies on white silk fabric and a cluster of small pink roses, pink and white clover blossoms, or a bunch of violets with a bow-knot of lace inserted, giving the effect of tying the stems of the flowers, which are embroidered. There is also found the college stocking with a small college flag inserted over the instep or at the side. The novelties are so numerous that it is difficult to describe them, but the fact we wish to convey is that "art hosiery" is properly styled and must become at no distant date a more decided feature of the industry.—Extract from an American contemporary.

A LIBRARY FOR FOUR DOLLARS.

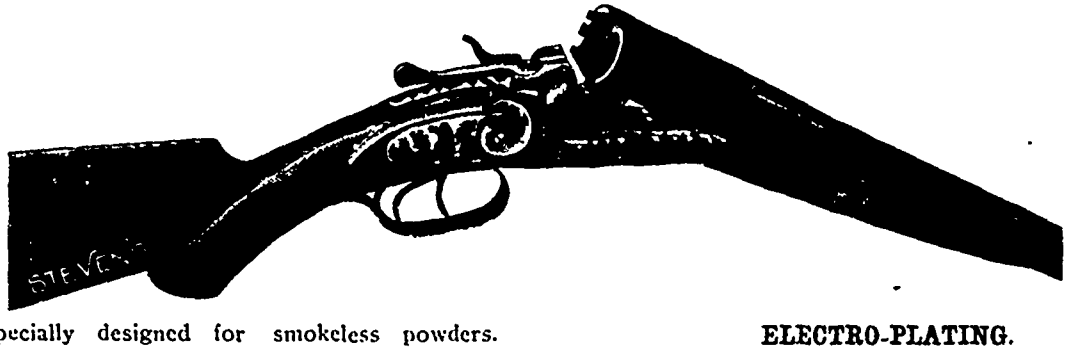
Four dollars is a small sum with which to supply a family for a year with the best pictures and literature. "The high-water mark of color reproduction," as Howard Pyle characterizes the exquisite color reproductions of his paintings in the December Century; history, current topics of vital interest, the best verse and fiction of the day. The most striking successes of The Century Magazine have been made in the field of history, witness the famous Century War Papers, Nicolay and Hay's Life of Lincoln, etc.; and it is to return to the field of historical literature this year. A striking series of illustrated articles on the early campaigns of the Revolution, written by Professor Justin Harvey Smith, of Dartmouth College, will be one of the features, especially covering the

picturesque march of Arnold through the Maine woods. Important articles on the "Trusts" will be printed from time to time—not attacking or defending, but simply telling the inside history of the great trusts and how they are conducted.

Richard Whiteing, the author of that popular book "No. 5 John Street," is to write one of the serials for The Century in 1903, "The Yellow Van," the story of an American "schoolma'am" who marries an English duke. Another serial, by the author of "Mrs. Wiggs of the Cabbage Patch," the most popular book of the year, will begin to appear in the December Century. Papers by "Mr. Dooley," giving his unique "Opinions" on literature; new light on the lives of Edgar Allan Poe and Sir Walter Scott; richly illustrated articles on the great exchanges of the world, and the best short stories that can be procured from the leading writers—all these are coming in The Century. Beautiful pictures in color will appear from time to time. The pictures are richly worth framing and a place in every home. The reading means wide information, culture, and rich intellectual pleasure from month to month. The bound volumes should have permanent place in every library. Big returns, all this, on the small investment of four dollars.

NEW SHOT GUN.

The J. Stevens Arms & Tool Co., of Chicopee Falls, Mass., have just got out their new double barreled shot gun referred to recently. The following are the features of this new gun: It has smokeless steel barrels, reinforced breech, frame and parts drop forged, matted extension rib, top lever, treble bolt, low circular hammers, rebounding bar locks with steel works, solid plungers, patent fore-end, checkered pistol grip, with rubber cap, rubber butt plate, choke bored and especially designed for smokeless powders. Machine-made throughout, and all parts are interchangeable. Weighs about 7½ pounds. It is made at present in 12 gauge and 30-inch barrels only.



OF INTEREST TO ELECTRICIANS.

By years of exposure to atmospheric temperature hardened steel loses hardness.

Steel magnets lose their permanent magnetism at the boiling point of almond oil.

Steel not only loses its magnetism, but becomes non-magnetic when heated to an orange color.

Silvanus Thompson says that the sudden slamming on of the armature of a permanent magnet is liable to deteriorate the magnetism; and that the sudden detaching of the armature is of advantage to the magnet.

In the storage battery the plates intended for the positive are pasted with red lead and dilute sulphuric acid (acid 1 part, water 9), and those to be used for negatives with litharge and dilute sulphuric acid.

The positive plates of a storage battery when fully charged should look like wet slate, nearly black; when partly charged they are dark red, chocolate or plum color. The negative plates are always much lighter than the positive and have a pale slate color.

Too quick a discharge buckles the plates and a very sudden discharge draws the paste out of them. When fulled charged plates which have been removed from the electrolyte are to be replaced, the liquid put in should have the same specific gravity as it was before.

According to Silvanus Thompson, a simple tangent galvanometer may be made to read as an ampere meter when constructed as follows: "Take a piece of insulated copper wire of a gauge not less than No 10 B.W.G., or say than three millimeters in diameter, and of this wire wind five turns only, so as to have a mean radius for New York, Cleveland and Chicago of 6.72 inches; for Philadelphia, 6.37 inches; Washington, 6.18 inches; San Francisco, 4.85 inches; New Orleans, 4.42 inches; then such a coil when traversed by one ampere deflects the needle exactly 45°, that is, to the angle whose natural tangent = 1, and the natural tangents of the deflections will therefore read amperes directly. The radius has to be inversely proportional to the intensity of the horizontal component of the earth's magnetic force at the place where the ampere meter is to be used. It may be further noted that a current of one ampere strength will cause the deposition in one hour of 1.174 grammes or 18.116 grains of copper in an electrolytic cell. It will in one hour deposit 4.024 grammes or 60.52 grains of silver in a silver cell.

ELECTRO-PLATING.

QUICKING SOLUTION OR MERCURY DIP.

Quicking solutions are used for coating such metals as copper, brass and German silver with a thin film of mercury before placing in the gold or silver baths.

The best quicking dip is made in the following manner: For one gallon—Put 1 oz. of quicksilver in a glass jar, pour in 1 oz. of pure "nitric acid and 3 oz. distilled water; place jar in sand bath and apply gentle heat until the quicksilver is dissolved, if it does not all dissolve add a little more acid, until the solution is complete, add water enough to make a quart, then add a cyanide solution slowly, carefully notice when it ceases to cloud the liqueur, and add a few drops of nitrate of mercury, if no cloud is formed the solution is neutral, and may be filtered and the precipitate washed on the filter with clean water, the water allowed to pass through the filter.

The precipitate should then be placed in a glass or stoneware jar and a strong cyanide solution poured over it until

all is dissolved, add a little more cyanide solution and sufficient water to make a gallon.

CLEANING SOLUTION FOR METALS.

Brass and copper, 100 water, 60 nitric acid, 100 sulphuric acid; zinc, 100 water, 15 sulphuric acid; iron, 100 water, 5 nitric acid, 10 sulphuric acid, 5 muriatic acid; silver, 100 water, 10 nitric acid. The dips should be accompanied with frequent brushing with ground pumice. An acid dip should never be used to clean tin, lead or pewter, these metals are best cleaned with a strong solution of caustic soda. All material cleaned with acid dips should be thoroughly rinsed in clean water (preferably rain water), before transferring to plating bath. With material cleaned with caustic soda less care is necessary. Extreme care must be taken to have the article to be plated scrupulously clean and to keep the plating solution free from any foreign substance. Have the anode surface equal or slightly larger than the surface to be plated, otherwise there will be more metal deposited than is dissolved from the anode, which will impoverish the solution. It is best to connect articles made of brass and copper to the cathode rod before immersing into cyanide of silver and gold solution, as the cyanide has a chemical action upon these metals which is resisted by the current.

IMITATION RELIEF PRINTING.

An improved process for obtaining upon either open or closely woven fabric an impression giving the appearance of being in relief has recently been patented by a Frenchman, such effect being obtained by the aid of a filling which, in open woven fabrics, fills the spaces in forming the design. The entire process may be carried out either by hand or by a suitable machine for printing on fabrics. For manual operation two roller-presses are employed, the first press being provided with metal plates engraved with a suitable design, the second press being employed for transferring the design to the cloth. The engraved metal plates bearing the designs are first coated with an appropriate mastic or varnish composed, for instance, of a powder with a zinc or lead base, such as white lead zinc-white, or flake white mixed with a suitable fatty substance, and colored or not as desired. The superfluous mastic or varnish is removed from the plate, which latter is then covered with a sheet of moistened paper, the whole being then passed through the first press. By this means the design is transferred to the paper, and this latter is at once applied to the fabric, a moist cloth and a waxed cloth having first been applied to the back of the paper. The whole is now passed through the second press, thus transferring the design to the fabric. The paper bearing the design may be applied either in its entirety or by dividing it so as to distribute the parts over a larger portion or surface of the fabric.

For openwork fabrics, such as gauze, it is necessary to apply to the table of the second press, first a waxed cloth, then a moist linen cloth, and then a sheet of paper. The fabric is next placed upon this foundation and covered with the paper bearing the design, a moist linen cloth and a waxed cloth being placed on top, and these seven materials finally pressed together. The machine for printing designs on fabrics consists of two frames of ordinary form generally adopted in similar machines, one at each side, and connected with each other by crossbars. Upon the right-hand frame are mounted six toothed wheels, a friction disc with a roller and horizontally-disposed screw, and a driving pulley. Upon the left-hand frame are mounted the starting gear and an ordinary lever for the large roller. At the upper part a bar retains and guides a receiver, which is horizontally movable through the intervention of one of the toothed wheels contiguous to a bar, and to which bar is fixed a block having an oblique groove capable of imparting a displacement of a few inches. The receiver is open at the bottom and is contracted at the lower end, at which it has an open portion of a few inches throughout its width. A suitable roller placed beneath the aperture closes it, and becomes coated with the contents of the receiver.

Two movable blades permit of regulating the thickness of such coating; a third blade provided in the interior of the receiver facilitates the coating of the roller. The roller is adapted to be heated by steam, and it is fitted at each end with a stuffing box. It is composed of two parts, and its shaft is formed of a hollow mandrel contracted at the part where it forms the journal. Its second part is a copper cylinder with a tapering bore forming a sleeve or mandrel. It is placed above another roller, by which it is driven by contact. The second roller is provided at its extremity with a toothed wheel, and is covered with melton kept stretched by a small roller placed above it. The second or large roller is kept in equilibrium by two cast-iron arms in which the journals repose, and it is moved by eccentrics through the intervention of levers. It may also be caused to oscillate by means of two vertically-disposed screws provided with a hand-wheel.

This system is capable of being modified by mounting the brasses of the rollers so as to be movable by means of screws for displacing them, and then retaining them in the required position. A third roller placed contiguous to the second roller receives motion from the latter by pressure, and is provided with an appropriate device for wiping it. A fourth roller placed below the third roller receives from the latter its rotary motion by pressure. It is provided with waterproof cloth, and another covering of waterproof linen, both being stretched by means of small rollers. An ordinary moistening device is provided for moistening the linen cover. A fifth roller, placed by the side of the fourth roller, receives motion from this latter by pressure, is covered in the same manner, and is provided with a device for moistening the linen cover. A suitable roller is provided adapted to rest against the second roller for creating pressure.—Textile Manufacturer.

THE STEAM ENGINE INDICATOR.

The steam engine indicator is now so well known and so much used that remarks on its history or construction are unnecessary. It is supposed to have been invented by Watt, and further improved by McNought, of Glasgow, Hopkinson, Stillman and others, but the most important improvement over all was made by J. W. Thompson, of Salem, Ohio.

The office of the indicator is to furnish a diagram of the action of the steam in the cylinder of an engine during one or more revolutions of the crank; from which is deduced the following data: Initial pressure in cylinder—piston stroke to cut-off—reduction of pressure from commencement of piston stroke to cut-off—piston stroke to release terminal pressure—gain in economy due to expansion—counter pressure, if engine is worked non-condensing—vacuum as realized in the cylinder, if engine is worked condensing—piston stroke to

exhaust closure, usually reckoned from zero point of stroke—value of cushion—effect of lead, and mean effective pressure on the piston during complete stroke. The indicator diagram, when taken in connection with the mean area, and stroke of piston, and revolutions of crank for a given length of time, enables us to ascertain the power developed by engine; and when taken in connection with the mean area of piston, piston speed and ratio of cylinder clearance, enables us to ascertain the steam accounted for by the engine.

The mean power developed by engine compared with the steam delivered by the boilers furnishes the cost of the power in steam, and when compared with the coal, furnishes the cost of the power in fuel.

The diagram also enables us to determine, with precision, the size of steam and exhaust ports necessary under given conditions; to equalize the valve functions; to measure the loss of pressure between boiler and engine; to measure the loss of vacuum between condenser and cylinder; to determine leaks into and out of the cylinder; to determine relative effects of jacketed and unjacketed cylinders, and to determine effects of expansion in one cylinder and in two or more cylinders.

The diagram is frequently used as an exponent of the engine from which it is taken, but it is not always that diagram which to the observer looks the most perfect that represents the best economy. Experience has shown that other data than the indicator diagrams are necessary to a correct estimate of the economy of performance of an engine. Although calculated to serve good ends, the steam engine indicator, like the surgeon's knife, should never be applied by unskillful hands.

WATER.

1 cubic inch = .0361 pounds.

27.7 cubic inches = 1 pound weight.

1 cubic foot = 62.4245 pounds at 39° F.; 7.48 gallons.

1 gallon U.S. = 8.33111 pounds (distilled; 8.34 pounds ordinary practice); 231 cubic inches.

1 imperial gallon = 10 pounds at 62° F.; 277.274 cubic in

1 pound pressure = 2.31 feet in height.

1 foot in height = .433 pounds.

INJECTOR.

There is no scientific work published that treats exclusively on the subject of steam jets as applied to injectors for boiler feeding; and when considering the great advancement that has been made, and the wonderful improvements that have been presented in this direction, it is something to be deeply regretted that as yet no one has contributed a treatise furnishing information that is constantly being sought after by intelligent engineers regarding the science of steam jets and their operation. The many defects and the serious annoyances attending the use of the injector during the early years of its use, would necessitate a large volume to state the details, but by dint of untiring perseverance it has now been brought to a high state of perfection, and is fast coming into general use, A certain writer has expressed himself in regard to this subject as follows: "Reduced to its simplest terms, the invention of the injector is based upon the idea that the steam boiler should furnish directly the power necessary to supply itself with water."

Another writer has summed up the new scientific principles of the injector as four in number, that are combined and brought into play in the invention along with the principles and mechanical methods a'ready shown:

"1st. On contact with the water, the steam condenses and communicates to it its velocity.

"2nd. Condensation can only take place if the water is notably colder than the steam, and it is therefore necessary that the water already heated by condensation of a part of the steam shall be put in contact with uncooled steam.

"3rd. The pressure of the steam jet obtained by the condensation of the steam may be notably greater than that of the motive or main steam pressure from the boiler.

"4th. Water may be thrown to a distance from a stationary tube within another one also stationary, communicating with a chamber wherein there is pressure, without any loss of the water occurring as a consequence of such transmission."

The explanation of the mechanical action of the injector is easily understood, as follows: The injector when feeding a boiler utilizes the velocity of the steam pressure coming direct from the steam space of boiler through pipe of required area to insure sufficient velocity according to the amount of water to be fed to boiler per hour. The steam on entering the injector passes through the steam jet (which is shaped in the best possible form to increase the original velocity of the steam), creates a vacuum in the suction pipe and draws the water into the injector The contact of the water with the steam condenses the steam, and the velocity of the steam is imparted to the water, creating a velocity of the latter equivalent to about one-half the original velocity of the steam as it passes through the steam jet when entering the injector, but of sufficient momentum to feed against the counter pressure of the same boiler at all times, and under all pressures.

RELATIVE EFFICIENCY OF FUEL.

One cord of air-dried hickory or hard maple weighs about 4,500 lbs., and is equal to about 2,000 lbs. coal.

One cord of air-dried white oak weighs about 3,850 lbs., and is equal to about 1,715 lbs. coal.

One cord of air-dried beech, red oak or black oak, weighs about 3,250 lbs., and is equal to about 1,450 lbs. coal

One cord of air-dried poplar (whitewood) chestnut or elm, weighs about 2,350 lbs., and is equal to about 1,050 lbs. coal.

One cord of air-dried average pine weighs about 2,000 lbs., and is equal to about 625 lbs. coal.

From the above it is safe to assume that 2¼ lbs. dry wood is equal to 1 lb. average quality of soft coal, and that the full value of the same weight of different woods is very nearly the same—that is, a pound of hickory is worth no more for fuel than a pound of pine, assuming both to be dry. It is important that the wood be dry, as each 10 per cent. of water or moisture in wood will detract about 12 per cent. from its value as fuel.

ELECTRICAL DEFINITIONS.

Ohm—The unit of electrical resistance, equal the resistance of one thousand feet of No. 10 (B. and S gauge), pure copper wire at a temperature of 75° F.

Ampere—The unit of volume (or strength) of electric current, equal to the current generated by a battery consuming zinc at the steady rate of one ounce per 24 hours; or, amount that one volt will force through one ohm of resistance.

Volt—The unit of pressure (voltage or electro-motive force), equal to one-half the pressure of a single freshly charged lead storage battery cell; or, pressure required to force one ampere through one ohm of resistance

Watt—The unit of power equal to 1-746 of a horse-power.

Kilo-watt—A thousand watts, or roughly 1⅓ horse-power.

Candle-power—The unit of light, equal to that produced by a candle burning two grains of spermaceti, per hour.

Circular-Mil—The area of cross section of a wire one mil (or one-thousandth of an inch) in diameter.

RELATIVE VALUES OF GAS.

Natural gas, by weight, 1,000; by volume, 1,000. Coal gas, by weight, 949; by volume, 666. Water gas, by weight, 292; by volume, 292. Producer gas, by weight, 76.5; by volume, 130.

The water gas rated above—as you will understand—is the gas obtained in the decomposition of steam by incandescent carbon, and does not attempt to fix the calorific value of illuminating water gas, which may be carburetted so as to exceed, when compared by volume, the value of coal gas.

THREE PHASE DETERMINATIONS.

In a three phase circuit each wire is affected, as if it had a single return instead of two. The phase differences in the other two wires making their influence equivalent to that of a single return. Hence if the wires are equidistant from each other, that is, situated at the corners of an equilateral triangle, they may be regarded as three separate circuits requiring no return wires, but each affected inductively as if a return existed in the position of one of the other wires.

The wires should, when practicable, be placed nearly equidistant from each other in cases where inductive effects will be important. The nearer they are together the less induction will be. When lights are connected to three phase circuits they must either be connected between the wires, or from each wire to a common return wire. These connections may be designated by the letter Y, and the Greek letter Δ. A reasonably good balance must be maintained at the generator on the three legs of the circuit.

DRYING MACHINES.

Various drying machines are used in the finishing trade, adapted for quick or slow drying, according to the kind of finish, and also adapted to dry the cloth on both sides or on one side only The drying machine for drying both sides of the cloth takes the form of a number of cylinders heated by steam. These were all formerly, and are still, as a rule, made of tinplate, and hence are commonly known to the finisher as the "tins." "Drying over tins" is therefore the technical expression when the cloth is dried on both sides, while "drying over cylinders" is used when the cloth is dried on one side only.

The usual form of machine consists of a number of long cylinders, ranging from 15 to 21. The length and diameter depend on the number of pieces sent through at the same time. Thus, some tins are only made to take one piece, while others can take three, which is the maximum number that can conveniently be taken at a time, the width of a piece being supposed to be about 36 inches. The cylinders vary in length from about 4 to 9 feet, and their diameter ranges from 16 inches to 2 feet. The tins are usually constructed of tinplate, but are often made of copper, which, being a better conductor of heat, dries the cloth quicker, but is obviously much more expensive.

They are driven at a uniform speed by bevel gearing. Inside the cylinders are a number of circular stays or blocks to support the cylinders—usually one to every 2 feet. The axes of the cylinders are hollow, and one serves to convey steam into the cylinders, while the other conveys away the surplus steam and the condensed water that is formed. The pressure of steam varies according to the number of tins and speed of drying, and is usually about five pounds. If a quick drying is required, to give a very stiff finish, then the pressure may be allowed to go up to 10 pounds. On the other hand, by reducing the pressure to two pounds, a slow drying effect is obtained, with the result that the finish is softer.

STYLE OF HATS.

I heard a prominent hatter conversing with a friend a few days ago in regard to styles of hats. I will not repeat all he said, but in substance his remarks were as follows: I believe the time is coming when a radical change will take place in men's headwear. The silk hat that is to-day worn will be a thing of the past, it should be, too. A more uncomfortable article could hardly be devised. It is heavy, a light breeze will catch it every time; it is easily ruffled and is a delicate hat at best.

The Derby has little to recommend it except custom. The most sensible hat to-day, in my mind, is the soft felt with a moderate brim, but both the brim and the height and style of the crown should be regulated according to the build and style of the wearer. The color also should be such as will go with the man's clothing. The soft felt hat of good quality will stand almost anything, sun and water will not hurt it, you can sit or stand on it, but it will always come up smiling under the brush.

TAPESTRIES IN HISTORY.

In the course of a lecture deavered by Prof. Charles E. Dana, before the Philadelphia School of Industrial Art, on the subject of tapestries, the speaker said that if the Egyptian women, who wove beside the Nile 5,000 years ago, were to come to life to-day, they would find the looms, although somewhat larger than those they used, very little changed in other respects. The part played by tapestries in the world's history was shown to be an important one. They had been of historical value in preserving a record, not otherwise obtainable, of costumes and customs. Legends were preserved by means of them and religious subjects were common in the early designs.

"In the Orient of old, tapestries and other weavings were only for high dignitaries," said Professor Dana. "A tent constructed for one vizier had a centre pole 108 feet high. To construct the tent required the work of 150 men for nine years. We read much in the Arabian Nights of gorgeous hangings, but the specimens that have come down to us have proved to be nothing more than crudely embroidered pieces of linen. The French were the chief nation in encouraging the weaving industry. They offered great inducements to the best Flemish weavers to settle in France, and did everything to further the art. In the Reign of Terror, however, the trade received a setback by a decree forbidding the weaving of men's figures in carpets. Men were not made to be trodden on, it was said."—Carpet and Upholstery Journal.

The Man On Company has been incorporated in British Columbia, with a capital of $10,000, to carry on a general commission and agency business, in Chinese and Japanese dry goods, clothing, novelties, fancy goods, silks, etc.

BLEACHING JUTE.

Steep the jute over night in water, wring out, wash well, then boil for one hour in a bath of 5 lb. of soda in 100 gallons water, wring, wash again, and steep for 10 hours in bleaching powder liquor of ¾° Tw. strength; wring, steep in hydrochloric acid of ¾° Tw. for one hour, wring again, and wash well; then steep for one hour in a bath of 2½ lb. permanganate of potash in 100 gallons water, and after squeezing, pass for one-half hour in a bath of sodium bisulphite (8 gallons in 100 gallons water), wash, and boil up with soap and blue.

REDO, A NEW INDIGO SOLVENT.

M. Jules Garcon, in Le Moniteur de la Teinture, notices a new reducing agent for indigo brought out under the name of Redo, invented by Louis Deschamps and Joseph Harding. M. Garcon says its use renders indigo dyeing as easy as the simplest work with a direct dyestuff. Redo is a white paste which seems to be a hydrosulphite in a more concentrated form than has hitherto been realized commercially. It will keep for a long time without deteriorating. In the presence of lime it dissolves indigo in a few minutes, and a solution is made which is used like an ordinary dye-bath. M. Garcon claims that, shade for shade, the use of redo considerably cheapens indigo dyeing.

THE CARPET SITUATION.

For some reason or other—probably the prevalence of good times—the carpet business has taken a very decided leap forward this fall. Householders evidently find this season an excellent one for exchanging their old and worn carpets for something bright and new. There is also in the industrial centres a considerable thickening of population, which has led to a largely increased demand for all kinds of household furniture, carpets among other things. During the two weeks of the Exhibition in Toronto, the sale of carpets by the wholesale houses was reported as being exceptionally good, and since then the travellers' orders have been coming in briskly and in large quantity. The heads of the carpet departments are all very optimistic in speaking of the possibilities of the future and one and all have faith in the prospect of a brisk Fall trade.

The Champion Dry Goods Company has been incorporated, with a capital of $20,000, to buy out and carry on the business of the Crescent Dry Goods Co., at Rossland, B.C.

A by-law to grant a bonus of $20,000 and exemption from taxes in favor of the J. W. Peck Mfg. Co., shirt manufacturers, has been ratified by the council of St. Louis, a suburb of Montreal. Objection was made that the factory would employ chiefly women, but the by-law went through.

Boyd Caldwell & Co. have been incorporated to carry on the well known woolen manufacturing business at Lanark, established by Boyd Caldwell, and carried on by his sons since his death. The capital is $200,000, and the company is composed of T. B. Caldwell, Jeannette Caldwell, Boyd A. C. Caldwell, Alexander C. McCallum, and Christopher M. Forbes, all of Lanark.

Textile Design

RAIN CLOTH.

This fabric is so called because it is used in the manufacture of water-proof garments for ladies and men, such as gossameres, mackintoshes, etc. The finer grade is made from worsted yarn, a dark and light thread being twisted together for warp with solid colors for filling.

The following are a few weaves with layouts for this class of goods. The yarn should be made of good stock as the weaves are firm and poor yarn will cause trouble.

Design 1.

Design 1 is dressed with 5,040 ends of a dark and light twist 2-40 worsted; 15½ reed; 5 threads in a split; 66 inches wide inside listing; 70 picks of black or dark mix. *Filling*, 2-40 worsted; chain No. 1.

Design 2.

The layout for Design 2 is: Dress 7,680 ends of dark olive and white twist 2-40 worsted; 13 reed; 9 threads in a split; 66 inches wide inside of listing; 74 picks of black 2-40 worsted; weave with chain 2.

Design 3.

Other chains such as 3 and 4 may be used with No. 1 layout; but No. 1 chain will make the firmest piece of cloth, and firmness is much to be desired in this fabric. Imperfections should be avoided as much as possible in the weaving.

Design 4.

as it will be found difficult to mend this cloth in the sewing room. With good yarn, however, we should be able to get both quality and quantity from the loom.

The weaves given in this article are face down. If wanted face up, use sinkers for raisers. Weaving them face down is the better way for all concerned.—D. S. T. *in Boston Journal of Commerce.*

WOOLEN AND WORSTED YARNS—DIFFERENCE BETWEEN THEM.

As woolen and worsted yarns occupy the premier position for clothing purposes a consideration of them will not only prove interesting but profitable. The structure of the yarn will first be considered, and then a comparison of the effects produced by them. In the first place, both woolen and worsted cloths are made from wool obtained from the sheep. Many people look askance at woolen cloths, because in some instances they are made from shoddy, mungo, noils, etc., and again, new wool is often mixed with small quantities of these re-manufactured materials, so as to cheapen the blend, and obtain a lower-priced cloth. These lower-priced cloths serve their purpose, providing thousands of people with good clothing. Otherwise they would go scantily clad. Nature

makes no waste, neither should man; and let us give honor to the men who produce these cloths, though they are made from shoddy, because it is most certainly due to them in the highest degree. Worsted cloths, on the other hand, are not so liable to be adulterated by introducing these very short materials, because difficulty would be experienced in making the thread, retaining the fibres introduced. Of course, if a woolen cloth is desired, it can always be obtained by paying the price for it. The question has often occurred to many persons, "if woolen and worsted cloths are both made from wool, why is there this vast difference between woolen and worsted cloths, taking four typical cloths as examples—(1) fancy cheviot woolen cloth; (2) melton; (3) worsted vienna coating; (4) fancy cross-bred worsted coating?" The question must be considered as to the effect of the yarn on the cloths, avoiding the question of structural differences. To the uninitiated the above question appears almost an insuperable one; but an attempt will be made to elucidate it and present the truth. Perhaps it will be advisable to examine a few of the arguments that have been advanced at various times to explain this question, and if they cannot be accepted they must be refuted, so that a clear and definite understanding may be obtained in the end. In the first place, it used always to be said—and is maintained by some still—that worsted yarns are made from long wool, and woolen yarns from short wool. However true this may have been formerly, we must decline to accept it in the light of present information. A bale of wool sent into a mill may be either made into woolen or worsted yarns, as desired by the manufacturer; in fact, if he wishes so to do, he may split the bale into two parts, and make one part into woolen and the other into worsted yarns. The advocates of this statement then added a little to it, saying that for worsted yarns the material must be combed to get rid of the short fibres or "noil," and for woolen yarns the material must be carded. The question now arises as to why material for worsteds must be combed, and for woolens carded, and what is the effect of the two causes in the final result.

Again, "long wool," "short wool," are merely comparative terms as regards the length of the material, because there is no rigid division between the two, and it is impossible to say where one ends and another begins, one gradually merging into the other. The question of length, as being the true solution of the problem, must be dismissed as untenable. The second explanation advanced left the question of raw material out of consideration, and attributed the difference in the two yarns to the means employed in manufacture—viz., woolen yarns are carded, and for worsted yarns the material is combed. Before proceeding to consider the second point, let one thing be remembered—that any difference in the two yarns ultimately must be present in the yarns, and the processes through which the material passes until turned out as yarn are designed and arranged to secure the desired end. Do not let the means used be mistaken for the end and final result. Carding is a process for separating the fibres from one another and intimately mixing them. Combing is a process similar, and it also separates the long wool from the short, the former being termed "top" or "tops," and the latter "noils."

Woolen yarns are invariably carded, but all worsted yarns are not combed, some being carded and combed, others carded only, and others again are prepared and combed. From this it will be seen that woolen yarns are carded, and also some worsted yarns are carded; therefore, this explanation is not satisfactory.

The third suggestion is similar to the second, in that the difference in the two yarns is brought about by the method of spinning. The processes for the yarns are essentially different, and are, therefore, means used to obtain different ends as seen in the yarns. Worsted yarns are usually spun on a throstle frame, and woolen yarns on the mule; and, therefore, this was stated as the difference between the two yarns. To say that all yarns spun on the mule are woolen yarns is to some extent erroneous, because some worsted yarns are also mule spun. Woolen yarns are invariably spun on the mule.

The essential features of the process are that the sliver to be spun into worsted yarn is passed through two sets of rollers having different surface velocities, drawing or drafting the fibres parallel, and the thread, as it emerges from the front pair of rollers, is wrapped on to the bobbin as fast as delivered. This is termed roller-draft. The thread after being drawn in this way, is twisted in the case of worsted mule spinning before being wrapped on to the bobbin; and in frame spinning it is twisted at another operation. In the case of woolen spinning, the sliver passes through one set of rollers which deliver for a certain distance, but not equal to the traverse of carriage as in worsted mule-spinning, and as the carriage goes forward to complete its traverse, the whole thread is drawn in length, and instead of having parallel drafting as where rollers revolve continuously, we find the long fibres have to bear the strain and go to form the core of the thread, whilst the short fibres are held by one end in the core, the other, more or less free, forming the fringe or beard on the yarn. This method of drafting is termed "spindle draft."

We have then "roller draft" for worsted yarns, and "spindle draft" for woolen yarns; but these terms would be better replaced by "continuous draft" and "intermittent draft," respectively. The former is the method of drafting for worsted yarns, and the latter for woolen yarns.

We must here take exception to a statement made by a certain writer upon this subject. In speaking of this question, he remarks "that woolen yarns, until recently, have been spun only on a mule since that machine was invented; but a spinning frame upon the throstle principle of continuous drafting has lately been introduced which is suitable for a sort of woolen yarn." A yarn spun on the throstle is no sort of woolen yarn at all, but is rather, if we may borrow his phrase, a sort of worsted yarn.

The fourth point suggested to answer the question was based on the milling properties of the raw material. Now, as before remarked, a quantity of wool may be made into woolen or worsted yarn, or both if necessary. Again, we should assume from this that all woolen cloths are milled, and worsteds are not milled; but in practice, some worsteds are milled, and some woolens are not. Therefore, the question of milling or felting of the raw material cannot be accepted as the solution of the difficulty.

To summarize the points we have mentioned, it is found that two are attributed to intrinsic properties of the raw material, and the other two to extrinsic causes brought to bear upon the material for producing a certain result. The two former include (1) length of fibre and (2) milling properties. These must be dismissed on practical grounds, because neither the length of the fibre nor milling properties of the raw material determine absolutely whether a certain quantity of raw wool shall be made into woolen or worsted yarns.

The two latter points mentioned deal with processes through which the material is passed in manufacturing, and are (3) carding and combing, and (4) mule and throstle spinning. Here it is necessary to differentiate between cause and effect. The processes, through which the material to produce woolen and worsted yarns respectively passes, are

specially designed to give the different effects which we see in the two yarns, and as the parts of anything cannot be the whole, then the processes, though arranged for producing a specific result, cannot be the result.

Having refuted the more or less prevalent ideas in regard to woolen and worsted yarns, it now lies with us to present a more rational and the true explanation of the difference which exists between them, and this will be accomplished by examining the yarns themselves. Taking a typical worsted yarn, it will be noticed that it is comparatively lustrous, very even and level, with few projecting fibres, and all the fibres parallel in the direction of the thread. This parallelization of the fibres is the essential feature of a true worsted yarn. Taking a typical woolen thread, it will be seen to have a "beard" or short fringe all round it, which is caused by the shorter fibres being attached by one end in the centre of the thread, and the other projecting to form the fringe as explained. The thread is not so even nor near so lustrous as a worsted yarn, and the fibres composing the yarn will be found, if carefully examined, to be crossed and doubled in all directions without any definite order. From this explanation, it will be seen that the true difference between the woolen and worsted yarns lies in the ultimate arrangement of the fibres in the yarn giving quite different results in the cloths made from them.

We may, therefore, define a worsted yarn as a thread spun from the wool in which the fibres are laid parallel in the direction of the thread; a woolen yarn, on the other hand, is a thread spun from wool in which the fibres are crossed and laid in every conceivable direction, this really constituting the true difference between them. Not being based on the properties of the raw material nor on any mechanical process in the conversion of the raw material into yarn, but being the result of an examination of the yarn finally produced, or the raw material after having gone through all the mechanical processes to convert it into yarn, it must be admitted that it is the true solution of the problem.

Regarding the general application of the yarns, which must be dealt with very briefly, it might be said that worsted yarns are very suitable for bringing out weave effects, and colored threads may be developed very clearly, yielding bright and lustrous cloths. Woolen yarns, on the other hand, are more useful for producing solid, compact cloths, and when colored, are generally arranged for a general hue, rather than for developing individual colors.

In regard to the four typical examples of cloths mentioned, the two former would be made of woolen yarns, and the two latter of worsted yarns. Again, the fancy cheviot woolen cloth and the fancy cross-bred worsted would be made of long-fibred material as compared with material used for the melton and the worsted vicuna coating. The melton and the worsted vicuna coating would be milled in finishing; the former excessively, so as to give a firm and solid cloth, and the latter slightly, giving a soft, full-handling cloth; whilst, on the other hand, fancy cheviot woolen suiting and the fancy cross-bred worsted suiting would not be milled at all. Therefore, to speak of the application of woolen and worsted yarns must necessarily be in a general sense.—Textile Journal.

HAND AND FOOTWEAR OF POPE LEO XIII.

In Lent the Papal raiment, from shoes to cap, is of scarlet. The Easter season calls for white. Other holy days demand other colors. Every item of each costume is the finest and richest of its kind. The surplices worn at audiences are of priceless old lace. Nowhere in Europe is there a more valuable and interesting collection of lace. The slippers of the Pope are legion, and each pair is of the finest velvet. The right slipper, which is kissed by pilgrims and other pious visitors bears a cross in gold embroidery, while on the left are embroidered the crest, keys, tiara and pallium which make up the crest of the Roman church. But the slippers fade into insignificance before the value of the innumerable pairs of gloves. These gloves are of the finest white wool. That sounds modest, but, as it happens, the wool is embroidered in costly pearls. The material for the gloves, as for all woolen garments worn by the Pope, is made from the fleece of a special flock of sheep dedicated to this purpose, and owned by a family that has since the middle of the sixteenth century enjoyed the privilege. From a herd of 50 sheep a number of lambs are set aside each year. On January 21st the lambs are taken to the Pope and, in an impressive ceremony, receive the Papal blessing. After that, they are kept for a year at a convent near Rome, and are cared for in the most elaborate and punctilious fashion. The year being passed, the lambs are shorn and the nuns weave the fleece into palliums for the Pope. The pallium, a long strip of white wool, adorned only by a gold cross at each end, is the most sacred of priestly vestments, and is worn around the neck and body, the ends falling over the left shoulder. Before Pope Leo wears one of his many palliums it must lie for a certain length of time upon the sarcophagus of St. Peter. Many of the Papal vestments are set with rich jewels and stiff with gold and silver, but these gorgeous garments are seldom worn since the Vatican lost its temporal power and the Pope has given up grand public ceremonies. One of the jeweled robes, the famous cappa magna, or great cape, is so thickly set with gems that its weight alone would prevent the old and frail Pope from wearing it. Pope Leo XIII. is fond of jewels, and has a remarkably valuable collection of rings but only three of them are official. The Fisherman Ring, carved with a representation of St. Peter fishing, is the Pope's official signet ring, and is destroyed at the death of its wearer, a duplicate being made for his successor.—Trade Journal

AN INGENIOUS DEVICE FOR LOOMS.

The following is a description of a very ingenious invention that Adolph Suck is now working on and perfecting. It is a mechanical attachment to be fastened to an ordinary cloth loom for picking up and tieing broken warp threads. The invention, he claims, is very simple, and one that will require but half of the help now needed in the weaving room, and will also do away with the space required for drawing in. It can be attached to any loom. The principle is that it has an extra spool of thread attached to the machine which is used for tieing up warp threads. As soon as a warp thread breaks, the loom is stopped and the broken thread is taken hold of, while the machine splices a piece on and draws it forward through the harness and secures it to the cloth. The waste ends are cut off, the loom starts of its own accord, and continues the process of weaving. It is Mr. Suck's intention not to put this machine on the market for sale, as he intends to establish a 100,000-spindle mill and equip the looms with his device. The machine will be leased to the mill. Mr. Suck was in the employ of the late Stephen Greene and has had many years' experience in the business of designing cotton mills, and is now at work on some very complicated coaling machinery for the Coal Handling Company. He makes a specialty of industrial plants requiring special devices for handling and operating. Mr. Suck comes of an inventive family, his brother being the originator and patentee of a voting machine which has attracted wide attention.

SYNCHRONOUS MOTORS.

Synchronous motors are similar in character to alternating generators. Their fields are, as a rule, excited by continuous current derived either from the machine itself or from an outside source. Their armatures receive alternating currents from the circuit and operate at the same frequency as the generator and in synchronism with it. The principal limitation to the use of synchronous motors is their inability to exert a large starting torque without requiring excessively large currents. Synchronous motors are used both on single phase and on polyphase circuits. Polyphase synchronous motors, when self started, generally start as induction motors in virtue of the progression of the flux from the armature, which acts upon the field poles in the same way that the armature of the induction motor is operated by its field. Self-starting single phase synchronous motors of many types have been built and used to some extent. Many of these start as simple series or shunt motors, being fitted with commutators which, after starting, are used to deliver direct current to the fields.

It may be generally stated that all self-starting synchronous motors require very large currents in starting, and these starting currents are highly inductive. As a rule, the starting torque obtainable is low even when excessive currents are used. Synchronous motors will drop out of step if the driving power is stopped for an instant and will sometimes do so when the speed of the dynamo is unsteady or periodically fluctuating, as when driven by an engine with insufficient fly wheel capacity. All of these peculiarities restrict the field of usefulness of the synchronous motor. The type, however, has very great advantages which make its use desirable wherever it can be applied instead of the induction motor without causing troubles with service or with the regulation of the system.

Among these advantages are: First, the synchronous motor, with proper field adjustment, operates practically without lagging or leading current. Second, it can be made of very high efficiency without mechanical difficulties and with a liberal clearance between armature and field. If the load of a synchronous motor changes while the excitation is fixed, the power factor will be affected to a small extent, the load will, however, not become seriously inductive and the motor will always tend to produce a minimum variation in the voltage of the circuit. The design of a synchronous motor should be suited to the work which it has to do. The motor must have sufficient starting torque with the least possible starting current. It should have an armature reaction sufficiently high to give high efficiency and small starting current, and yet not too high to reduce the synchronizing power to an unsafe degree. The starting current is of particular importance from the standpoint of voltage regulation on circuits and the amount of this current and its power factor should be considered. The starting current of a synchronous motor may often be reduced by lowering the impressed voltage without reducing the torque below the requirements. This can be done by transformers or compensators or by the introduction of resistances or reactances. If reactances are used the power factor of the starting current is lower than it would be with reactances or compensators.

—The finest municipal school of technology in the world has been opened by Mr. Balfour in Manchester. It has been seven years in building, and has cost £300,000. The Premier said the school was an outward and visible sign of the awakening that had come over the country. The time had passed when we could say we were first among the industrial nations and the rest nowhere.

—A cotton mill of 500,000 spindles is to be built in Kansas City, Mo., U.S.A., according to plans now made public, and provided that the necessary capital of £2,000,000 can be raised. The prospectus calls for the largest cotton mill in the world, with 12,000 looms and all the necessary machinery for making plain sheeting of various grades. The mill would consume 170,000 five hundred pound bales of cotton per year, and would turn out about 75,000,000 pounds of finished cotton cloth. Large economies are claimed in the location, in direct trade with Western merchants.

The carpet factory at Galt, carried on by the Burrows' Co., and bonused by the town, has had a brief existence. The town has taken possession of the property, and is negotiating for its sale to George D. Forbes, of Hespeler. The following resolution passed at a recent meeting of the town council will help to explain the matter: Moved by Ald. Cameron, seconded by Ald. Turnbull: That the lands and premises owned by the corporation of the town of Galt, and the buildings thereon situated on the westerly side of North Water street, in the town of Galt, known as the carpet factory, be sold and conveyed to George D. Forbes, of Hespeler, for the price or sum of $7,000, the purchaser to assume and pay for all fixtures and improvements put in the building if said sale and conveyance can be legally carried out. Since then the portion of the machinery which was unencumbered was put up for sale at auction by Sheriff Motz. The bidding began at $500, and after slow progress closed at $800. A. H. Macdonald, of the law firm of Macdonald & Drew, Guelph, being the purchaser. The engine, boiler and heater were not sold. Mr. Macdonald was evidently acting for the bank, and he had no competitors among certain carpet and woolen mill men present at the sale. The company was incorporated in January, 1902, with an authorized capital of $40,000. They obtained a loan from their banker, and on this they were sued, and judgment obtained against them for $12,693. The assets were the unencumbered machinery, the building being owned by the town. Altogether they owe about $15,000.

TEXTILE PUBLICATIONS.

In order to accommodate readers of The Canadian Journa' of Fabrics, the publishers will be pleased to mail any book in the following list on receipt of the publisher's price, duty free. Books on technical and practical subjects, not in this list, can be obtained and mailed at publisher's prices. In ordering, please give full address, written plainly:

Loom Fixing; a handbook for loom fixers working on plain and fancy worsteds and woolens; containing chapters on shuttles and bobbins, and their management; head motion; putting in warps; filling; adjusting and starting new looms; chain building, etc.; 104 pages, by Albert Ainley $1 00

Technology of Textile Design; explains the designing for all kinds of fabrics executed on the harness loom, by E. A. Posselt 5 00

Structure of Fibers, Yarns and Fabrics, the most important work on the structure of cotton, wool, silk, flax, carding, combing, drawing and spinning, as well as calculations for the manufacture of textile fabrics, by E. A. Posselt 5 00

Textile Machinery Relating to Weaving, the first work of consequence ever published on the construction of modern power looms, by E. A. Posselt..... 3 00

The Jacquard Machine Analyzed and Explained; explains the various Jacquard machines in use, the tying up of Jacquard harness, card stamping and lacing, and how to make Jacquard designs, by E. A. Posselt..... 3 00

Textile Calculations; a complete guide to calculations relating to the construction of all kinds of yarns and fabrics, the analysis of cloth, etc., by E. A. Posselt.. 2 00

Wool Dyeing; an up-to-date book on the subject, by E. A. Posselt 2 00

Worrall's Directory of Cotton Spinners, Manufacturers, Dyers, Calico-printers and Bleachers of Lancashire, giving the mills of the British cotton district, with number of looms and spindles, products of the mills, cable addresses etc $2 00

Worrall's Directory of the Textile Trades of Yorkshire, comprising the woolen, worsted, cotton, silk, linen, hemp, carpet, and all other textile mills, giving looms and spindles, and the various lines of goods manufactured, etc $2 00

Worrall's Textile Directory of the Manufacturing Districts of Ireland, Scotland, Wales, and the counties of Chester, Derby, Gloucester, Leicester, Nottingham, Worcester, and other centres not included in preceding works, with capacity, products of mills, cable addresses 2 00

CHEMICALS AND DYESTUFFS.

Trade is good, and prices firm and without change in most lines. Heavy chemicals and acids are in good demand. Sulphuric acid has advanced in price, and lard oils and tallows have also risen somewhat.

Bleaching powder	$ 2 25 to $ 2 50
Bicarb. soda	2 00 to 2 05
Sal. soda	0 85 to 0 90
Carbolic acid, 1 lb. bottles	0 40 to 0 50
Caustic soda, 60°	2 35 to 2 60
Caustic soda, 70°	2 60 to 2 85
Chlorate of potash	0 10 to 0 11
Alum	1 35 to 1 50
Copperas	0 70 to 0 80
Sulphur flour	1 70 to 2 00
Sulphur roll	1 90 to 2 00
Sulphate of copper	5 50 to 6 00
White sugar of lead	0 07 to 0 08
Bich. potash	0 7½ to 0 08
Sumac, Sicily, per ton	50 00 to 58 00
Soda ash, 48° to 58°	1 30 to 1 40
Chip logwood	1 90 to 2 00
Castor oil	0 08 to 0 09
Cocoanut oil	0 10 to 0 11

A party named A. W. Holbrook is operating plants for the renovating of gram bags at White River Junction, Barnet and East Craftsbury, Vt., and Palmer, Mass. What the process is is not stated.

—A slight check has been given to the demand for cycling hose by the adoption by some cyclists of sandals and no stockings in riding in country districts. The vagaries of climate do not, however, favor this new departure.

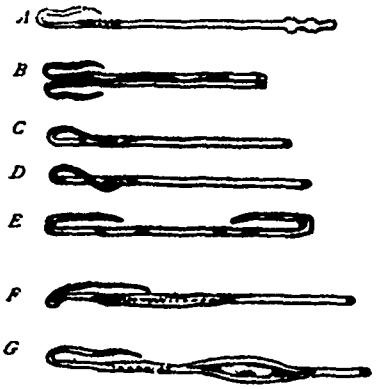
The Freeman Fertilizing Co., at Hamilton, has been ordered to abate the nuisance caused by the offensive odors from their works near the cotton factory. Thirty days was allowed them in which to obey the order. At the end of that time the nuisance had been reduced. Fans had been introduced and a furnace ordered which it was alleged would consume the gases. Thirty days longer was granted.

ORIGIN AND DEVELOPMENT OF THE BEARDED KNITTING NEEDLE.

Wm. Lee, in the year 1598, brought out his first hand stocking frame. The bearded or spring knitting needle used is similar to that employed in the present day, and is shown in diagram *A*. The origin of this needle is set forth in the different histories recording the wonderful invention.

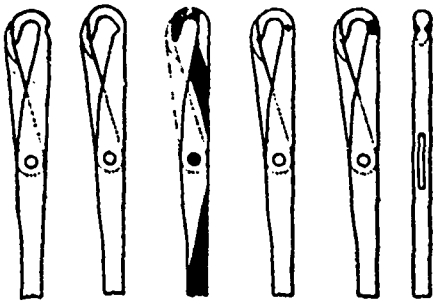
Henson, in his History of the Invention of the Stocking-frame, says: "The web of a stocking is knitted by hand, on three or four long pins, of a row of loops, and in a round shape; it seemed to Lee impossible to construct a machine to make a round web having as many needles as loops, in the circumference of the hose. Pondering on the difficulty, he one day saw his mistress knitting the heel, using two needles only; one held the loops while the other was employed in forming a new series. It struck him he could make the web flat, or in a straight line of loops, and when thus made join the selvedge by seaming them together, and thus make it round. He was then led to the idea of throwing a thread across a long elastic hook, the point of which should be pressed down into a hole into the stem of the wire, and thus loop at pleasure. He bored the holes, and tried to insert the point, but though he could make the loop on the wire (since called a needle) it would not slide easily over the inserted point. At length he thought of a groove instead of the hole. But here tools failed him in making the groove. He flattened the wire at that part, heated it, and turned the edges towards each other, and spoiled much wire in the effectual attempt. Afterwards, by using a three-edged file, he cut out the

groove. After spending a long time in making these hooks of various shapes, he made the long bearded hook or needle fit for his purpose. In his first attempt at looping, he inserted firmly into a piece of wood a dozen of these needles, eight to an inch; fixing this piece of wood upon a wooden frame-work (hence the name frame), and endeavored to make a succession of loops upon them by hand, which he finally accomplished, knitting on this row of hooks a pair of garters in this manner. The next point needed, was to form and fix a wooden bar (the presser) to press down at one movement all the barbs of the hooks into the grooves, using the one hand to bring forward the loops while he put all the beards down into the grooves with the other; and so by passing the row of loops over the beards and needle heads he formed row after row of loops to pass upon the previously made rows, till several inches of web were produced. Very little alteration has been made in this needle, excepting in its quality of construction and material used, as will be seen from the diagram, which shows a few of the different kinds of this needle as used for the purpose of acquiring special results in



knitting. Diagram *B* shows two such needles placed back to back. Needles so formed are used in loop-wheel circular frames for making a specialty of knitted fabric known as pearl-work. The needles, as shown in diagram *C* and *D*, have their beards partially or wholly twisted round the stem. They are used for various purposes, such as broad rib work on Cotton's patent; roll-off work on German circular frames, for making a special twist fabric. In ordinary knitting the twist of the beard allows the needle to press off its loop, but in the circular frames referred to, when the beards are twisted half round, the needle turns the points downwards, and the yarn so fed that the loop becomes twisted and so makes a special fabric known as the twist fabric. Diagram *E* shows a bearded needle with a beard at each end, and which is known as the double ended bearded needle. This has been used in circular frames for making circular pearl-work and special rib fabrics. Diagram *F* is a pearl needle as used on hand frames and pearl machines, also for making pearl work, the specialty being the larger eye on the under side. Diagram *G* is a similar needle with the larger eye on the side of shank. There have been many minor alterations in the shape of this class of needle, and also in the method by which they are attached to the various machines, as the latch or tumbler needle lends itself, by its particular construction, to great variations.

One of the great difficulties in the use of needles in knitting machines, especially in knitting seamless hosiery, is the liability to breakage. This is proving to be quite an item in the cost of producing goods. In one of the best equipped mills in the southern States, in which 287 machines, full automatic, 176 needle gauge, are in operation, 2,651 needles were either broken or worn out in a single week (1,614 broken, 1,007 worn), the output of the mill being 6,449 dozen, that is one needle broken for each four dozen goods knit, and one worn for each 6 2-5 dozen knit. The wear can hardly be reduced, the break can only be kept down by securing needles of the best quality, using good yarn, and employing efficient help.



A recent patent for a knitting machine needle is shown in cut 2. The claim is for a knitting machine latch needle having its upper portion locally weakened so as to cause breakage at a predetermined point when the hook is subjected to undue strain.

For the cut illustrating the development of the needle we are indebted to the Hosiery Trade Journal. We would like to have the experiences of some of the Canadian knitting mills in the matter of needle breakage.

THE LABOR MEMBER FOR LANCASHIRE,

D. J. Shackelton, recently returned as labor member for the Clitheroe division of Lancashire, England, was once a weaver in a cotton mill. For a long time the electors of Nelson and Colne, the two most important towns in the Clitheroe division, have been hankering after more direct representation in the House of Commons, and when a vacancy was caused through the elevation of Sir N. K. Shuttleworth to the House of Lords, the labor party decided to bring forward a representative. The division is decidedly Liberal, and it was thought that the Hon. Phillip Stanhope, ex-M.P. for Burnley, would be brought out in the Liberal interest. However, as Mr. Shackleton was in many ways a Liberal, it was decided to join forces. The Conservative party had no desire to fight such a one-sided battle, therefore Mr. Shackleton was returned unopposed. The new member was born at Alma Cottages, Rawtenstall, a town in the Rossendale division of Lancashire. His father Wm. Shackelton, was a weaver in the cotton mill at Hall Care, Rawtenstall. When old enough for work he began to weave under the care of his father. He was a very steady boy, and had an inclination for study. About this time a Sunday school was started under the auspices of the Church of England, the Shackelton family assisting in its formation. About twenty years ago the family left Rawtenstall and removed to Haslingden, a town in the same division. It will, no doubt, interest our readers to learn that Michael Davitt, the noted Irish politician, was at one time employed in a cotton mill just outside Haslingden. In fact it was here that he lost an arm in the machinery. Being unable to continue work in the mill he secured a situation in the post-office at Haslingden, where, no doubt, influenced by his surroundings, he began to study, with the result that he eventually became one of the most aggressive members of the Irish party. From Haslingden the Shackelton family removed to Accrington, three miles distant, where Mr. Shackelton, jr., became president of the Accrington Weavers' Association, and was made a magistrate. Subsequently he was appointed secretary of the Ramsbottom Weavers' Association, but afterwards removed to Darwen, to fill a similar position, which he holds at the present time. Mr. Shackelton is an effective platform speaker and an excellent organizer. He has had a

place on a number of important deputations to London in connection with the cotton trade He recently visited this continent in the interest of the trade, and had an interview with President Roosevelt He is very highly esteemed and counted an authority on all questions affecting the cotton trade Whilst in Parliament he will be maintained by the Trades Union Richard Whittaker, formerly general manager of the Montreal Cotton Company, hails from the same town (Rawtenstall)

LITERARY NOTES.

Under the title of the "Silk Industry of America," Franklin Allen, the special reporter on the silk section of manufactures for the United States census office, has given a statistical history of the progress of silk manufacturing in the Republic, and a remarkable record it is. From the census of 1890 to that of 1900 the silk industry did not show a great apparent gain, but this was because in the last census 39 mills making braids and trimmings were transferred from the silk to the cotton or woolen list, and 78 hosiery and knit goods mills using silk were transferred to the knit goods branch, as were also the silk glove factories. Making allowance for the effects of this improved classification the showing is most creditable to the skill of our neighbors, who have now 483 establishments devoted to the manufacture of silk (or 600 including the mills transferred), the states leading in the industry being New Jersey, Pennsylvania, New York, Connecticut and Massachusetts A capital of $81,082,201 is invested in the business, in plant, etc, exclusive of the capital stock of the companies, and the annual value of the products of these mills was $107,256 258, the annual value of the materials used being $62,406,665. In 1850 there were 67 silk factories in the states, the annual value of production being $1,809,476. The amount of raw silk then imported for use in the mills was 120,010 lbs., while in 1900 it was 11,259,310 lbs., valued at $44,549,672. In 1850 the United States imports of silk goods amounted to $17,694,658, while in 1900 silk goods imports were valued at $26,803,534. Add to this last total the value of home manufactures, and we have a total consumption of silk goods in the United States of over $130,000,000. These figures show not only the large consumption of silk goods per head of population in the United States, but they show the rapid headway home manufacturing has made against foreign made goods. Since 1860 the imports have ceased to develop, the totals ranging from $21,000,000 to $38,000,000, and averaging about $30,000,000; so that the battle has been to the home manufacturer. The United States now ranks second in the world in value of silk products, being surpassed only by France. Germany follows the United States, and Switzerland stands fourth. It is noteworthy that notwithstanding the efforts of various state governments and societies to promote silk culture the growing of silk in the United States is still non-existent as an organized industry. Japan supplies the greatest percentage of raw silk to the United States (42 per cent.), China being second with 39 per cent., and Italy third with nearly 20 per cent. The method of treating textiles in the United States census office is clear and rational. The figures of the Canadian census are not merely useless, they are misleading, a meaningless set of reports being continued in spite of the good example set by the department at Washington, not to speak of the methods adopted in European countries.

The October number of the P.E.I Magazine, published at Charlottetown, is a very readable issue, especially interesting being the random sketches "One touch of Nature," by W. S. Louson, sketches of the history of Alberton, by A. F. Matthews, and Pichon's narrative of the Island of St. Jean, the French title of Prince Edward Island.

Elsie A. Dent continues her readable talks on astronomy in the November number of the Canadian Magazine, while C. W. Nash in a humbler realm of nature entertains us with curious facts about the Canadian woodcock. "A Summer Holiday in the Rockies," by Julia W. Henshaw, is illustrated with some fine photo engravings of our grand mountain scenery.

In the November Century the "Beef Trust" of the United States is analyzed by Geo. Buchanan Fife, but not in a partizan spirit. "The grand canyon of the Colorado" is described in the same number by John Muir and gorgeously illustrated by seven color pictures by Parrish. An article that will interest Canadians is "the prologue of the American Revolution," being the first of a series of papers dealing with the invasion of Canada by Montgomery and Benedict Arnold. The writer, consciously or unconsciously, imitating Carlyle, gives us pictures that are rather graphic as history, but they will be interesting as describing from the United States point of view a period of Canadian history, not too well known

The Delineator for November is a good number of the year, and presents an inviting display of fashions, literary features and domestic matter. With the paper on Dante, one of the best in the whole collection, the stories of Authors' Loves end in serial form. Another collection of Historic and Other Pitchers will delight china lovers.

The editors of the Dyer and Calico Printer, London, are about to issue a manual of "Mercerization," in two volumes, with plates and illustrations and specimens of dyed and printed fabrics of this class

THE WOOL MARKET.

The last Colonial wool sale of the year will open in London on November 25th. The arrivals amount to 59,989 bales.

In the United States strength is the predominant feature of the market. The outlook has not been better for a long time.

In Toronto there is no demand for export, and the market is quiet. Prices are steady and unchanged. For fleece there is fair enquiry. Canada washed, 14c.; unwashed, 7½c. Pulled, quiet; extras, 18c. to 19c.; supers, 14c. to 15c.

Montreal.—No particular change in the merino wool trade here. Prices, if anything, are firmer Fine crossbreds are higher by 5c. to 7½c. A lot of North-West fleece has changed hands, we hear, at about 14c. Canada fleece is getting very scarce in this market. Skin wool quoted, 15 to 16½c.; Cape, greasy, 17 to 18c.

Speaking of North-West wool, the Winnipeg Commercial says: The total clip of the range country has been, according to Mr. Leadlay's figures, about 1,100,000 pounds, as against 500,000 pounds last year The average price paid for the wool clip this season was around 8 to 9c. per pound. Mr. Leadlay thinks that the sheep ranching industry has already passed the limit up to which it may be successfully carried on in the range country. The market for mutton and wool is not a large one and unless some new outlet is found the industry will hardly be able to keep up its present proportions, much less make further growth.

The Canadian woolen mills are all busy, and their requirements will be large, which must tend to harden prices for some time to come.