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Canadian Journal of Fabrics

THE JOURNAL OF THE Textile Trades of Canada.

Vol. XIX. TORONTO AND MONTREAL, AUGUST, 1902. No. 8.

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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.

E. B. BIGGAR | BIGGAR, SAMUEL & CO. PUBLISHERS | R. R. SAMUEL

TRAVELLING REPRESENTATIVE: A. W. SMITH.

PHILADELPHIA AGENT H. E. BURNETTE, 2036 North 13th Street

BOSTON AGENT: F. F. GRANT, 5 Gayland St., Roxbury.

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.

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SAVING WASTES IN WOOLEN MILLS.

An appreciation of the value of waste material and by-products in woolen and other textile mills is not yet properly developed among Canadian manufacturers. The commercial value of waste is better understood in Continental and British textile mills, where almost nothing is allowed to be lost, and it is not too much to say that the unrecovered waste of our woolen and cotton mills is one explanation of the fact that some Canadian mills have such a hard time in competing with the products of foreign mills. One difficulty here is that in the case of very small mills the annual output of waste material is not sufficient to justify much expense in providing plant and chemicals for treating it; but even here the subject is worth study, and in the case of the larger mills the subject is of first importance.

Economy in manufacturing is becoming more appreciated in United States mills, and the Census Bureau there, which is much better conducted than our own, gives a very practical turn to its work by publishing in one of its latest bulletins, a report on the "Utilization of Wastes and By-Products in Manufactures," by H. G. Kittredge, of Boston, a well known expert. The following are some extracts from this report, dealing specially with woolen mills:

The woolen industry furnishes a number of materials formerly regarded as waste, that are now utilized in the industry itself and for pharmaceutical and other purposes. The principal articles of waste are rags and wool-grease. The former is reconverted into wool and used the same as the original raw material, while the latter is employed in other industries. The sheep obtains from the soil of the pastures upon which it feeds a considerable portion of potash, which, after circulating through the system of the animal, is excreted with other matter from the skin and becomes attached to the wool. This excretion is known by the French as "suint," and oftentimes constitutes, together with the dirt that is mixed with it, two-thirds of the weight of the fleece. Formerly, the suint was allowed to go to waste when the wool was cleaned; and even now a large portion of it that is taken from the fleece is allowed to go to waste with the wash waters. There is a disposition at present, however, to recover the grease from the wash waters and use it for industrial purposes. At first, attention was directed to the saving of suint for the purpose of obtaining the potash and potash salts contained in it, and with this object a special industry was established in the wool districts of France and Belgium for converting it into commercial products, which were exhibited at the several industrial exhibitions in Europe, and especial mention was made of them at the Paris Exhibition of 1867, many of them receiving silver medals.

The encrusting matters attached to wool, besides the dirt, consists of wool fat, which is soluble in ether, and wool perspiration, which is soluble in water. The wool fat and the wool perspiration are together embraced under the name of the "yolk" of the wool. The wool fat is a mixture of a solid alcoholic body, cholesterine, together with iso-cholesterine, and the compounds of these bodies with several of the fatty acids. These free higher alcohols are soluble in boiling ethyl-alcohol, while the compounds they form with the fatty acids are insoluble in alcohol but soluble in ether. Wool perspiration consists essentially of the potassium salts of oleic and stearic acids, and possibly other fixed fatty acids, also potassium salts of volatile acids, like acetic and valerianic, and small quantities of chlorides, phosphates, and sulphates. "Industrial Organic Chemistry," third edition, Sadtler, (page 306). Thus it will be seen that the yolk of wool contains many elements of recognized value in arts and manufacturing.

When the potash salts are evaporated and ignited, they yield a product of potassium carbonate, and it is estimated that 2,200,000 lbs. of this product is saved from the wool wash waters of the mills and scouring establishments of France and Belgium. When the yolk is submitted to dry distillation, it yields a residue containing carbonate of potash, nitrogenous carbon of great value for the manufacture of yellow prussiate of potash. According to M. Chandelon, 2,200 lbs. of raw wool may furnish 300 quarts of yolk solution of 1.25 specific gravity, having a value of 14s. 8d., while the cost of extraction does not exceed 2s. 6d. ("Industrial Organic Chemistry," third edition, Sadtler).

It is only within comparatively recent years that volatile solvents have been used for extracting the yolk from wool. By far the greater quantity of wool is still cleaned by the old process of scouring with alkalies and washing in a rapid current of water. The volatile-solvent process, however, is coming into use, though now confined chiefly to establishments where large quantities of wool are cleansed. The great cost of the plant for cleansing wool by this method confines it to large establishments. Various volatile solvents can be used, such as fusel oil, ether, petroleum, naphtha, and carbon disulphide. When these solvents are used they have to be followed by washing with water, as, while they dissolve fatty matters, they do not take up the oleates, etc., of the wool perspiration. The treatment of wool by these means is now confined to petroleum naphtha, and, as now conducted, according to the best methods in vogue, is found to be not only practicable but remunerative, both in the saving of a valuable product and in leaving the wool in an excellent condition for the various processes of manufacture.

In 1897 a bill was presented to the English Parliament, from the Bradford district, relating to the treatment and disposal of "suds" from the wool washbowls in combing sheds. At that time considerable interest was attached to a process which had been introduced at the works of William Scaife & Co., wool combers, Laisterdyke. The process is described as exceedingly simple and apparently successful. The suds, after being run off from the washing bowl, are allowed to stand for about half an hour in a settling tank, to permit the sand and solid matter to fall to the bottom. The liquor is then pumped into a tank, very much like a washbowl, in the bottom of which is a system of pipes through which compressed air is forced. About one gallon of sulphuric acid is added to every 700 gallons of suds before the "blowing" begins. The violent aeration of the liquor which ensues quickly brings the grease to the surface in the form of a thick foam or froth, and a set of boards, carried on an endless chain, scrapes this off and carries it away over one end of the tank. The blowing is continued as long as any froth arises, which is just as long as there is any grease left in the water. The foam, which contains only about 5 per cent. of water, is treated just as the magma, obtained in the usual way by precipitation, is dealt with —by pressure in a steam press.

Within the past five or six years, several methods for cleansing wool, and for the recovery of the grease, etc., from the wash liquors, have been introduced into England and on the Continent, that have attracted considerable attention and comment from scientific journals. At the works of Thomas Biggart, of Dalry, Ayrshire, the recovery of grease and potash from the wash liquor is effected in the following manner: The suds from the first scouring bowl, containing about nine-tenths of the grease and potash, after standing about twelve hours to ensure deposition of the sand, are evaporated in a pan until the liquid attains a syrupy consistency. The resultant liquid is then cooled in shallow iron trays, and the grease which collects on top is removed at intervals. The semi-liquid residue is then calcined in a brick oven and the heat produced from it is used to assist in the evaporation. A crude carbonate of potash is thus produced, which, after being completely carbonated, is boiled to dissolve out the potash salts. The solution is then concentrated to 100° Tw., the potassium sulphate and chloride crystallizing out on cooling. The potassium carbonate and grease obtained are sold.

In a recent type of machine—that of Emile Richard-Lagerie, of Roubaix, France—the wool is subjected successively to the action of liquors of diminishing strength, the last being clear water. The liquors, after having passed through the wool, are pumped into tanks for redistribution until they attain a density of 1.07, when they are evaporated and the residues calcined for the manufacture of potassium carbonate. Each machine is capable of dealing with about eight tons of wool per 24 hours.

The grease is extracted from the suds at the works of Alf. Matte & Co., Roubaix, by a mechanical process of "battage." The suds are, by means of a rotary agitator, beaten into a froth, which carries the fatty matter to the surface. These are skimmed off into conduits by a mechanical scraper, and are forced by a steam extractor into a wooden tank in which they are heated to 60° C. and treated with sulphuric acid in the proportion of 1 lb. to 100 gallons. The acid is then removed by washing and the grease is filter pressed.

In the establishment of Thomas Fox, Wellington, Somerset, the soapy liquors are led into six acidifying tanks, and treated with sufficient acid to liberate the fatty acids. These on separating, together with the wool fat, are drained on sawdust filters. They are afterwards taken off and purified by distillation for conversion into soap again. The dilute acid from the acidifying tanks is pumped into intermediate storage tanks for further settlement, after which it flows into the precipitation tanks and is treated with the general waste waters from the works, by aluminoferric, sulphate, and lime. ("Journal Society of Chemical Industry," vol. 15, page 47).

There has been a patent granted in England (No. 20,433, October 29th, 1895), for improvements relating to removing, recovering, or separating certain constituents from the suint and obtaining certain valuable products therefrom. The solvent employed in this process for treating the wool is a heavy petroleum oil (specific gravity, 0.837 to 0.878) at a temperature of 120° F. On cooling the resultant liquid to about 70 F., the cholesterol of the suint separates out as a heavy deposit, while the glycerides remain in solution. This solution is found to be an efficient agent in scouring the wool, leaving it in a condition suitable for the subsequent carding, etc. The wool is treated with the petroleum oil in an ordinary wool-scouring bowl fitted with pressure rollers. One-half to one gallon of solvent is employed for each pound of wool. After about twenty minutes' action, the greater part of the liquid is drawn off, and the operation is repeated if necessary. The wool is then treated with water or neutral soap, rinsed, pressed, and dried. After filtration, the liquid is cooled, the deposit is removed, and the clear solution used again. This solution may also be employed as a lubricant or for use on leather, and since it contains no free fatty acids, it would seem to be better adapted for either purpose than the analogous mixture of degras and petroleum oil.

Among the most valuable improvements in treating wool fat and producing products therefrom are those covered by a United States patent (No. 539,386), recently granted to William D. Hartshorne, of Methuen, Mass., and Emile Maertens, of Providence, R.I. By the methods employed by these inventors five resultant products are obtained from wool fat. The object of the invention is to more thoroughly separate or divide wool fat into products possessing different properties and characteristics, so that the constituent parts of the wool fat, when obtained in a comparatively pure isolated state, are in the best form to be put to the various uses to which each is best adapted. This separation is considerably affected by temperature and by concentration of the solution from which and by which they are extracted. The fat products obtained are applicable to the following uses: (1) As a base for ointments and other pharmaceutical and toilet preparations on account of its penetrating, lubricating, and softening qualities. (2) As a leather and belt dressing, and, when freed from resinous matter, as a lubricant in conjunction with certain lubricating oils. (3) As a lubricant for wool and other animal fibres. This can be used to advantage to increase the specific gravity and viscosity of certain lubricating oils.

—Figures compiled by Gustave, Ebell & Co., of Berlin, regarding the wool trade of Germany for the past year, show that German trade, not only in raw wool, but in woolen and shoddy goods, suffered a shrinkage in 1901, compared with recent previous years. Here and there some items show an increase, but taken as a whole, the German woolen business has felt the pinch of the financial crisis brought about by over-speculation, and if it were not that a virtual combine exists to regulate prices of exports in textiles from that country, there would be a collapse in this branch of German industry.

—Reports are current that the "American invasion" of Great Britain has developed from electrical equipment and general machinery and manufacturers to the textile trades. It is stated that some United States capitalists have been looking over a number of cotton mill properties in Lancashire and that they propose to purchase these mills and equip them with United States machinery and run them on United States methods. Considering the depressed condition of English cotton manufacturing establishments, it will be interesting to see what these ambitious Americans will do in this field of enterprise. The only thing definite that has come out of these rumors is the fact that Colonel (or is it General?), Draper, head of the Northrop Loom Co., of Hopedale, Mass., has been visiting Manchester with the object of establishing a branch loom works for Great Britain. For a while English cotton manufacturers would not look at these fast running looms, but when their astonishing performances were demonstrated in United States and Canadian mills, a number of small trial orders were given, and it is to look after this infantile development that the proposed branch works are to be built. Possibly the rumors of American mills in England are based on the idea that the Northrop loom people will equip a mill with their machines to show Lancashire manufacturers how the thing is done.

The recent speculations in the raw cotton markets have caused British cotton manufacturers to think more seriously than heretofore of the need of growing more cotton in various parts of the British Empire. The urgent need is an extension in the area of a class of cotton corresponding to the American staple. Russia has set an example in such enterprise, and considerable areas of marketable cotton are now raised in Asiatic Russia with such success that Russian spinners will soon be largely independent of the fluctuations of foreign markets. Germany, too, is making steady efforts to grow cotton in her colonial possessions, and we learn from private sources that the colored young men, who were sought by the German Government from Booker T. Washington's industrial school, at Tuskegee, Ala., to introduce cotton planting in Togoland, are succeeding well. These young men went with implements such as are used in the Southern States, and propose to teach the natives of Togoland their methods of raising cotton. The idea is well conceived and should be an object lesson to British cotton manufacturers, as to what may be accomplished in such portions of greater Britain as South and South-Central Africa, West Africa and parts of British Asia, Borneo, and perhaps portions of Australia. We are glad to learn from our Manchester exchanges that an association, called the British Cotton Growing Association, has been formed with headquarters in that city, with the object of promoting cotton growing in British colonies, and the promoters are so far in earnest that they have subscribed nearly £4,000 to put their ideas into practical shape. The Liverpool and the Manchester cotton associations are represented in it, as well as leading manufacturers and the cotton operatives' associations. At a meeting last month, a discussion took place on the possible cotton fields of the Empire. With regard to West Africa, D. L. Wright reported upon the conference held in Liverpool, a few days before, with Sir William McGregor, Governor of Lagos, and Sir Charles King Harman, Governor of Sierra Leone. Much valuable information was brought out at the conference, and it was evident that the governors of these colonies were disposed heartily to welcome and give all the encouragement in their power to the extension of cotton cultivation there. Sir William McGregor stated that the only satisfactory mode of procedure was that of encouraging the native chiefs to undertake the work, while the association contented itself with supplying seed, gins, and instruction, and made arrangements for bringing the cotton to market. Edward Nathan, who has recently returned to Manchester from the Soudan, stated that the enterprise in that country was already making headway under very encouraging circumstances. He estimated that the amount of available land there was not far short of 15,000,000 acres, and the Arabs, who constituted the principal part of the population, might be regarded as likely to take up the work with good prospects of success. The cotton when grown could be without difficulty and at no very great cost brought down the Nile Valley to the markets. Seeing what has been accomplished by Russia and Germany, there is every reason to think that in a few years practically all the cotton required by British mills can be grown within the British Empire.

Foreign Textile Centres

Manchester.—The cotton spinners' federation has been in conference with a view of a further stoppage of two days a week for two months. Meetings of district associations have also been held representing 7,000,000 spindles, and if the suggestion is adopted it will tide the mills over till near the reception of the new crop. Trade among the cotton mills remains in its former depressed state. The spinning section gets no relief from its heavy depression. Though a little more business had been reported in cloth, it did not seem to be reflected in yarns, and only a very small turnover was effected for either the home or shipping sections. Prices continue without improvement, and the best show a serious loss on production.

Bradford.—Topmakers are asking more money for the finest classes of wool, and though at present the advance is unobtainable, they believe it will pay them to hold rather than to make concessions. Consumers, on the other hand, await a better disposition among merchants to pay prices which will compensate for the recent rise in merinos. Manufacturers are determined to abstain from contracting for further supplies of fine wool on the basis of present quotations. Fine crossbreds are tending upwards, and medium and lower descriptions are steadier. Home-grown wool is very dull, with no prospect of immediate improvement. Mohair and alpaca are firm.

Kidderminster.—Business in the carpet trade is quiet, and manufacturers are looking after their patterns for next season. Not much is doing in yarns, but there is an undercurrent of strength in the market. Enquiries are more numerous from all markets, and, in spite of the present slack demand, yarns hold their values very well. There is a general feeling that the wool and yarn trades may shortly be in a much better state.

Leeds.—With colonial wool firmer topmakers are asking a further advance, probably with the expectation of checking contract proposals; but neither in the top trade nor in the local wool market is much business being done. Makers of worsteds are able to keep their looms well employed with orders for next spring, and for these goods more money is being paid, though not as much as wool rates would warrant. Merchants are showing rather more anxiety to place orders owing to the upward movement at the London sales. Expectations of a good spring trade are largely confined to the home trade, excepting Canada and Australia.

Leicester.—The yarn market is active. The fancy branches are under great pressure for delivery. The hosiery industry is improving both for home and export markets.

Nottingham.—Yarns only meet with a dull enquiry, and buyers of cotton lace yarns place their orders sparingly, looking for concessions. Merino yarns are firm in value, and there is a moderate demand. Brown nets remain as heretofore. Business in the lace warehouses is brisk. Finishers are fully employed, orders being in arrears.

Rochdale.—Wool is increasingly difficult to buy at the London sales, and this places manufacturers in an awkward position, as the prices of flannel are now very unremunerative, and it is always difficult to raise them in the middle of the season. Trade is consequently dull.

Kirkcaldy.—In the floorcloth and linoleum industry, much activity prevails, and the prospects after the holiday season are encouraging. Owing to the great scarcity and dearness of raw material, the price of linen yarns is high and firm, and as a rule manufacturers are only buying in small quantities. While that is so, a fair demand is experienced for linen goods, and the factories are all very busy.

Belfast.—There is little change in the position of this linen market. Prices firm with a further hardening tendency, but the demand remains stationary, The spinning branch fully maintains the position, and all coarse yarns are selling freely at top prices. For fine yarns there is very little enquiry at the moment. The manufacturing end is steady. Coarse goods are meeting with a fair share of attention, but producers find difficulty in securing advances. The Flax Supply Association circular for June, in dealing with the Board of Trade returns relating to the imports of flax, tow and yarns into, and the exports of yarn, thread and linen piece-goods from the United Kingdom (the shipments for the month just closed being contrasted with an average for the corresponding month in the last five years), says: The imports of flax and tow together show an increase of 2 per cent. Flax is increased 4.7 per cent., but tow is decreased 11.2 per cent. There is an increase in flax from Belgium of 90.2 per cent. Yarn imports exhibit a marked increase, the quantity being increased 68.1 per cent. and the value 54.5 per cent. Yarn exports, on the other hand, have fallen off. To Germany the decrease is 5.9 per cent., to Spain 8.4 per cent, to Belgium 25.2 per cent., and to Holland 51.8 per cent. The total is 13.0 per cent. Linen piece-goods exports are decreased 18.3 per cent. The leading countries are as follows: Australasia, 2.6 per cent.; United States, 26.3 per cent ; Foreign West Indies, 28.7 per cent.; Germany, 29.4 per cent.; and Republic of Colombia, 81 0 per cent.—all decreases. France, 11.3 per cent.; British East Indies, 37.3 per cent., and Canada, 49.3 per cent —all increases. Thread exports are increased 9.1 per cent., and 14.7 per cent. in quantity and value respectively. Unenumerated articles of linen manufacture show a decrease of 5.0 per cent. in value.

Dundee.—The Textile Mercury's correspondent says: Calcutta wires that jute is quiet and business difficult, except by a concession in price. On the other hand, the buyers feel that there is little prospect of much lower prices for jute, as the reports on the crop while slightly more favorable than those indicated in the Government forecast, leave much to be desired. The feeling deepens therefore that values of new crop are likely to be maintained; £13 12s 6d. is about the price for Aug.-Sept. firsts, and other kinds in proportion. Jute yarns are steady—indeed, rather dearer. Spinners quote 1s. 5d. for common 8-lb. cops, and accept ¼d. less. For warps the price of 8 lb. is 1s. 6d. to 1s. 6½d. for favorite spins Good yarn is sold at 1s. 7d. for 7 lb., and is in demand. Hessians are in rathe better request. This is especially true of good fabrics, which are in excellent demand and are decidedly higher in value. For all miscellaneous goods there is a steady and large demand. For these "out-of-the-way" manufactures there is a constant demand. Indeed the Dundee trade relies more and more on this trade, which eludes the bitter Calcutta competition. Flax is still firmer in price There is now very little offering, and buyers wait impatiently for the new crop. The reports on the growing crop are somewhat contradictory. The season is late, and in Russia there has been a lack of good growing weather. Telegrams indicate a great improvement, with more heat. In the meantime there is very little flax offering. There has been some business done in Archangel this week at about £38 for first Zabruck, with buyers over. Tows are still higher in value, and the scarcity of suitable fibre forces this market up. Flax yarns are still difficult to sell, especially dry spuns. There is a better demand for tow yarns, and spinners have secured another small advance in price. Linen goods are in rather better request. Buyers have at last come to the conclusion that to wait longer is to pay more. America has been buying, and there is certainly not a large, but still an improved demand. Those in the jute fancy trade find it difficult to secure the full advance in prices required by the higher value of jute.

Chemnitz.—A correspondent writes to "Dry Goods," Max Jagerhuber's new paper, as follows: "So far as desirable goods are concerned, they do not want any more orders in the Chemnitz market; in fact, they have put prices so high that people cannot buy,, and the workers are so independent that they won't make anything but the easier patterns, and won't look at you if you order anything else. The principal reason why merchants in the United States do not have their goods delivered is on account of the duties which do not allow us to pay over the limited price. In England, where there is no duty, the same goods readily sell for fully 10 per cent. more than Americans can afford to pay, and therefore the Germans prefer to sell to the English, and you cannot blame them. The styles now-a-days seem to originate in New York city. The American woman no longer looks to France to tell her how to dress. For instance, in Paris at the present time, nine out of every ten women are wearing tan shoes and stockings, while in America women will not look at tan stockings."

The Silk Trade.—Dry Goods, New York, says: Business in general in America is better than it is in Europe. Although prices for raw silk are higher, European manufacturers have not been able during the present season to secure any advance on the prices obtained during the spring. Zurich manufacturers have been more successful in marketing their product than those in Lyons. For one thing, they seem to be nearer in principle to the American manufacturers. They make popular priced stuff which appeals to the people. Another reason is that the fashion tends toward plain fabrics well adapted to the organization of their mills. The French manufacturer's great forte is his creative ability and artistic taste, and as the demand for fancy goods has been extremely limited, he has naturally been at a disadvantage. Silk crepes in all the variety of weaves with the veritable crepe de Chine in the lead have lost nothing of their prestige, but appear in all of the delicate Pompadour shades and in the new reds and blues. Rich brocades are found in the silk and wool mixtures as well as in the all silk variety; some of them are represented in ton-sur-ton, but they are mostly in self color. Crepe weaves in all kinds of high class fabrics are considered good sellers and to rest on a firm foundation.

—A little machine which threads one thousand needles a minute is at work in St. Gall, Switzerland. The purpose of the machine is to thread needles that are placed afterwards in an embroidery loom for making Swiss or Hamburg lace The device is almost entirely automatic It takes the needle from a hopper, carries it along and threads it, ties the knot, cuts the thread off a uniform length, then carries the needle across an open space and sticks it in a rack. The work of threading these needles was formerly done by hand.

Textile Design

FANCY CASSIMERE.

Complete Weave.
Repeat 2x2.

Warp:—2,376 ends, all 4 run woolen yarn, 8 or 12-harness straight draw.

Reed:—9½×4=64 inches wide in loom.

Dress:—

1 end, white 1 end, gray mix 2 ends, white 2 ends, gray mix	×8=48 ends,
1 end, white	= 1 end,
1 end, gray mix	= 1 end,
2 ends, white	= 2 ends,
1 end, gray mix	= 1 end,
1 end, bright brown	= 1 end,
1 end, white	= 1 end,
1 end, gray mix	= 1 end,
2 ends, white	= 2 ends,
2 ends, gray mix	= 2 ends,
1 end, white	= 1 end,
1 end, gray mix	= 1 end,
2 ends, white	= 2 ends,
1 end, gray mix	= 1 end,
1 end, green	= 1 end,

Repeat of pattern: 66 ends.

Filling:—35 picks per inch, arranged thus:

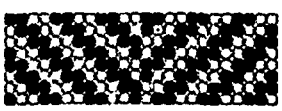
1 pick, 2-ply, 6-run black and white, d. & tw. 1 pick, 3½-run black	×33=66 picks.
1 pick, 2-ply, 6-run black and white, d. & tw.	= 1 pick.
1 pick, 3½-run red	= 1 pick.
1 pick, 2 ply, 6-run black and white, d. & tw. 1 pick, 3½-run black	× 5=10 picks.
1 pick, 2-ply, 6-run black and white, d. & tw.	= 1 pick.
1 pick, 3½-run green	= 1 pick.

Repeat of pattern: 80 picks.

Finish:—Melton finish, scour well, clip on shear, press; 56 inches finished width.

(From The Textile Record, Phila.)

CHEVIOT SUITING.



Complete Weave.
Repeat 24x4.

Warp:—2,400 ends, 8-harness fancy draw.

Reed:—19×2=63½ inches wide in loom.

Dress:—

1 end, 2-ply, 6-run black double and twist	= 1 end,
1 end, 2-ply, 6½-run white and 5½-run dark drab, double and twist	= 1 end,
1 end, 2-ply, 6-run white, double and twist 2 ends, 2-ply, 6½-run white and 5½-run dark drab, double and twist	×7=21 ends,
1 end, 2-ply, 6-run white, double and twist	=1 end,
1 end, 2-ply, 6-run black, double and twist	=1 end,
1 end, 2-ply, 6½-run white and 5½-run dark drab, double and twist	=1 end,
1 end, 2-ply, 6-run white, double and twist 1 end, 2-ply, 6½-run white and 5½-run dark drab, double and twist	×9=18 ends,
1 end, 2-ply, 6-run white, double and twist	=1 end,
1 end, 2-ply, 6 run black, double and twist	=1 end,
1 end, white spun silk, single	=1 end,
1 end, 2-fold, white spun silk	=1 end,

Repeat of pattern: 48 ends.

Filling:—43 picks per inch, all 5-run black.

Finish:—Cheviot finish, scour well, clip on shear; 56 inches finished width.

(From The Textile Record, Phila.)

DIFFICULTIES DURING FINISHING.

As a rule, the difficulties originating outside of the finishing room can best be corrected in the department where they arise, though some demand special care and treatment in the finishing room. At all events, the finisher is expected to bring the goods out as nearly perfect as possible, and to do this entails upon him the double duty of having his eyes open to faults in both his own and other departments, which have an influence upon his work. Difficulties in the finishing room, says the Textile World, often come when least expected, and sometimes disappear before their cause has been determined.

One of the troubles which almost every finisher has at *times to deal with is that of cockled cloth; while it is made* distinctly manifest in the finishing department, the cause may or may not be due to any fault in the finisher's method. In fact, it is more frequently traceable to some other department, and there is hardly a department in the mill that is entirely free from a possibility of causing the trouble. There are three conditions that may cause cockles to originate in the finishing room. If the fulling soap is not sufficiently strong to thoroughly saponify the grease in the goods, the fulling must be imperfect. In places where the grease has been overcome, and its effect destroyed, the fulling will proceed, while it will be retarded where the saponification has not taken place, or is imperfect. This, of course, results in irregular fulling, and the cause can only be removed by adding to the fulling soap a sufficient amount of alkali to render its action perfect and complete. Another cause of cockles may be the lack of sufficient amount of alkali to render its action *perfect and complete. Another cause of cockles may be the* lack of sufficient soap. If there are parts of the cloth that are not sufficiently wet, they will fail to full, while the parts that are wet are favorably affected, thus producing an irregularity. A third cause, which is somewhat similar to the second, is the careless application of the soap, by which, even though the quantity be sufficient, it fails to go on the cloth evenly, and the parts that are wet, first get the start of the places that become wet later, thus producing an irregular width which the after fulling may not fully overcome. The finisher should therefore see to it that his soap is equal to the requirements, and that the soaping is carefully and intelligently done.

It would be impossible to designate all the things in the other departments that would cause cockles. But it is plainly evident that anything could in any way produce uneven fulling might be responsible for them. The following are a few of them: In the picker-room any irregular mixing of long and short stock, or wool and cotton, by which some portions of the filling yarn would have more of the good stock than other portions; any irregularity in either size or twist of the yarn; and we may here say that this suggests the importance upon some kinds of work of keeping top and bottom spools from the cards separate and using the yarn separately. Careless steaming of the weft, by which some parts may become saturated with water, causing irregular weaving, will sometimes *give trouble. A variation in the weaving by which the cloth* may vary in weight, having heavy and light places; this may occur from the carelessness of the weaver or from an irregularity in the take-up of the cloth, or the friction or let-off at the warp beam; or sometimes a beam that is crooked or with a sprung shaft will cause an irregularity in the cloth. All of these possible causes make it nearly impossible for the finisher to at once locate the cause or to apply the remedy. But he should be able to determine if the trouble is in his department, and act accordingly.

Cockles caused in the finishing-room are usually irregular, and the wrinkles caused by them more pronounced in the

middle than on the sides of the cloth; while if caused in the other departments, the wide and narrow places will show equally all across the cloth, the changes being abrupt from wide to narrow, and often in spaces indicating one or more bobbins of weft, or at uniform intervals, corresponding with the revolutions of the warp beams. In the matter of the oil used upon the material in carding, the manufacturer cannot be too careful to secure a good oil and avoid frequent changes. The manufacturer is sometimes too ready to try experiments, and by getting into the works two or three kinds of wool oil, each of which requires a different strength of soap, gives the finisher the impossible task of producing uniform results with a soap only adapted for one of the oils in question By a proper adaptation of the soap, and a careful application of the same, together with a prompt report when it is discovered that cockles are caused by faults in the other departments, the finisher will have done his duty regarding them.

Another trouble which the finisher has sometimes to contend with is mill wrinkles, or wrinkles made in the fulling mills, which become felted, so that they cause an imperfection in the finished fabric. As a rule, these wrinkles occur near the ends of the cloth, usually being most pronounced on the end that enters the mill first. Careless sewing of the ends, by which the seam is irregular, or the stiches too long, will produce wrinkles; and often their extent into the cloth is in proportion to the irregularity or length of the stiches. Fine and uniform sewing, or, what is better, the use of a mill sewing machine, will remove this cause.

The weaving of headings in the ends of the cloth, of yarn that fulls faster than the body of the piece, will cause the cloth to wrinkle, on the same principle that narrow places in cockled goods will produce them; and where the wrinkles remain in the cloth during the fulling they produce felted streaks. It is best to have no heading woven in the cloth, unless it be of yarn of less fulling quality than the regular weft. Should the mill wrinkles occur in the body of the piece, without reference to the ends, the only remedy is a frequent overhauling or opening of the cloth to change the folds in it before they become set or felted. If the cloth is not intelligently designed or "laid out" in the loom and the warp threads are crowded or out of proportion to the weft mill wrinkles will result, in spite of the finisher's best efforts, especially upon goods requiring several hours' fulling. Anything that tends to open the cloth on its passage from the rolls to their entrance again, or otherwise to change folds, will obviate the trouble, and in this matter there is an opportunity for an improvement in the modern fulling mill.

Rolling selvages are usually due to something not under the control of the finisher. Frequent opening and shaking of them out or sewing the edges of the cloth together, with the side toward which they roll outward, so that in their tendency to roll they are holding each other from it, are the only remedies for the finisher. Further corrections must be made in the yarn or weaving. Cloth with a predominance of weft on one side will tend to roll toward that side; and the trouble is intensified by the open or loose character of the weave. If the selvages are made in the loom tighter, or of stock that will shrink faster, and in consequence become tighter than the cloth, they will at once begin to roll, and the only remedy is a change either in the yarn or the weave of the selvage, to make it slacker or less inclined to shrink.

Sometimes, when the selvages are all right, the leaving out of a broken warp thread in them, or a wrong draw, will expose the weft, causing the shrinkage at that point that will turn the edge of the cloth and produce the trouble. It is too often the case that the weaver fails to understand the importance of perfect selvages, and they go to the finishing-room in all kinds of conditions, giving the finisher trouble in fulling, gigging, shearing, and pressing, often resulting in their destruction, despite his best efforts to save them. The result of rolling selvages is a more compact and heavier felt on the sides of the cloth, owing to the increased warmth at that point in fulling; so that it is quite impossible to produce a uniform finish, even if the finisher succeeds in opening out the cloth in the last processes of this work.

Dirty goods mean a serious difficulty. One important thing which is too often overlooked is the fact that the fulling is, or should be, considered a part of the scouring process, and serves as such when it is correctly done. As a rule, where goods are not properly cleansed, the fault is as likely to be in the fulling as in the scouring. If the saponification is imperfect or incomplete in fulling, the heat produced in the process tends to set the grease, making it harder to remove in scouring. If the saponification is perfect it converts all the grease into soap, and though in dirty state, if of sufficient body, it holds all the foreign matter until the scouring follows to complete the work. There are many difficulties in the dry finishing that are the direct result of a failure to properly clean the goods, hence the battle is largely won by *thorough work in the wet department*. *Crooked plaids* or checks are sometimes made worse by uneven or very slack selvages; but good results can only be assured by care to keep them as nearly straight as possible in drying and on the press.

FABRIC OF THE ROCHDALE WEAVERS.

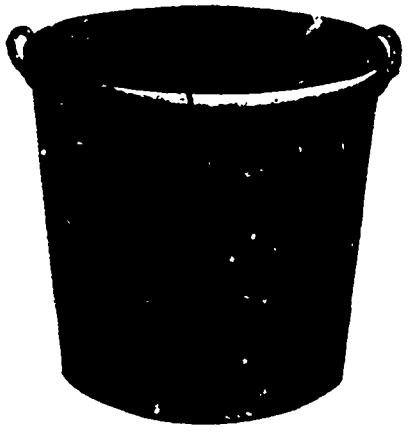
It is not known to everybody that to the weavers of Rochdale, Eng., belongs the credit of being the pioneers of the co-operative system of supply, and that the co-operative association which they founded in 1843 is to-day perhaps the largest institution of its kind in the world. They wove better than they knew, and the fabric they completed then is a model of its kind. The Montreal Witness thus summarizes its last annual report:

Inaugurated in the year 1843 by a small gathering of poor weavers in Rochdale, the last annual report of its operations shows an expansion truly marvellous. The first co-operators agreed to pay twenty pence a week into a common fund, but so great was their poverty that few of them were able to meet their payments. Their number increased, however, and at the end of the first year they had a capital of £12, but realized no profits. In the second year the membership had risen to 74, and the profits amounted to £22. The spirit that animated these poor associates was admirably shown by the meeting at which this result was declared by the setting apart of two and a half per cent. of their surplus as an education fund. Thenceforward the association developed its resources till, in 1876, its membership numbered 8,890, in which year its business amounted to £305,000, and its profits to £50 000. The gigantic expansion of the movement since that date is seen in the account of its operations for the year 1001, which gives a total of £81,782 900, or more than four hundred million dollars, with dividends to shareholders of over forty-five million dollars! Capitalistic combination, which is known in every instance to be largely based on the hypothetical value of monopolies in assumed control of markets, can show nothing more wonderful than this. From an economical viewpoint it demonstrates the stupendous values in the business of supplying the people with the necessities of life This is further proved by the simple statement that the association has reduced the cost of conveying goods from the producer to the consumer from 33 1-6 per cent. to 6½ per

cent. In addition to its vast wholesale stores and 3,000 retail shops, it carries on a huge system of banking, building, fire, life and accident insurance, education and various schemes of recreation and social improvement. The wisdom and practical beneficence of co-operation could not be more thoroughly demonstrated. The splendid success of the Rochdale Association has inspired like movements in the countries of continental Europe, notably in Germany and Switzerland, with almost equally encouraging prospects. On this side of the Atlantic successful co-operative associations are in operation in California, Kansas, Iowa, Maine and Massachusetts. In the last named state the Co-operative Association of America recently acquired the largest department store in New England, outside Boston, and is devising plans for further extension of its business. It will thus be seen that the plan of co-operation among the people is advancing and extending with very appreciable strides.

A SAMPLE OF TRUE ECONOMY.

In England, where the edge of competition is even keener than in our own country, there are quite a number of firms manufacturing rawhide baskets for use in mills, while in this country their use is very limited. Why is this thus? The shrewd Englishman simply does not look on "first cost" of an article, when he buys his supplies for his mill, and his policy of real economy always leads him to consider quality first and price second. The ordinary mill basket is cheap and lasts about a year, the rawhide basket costs about twice as much but lasts about fifteen years. This is why the English-



man gets the rawhide kind and the average American is still a point behind in that respect. But to the credit of the latter, be it said, that many have come to ar awakening and there are quite a few mills running to-day that have "no basket account" because "they bought once, but not since," and rawhide did it. The firm of John W. Barlow, of Lawrence, Mass., an old "standby" and "landmark" in the mill-supply business of this continent, have made rawhide baskets for many years, and of all descriptions, round taper, oblong and half round doffer. These baskets are made from imported Buffalo rawhide and while they are light they are very durable and almost indestructible. The truly economical millman buys rawhide baskets; he won't buy again, because he won't need to.—"F." in Wade's Fibre and Fabric.

—An English firm has recently brought out a machine for removing wool from sheepskins. It is not properly speaking a wool pulling machine, since the wool is removed by the action of a wire heated to a white heat by electricity which burns off the wool at the root of the fibre.

THE SPIDER AS A SPINNER.

One of the most interesting features in the economy of spiders is their power of emitting slender threads of a silk like substance called gossamer, with which most of them construct mesh-like nets, and a few long, langling cables, by which they are buoyed through the air with nearly as much facility as though they had been furnished with wings. The apparatus provided by nature for elaborating and emitting this gossamer is a beautiful piece of mechanism. Within the animal there are several little bags or vesicles of a gummy matter; and these vesicles are connected with a circular orifice situated at the abdomen. Within this orifice are five little teats or spinnerets, through which the gossamer is drawn. It must not be concluded, however, that there is only one film of gossamer produced by each spinneret; the fact is, these teats are studded with thousands of minute tubes too small for the naked eye to perceive, and each of these emits a thread of inconceivable fineness. These minute tubes are known as spinnerules, and the films which proceed from them unite like so many strands of a rope to form the thread of gossamer by which a spider suspends itself. The finest thread which human mechanism can produce is like a ship's cable compared with the delicate films which flow from the spinnerules of the largest spider. The films are all distinctly separate on coming from the spinneret, but unite, not by any twisting process, but merely by their own glutinous or gummy nature. Thus the spinning apparatus of the disdained spider, when viewed by the eye of science, becomes one of the most wonderful pieces of animated mechanism known to man. The animal has great command over this apparatus, and can apply it at will, as long as the receptacles within are replenished with the gummy fluid, but as soon as this gum is exhausted, all its efforts to spin are fruitless, and it must wait till nature, by her inscrutable chemistry, has secreted it from the food which is devoured.—Dr. M. L. Holbrook, in the "Phrenological Journal."

WHAT GOES IN WOOLENS IN NEW YORK.

Mixtures of rough weave and hairy effects undoubtedly have the lead for walking costumes. They are far more chic than smooth surface or piece dyed textiles, being especially adapted to the style and intent of the rough and ready suit. Checks and small plaids, mostly in two shades of a color, are forcing recognition, and their first blossoming into garments will undoubtedly be in the tailor costume if not the walking suit; the distinction between the latter and the former is a difference in the length of the skirt. In these shaded effects the darker shade invariably forms the background. Green, blue, gray, garnet or crimson are the leading colors and there are also blacks crossbarred with white.

The superiority of the season's productions to anything ever before achieved in this country is creating general interest and much comment. All of the new styles in rough and hairy mixtures, canvas weaves, crepe effects and heavy étamines are represented in great variety, most of which, in beauty of weave and structure and softness of coloring, are successful rivals of the best imported goods.

AIR VALVES.

The escape of compressed air through an air valve, or other opening, has been known to produce bursting of the main pipes; for the escape is instantaneous, and permits the columns of water in the pipes on both sides of the valve to rush together with great forces, which arrest each other, and react against the pipes.

SOAPS FOR SPECIAL USE ON TEXTILES.

By H. C. Standage, in The Textile Journal, London.

The soap employed in the textile industries require to be of special composition. A soap made from bone grease and oleine should be avoided; those made with tallow and bleached palm oil are the best for some purposes. In making these soaps, a special procedure must be followed, such as having the palm oil bleached by heat, so as to remove the peculiar smell palm oil imparts, while the saponification is first effected by the use of a lye of 10 to 12 degs. B., and subsequently filled with a stronger lye of 15 to 16 degs. B. Even in the boiling of the soap now, it should be done on a clear sub lye. The following formulæ are typical of good textile soaps:

(a) Tallow, 8 parts; pea-nut oil, 12 parts; bleached linseed oil, 4 parts; palm kernel oil, 12 parts; caustic soda, 8 parts; salt, 3.6 parts. Thi is for a hard soap.

(b) In a soft soap the ingredients may consist of 8 parts of tallow, 6 parts of bleached palm oil, 14 parts of saponified oleic acid, 9 parts of pea-nut oil and 3 parts of bleached linseed oil.

(c) In woolen articles soda, as a saponifying ingredient must not be used, because a soda-lye produces a hard soap, which causes the woolen fibre to "felt" together. The saponifying lye should be one made with potash, thus producing a "soft" soap.

(d) As a washing compound for woolen textures, the following is very good: 3½ parts of dried soda (i.e., crystallized carbonate of soda that has been exposed to the air until it effloresces to a dry white powder); 1 part of powdered soap (soap that has been cut up and dried by exposure to the air until it can be reduced to powder by grinding); 1 part of sal-ammoniac in powder. These ingredients are mixed together by sifting several times through a fine sieve, and for use the requisite quantity of the compound is dissolved in water, in which the woolen textile is dollied and removed, and dried without wringing.

A cleansing soap for silk textiles is prepared by cutting up 150 parts of soap into small pieces, and putting same into a suitable boiling vessel, together with 150 parts of beef gall, 16½ parts of pure honey, 15 parts of sugar, and 25 parts of Venice turpentine. When these ingredients are well incorporated, line a suitable mould with a wet cloth, and pour the hot soap mass into the mould, and allow it 24 hours to cool, when it will be sufficiently hardened to be cut up and used for washing the textile with.

Scouring soaps for cleaning various textiles are of different kinds, of which the following formulæ are typical:

(a) The following soap is for removing wine and vinegar stains from fabrics: Cut up 9½ ozs. of castile soap, and dissolve it in sufficient spirit of wine, in a bottle, placed in a vessel of hot water; while dissolving, whisk up the yolks of 8 eggs, and mix this with the soap mixtures. Shake up the mixture well, then add one fluid ounce of oil of turpentine, and well mix the whole. For use, the stained part of the fabric is rubbed over with a piece of clean linen, dipped in this *saponaceous compound, and then the part rinsed in clean* water.

(b) The following compound is for a similar purpose as the above: Cut up 5 ozs. of hard white soap ("curd" soap, which is composed of mutton tallow saponified with a soda lye). Put the soap in a jar, and pour over it ¼ fluid oz. of oil of turpentine, and add 50 grains of sal-ammoniac. Stand the jar in a vessel of boiling water, and stir the mixture until all the ingredients are well incorporated.

(c) The following soap is for cleaning cotton and silk textiles: Cut up 16 ozs. of good ordinary laundry soap, and mix it with 8 ozs. of beef gall and 3½ ozs. Venice turpentine. Put the mixture into an earthenware jar and stand same over a hot-plate, gas stove, or in an oven, until the soap is melted; then well mix by stirring up the contents.

(d) The following soap compound is made into balls or moulded into cakes, and used like ordinary soap for removing stains, etc., from cloth and silk goods: Cut up 1 oz. of Venetian or Castile soap into shreds; just moisten the mass with soft water (i.e., water free from lime and magnesia salts), add 1 to 1½ minims of oil of tartar, and digest together at a gentle heat; then roll into balls. "Oil of tartar" is carbonate of potash which has deliquesced by exposure in a moist atmosphere.

(e) The following soap is one of general use for removing spots and stains on fabrics. For use, the stained parts are moistened with water; then the soap ball is rubbed over the part, which is allowed to dry on; then the spots are washed again with soft water; this process being repeated, if the stain is not at once removed by the treatment. Afterwards, the fabric should be rubbed up with the soap by a piece of pure linen or damask. Preparation: Cut up 4½ ozs. of castile soap, gently warm it, then add 40 grains of powdered verdigris, 40 grains cream of tartar, and work the mass into a dough, and finally mix in ½ dwt. (30 minims) of filtered lemon juice. Well mix the whole mass; then make up into balls or cakes, and allow them to dry at a moderate temperature. The color of the soap is green.

(f) The following compound is prepared and used precisely as in the last recipe: Cut up 4½ ozs. of Venetian soap into thin shreds, moisten them with a little water, and work the mass into a dough; then mix in 48 grains of sulphate of zinc (powdered), 48 grains of red bole (powdered), 14 grains of carbon or lampblack, and 20 minims of spirit of sal-ammoniac, and form mass into balls.

(g) A cleaning soap for colored textiles is prepared as follows: Melt 250 parts of cocoanut oil, and stir into it 15 parts of beef gall, and saponify the mixture by stirring in 120 parts of soda lye of 38 degs. B. Color the soap green, when finished, with 3½ parts of green ultramarine, and perfume with 7½ parts of oil of lavender, 7½ parts of oil of cumin. For use, it is employed like ordinary soap.

(h) A cleansing soap for wool, to free it from grease, is prepared as follows: Boil to a grain in caustic soda lye, 175 parts of cocoanut oil, 6 parts of olive oil; allow the soap to separate; then draw off the lye, and add 196 parts of potash solution of 20 degs. B., and boil up for a short time; then add 44 parts of cocoanut oil, and when that is taken up by the soap mass, add 44 parts of potash solution of 20 degs. B., adding this by degrees, allowing every quantity to be taken up before adding the next portion; then turn out the soap compound into moulds to solidify; cut up for use.

(i) A soap for removing grease stains is prepared by rubbing together in a warm wedgware mortar equal parts of Venice turpentine and carbonate of potash, together with a little water, to mix the whole into a paste or dough Mould this into cakes or balls for use

(j) The following soaps are useful for dyed goods (dyed with madder) for brightening the colors of the printed pattern. Make a lye by dissolving 5 parts of soda caustic in 34 parts of water and work the lye, saponifying 60 parts by fatty matter, such as oleic acid or olive oil.

(k) Harmless scouring soap: Cut up into slices 35 parts of white curd soap; dissolve this in a little water, stir in 6 parts of pearlash, and when this is incorporated, add 3 parts

oil of juniper berries, and form into balls or press into cakes.

(l) A scouring soap for woolen textiles is prepared by melting 25 parts of cocoanut oil, and stir in 1½ parts of ox gall, and saponify the mixture with 12½ parts of caustic soda lye (38 degs. B.) Color the mass with a little ultramarine, and perfume with a mixture of oil of lavender and oil of caraway seed. The ox gall may be purified by first boiling it with 10 or 12 per cent. of wood spirit, and stirring.

(m) An ox-gall cleansing soap for cotton fabrics is prepared by melting 2 parts of white curd soap in a little warm water and then mix in 1 part of purified ox-gall, and when the same has hardened, cut up or press into cakes.

(n) Woolen fabrics should not be cleaned with soda soap (i.e. curd soap), neither should resin be present in the soap mass, because it renders the wool fibre harsh, while silicates of soda are decomposed in the processes incidental to the textile manufacturer's manipulation, whereby the silica is deposited on the fibre and injures it. Starch is also a detrimental component of a soap for wool cleaning. It should be mentioned that resin, silicate, starch and sugar, are all used in soap making as "fillers" to give weight to the saponified mass of fatty matter and alkali. Such filling ingredients should not be used in preparing soaps for textile purposes As regards woolen, a potash soap (i.e. a "soft" soap) is the best to use. There should be a slight excess of alkali, but no adventitious agent. The proportions of the fatty matter and alkali that produce the best compound for cleaning woolen goods are these:

1. Fatty acids, 50 parts; potash, 11½ parts; water, 38½ parts=100 parts. 2 Fatty acids, 40 parts; potash, 9½ parts; water, 50½ parts=100 parts. There are many other compounds used by dyers and finishers for the cleaning of textiles, *removal of spots stains, etc.; but these we must leave for a* separate paper.

FULLING HEAVY WOOLENS.

In the fulling of all woolen textiles there are certain conditions which have the effect, to a greater or less degree, of retarding the process, and of keeping it from bringing about the desired results in the quickest time possible, and with the least expense as to labor and time, and preserving the value and wearing qualities of the material. A soap which is not right in its constituents or in its makeup, or which is not applied correctly or at the right time or cloths that are not correctly prepared for the process, or are peculiar in some measure as to the stock of which they are made or the conditions in which they are brought to the mill, are some of the conditions which will lead to the retarding of the process. It is especially in connection with the latter that we wish to deal in the present article. Heavy goods, and goods that are thickly woven, and such as carry in their body a considerable amount of grease and dirt and natural materials, will always be found to full with great difficulty. Something special must be done in order to counteract these conditions and make the process such that in its action upon the textile it will increase its value rather than diminish it. One of the things which is constantly done in order to help the fulling process in working on these kinds of cloth is to wash the goods previous to their being put in the mill. This washing *does not necessarily have to be very thorough—nothing* like, in fact, that which succeeds the fulling, but it has to be sufficiently vigorous to loosen all the foreign materials in the fabric, and give the fibres an opportunity to come into contact with the soap, and to get all the benefit which is to be derived from friction and heat, which are the working elements in the process. It may seem as though this washing were unnecessary and simply an added expense, but experiment undoubtedly will testify to the fact that in most cases it is a distinct advantage.

In order to show the actual facts of the case, if a quantity of pure wool be taken and washed before it is fulled, it will lose about 5 per cent. of weight as compared with wool that has not been washed. The explanation of this loss is probably the fact that a larger amount of dirt and grease has been removed. If a quantity of pure wool be taken and fulled without washing, it will be found that it will be much more difficult to cleanse it afterwards; and this would seem to indicate that the removal of the foreign materials previous to the fulling is a distinct help, so far as the strength and quality of the wool fibre are concerned. A woolen not washed until after fulling will yield two or three times as much of the foreign material as goods that are washed previous to fulling. It might be thought that the washing before fulling would make the fulling operation shorter, so far as time is concerned; but the fact of the matter is, the time consumed is about the same. While this, however, is true, the distinct advantage comes, not in the question of time, but in the question of the appearance of goods, together with their handle or feel. The colors and shades always show up better where the goods have been previously washed, and the whole appearance of the fabric is so superior that while perhaps expense has been incurred, and the time of operation has not been shortened, nevertheless, taking it all in all, the additional process has easily paid its way.

In fulling, one of the things that we have to look after is the crowding up of the goods to the required limit. It is noted in connection with this previous washing that it distinctly aids in this particular in some cases. We have observed that where carbonized wools of low grades are employed, it is sometimes very hard to get them up to the point desired unless they are previously washed. In working on this description of fabrics, it is almost fatal to attempt to force the operation, since it cannot be done without detriment to the life and strength of the goods. If goods of this description are treated with benzine, they will always give up a certain amount of grease and fat, and this seems to indicate that soap is present, or, in other words, the goods are not properly washed. The only way to be sure of a clean fabric under these conditions is to wash before fulling. There is a considerable difference in the amount of time required for fulling these goods when they are washed previously and *when they are not. If they* have been thoroughly washed for three or four hours with a good supply of soda alkali, the time will be reduced nearly 30 per cent. This is true, it must be remembered, with the low-grade stocks of which we have been speaking. If shoddy be used in these low-grade woolens to any liberal extent, the washing before fulling will in many instances give the fabric the appearance of woolen cloth, and pretty nearly cover up the presence of the adulterant; but the shoddy has to be in right condition, and if it is carbonized, as it usually is, it must be washed free of sulphuric acid. If you boil the woolen in water, and find that it gives an acid reaction, you may know that it is not free of the acid and will not work to the best advantage. Where this free acid is present, and the goods are brought into contact with a soda alkali, the tendency is for the formation of a new kind of material upon the surface of the fibres This material will act injuriously in connection with the fulling, since it is insoluble in water, unless the water is considerably heated

Some may say, perhaps, that washing keeps the goods from fulling up to the right width and length, and indeed

this may be the experience under certain conditions, but we may rest assured that where it does occur, the fault does not consist in the fact that the operation has been undergone, but that it has been improperly manipulated. If the washing previous to fulling has been thoroughly done, and the fibres left perfectly free to be acted upon by the fulling elements, without at the same time having their natural properties impaired or destroyed, the fulling process simply cannot help but be expedited thereby. If, however, it is impossible to get the goods quite up to the point, this is somewhat atoned for by the very much superior appearance and feel of the fabric in question.—American Wool and Cotton Reporter.

RENDERING COLORS ON WOOL FAST TO STEAMING.

Certain of the azo colors on wool undergo a marked change when subjected to the action of steam. As steaming is indispensable in the finishing of woolen goods, a method of rendering these azo colors proof against the action of steam would be of great value. The Manufacture Lyonnaise de Matieres Colorantes propose a method for effecting this result, and state that the change of shade is due to the transformation of the color from one group of azo dyes to another. For example, azo black turns red at first by reason of its combination with an amidoazic compound, the presence of which on the fibre can be readily demonstrated

The Lyons company have conducted a series of experiments based on this assumption, and state that they have by the use of oxidizing agents succeeded in counteracting the action of the fibre on the coloring matter. Only those agents are employed which are not readily modified by the animal fibre before the steaming process. The bichromates and permanganates are not suitable on this account, while the chlorates, and such bodies as salts of copper, are found to answer the purpose perfectly. The process is very simple, consisting in impregnating the goods with the oxidizing salts; this can be done either in the dyebath or afterwards. The quantity of oxidizing agent used depends upon the depth of the shade and quality of wool. The following are the average quantities used: 3 to 4 per cent. sulphate of copper on weight of goods, and 5 to 8 per cent. chlorate of soda. When the copper salts are used, the goods can be washed either after dyeing or impregnation with the salts; this is not the case when chlorate of soda is used. Among the colors made fast to steam blowing by this method may be mentioned the naphthylamine blacks, naphthyl blue black N and anthracite black.—Textile Mercury.

THE VALUE OF HUSTLING.

The value of getting out and hustling for a market for novelties was illustrated in an interesting way in the recent experience of a New England mill. Until three years ago, this mill had never made anything but the plainest kind of goods At that time the treasurer concluded that it was time to do a little experimenting and he spent a day a week in New York and Philadelphia studying what was doing in goods made from yarns below 40s.

He was fortunate in employing a superintendent who was not afraid of anything ever put on a loom, and when he asked him one day about a certain kind of basket weave he was cheered into believing that the goods could be produced very readily and at low cost on machines that would cost but a trifle and could be used afterward in a variety of ways. Accordingly he took some orders in a small way for some coarse basket novelties and began producing the goods.

Presently the man who first gave him the orders asked him if he couldn't get him out 100,000 yards of these goods immediately, and he was only too willing to make a try for the offer. He moved about a little, and he found that the converter who was using his goods had made quite a hit in the market with them as a dress fabric

They had been sent to a Rhode Island finishing works, where they were mercerized and dyed in many different colors and were sent out ready for the retail market to be sold for 25 cents a yard. They netted the local manufacturer about eight cents a yard, and he was quite content with the profit he picked up on the order. It is needless to add that this treasurer has become confirmed in the opinion that with the help he can quickly gather about him in a centre like this, he can soon build up a distinctive trade in novelties and produce them in a mill that will be classed in the world as a print factory for many years to come.—Textile Excelsior.

A NEW SOURCE OF INDIGO.

A patent has been taken out in France for extracting indigo from the leaves of a species of Lonchocarpus, which grows in and near Dahomey. The leaves are cut up small and allowed to ferment in water for from seven to twelve hours, according to the heat of the weather. By the use of filter presses, a clear, colorless liquid is obtained from the fermented mass, and is precipitated with lime—air being blown through the mass. The blue indigo is then obtained in the solid state.

To bring all impurities into solution, and to facilitate the settling of the indigo, the lime vat is boiled for about a quarter of an hour, at the end of the oxidation process. The liquid is then decanted, and the indigo blue is made into cakes, which are dried in the shade in the open air.—Textile Excelsior.

USES OF MOHAIR.

Mohair is the trade term for that part of the hair of the Angora goat which is used in the manufacture of textile fabrics for upholstery or other purposes. Besides the mohair, there grows upon the Angora goat a short, stiff hair, which is technically known as "kemp." Its presence in mohair always reduces the price in proportion to the amount that is present. The reasons for this are various: the hair is coarser than the mohair; it is lustreless; it is of various short lengths and must be removed, in doing which there is a heavy loss of mohair, and it will not, except to a limited degree, take the dyes used for mohair. The properties which render mohair desirable for the textile manufacturer are its length, fineness, lustre, strength, elasticity and specific gravity. There is no difficulty in securing length and strength, but the other properties must come by the most painstaking care by breeding. Having length, strength and lustre, the manufacturer wants the fibre as fine as can be bred. Good mohair averages about one five-thousandth of an inch in diameter. After the mohair sorter has done his work with a fleece, the fibre is scoured, dried and straightened, and then put upon a combing machine. This machine separates all fibres, whether of kemp or mohair, of four inches in length and under. Kemp of a greater length than four inches remains with the longer mohair. If there is much of this long kemp after the first combing, the fibre passes through a second combing, the machine being set to throw out the kemp and mohair of greater length. The residue of these two combings being a mixture of kemp and short mohair, is called noilage. The mohair thus combed is

used in the fabrication of plushes, upholstery goods, etc., while the noils go into the manufacture of carpets, blankets, etc. Many grades of mohair are mixed with silk and wool in a large variety of fabrics. It adds to these not only its brilliant inherent lustre, but great durability as well. Angora pelts are used quite extensively as carriage robes. In their natural whiteness and brilliancy, which cannot be excelled, the skins of the kids and younger does are made up into robes for baby carriages. As rugs these skins are both ornamental and durable. They may be used in their original whiteness or be dyed any color to suit. Their softness makes them very desirable.—Carpet Trade Review.

SOFTENING CHLORED WOOL WITH METALLIC SALTS.

Treatment with chlorine and its compounds, such as bleach, usually seriously affects the useful properties of wool, and in particular the power of felting. The wool also becomes as dry and stiff as cardboard A process has been patented for restoring to bleached wool its elasticity, suppleness, soft handle, and felting power, by means of the salts of the metals. The most appropriate salts are those of aluminum, zinc, tin, iron or chromium, and the chlored wool is simply immersed in a solution of the salt. The baths are made with 125% of the weight of wool, of aluminum acetate dissolved in water to a strength of 10° Be., or a corresponding solution of another metallic salt. In all cases the salt should be one of an organic acid, such as tartaric or acetic. The action of the bath can be accelerated by warming it, and after a short immersion the wool is rinsed, neutralized with a bath of carbonate of soda, and rinsed again. The stiff handle does not disappear immediately, but gradually on exposure of the rinsed and dried wool to the air. At the same time the felting power is regained. The bath can be used any number of times if kept up to strength by adding more metallic salt and water, as may be necessary after the removal of each batch of wool.—Dyer and Calico Printer.

NEW TURKEY RED DYEING PROCESS.

The Badische Anilin and Soda Works claim to secure a fast Turkish-red on cottons and other fabrics of vegetable origin by the use of alizarine and of similar mordanting pigments. The process, which has been patented, consists essentially in employing an oil bath prepared by boiling together castor oil, caustic soda in aqueous solution, sodium stannate, sodium aluminate, and sodium phosphate, and, subsequently, a strongly acid mordant. The dyeing operation is by these means greatly simplified, cheaper and quicker, without diminishing the intensity or beauty of the color effects produced. The application of the above bath does away with the steaming process resorted to for developing and fixing the pigment on the fibre, with the drying process previous to mordanting and after dyeing, and with a few other operations of minor importance.—Kuhlow.

PROPERTIES OF THE WOOL FIBRE.

From the Textile Mercury.

One of the most interesting features in the constitution of the wool fibre is the presence of sulphur, which varies from one to four per cent. A large proportion of this can be removed by chemical means without in any way injuring the fibre, but it has been found impossible to remove it entirely without injuring its structure and properties. The presence of sulphur is, in many cases, a disadvantage. In dyeing light delicate colors in the dyebath, it is necessary, in some cases, to avoid as much as possible copper or lead dye kettles, as the sulphur in the wool, coming in contact with any metal—especially in a neutral dyebath—causes the formation of a dark colored sulphide of the metal, which destroys the beauty of many light delicate colors. This fact is well known to all wool dyers.

When an excess of tin crystals is used in mordanting, the wool often acquires a brown tint, this being caused by the sulphide of tin being formed upon the fibre. When wool has to be dyed delicate shades it is sometimes necessary to remove the sulphur. This may be done by first steeping for 24 hours in a diluted bath of milk of lime. After this it is acidulated with hydrochloric acid, and then finally washed in pure water. This process diminishes the amount of sulphur present in the wool to about one-half of one per cent. Wool so treated does not become brown when brought into contact with metals.

The presence of sulphur may be readily shown by a few simple experiments. If wool be placed in a boiling dilute solution of basic acetate of lead (oxide of lead dissolved in neutral acetate of lead solution), it first turns a brown and finally black. This is owing to the sulphur in the wool combining with the lead to form the black sulphide, which is precipitated upon the fibre. This may be used as a test for distinguishing wool from silk and other textile fibres.

One of the most important operations in the treatment of wool is the scouring. The natural wool contains a large percentage of natural fat or grease, which is termed yolk, and also a quantity of dried-up sweat, which goes by the name of suint. Before the wool can be employed for textile purposes, or rather before it can be printed or dyed, these natural oily products must be thoroughly removed by means of soap or mild carbonated alkalies. If a fleece of raw wool be washed in pure warm water, it will be found that the water, after the immersion of the wool, shows a decidedly alkaline reaction. This is due to the presence of carbonate of potash in the wool fat or suint. The other fatty portion—that is yolk—is insoluble in water, but soluble in most of the light *liquids, such as benzine, ether, bisulphide of carbon, etc.* When the raw wool contains an excess of this fatty matter (yolk), it is more difficult to scour thoroughly, and will require the use of a larger quantity of soap and alkali. Such wools are often termed "pitchy."

In scouring wool there are two great dangers to be strictly guarded against; excessive and prolonged heat and strong alkalies. If wool be boiled in water for a considerable time, it will be observed that it loses much of its lustre, feels harsher to the touch, and also becomes felted and matted together. This has to be carefully guarded against in all dyeing operations, where the handling or moving of yarns is apt to produce this unfortunate effect. Prolonged boiling causes the fibre to undergo slight decomposition. In scouring, the bath should never be warmer than will allow the hand to be held in it comfortably. If the temperature be higher than that—100° to 110° Fahr.—it is too hot. A higher heat than this damages the lustre of the wool, impairs the beauty of the fibre, and renders it liable to felt.

The use of an excess of the alkaline scouring reagents also tends to destroy the lustre. This is owing to the opening of the outer scales by the action of the alkali. When a wool fibre which has been over-scoured is examined under the microscope, it will be observed that the scales are ruffled and the beautiful reflecting surface of the fibre more or less destroyed. The opening out of the scales increases

the property of felting, and also causes the wool to have a harsh feel.

Caustic alkalies, such as soda or potash, have an extremely injurious action on wool, and such should never, under any conditions whatever, no matter how diluted the solution, be allowed to come in contact with wool. If a small hank of wool be immersed in a dilute and warm solution of such an alkali, it gradually dissolves, forming a soapy liquid. This shows the great danger of using low-class, impure soaps or cheap carbonated alkalies for scouring, as these may contain a small percentage of free caustic alkali. Carbonated alkalies, like carbonate of soda or potash, when in dilute solution, have a mild effect on wool, and can therefore, in conjunction with the soap, be cautiously employed for scouring. A valuable addition to the scouring bath is ammonia, either in the liquid form or as the carbonate of ammonia. From the very earliest times stale urine or lant has been employed for scouring purposes, its detergent qualities being due to the presence of ammonium carbonate. This use, however, is now obsolete.

The selection of a good scouring soap is of great importance in the scouring of wool, as on this depends much of the success in the scouring operations. All authorities agree in considering a potash soap to be the best, as it has a milder effect on the fibre than a soda or hard soap. Indeed nature seems to indicate that potash is the most suitable alkali for wool, for the natural wool fat contains a large percentage of potash salts, with little or no soda. The following analysis of the ash of wool fat is given by Chevreul:

Potassium carbonate	86.78
Potassium chlorides and sulphate	9.01
Soda, magnesia, lime, etc	4.21

A good soft soap, therefore, with the addition of a small quantity of ammonia to the scouring bath, forms the best cleansing reagent. Good soda soaps, or what are termed hard soaps, when free from adulteration and excess of alkali, give excellent results for wool scouring, when assisted with the additions of a little carbonate of soda. Any soaps or alkalies which on analysis show the slightest percentage of free caustic alkali, should be rigidly avoided in all the processes of treating wool. The quantities of soap and alkali required to scour wool vary according to the quality. Pitchy wools, for instance, containing much fatty matter, require a larger proportion than the better grades of fleeces. This matter has really to be left to the judgment of the wool scourer, but it may be mentioned that in dealing with greasy wools it is much better to run them three or four times through the machine, using a weak alkali each time, than to attempt to do the scouring in two runs by using stronger alkalies.

After the raw wool has been freed of its natural grease it has to be treated with oil before it can be spun or woven, this oiling having really for its object the prevention of felting during the various operations—carding, spinning, weaving—necessary to transform the wool fibres into a woven fabric. Before the yarns spun from this oiled wool or any fabric woven from it can be dyed and milled, it is necessary for the oil to be extracted, and so there arises the necessity of a second scouring operation with soda and soap. The extent of this is largely determined by the character of the oil used for oiling the raw wool and the amount used, and here experience is the great teacher as to the duration and extent of the scouring operations.

In carrying out the various operations involved in dyeing wool, there is a great danger of felting occurring; indeed, it is difficult to avoid some small amount taking place, but the dyer should do all he can to keep it down to the minimum quantity. It may be useful to refer to a few factors that tend to promote this undesirable quality of felting during dyeing. For instance, felting arises from too much handling of the wool, and also from over boiling while in the dyebath It is difficult always to avoid these dangers, especially when the dyer is trying to match an exact shade, as the yarn has often to be lifted and relifted out of the dyebath, to enable fresh proportions of coloring matter to be added and to bring the dyed color to the required shade. As each fresh addition of dye requires a further boiling of the yarn in the dyebath, it is thus easily seen that even with the utmost care it is sometimes difficult to avoid undue boiling and manipulation of the wool.

Another factor in dyeing, which causes the wool to felt readily, is the presence of acid in the dyebaths. An acid, generally sulphuric or acetic, has to be added to the dyebath, to act as a mordant or assistant, enabling the dye to fix itself upon the wool. What the acid really does is first to gently open out the external scales of the wool fibre, and by so doing admit the dye into the centre of the fibre itself. The dye then unites with the fibrous cells which form the interior of the wool, and is there fixed. The internal cells which constitute the whole of the interior of the wool fibre possess a marked affinity for dyestuffs, especially the aniline dyes. Indeed, many of these—such as magenta, malachite green, methyl violet, and similar basic dyes—are readily dyed upon wool without the assistance of any acid or mordant.

The different qualities of wool have varying degrees of affinity for dyes. It is generally found that the higher the lustre of the wool, the less the affinity for dyes. Thus fine lustred wools, which resemble more the nature of mohair, and also alpaca and hair, though of a beautiful lustre, are difficult to dye, while the non-lustre wools, such as merino, are more open in nature and dye much readier. The reason for this may be readily understood from what we have previously said in regard to the cause of lustre and non-lustre. In a great many cases wool has a greater affinity for dyestuffs than silk, and this may be shown by dyeing small hanks of wool and silk in dyebaths containing some of the aniline dyes, such as naphthol yellow, or the natural dyestuff, indigo extract. If, after dyeing, the hanks be boiled in water with a little soap, it will be found that the colors dyed on the wool are much faster than those on the silk.

There is also another reason for the addition of acid to the dyebath. In the great majority of dyestuffs—for instance, indigo extract, acid yellow, scarlet, cyanole, patent blue, acid magenta—the actual coloring principle partakes of an acid nature, which in the commercial dyestuff is neutralized with an alkali. Therefore it is found that these dyes as they are sold to dyers will not as a rule dye wool from a plain bath: the addition of an acid is necessary to separate out the alkali from the true color acid of the dye, which is therefore present in a free condition in the dyebath, and being free enters into combination with the wool fibre and dyes it. Dilute acids have little or no action on wool, even at the boil, but strong acids destroy the fibre completely. Wool seems to have the remarkable property of absorbing a certain quantity of dilute acid—sulphuric, for example—and even after the wool has been repeatedly washed with water after immersion in an acid liquor it still retains some acid. Wool so treated can often be dyed full shades from neutral solutions of the azo acid dyestuffs without any addition of acid to the dyebath being necessary.

Wool can stand the action of acids much better than cot-

ton, and on this fact depends the process of "carbonizing" or "extracting"—that is, the separation of wool from cotton in rags containing both these fibres. The rags are steeped in dilute sulphuric acid and then dried in a stove, by which process the cotton is completely destroyed and may be beaten out as a fine powder, while the uninjured wool remains.

It is of interest to note that sulphurous acid or sulphur dioxide is also readily absorbed by the wool fibre during the bleaching or "stoving" operations. Wool, therefore, that has been bleached by means of burning sulphur, before dyeing and printing, should be treated with peroxide of hydrogen, or in some cases a dilute solution of chloride of lime, in order to oxidize the sulphurous acid in the fibre into sulphuric acid. If this is not done, the colors will either not fix properly on the wool or else they will become quite decolorized by the reducing action of the sulphurous acid.

The property of absorbing sulphurous acid shown by the wool fibre is in many cases a drawback, as when sulphur-bleached yarns are interwoven with fancy dyed threads the colors of the latter are sometimes bleached by coming in contact with the sulphured yarns. This, however, may be remedied by treating them in a dilute bath to the oxidizing action of hydrogen dioxide, when the sulphurous acid is converted into sulphuric acid.

Some acids and mordants—such as tartaric acid, vinegar, lactic acid, alum, etc.—have a very mild action on the wool fibre, while others of a stronger and more corrosive nature have a highly injurious action and require to be used with caution. Tin crystals, oxalic, nitric and hydrochloric acids must be used sparingly if they are used at all.

The action of chlorine on the wool fibre is most interesting, and is also of the highest importance. Mercer was the first to discover that wool treated with chlorine had a great affinity for coloring matters, and indeed the printing of many kinds of woolen fabrics, such as delaines, would perhaps not be accomplished were it not for this wonderful mordanting property of chlorine. In practice, the goods are passed through a very dilute solution of chloride of lime (bleaching powder) or sodium hypochlorite, and afterwards through a dilute acid bath, when the chlorine becomes liberated within the fibre. This forms the "prepare" necessary for woolen goods before being printed. Were they not so "prepared" or mordanted with chlorine, the colors would not fix on the fibre properly. Wool treated with chlorine acquires a yellowish tinge, and it is therefore quite impossible to employ this reagent in wool bleaching, although it is used for bleaching cotton and linen. The only bleaching reagents which can be employed for wool are sulphurous acid and sodium or hydrogen peroxides.

In speaking of the absorbent property that wool has for gases it may be of interest to mention in passing that it shows a like affinity for odors and perfumes. This explains why the woolen curtains of a room and woolen cloths retain so tenaciously the smell of tobacco. Often a non-smoker, after being in a railway smoking carriage, will find his clothes smelling of tobacco for a day or two afterwards.

GERMAN WOOLEN AND SILK TRADES.

Kuhlow's German Trade Review says: Wool spinning mills had a decidedly better year than in 1900. No speculative deals were recorded. The general improvement experienced in the weaving centres at Greiz, Gera, Meeran and other localities reacted beneficially on the spinning mills, making them more independent, and caused prices to increase at a steady, though slow rate. Cheaper fuel and an easier labor market also operated towards betterment. The tariff changes now under discussion in the German Reichsrath will not affect this industry. As regards raw wool, sheep breeding is rapidly on the decline in Germany. The acreage under pasture land is gradually being reduced, and, in conjunction with cheap ocean freights, enabling Australian, South African, and Argentine breeders to underbid home collected wool, have conclusively sealed the fate of German sheep-breeding. As regards silk, the numerous attempts to cultivate silk works, started in 1830, have completely failed, owing to climatic conditions being adverse to the growing of the mulberry tree. Cotton spinning was in a rather bad way. Out of 41 joint stock companies, 25 are stated to have paid no dividends and 6 only yielded more than 6 per cent. profit. The majority of spinners, it is said, are now working at a loss of 1d. to 1¼d. on the pound. This industry is also not likely to be affected either for better or worse by the new tariff. The reductions on counts under 30 are of no account; on coarse counts German spinners can compete without protection. It is even likely that the duty would be entirely abolished but for fear of the market being swamped with imported yarns at a loss.

DISCHARGES OF WATER.

The following is a Table of Discharges in cubic feet per second corresponding to given discharges in Imperial gallons per 24 hours:

Imperial gallon = 277.274 cubic inches.

Discharge in cubic feet per second = 1.85717 × discharge in Imperial gallons per 24 hours.

Millions of Imp. gals. per 24 hours	Cubic feet per second.	Millions of Imp. gals. per 24 hours	Cubic feet per second.	Millions of Imp. gals. per 24 hours	Cubic feet per second.	Millions of Imp. gals. per 24 hours	Cubic feet per second.
.010	.0185717	13	24.1432	43	79.8583	72	133 7162
.020	.0371434	14	26.0004	44	81.7155	73	135.5734
.030	.0557151	15	27.8576	45	83.5727	74	137.4306
.040	.0742868	16	29.7147	46	85.4298	75	139.2878
.050	.0928585	17	31,5719	47	87.2870	76	141.1449
.060	.111430	18	33.4291	48	89 1442	77	143.0021
.070	.130002	19	35.2862	49	91.0013	78	144.8593
.080	.148574	20	37.1434	50	92.8585	79	146.7164
.090	.167145	21	39.0006	51	94.7157	80	148 5736
.100	.185717	22	40.8577	52	96.5728	81	150.4308
.200	.371434	23	42.7149	53	98.4300	82	152.2879
.300	.557151	24	44.5721	54	100.2872	83	154.1451
.400	.742868	25	46.4293	55	102.1444	84	156.0023
.500	.928585	26	48.2864	56	104.0015	85	157.8595
.600	1.11430	27	50.1436	57	105.8587	86	159.7166
.700	1.30002	28	52.0008	58	107.7159	87	161.5738
.800	1.48574	29	53.8579	59	109.5730	88	163.4310
.900	1.67145	30	55 7151	60	111.4302	89	165.2881
1	1.85717	31	57.5723	61	113.2874	90	167.1453
2	3.71434	32	59.4294	62	115.1445	91	169.0025
3	5.57151	33	61.2866	63	117.0017	92	170 8596
4	7.42868	34	63.1438	64	118.8589	93	172 7168
5	9.28585	35	65.0010	65	120.7160	94	174 5740
6	11.1430	36	66.8581	66	122.5732	95	176 4312
7	13.0002	37	68.7153	67	124.4304	96	178 2883
8	14.8574	38	70.5725	68	126.2876	97	180 1455
9	16.7145	39	72.4296	69	128.1447	98	182 0027
10	18.5717	40	74.2868	70	130.0019	99	183 8598
11	20.4289	41	76.1440	71	131.8591	100	185 7170
12	22.2860	42	78.0011				

HYDRAULIC INTENSIFIERS.

Instead of loaded accumulators, water-loaded or water-pressure intensifiers are often employed for converting a low-pressure supply into a high-pressure service. The low-pressure water is conducted into a large cylinder having a piston which is connected to a plunger or ram of smaller diameter, working into another smaller cylinder of a size proportional to the difference in pressures required upon the two services of water. Thus a water supply of 40 lbs. per square inch working into a 24-inch diameter cylinder exerts a total pressure on the piston as follows:

$$40 \times 24^2 \times .7854 = 18092 \text{ lbs.},$$

and if the diameter of the piston be 6-in., the pressure per square inch upon the water in the smaller cylinder becomes:

$$18092 \div 6^2 \times .7854 = 640 \text{ lbs., per square inch,}$$

or

$$40 : \text{high pressure} :: 6^2 : 24^2$$

$$\text{Therefore, high pressure} = \frac{40 \times 24^2}{6} = 640 \text{ lbs.}$$

TABLE OF EQUIVALENT HYDRAULIC UNITS.

One Imperial gallon	=	277.274 cubic inches.
One Imperial gallon	=	.16 cubic foot.
One Imperial gallon	=	10.00 lbs.
One Imperial gallon	=	4.537 litres.
One cubic inch of water	=	.03607 lb.
One cubic inch of water	=	.003607 Imperial gallon.
One cubic foot of water	=	6.23 Imperial gallons.
One cubic foot of water	=	28.375 litres.
One cubic foot of water	=	.0284 cubic metre.
One cubic foot of water	=	62.35 lbs.
One cubic foot of water	=	.557 cwt.
One cubic foot of water	=	.028 tons.
One lb. of water	=	27.72 cubic inches.
One lb. of water	=	.10 Imperial gallon.
One lb. of water	=	.4537 kilo.
One cwt. of water	=	11.2 Imperial gallons.
One cwt. of water	=	1.8 cubic feet.
One ton of water	=	35.9 cubic feet.
One ton of water	=	224 Imperial gallons.
One ton of water	=	1000 litres (approximately).
One ton of water	=	1 cubic metre (approximately)
One litre of water	=	.22 Imperial gallon.
One litre of water	=	61 cubic inches.
One litre of water	=	.0353 cubic foot.
One cubic metre of water	=	220 Imperial gallons.
One cubic metre of water	=	1.308 cubic yards.
One cubic metre of water	=	61028 cubic inches.
One cubic metre of water	=	35.31 cubic feet.
One cubic metre of water	=	1000 kilos.
One cubic metre of water	=	1 ton (approximately).
One cubic metre of water	=	1000 litres.
One kilo. of water	=	2.204 lbs.
One atmosphere	=	1.054 kilos. per sq. in.
A column of water 1 ft. high	=	Pressure of .434 lb. per sq. in.
A pressure of 1 lb. per sq, in.	=	Column of water 2.31 ft. high.

TURBINES.

Turbines are divided into three main classes, namely: (1) Parallel flow, (2) Inward flow, (3) Outward flow. The first is so called because the water flows through the turbine in a direction parallel to its rotating axis, and acts upon inclined curved blades. In the second the water impinges tangentially upon vanes in the plane of rotation from the circumference inwards; and the third also acts in the plane of rotation, but from the centre outwards. In all types suitable guide blades are fixed, which direct the water.

METHOD OF ATTACHING CARD CLOTHING TO FLATS OF CARDING ENGINES.

The object is to stretch the card clothing on a special plate before applying the same, in connection with its plate, to the flat, the fastening of the clothing and its plate afterward requiring only the application of fastening clips.

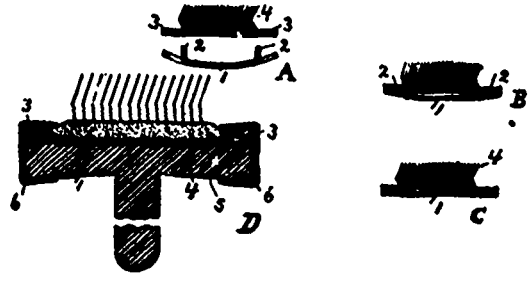


Fig. A is a cross section, showing the card clothing about to be applied to its plate. Fig. B is a like view showing the clothing applied to the plate, and Fig. C a similar view showing the clothing in its stretched condition. Fig. D is a sectional view (enlarged compared to the former figures) of the flat stretching plate, stretched card clothing and clips, shown attached to a flat. The gist of the novelty consists in a stretching plate 1, which is curved (see Fig. A) and provided with prongs 2 adapted to enter the edges 3 of the card clothing 4. After the clothing is thus applied (see Fig. B) the prongs 2 are then bent backward, a feature simultaneously straightening out the plate 1, and in turn stretching the clothing, as shown by Fig. C. After this operation, the clothing and its plate are placed on the flat 5 and binding clips 6 applied, thus fastening the clothing and plate securely to the flat.—*Textile Record.*

CANADIAN VENTILATING FANS.

As a testimony to the efficiency of Canadian-made ventilating fans we give the following letter from the manager of the Merchants' Cotton Co., Montreal, to the McEachren Heating & Ventilating Co., of Galt, Ont.: "Re yours of the 10th inst., I promised some time ago that I would make an exhaustive report with regard to the economy in the use of your fans. Let me say now that I have not yet been able to go into the matter as exhaustively as I would like, but I shall be able to give you correct figures a little later. However, I will say right here, and now, that your fans are, in use, a great saving, and enable us to hold steam on our engines that are loaded to their full capacity, with very little variation through the whole length of the ten hours. In the 3,000-h.p. upon which we are using your two fans, I have no hesitation in saying that we should save this year at least 3,500 tons of coal for the year, over and above what we have been burning on the same power in years past. This is not the only advantage. One almost equal to it is that we can carry our speed up to its maximum capacity, thereby allowing us to produce a much greater quantity of goods per lb. of coal. More than this, there is the economy in the matter of stokers. We are running both our plants with much less labor than before

installing your fans, and altogether I cannot speak too highly of the results obtained, but I cannot give the definite figures just now. Hoping this may be of some service to you, ALFRED HAWKSWORTH, Manager."

SELF SHUTTLING LOOM.

Speaking of the new self shuttling loom brought out in England the Leeds correspondent of The American Wool and Cotton Reporter says: In my letters from Glasgow some time ago, I mentioned a self-shuttling loom which was running at the exposition there, made by an English loom maker. I stated in my criticism of this loom that it would not be of any use for the worsted or woolen trades, because the end of the spent bobbin was left in the "shed" of the warp, and caused a broken pick which would be a serious defect in any class of goods except cheap cottons. The makers have now attempted to overcome this serious drawback. The starting point of this new loom is the weft fork used universally in connection with the self-stop motion. when the weft-bobbin is empty and the fork drops, the loose pulley begins to operate a series of cams or tappits on the low shaft. One revolution of these cams, four in number, produces these operations; the front of the shuttle box is raised, the spent shuttle is thrown out, a full shuttle is placed in the shuttle box and the loom restarted in a very short space of time. To avoid the broken picks caused by the ends of the bobbins, an adjustable pointer or finger comes into contact with the weft on the bobbin each time the shuttle reaches the outward end of its travel and when the weft in the shuttle is nearly exhausted, this feeler works the weft fork in the same manner as if the bobbin was empty. We have seen this arrangement at work on coatings, serges and Italians and dress goods, and it appears to do all the makers claim for it.

In a later letter, the same correspondent says: It has been left to a firm of manufacturers, however, to get at what is considered the best arrangement. We are indebted to America for the latest improvement in this direction. Lister & Co., of Manningham mills, the great silk seal people, have tried every invention which has come forward, but it is only lately that they have found a mechanical device so perfect that it could be made in their own business a commercial success. We have an opportunity of seeing two looms at work fitted with the Kip electrical attachment which, after prolonged testing, has proved itself so satisfactory that Listers have ordered thirty sets from the makers in America. These looms are velvet looms, and the difficulties of successfully adopting automatic devices are much greater in the case of a velvet loom, because it works with two warps and two shuttles, the one set under the other The history of the Kip electric attachment is interesting. When the McKinley tariff bill was passed, it stopped the sale of silk seals into America, and the firm of Titus Salts, of Saltaire, transferred their seal plant to Bridgeport, Conn. Ultimately the concern was taken over by an American company, and it is the head of this business who has invented the Kip loom. The mechanical parts of it are simple They are in two sections, one for the warp and the other for the weft. All the warp threads are put through steel healds, coppered over to make them electrical conductors. when a thread breaks the weight drop on the heald falls on to an electro-magnet which causes the loom to stop. The shuttle changing is effected in a manner somewhat similar to the plant adopted by Hattersley, which I have described in a previous letter, except that the stopping of the loom is done electrically In a double pile velvet there may be as many as 32,000 warp threads and each one is under control. The great advantage of this and similar contrivances is that less responsibility is thrown upon the weaver, whose main duty it is to prevent imperfections. The weaver is relieved from much mental strain and the invention not only stops the loom when a fault occurs, but it shows the weaver exactly where the breakage has occurred. A weaver can thus attend to three or four looms. At Bridgeport, one man minds four double pile looms with less trouble than was formerly involved in looking after one.

FASHION NOTES.

Fancy waists continue to exhibit the closing at the back

Shirring is seen on many of the pretty new frocks for juveniles.

The slot seam is a distinguishing characteristic of both the newest skirts and jackets.

The taffeta coat is acknowledged to be one of the smartest wraps of the season.

A white gown of some soft sheer fabric is practically indispensable for wear at garden parties, afternoon teas, etc.

The one special note of color in dress this season is green; the emerald shade, is perhaps, in highest favor.—From the August Delineator.

Dainty roses of chiffon and ribbon are much used for dress and corsage ornamentation. These roses may be easily made by a clever needle-woman.

Irish lace is at present the leader in the fashionable laces, separate waists are embellished with it and entire gowns evolved from it. For linen and other wash gowns nothing is handsomer than the yoke, sleeve and collar decoration of this lace.

THE COTTON INDUSTRY IN JAPAN.

Some time ago a great cry went forth that Japan would ultimately become the great rival of Lancashire in the production of cotton yarns and cloth. It was said that labor being cheap and the hours of labor unlimited, the prospects of large profits would attract European capital, to the detriment of Lancashire employers and workpeople. There is always a flow of capital to centres where opportunities are offered for making large profits and with the belief that Japan had a great future before it, so far as the cotton industry is concerned, mills were built and fitted with the best of machinery with the expectation of handsome dividends Although the wages of the Japanese are small and their working hours long, these advantages have not turned out so beneficial as was anticipated by those who invested their capital in the new mills, and there is now a cry in Japan about the native labor being dearer than the labor in Europe or America. The Japan Gazette states that 1,000 workpeople are required in a Japanese mill of 10,000 spindles or more than five times the number required in an American mill for the same number of spindles and, taking the production into account, the American labor is much cheaper than that of the Japanese. The want of skilled labor in Japan is now said to be a serious hindrance to the introduction of foreign capital, which is so earnestly desired by the Japanese financiers. Children of five to ten years of age are largely employed in the factories, and the men and women have to work 14, 16 and up to 18 hours per day, both sexes having to work in the night. There are very few holidays during the year, and little consideration is shown for the

health and lives of the workpeople. There are no labor laws in Japan, but such questions are being discussed in the newspapers, the laws in operation in this country and America being often referred to. If legislation of this class is undertaken there can be no doubt that the lot of the Japanese workers will be made much better and the exploitation of their labor by foreign capitalists will receive a corresponding check.—Cotton Factory Times.

SOUTHERN NEGROES AS INSTRUCTORS IN COTTON GROWING.

Referring to the editorial in this issue on cotton growing in the British colonies, we are indebted to the Tuskegee Normal Institute of Alabama for the following letter received by Booker T. Washington from the party of young colored men sent out to Togoland at the solicitation of the German Government to teach the natives of that West African colony how to grow cotton. We may say that Togo is the most northerly of the German possessions in West Africa. It is situated on the Slave Coast, almost directly under the Equator, between British Ashanti and French Dahomey. It has about 26,000 square miles, and an estimated population of 500,000 inhabitants. Its chief export has hitherto been palm oil. After describing the voyage the letter goes on to say that "the first point touched in Africa was Bissas, a Portuguese settlement about 1,000 miles up the coast from Lome. Bissas is 50 miles up the Oeba river, and was at one time a slave trading post. The natives in this colony are in their original state. Leaving this point, we stopped frequently along the coast and went ashore among the natives. One point at which our vessel stopped was Conakery, a French colony. Here we found the natives as clerks, custom officers and traders. We visited a little church for the English-speaking natives and found it filled with nicely dressed natives and a native preacher conducting the services. Many of these natives have come here from Sierra Leone. Our next stop was at Monrovia, Liberia. Here to our sorrow, we had only one day. The six or eight hours we had on shore were spent in visiting the town and the Senate, which was in session at the time. This body consists of about 22 members. About half of the members are natives. The debate was filled with words of wisdom and showed statesmanship. This little republic is exerting a great influence upon the natives along the coast below.

"The negro who comes here from America must work and thus he teaches the natives to work. These natives are sought by European vessels for laborers and are carried down the coast. In this way they are being used for most of the important labor along the west coast. Manual labor is more dignified here than in other colonies. The masters work here. In English colonies, we found the natives, especially the boys, quite improved in education, but not inclined to manual labor. They seek to imitate their masters and become English gentlemen.

"Lome, Togo, was our first and only stop in German territory. Here German exactness is in evidence. The natives are required to do their work in order and promptly. They are required to build good roads and to keep them in good condition. They are encouraged to have farms and markets are formed in the little town on certain days that they may sell their produce. New enterprises are encouraged to come among the natives for the general improvement of the colony. We have located our farm and have 150 laborers now clearing it off.

Our readers may remember in this connection that later reports tell of the results of the first season's crop raised by these young negro teachers in Togoland. Samples of the cotton have been sent to Germany, and have been graded on the Exchange at Bremen as "above American middling," a result equally creditable to the enterprise of the German officials and to the intelligence of the students of the Tuskegee Institute. Let British colonial officials take a lesson.

PRODUCING SOLUBLE INDIGO.

Before natural indigo in the dry state in which it is put upon the market can be used for dyeing purposes it must be ground in specially-constructed mills in order to bring it to a condition in which it will readily and completely dissolve in the indigo vat. This grinding operation is frequently prolonged for several days. Synthetic indigo also, under certain conditions, separates out in the last stage of its manufacture into a crystalline condition, and the crystals may be of such a size as to injuriously affect the ready solubility of the indigo in the vat. To combat these disadvantages the Badische Anilin and Soda Fabrik have discovered that indigo which is with difficulty soluble in the vat, irrespective of its origin, can by a simple treatment be converted into a new form of indigo which can be readily dissolved.

The process consists in treating indigo with sulphuric acid under such conditions of concentration that no sulphonation of the indigo takes place, whilst a sulphate of indigo, or loose combination of sulphuric acid therewith, is formed. For this purpose sulphuric acid containing from about 65 to 85 per cent. H_2SO_4 can be employed. This sulphate so obtained crystallizes in the form of black-brown needles, which are collected and treated with water, when they decompose, and the regenerated indigo separates out in a physical condition that is fitted for use in all kinds of vats. It is easily soluble, even in the fermentation vat, which acts particularly mildly. The new readily-soluble product is chemically indigo, but its physical condition is changed by the treatment, and the change consists probably not merely in fineness of division, but in an essentially different molecular structure

The following example will serve to further illustrate the manner in which the above can be carried into practical effect: Stir about 100 parts of dry indigo in the form of powder into about 500 parts of sulphuric acid containing 75 per cent. H_2SO_4. Warm the mixture, whilst carefully stirring, to about 30 degrees C. When the mixture is effected so that a uniform paste is obtained, allow the mass to stand for about an hour. The sulphate of indigo is then formed To obtain the indigo in the aforesaid new physical condition, add to the entire mass about 2,000 parts of water Stir well, collect the new indigo by filtration, and wash until free from acid. The new indigo retains its valuable property of ready solubility in the vat even after drying.—Textile Manufacturer

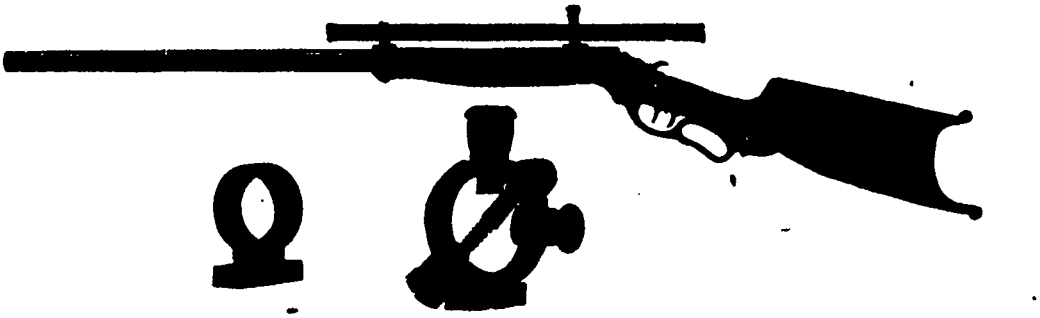
ANTIQUITY OF COTTON GROWING.

The history of the cotton plant antedates in its beginnings the commercial annals of the human family. India seems to have been the most ancient cotton-growing country For five centuries before the Christian era her inhabitants were clothed in cotton goods of domestic manufacture from the fibre grown upon her own soil by her own crude methods Notwithstanding the proximity of China to India, it was not till the eleventh century that the cotton plant became an object of common culture in China. The first mention made of cotton in the records was 200 years before the Christian era. From that time down to the seventh century it is mentioned not as an object of industry, but one of interest and

curiosity; an occupant of the flower garden, the beauty of its flowers being celebrated in poetry.

RIFLE TELESCOPES.

The J. Stevens Arms and Tool Co., of Chicopee Falls, Mass., have made remarkable progress in the variety and character of their guns and rifles. They have brought out several new types of arms, which are described in a handsome catalogue just published, and which can be had on mailing a card to the company. One of the latest of this company's moves is the purchase of the telescope department of the Cataract Tool & Optical Co., of Buffalo, which is now



devoted to making telescopes for the Stevens rifle. A sample of this new mounting is shown in the accompanying cut. The points of superiority claimed for the Stevens telescopes are: Their apparent universal focus; their perfect achromatic and spherical corrections; their exceptionally large and flat field of vision; their remarkable illumination; their non-breakable cross-hairs; their qualities as a night as well as a day glass; their very large lenses, and their proof against water and dirt.

NEW WOOL SPINNING MACHINE.

Editor Canadian Journal of Fabrics:

Sir,—You are probably aware at this time that a certain patent has been granted by the Canadian Patent Office for spinning frames, to F. A. Breeze, Forest Mills, a half interest having been assigned previous to its issue to James Wilson, Selby. If it would not be trespassing too much on your valuable time, we would like to draw your attention to this invention, and at the same time set forth a few of the most important claims we make for it. Our system, or machine, was designed by the inventor, for spinning wool, taking the place of the well known mule system, and our claims of superiority over that machine will be found in the following:

1st. We claim to have a stationary spinning machine, the mechanism employed for spinning, allowing us to use the well known cotton ring and spindle, for applying the subsequent twist, the speed of said spinning mechanism being limited only by the said cotton ring and spindle.

2nd. We claim with our invention to do superior spinning, making a smoother, evener and therefore a better yarn.

3rd. We claim to have a spinning machine which is simplicity itself, and by its simplicity we are able to do away with skilled labor. Other claims we could make, such as economy of space, etc, but these will suffice. Regarding the claims we have made for our invention, we might just add that we are prepared to demonstrate and verify at any time, all claims made.

Selby, Ont. BREEZE & WILSON.

IMPERIAL TRADE NOTES.

The following are among recent trade enquiries received at the Canadian Government Office in London from firms more or less connected with the textile trades. The names of the firms can be given on writing to The Canadian High Commissioner, or by enclosing a 2-cent stamp, for reply, to The Canadian Journal of Fabrics:

A Bradford firm desires to be placed in communication with umbrella manufacturers in Canada. A Huddersfield firm asks to be referred to the principal firms in Canada who are merchants in woolen and worsted goods. A correspondent in the Midlands with experience of Bradford and Manchester goods is open to act as buying or selling agent for Canadian houses in the trade. The makers of horse clothing of all kinds, saddle girths, knee caps, dog sheets, body belts, etc., wish to extend their business in Canada, and ask to be referred to importers of these goods. A firm of West of England woolen manufacturers are looking out for a first class agent to represent them in Canada, and also desire to get into touch with wholesale houses in the Dominion purchasing best cloths. A firm in a good position to undertake the agency in London of a large wood pulp mill in Canada desire to correspond with an important concern not already represented. Enquiry is made for English firms selling neckwear silks for manufacturing by a Canadian neckwear house. A Hamburg firm ask to be referred to Canadian wood pulp manufacturers desiring representation on the Continent. Enquiry is made by a Canadian firm of manufacturing stationers for names of some large envelope and paper bag makers in England, Germany, France, etc. A Canadian agent writes to get into touch with one or two leading bristle merchants in London handling Russian and China bristles. London firm, also a Liverpool firm, is desirous of representing Canadian exporters of wood pulp, phosphate of lime, and other chemical products.

COMMON CHEMICAL TERMS AND THEIR SCIENTIFIC EQUIVALENTS.

Common Names.	Chemical Names.
Aqua fortis	Nitric acid.
Aqua regia	Nitro-muriatic acid.
Blue vitriol	Sulphate of copper.
Cream of tartar	Bitartrate of potassium.
Calomel	Chloride of mercury.
Chalk	Carbonate of calcium.
Salt of tartar	Carbonate of potassia.
Caustic potash	Hydrate potassium.
Chloroform	Chloride of formyle.
Common salt	Chloride of sodium.
Copperas or green vitriol	Sulphate of iron.
Corrosive sublimate	Bichloride of mercury.

Common Names.	Chemical Names.
Dry alum	Sulphate aluminum and potassium.
Epsom salts	Sulphate of magnesia.
Ethiops mineral	Black sulphate of mercury.
Fire-damp	Light carburetted hydrogen.
Galena	Sulphide of lead.
Glauber's salt	Sulphate of sodium.
Glucose	Grape sugar.
Gollard water	Basic acetate of lead.
Iron pyrites	Bisulphide of iron.
Jeweller's putty	Oxide of tin.
King's yellow	Sulphide of arsenic.
Laughing gas	Protoxide of nitrogen.
Lime	Oxide of calcium.
Lunar caustic	Nitrate of silver.
Mosaic gold	Bisulphide of tin.
Muriate of lime	Chloride of calcium.
Oil of vitriol	Sulphuric acid.
Potash	Oxide of potassium.
Realgar	Sulphide of arsenic.
Red lead	Oxide of lead.
Rust of iron	Oxide of iron
Salammoniac	Muriate of ammonia.
Slacked lime	Hydrate calcium.
Soda	Oxide of sodium.
Spirits of hartshorn	Ammonia.
Spirits of salt	Hydrochloride of muriatic acid.
Stucco or plaster of Paris	Sulphate of lime.
Sugar of lead	Acetate of lead.
Verdigris	Basic acetate of copper.
Vermilion	Sulphide of mercury.
Vinegar	Acetic acid diluted.
Volatile alkali	Ammonia.
Water	Oxide of hydrogen.
White precipitate	Ammoniated mercury.
White vitriol	Sulphate of zinc.

HEAT VALUES OF OILS AND GASES.

The following table of the heating values of various gases and oils is from E. W. Roberts' "Gas Engine Handbook." The figures given are British thermal units:

Heat Values of Fuels.	B.T.U. per lb.	B.T.U. per cu. ft.
Hydrogen at 32° F.	62.030	348
Carbon	14.500	...
Carbon monoxide (C O)	4.396	539
Penn. heavy crude oil	20.736	...
Caucasian heavy crude oil	20,138	...
Caucasian light crude oil	22,027	...
Petroleum refuse	19.832	...
Anthracite gas	2,248	...
Bituminous gas	3.484	...
28 candle power illuminating gas		950
19 candle power illuminating gas		800
15 candle power illuminating gas		620
New York city water gas*		710.5 Ave
London coal gas		668
Benzine $C_6 H_6$	18,448	...
Gasoline and its vapor	11,000	690
Ethylene $C_2 H_4$	21.430	1,677
Marsh gas (Methane) CH_4	23,594	1,051
Natural gas, Leechburg, Pa		1,051
Natural gas, Pittsburg, Pa		892
Acetylene C_2H_2	21,492	868
Semi-water gas		185
Producer gas		150

The values shown in the above table are given on what is deemed good authority, but they will not be found to agree with all similar tables.

*Carbureted gas at 60° F. and at 30" water pressure.

POWER REQUIRED TO RAISE WATER.

Multiply the quantity of water raised in gallons per minute by 10, and by the height lifted in feet, and divide by 33,000. For losses due to friction and slip of valves add one-third to two-thirds.

HEAD OF WATER CORRESPONDING TO A GIVEN PRESSURE.

Water at maximum density 62,425 lbs. per cubic feet = 1 grain per cubic centimetre; *corresponding to a temperature* of 4° C. = 39.2 F.

Head in feet = 2.306768 × press in lbs. per sq. inch.
Head in feet = 0.0160192 × press in lbs. per sq. foot.
Pressure in lbs. per sq. inch = 0.433507 × head in feet.
Pressure in lbs. per sq. foot = 62.425 × head in feet.

TO FIND THE HORSE-POWER OF CHIMNEY OR SMOKE STACK WITH NATURAL DRAFT.

Rule: Find the cross sectional area of chimney or stack at its top, and multiply this by 10. Then multiply this product by the co-efficient, found in table corresponding to the given height of chimney or stack. The product will be the horse-power of chimney or stack.

Height of chimney	10	20	30	40	50	60
Co-efficient	0.5	0.67	0.8	0.91	1 00	1.08
Height of chimney	80	100	140	200	300	400
Co-efficient	1.23	1.36	1.58	1.86	2.23	2.55

A stack of 50 feet high above grate should have a draught with gases at *612 degrees Fah. and external air 62 degrees*, about .375 inches of water. This result is found by multiplying height of chimney by the constant .0075. The power of boilers is much increased by a forced draught, the comparative efficiency being as follows:

With natural draught = 1.
With jet draught = 1.25.
With blast draught = 1.6.

SHRINKAGE OF CASTINGS.

Cast iron, 1-8 inch per lineal foot.
Brass, 3-16 inch per lineal foot.
Lead, 1-8 inch per lineal foot.
Tin, 1-12 inch per lineal foot.
Zinc, 5-16 inch per lineal foot.

A pattern weighing one pound and made of	Will weigh in lbs. when cast in Cast Iron.	Zinc.	Cop- per.	Yellow Brass.	Metal.
Mahogany	8	8	10	9.8	10
Mahogany (St. *Domingo*)	10	9.5	12	11½	12
Maple	10	9.8	12½	12	12.4
Beech	11	11	14	13.4	13.8
Cedar	11½	11.4	14½	14	14½

—The Indian Government's forecast of the jute crop for next season estimates the yield at 5,280,000 bales, as against 6,250,000 bales last season. This is also below the yield of the two preceding years, and apparently indicates firm prices for jute goods.

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.

Collingwood is making a bid to secure the Perth Cordage & Flax Co.'s mill from Stratford.

The rubber factory at Granby, which had shut down for a short time, has resumed operations.

A century ago, 100,000 bales of cotton supplied the Lancashire mills for a year. That amount now lasts them a day and a quarter.

The Cassella Color Co (Canadian agency, 86 Youville street, Montreal) have issued a new book of diamine and immedial colors dyed on flannelette.

A fire broke out in the building at Perth used by T. A. Code as a picking factory. The hands employed set to work and had the flames extinguished before much damage was done.

The Canadian Cordage Company of Peterboro turns out five tons of binder twine a day, and will by autumn turn out ten tons daily. There will also be output of nine tons of rope and cord daily.

The Canadian Cordage and Mfg. Co., Peterboro, have commenced making binder twine, and will turn out a considerable amount for the present harvest. Their plant has a capacity of 2,000 tons a year.

The Canadian Colored Cotton Mills Company declared a dividend of two per cent., payable July 15, and the Montreal Cotton Company declared a quarterly dividend of 2¼ per cent., being at the rate of 9 per cent. per annum.

Negotiations are practically completed whereby Lee & Taylor will become proprietors of the western building of the No. 2 mill property owned by Wylie & Shaw at Almonte. They will transfer their shoddy machinery from the electric light property.

The wadding factory at Dundas was destgoyed by fire on August 6th. The fire commenced in the storehouse and soon spread to the other buildings. The cause is supposed to have been spontaneous combustion. The loss is from $3,000 to $4,000.

A fire in R. E. Sebastian's shoddy mill, Davenport Road, Toronto, a few days ago, did damage estimated at several hundred dollars. The mill had one picker, and was insured for $700, while there was full insurance on the stock. The fire started by an employee upsetting a lamp. It was nearly a total loss and is not likely to be re-established.

A terrible accident took place at the Stormont cotton mill, Cornwall, on the 21st of July, by which Lily Steacy, a girl about 19 years of age, had her entire scalp torn off. She was employed in the carding department and was fixing her hair preparatory to going home. She stooped down to pick up a small piece of waste when her hair caught in some rapidly revolving machinery with the above result. The entire scalp from the eyebrows to the back of the head was torn off. She was removed to the Cornwall General Hospital and the local surgeons hope to graft the scalp back upon the head. This is practically an experiment in surgery. The girl will recover in any case.

The proposed St. George pulp and paper mill will, it is expected, be ready for operation by Nov. 1. The company has 50 square miles of pulp land near St. George, N.B. They are putting up their own building. The machinery is ordered and will come from Sherbrooke. The mill is to have a capacity of 25 tons per day. All shipments will be made by water from St. George, which offers fine harbor advantages.

Geo. Reid & Co., textile machinery dealers, 11 and 13 Front street east, Toronto, have been appointed agents in Canada for Prince, Smith & Co., limited, of Keighley, Yorkshire, the well known makers of worsted spinning machinery. They have also been appointed agents for A. F. Craig & Co., limited, of Paisley, makers of modern machinery for the weaving and finishing of tapestry carpets. Messrs. Reid & Co. will shortly place on the Canadian market a novel machine for taking out burrs from wool, this machine being easily attached to an ordinary carding engine.

In conversation with Mr. Cudlip, manager of the St. John cotton mills, the Telegraph learned that there was at present a great shortage of skilled and unskilled help. During the warm weather a large number quit work in the mills and go to other employment, to return during the winter, making it impossible to materially increase the output of the factories. The mills are undergoing extensive changes at the hands of a large force of mechanics, and it is expected that in the fall, when the number of employees is increased, the benefit will be much noticed. Mr. Cudlip said that they had put in some Platt machinery, and also some of Taylor, Lang & Co.'s machinery. There is also some coming from the United States. The old machinery was also being renewed and remodeled, so that everything will be on a thoroughly modern basis. There are a great many learners now at work, and room for a large number more. The number of spindles now running is 28,000, but this will soon be increased. The mills sell their goods all over the Dominion, though the bulk are sold in Ontario and Quebec. They sell to practically every wholesale house in the Dominion. All cotton and woolen mills have experienced a much increased demand for their goods, and for a much higher quality of goods than formerly. They credit this to the fact that the country is being opened up and wages are higher and work more plentiful.

Copies of the last number of The Canadian Journal of Fabrics, containing an article on the advantages of the metric system in the textile trades have been asked for by United States officials, and two of our American trade contemporaries have asked permission to reproduce the chart of the metric system issued by the publishers of this journal, People are beginning to awake to the fact that this system of weighing and measuring is bound to come into use throughout the Anglo-Saxon world. The Montreal Witness, referring to this matter, says: In every trade some such reforms as those proposed by the textile men are called for by common sense and in the interest of commerce and intercourse. Technical reforms must be left to adepts. What is interesting in the action referred to is the fact that all such reforms seem to await the general adoption of the metric system. All such international reforms are, as a matter of course, in terms of the metric system, and it seems to be admitted as without question that it is useless to do anything until it can be done in that way. Lord Kelvin declared the other day that one-half of the work done by clerks and draughtsmen in engineers' and surveyors' offices and factories was entailed upon them by our medieval system of weights and measures, and probably more than that proportion of clerical work is wasted in the textile trade.

Joseph Scott, formerly at Beauharnois, Que, is now overseer of spinning for the Montreal woolen mills.

R. A. Gwynne, late of Fulton, N.Y., is now overseer of dressing in the Canada Woolen Mills, Carleton Place.

The International Paper Co. proposes to establish pulp mills near Three Rivers where it has acquired large timber limits.

At the second voting last month on the by-law for a bonus to the hat factory which Mr. Desaulnier, of St. John's, Que., proposes to start at Brockville, the by-law was carried, and contracts have been let for the new building.

The International Buckle Co. has purchased the Westport Woolen Mills, including buildings, water power, engine and boiler, and will convert them into a factory for making saddlery hardware.

The Tacoma (Wash.) Steel Co. has bought 150 square miles of timber land on Quatsena Sound, B.C., and is to commence the erection of a big pulp mill, the products of the mill to be shipped to Japan and Australia.

W. C. Caldwell and son and T. B. Caldwell with his two sons and a Lanark friend will leave the loom and spindle, and betake themselves to Lake Temagami, in New Ontario, for bass fishing. When they return they will be able to give a course of instruction in spinning fish yarns.

As a result of some difference between the operatives and the management, the Hawthorne woolen mill closed for a short time this month. The weavers and carders are the principal complainants. They claim that on the goods they are making, with the material supplied, they are unable to make living wages.—Carleton Place Herald.

J. R. Berry, superintendent of the Beauharnois, Que., woolen mills, has gone to Hespeler as superintendent of the Canada woolen mill, taking the place of Wm. Morrison, who has gone to the Beauharnois mill. Mr. Berry was presented with a clock and a travelling case by the hands on the occasion of leaving Beauharnois. He is not a stranger at Hespeler, having lived there about 20 years ago.

Owing to the large attendance of pupils the textile school at Philadelphia is being enlarged and departments of chemistry, dyeing and printing will be formed. The Bradford-Durfee textile school is another new technical institution in the textile line which is being built at Fall River. While our United States friends are thus pushing ahead in these lines what are we doing in Canada to educate young learners in the textile trades? The answer is, we are doing nothing. In other words we are going backward while the rest of the textile world is going ahead.

Dr. G. S. Bingham, of Hamilton, was one of the directors of the Imperial Woolen Mills Company, of Streetsville, whose history has been given in this journal. Judge Winchester, Master-in-Chambers, has given a decision in a case arising out of the liquidation which establishes a precedent. His Lordship's decision is that shareholders who pay in the full amount of their stock subscription at one time, in order to save trouble, and who do not wait until the calls are made, may be called upon to pay the sum a second time. Since the winding-up proceedings were taken, Dr. Bingham has been ordered to pay the full amount of his stock, $3,500.

Application has been made by the Johns-Manville Co., of New York, to the Superior Court at St. Hyacinthe for the winding-up of the Canadian Woolen Mills Co., of that city Gordon McDougall, of the Montreal legal firm having the matter in hand makes a statement in substance as follows: "The Canadian Woolen Mills Company was incorporated November, 1899, and was a merger of the interests formerly comprised in the St. Hyacinthe Manufacturing Co. and the Granite Mills, which were successors of the Boas Manufacturing Co. By this reorganization it was sought to consolidate the interests of these concerns and to satisfy the claims of unsecured creditors by an issue of common and preferred stock. Liquidation at this time would have been disastrous to this company, owing to the large bonded indebtedness. The property and manufacturing plant of the company has been valued at $2,000,000. The capitalization then undertaken was on a basis of $1,100,000 common stock, $400,000 preferred stock and $650,000 of first mortgage bonds. The Johns-Manville Company, of New York, have been largely interested in the bond issue, as well as being large holders both of common and preferred stock. The volume of business done by the company has been eminently satisfactory, but the large capitalization has made the handling of the concern very difficult, and, in order to put the company on a sound financial basis, and to supply a satisfactory working capital, a further reorganization has been decided upon. The mill will be continued as a going concern, and no reduction will be made in the staff. It is intended that all the trade creditors will be paid in full, and that the stock and bondholders will be given a full opportunity to protect their holdings. The mills have every facility for doing a large and successful business, and it is confidently expected that the present proceedings will result in a benefit to all concerned. A meeting of the bondholders will be called by the Royal Trust Company as soon as the liquidation proceedings are made effective. The Bank of Montreal has a claim of $300,000 secured by the Johns-Manville Co.

We understand that the bank debt is secured by a lien on the plant and that in the above valuation a large amount is set down to good will. The mill has been a slaughterer in the trade and consequently a thorn in the flesh of the Penman Manfg Co. to which syndicate circumstances point as a possible purchaser.

FABRIC ITEMS.

The Runians, Carson, McKee Company, retail dry goods and departmental store of London, Ont., has placed its business in the hands of receivers.

S. Werner & Sons, who represented themselves as coming from Berlin, Germany, and who opened up a dry goods jobbing business in Montreal last April, are reported as absentees. They were capiased by a woolen manufacturing concern on a claim of several hundred dollars, but subsequently left the city.

WEIGHT OF CASTINGS BY WEIGHT OF PATTERNS.

Weight of pattern, white pine, x 16—gives weight in cast iron.

Weight of pattern, white pine, x 17.1—gives weight in wrought iron.

Weight of pattern, white pine, x 17.3—gives weight in steel.

Weight of pattern, white pine, x 18—gives weight of copper.

Weight of pattern, white pine, x 25—gives weight in lead.

T. Y. Matsumoto, the Manchester representative of a large cotton goods house of Tokio, Japan, paid a flying visit to Toronto this month in company with S. Nonaka, professor of engineering in the Imperial Japanese Navy, Tokio. They left for England via New York.

The Dodge Mfg. Co., of Toronto, manufacturers of wood pulleys, have issued a catalogue of interest to all users of pulleys.

Jas. H. Wylie, of Almonte, is having the necessary alterations made to introduce electricity as the motor power of the Elmsdale woolen mills.

TABLE SHOWING THE DIFFERENCES BETWEEN WIRE GAUGES.

No.	Brown & Sharpe. (American)	Old English or London.	Stubs' or Birmingham.	New British Standard.
0000	.460	.454	.454	.400
000	40964	.425	.425	.372
00	.36480	.380	.380	.348
0	.32495	.340	.340	.324
1	.28930	.300	.300	.300
2	.25763	.284	.284	.276
3	.22942	.259	.259	.252
4	.20431	.238	.238	.232
5	.18194	.220	220	.212
6	.16202	.203	.203	.192
7	.14428	.180	.180	.176
8	.12849	.165	.165	.160
9	.11443	.148	.148	.144
10	.10189	.134	.134	.128
11	.09074	.120	.120	.116
12	.08081	.109	.109	.104
13	.07196	.095	095	.092
14	.06408	.083	.083	.080
15	.05706	.072	.072	.072
16	.05082	.065	.065	.064
17	.04525	.058	.058	.056
18	.04030	.049	.049	.048
19	.03589	.040	.042	.040
20	.03196	.032	.035	.036
21	02846	.0315	.032	.032
22	.025347	.0295	.028	.028
23	.022571	.027	.025	.024
24	.0201	.025	.022	.022
25	.0179	.023	.020	.020
26	.01594	.0205	.018	.018
27	.014195	.01875	.016	.016.4
28	.012641	.0165	.014	.014.8
29	.011257	.0155	.013	.013.6
30	.010025	01375	.012	.012.4
31	.008928	.01225	.010	.011.6
32	.00795	.01125	.009	.010.8
33	.00708	.01025	.008	.010
34	.0063	.0095	007	.009.2
35	.00561	.009	.005	.008.4
36	.005	.0075	.004	.007.6

WROUGHT IRON FOR PIPES.

Wrought iron, for pipes, has the great advantages over cast-iron of lightness, toughness and pliability. The lightness of wrought-iron pipes renders them easier to handle, and cheaper per foot notwithstanding that their cost per ton is about 25 per cent. greater. They are not liable to breakage in transportation or from rough handling, and they may be bent through angles up to about 25°. They, therefore, require no special bend castings for such angles.

F. E. Atteaux & Co, dyestuff and chemical manufacturers and dealers, have moved their Toronto offices to larger premises at 41 Colborne street.

TEXTILE PUBLICATIONS.

In order to accommodate readers of The Canadian Journal 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.

Business as usual at this time of the year is quiet. Market steady.

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

—"Why did you call your calico ball an author's gathering?" "Because we all appeared in print."

TORONTO CARPET MFG. CO'S STRIKE.

The weavers in the Toronto Carpet Mfg. Co's. Works, King St. West, Toronto, went out on strike about the middle of last month. One nominal cause of the strike was a small increase in wages and a reduction in hours from 60 to 55, but apparently the chief cause was an objection to the introduction of a new time registering clock for recording the arrival and departure of employees. These devices, it may be mentioned, are in use in the largest establishments of the U.S. and in many in Canada, and are the latest development of the time checking system. Previous to this the employees were allowed five minutes to dress at noon, but the five minutes frequently became ten, and even fifteen minutes, it is said, hence the introduction of the clock register and an order that no one was to cease work till the whistle blew. The ground of objection to the new machine was that the hands lost time by it. The company granted an increase of wages but refused to dispense with the machine. Robt. Glocking, Secretary of the Ontario Bureau of Labor, was called in by the strikers to mediate, but the company declined to accept intervention, and further decline to recognize any union in connection with their works. While out on strike the hands formed a union known as the "Textile Workers' League." Though not unanimously in sympathy with the striking weavers the carders and spinners in the spinning department went out in consequence of the strike, the total employees affected being nearly 300. When the company began to get in hands to take the place of strikers, the pickets of the latter made a practice of annoying and intimidating the new hands, and this went on till two were arrested, one being Florence Hunter and the other Edward Wright. For hissing the new girls the young woman was fined $1 and Wright was fined $5. The magistrate warned the strikers that further offences would be more severely punished.

THE WOOL MARKET.

The last of the spring and summer series of colonial wool sales in London closed with steady prices, but the expected advance of 10 per cent on previous sales did not materialize. The most that could be said was that fine wools were firm and in good request from American, German and French buyers; while medium and course grades were easy. Of English wools there is a good supply still on the market.

In the Canadian market not much has been doing since the purchase of about half a million pounds by the Manchester N.H. syndicate through its traveler Robt. Berryman. There is a steady home demand from the mills, which are generally busy just now. Offerings in the Toronto market are light, and quotations are as follows: unwashed 7 to 7½cts; washed 13 to 13½ pulled super 14 to 15; extra 16 to 19.

Manitoba wool is nearly all marketed and a good part of territory wool. The Commercial quotes prices at 6 to 6½ for Manitoba and 8½ to 10 for territory.

—The Story Cotton Company, of Philadelphia, has acquired a tract of land in the Transvaal. It is said that experiments have shown that cotton can be grown much cheaper in South Africa than in the United States.

Opinions of the Press

CHART OF THE METRIC SYSTEM.

The publishers have received many letters complimenting them on the issue of the popular Chart of the Metric System of weights and measures. The following are a few sample opinions:

I have very much pleasure in seeing you step to the aid of those pressing the Metric System to the front. I shall be glad to call the attention of teachers to your chart. The Metric System has for a number of years—since I came into office—been taught in all the schools of the province; and the metric measures are those called for in the returns from all our high schools—dimensions of school rooms, etc. I have much pleasure in sending you a few copies of my brochure on the "Three Great Reforms," in which it will be seen that for a number of years I had been an advocate of the system—even in the conservative city of Toronto. Wishing you much success.—A. H. Mackay, Superintendent of Education. Nova Scotia.

I am in receipt of your favor of the 7th ult., together with a copy of The Canadian Engineer for June, and a specimen of the Chart of the Metric System prepared by your firm. I am very pleased to read your article, but I wish particularly to compliment you on the chart. It is, I believe, the best I have seen for explaining briefly the principles of the Metric System. It will afford my committee much pleasure to hear of this awakening interest in Canada. Australia too is showing a growing disposition to adopt Decimal Coinage and Metric Weights and Measures, and here we keep gaining a step month by month.—E. Johnson, Secretary Decimal Association, London. Eng.

We see that you, too, advocate the general adoption of the Metric System of weights and measures, and we believe that as much as possible everywhere the same means should be employed to accomplish the desired aim. The widest possible distribution of your chart would no doubt be a good step forward. We request you therefore to forward to us two copies for our office and for the library of the American Society of Dyers.—L. M. Carriat, Philadelphia.

The Monetary Times has a review of your Chart of the Metric System. I notice the price is stated at ten cents per copy, but if you have any other more expensive editions printed, I should be glad to receive a copy or two; as it is my intention to frame a copy (if possible), and present it to the library of the society of which I am an associate, viz., the Incorporated Accountants (Eng.). It is high time that British traders and accountants awoke to the necessity of adopting decimal coinage and measures. Enclosed please find $1 (Canadian), to cover your expenses for as many copies as the remittance will pay for. Trusting you will be able to assist our efforts on this side to foster "intercolonial and home-country" trade, and lessen the tide of German competition, which is a danger to all the English-speaking countries, if Germany gets the upper hand (both politically and socially), and assuring you of the awakening of the British to their surrounding dangers of subsidized continental competition.—E. Woodroffe, 121 Stapleton Hall Road, Stroud Green, London, England.

Please accept my thanks for the Metric System Charts. The adoption of the Metric System must shortly take place, as everything is to be said for it and next to nothing against it. As to the chart, I consider it is a valuable one, and one which every progressive citizen ought to have in his home. The mass of information, which it explains, is handled in such a simple manner that anybody can understand it without becoming in the least confused as to the use of the different terms, which is the only drawback, that I know of, to the Metric System. There is no doubt though that, if the system were adopted, the terms would be abbreviated to suit the rapid business methods this side of the Atlantic. I expect that a number of people, to whom I have shown the chart, will be calling upon you for copies of it ere long, as they have already expressed intentions of doing so.—Dermot McEvoy, Mechanical Engineer.

The largest goat ranch in the world is owned by Charles S Onderdonk, of Lamy N M He has 20,000 goats, and they have 28,000 acres in which to roam

Frederick F. Ayer, president of the American Woolen Co, has given an additional sum of $30,000 to the Lowell, Mass., Textile School. Southwick Hall, now being erected for the school, will be paid for principally by previous gifts of money from Mr. Ayer, who seems to recognize the value of technical training in the textile trades.

The greater part of the world's supply of rubber, says The Scientific American, comes from the jungles of the Amazon. The growing demand has led the natives to explore places hitherto untrodden by the foot of man in search of new areas of rubber lands, and with a measure of success. The shipments from Iquitos during 1900 amounted to 920 tons, in 1901 to 1,391 tons and for 1902 it will be still larger

Anthracene Chrome Red A. produced by Leopold Cassella & Co., Frankfurt on Main is a new dyestuff for wool, which possesses remarkable properties of fastness and good equalizing power, while white cotton check threads or selvedges in woolen goods are not even tinted by it It is dyed in wooden or copper tubs, but not in iron kettles, with an addition of acetic acid, or of sulphuric and acetic acid, and then after chromed.

—A patent for extracting fibre from wood is controlled by a firm in Germany, which spins yarn from the material, which cannot be readily bleached, but is easily dyed with good results. The cloth manufactured from this fibre is suitable for bed tickings, curtains, etc. It is stated that a factory to manufacture the goods may be established at Bilbao, Spain.

—The demand for silks appears to be growing on this continent. The returns compiled by the Silk Association of America show that the imports of silk goods into the United States for July this year were $2,220,973, against $1,743,825 for July last year, while at the same time the imports of raw silk were $642,939 in July, 1902, against $552,913 in July, 1901, indicating a corresponding increase in the demands of United States silk mills.

A new German patented process of scouring wool is described as follows. The raw wool is packed into an air tight vessel, the air pumped out, and benzine, or benzol, etc., introduced, then gaseous sulphurous acid is forced in, which acts bleaching upon the wool, decomposes the salts of fatty contained in the suint, and produces in the autoclave the necessary pressure to expel from the apparatus and from the wool the fats Then the autoclave is filled with water to extract from the wool the remaining sulphurous acid and remove the potassium sulphite that has been formed