

Silk Market.

EUROPEAN.		Sixty Days	
Italian—Piedmont, Grand Ex.	\$.....	a	\$4 60
do Extra Classical	4 00	a	4 45
do Classical	4 15	a	4 20
do No. 1	4 05	a	.....
do Douppions 200-250	1 40	a	.....
JAPAN.		Six Months	
Kansai—Double Extra	\$4 00	a	\$4 05
do Extra	3 80	a	3 85
do Best No. 1—Extra	.....	a	3 70
do Best No. 1	3 60	a	3 65
do No. 1 Fil. hard nature	.....	a	3 60
Sinshu—Extra	3 77½	a	3 80
do No. 1 Fil.	3 52½	a	3 55
do No. 1-1½ Fil.	3 50	a	3 52½
do No. 1½ Fil.	3 47½	a	.....
Japan—No. 1 Rereels	3 05	a	3 70
do No. 1-1½ Rereels	3 60	a	.....
do No. 1½ Rereels	3 52½	a	3 55
do No. 2 Rereels	3 27½	a	3 30
CHINA AND CANTON.			
Canton Fil.—Ex. Ex. A. 14-16	\$3 00	a	\$3 05
do Extra Extra B. 14-16	2 90	a	2 95
do Extra A.	.....	a	2 85
Canton—Rereels, Nos. 1 & 2, selected.	2 60	a	2 65
Tsatlee—Blue Drag. & Fly Horse	3 05	a	3 10
do Pegasus	2 75	a	.....
do Mars S. S. S.	.....	a	2 60
Tussah—Best Chops	2 50	a	.....
China Steam Fil—	.....	.....	.....
First Class, 3 choices	4 05	a	4 10
Second Class, 3 choices	3 75	a	.....

There is a rumor current that a number of large knitting mills in central New York are contemplating to consolidate, but as yet the details are very meager. It is stated that some of the larger manufacturers in Amsterdam, Utica, and other places have been in con-

The directors of the Draper Co. have elected Mr. J. Frank Dutcher, president; Mr. Eben D. Bancroft, vice-president and Mr. C. Fred Butterworth, cashier. Mr. Bancroft has been purchasing agent and cashier of the company. No director was elected to the vacancy caused by the death of the late Joseph B. Bancroft, the late president of the company.

"MASON" MACHINERY FOR THE SOUTH.

The Decotah Cotton Mills, of Lexington, N. C., are installing a full complement of cotton spinning machinery, of the Mason Machine Works make, for a 10,000-spindle mill.

The Woodside Cotton Mills, of Greenville, S. C., are preparing for an installment of a 25,000 spindle equipment, together with cards and drawing frames of the Mason Machine Works.

THE COMB OF THE SCHAELLIBAUM GRID.

The Swift Spinning Co., Columbus, Ga., have complete installation of Schaellibaum Grids with Comb.

The Canton Cotton Mills, Canton, Ga., after trial completed installation of Schaellibaum Grids, and ordered also for new extension of mill.

Mr. Chas. E. Neisler, Supt. of several mills at King's Mountain, N. C., had Schaellibaum Grids installed in all these, and recommended them to all his friends.

AMERICAN EXPOSITION IN BERLIN, GERMANY.

America is to have a comprehensive and representative Exposition in Berlin, June, July and August, 1910. Applications for space have already been received by the American Committee, Hudson Terminal Bldg., 50 Church Str., New York, from many



A Corner of the Exposition Palace.

ference. It is believed, according to report, that the principal object of the combination is to better control the selling and the marketing of knit goods, to make agreements and control the opening of new lines, and to deal in raw material.

The indications are that every branch of American progress will be shown at the Exposition. Prince Henry of Prussia, brother of the Emperor, is president of the German Reception Committee, while in this country J. Pierpont Morgan is president

of the committees which are directing the work of selecting representative exhibits. Former Governor

of the visitors are commercially negligible sight-seers and exhibits are lost in a maze of many buildings and



The Exposition Palace.

Francis is First Vice President and John Wanamaker, the merchant prince, of Philadelphia, is Second Vice President.

amusement resorts, this indoor Exposition will appeal preëminently to the business men of Europe, who will want to see what the Americans are doing.



The Decorations Designed for the "American Exposition, Berlin, 1910."

As this will be the first All-American Exposition ever held in a foreign country, it will be of interest to all Europe as well as to America. American enterprise is well recognized abroad and the rapid progress of this country has attracted the attention of the entire world.

Unlike a World's Fair, where a large percentage

It will be of great interest for exhibitors to learn that patented articles and industrial property of every description will be as safe from imitation or infringement as though exhibited at home. This is one of the happy results of the new German-American patent treaty, which relieves American inventors from the necessity of working their patents in Germany.

For those who do not care to send a representative of their own to Berlin to install and demonstrate their exhibits, the Management will provide, through a Sales Office and a Bureau of Information established in the Palace, the services of competent men who will devote their entire time to such exhibits. Beyond packing the exhibits at their factory, the manufacturers will therefore be relieved from all further trouble in connection with the Exposition.

Exhibits may be sold during the Exposition, provided the customs duty be paid; custom officers will be in attendance to facilitate these matters.

Suitable awards will be bestowed on exhibits of exceptional merit, and the just distribution of these will be assured by the appointment of a competent and impartial jury of prominent Americans.

The Hamburg-American Line and the North German Lloyd have granted a freight reduction of 30 per cent on exhibits both ways, and the German Government has waived the customs duty.

PROTECTING IRISH LINEN.

In order to protect this historic industry of that country and thus provide employment for its scattered peasantry, the British government has enacted a law for the compulsory marking of hand-loom woven linen goods, in order to prevent the selling of power loom goods as hand woven goods. The main provisions of the legislation are as follows:

Every piece of linen damask produced upon a hand loom must have woven in the selvage the words "*Irish woven linen damask.*" Every piece of cambric or linen diaper goods must have stamped or printed thereon in legible characters the words "*Irish hand woven.*"

Any person guilty in any shape or form, of an offence under this act is liable on conviction for a first offence to a penalty not exceeding £10 (\$50). The penalty for the second or any subsequent offence is £20 (\$100) or less, or imprisonment for a term not exceeding six months.

RECOVERY OF OIL AND SOAP.

Alderman Broadbent, of Huddersfield, England, is quoted with furnishing interesting particulars of the commercial results of grease recovery from the waters of woollen piece-scouring. He estimates that 75 per cent of the oil contained in the pieces and 45 per cent of the weight of soap used can be brought back. With a plant costing £500 (\$2,500), and treating the effluent from 200 pieces weekly, profits up to 44 per cent have been realized. Reckoning working costs as £100 (\$500) for material, £65 (\$325) for labor, and £50 (\$250) for interest and depreciation an expenditure of £215 (\$1,075) is reached. The income from the 50 tons of oil recovered is £400 (\$2,000). The flocks and the press-cake are omitted, their value being set against the cost of power used.

Several individuals, connected directly and indirectly with the J. Spencer Turner Co., of New York, are installing in the abandoned Greenwood Mills, New Hartford, Conn., machinery with which to do experimental work on Ramie; for the purpose of ascertaining whether it will be possible to satisfactorily spin and weave the material into the products made with it in Germany.

BRITISH WOOL INDUSTRY.

All woven goods known as woollens and worsteds made for sale in the United Kingdom in 1908, according to the preliminary tables of the first census of production, recently issued by the Government, show a total value of \$195,735,494.

The total value of these woven fabrics produced in the United Kingdom, after excluding \$20,590,160 for carpets, rugs, and furniture stuffs, is \$175,145,334. The total production of the United States for substantially the same classes of goods, according to the census of 1905, was \$234,820,240.

The average number of persons employed is 257,017, of which 247,920 are wage-earners and 9,097 working on salary. The sex and ages of those employed are as follows: Males under eighteen, 21,953; over eighteen, 89,485; females under eighteen, 34,087; over eighteen, 111,492; total males, 111,438; total females, 145,579.

The following memorandum shows the quantity and values of wool manufactures for the United Kingdom, under the census of production act, for the year 1908:

Woolen tissues, broad, 137,188,000 yds., \$71,557,016; narrow, 35,328,000 yds., \$8,331,448.

Worsted coatings and trouserings, broad, 47,267,000 yds., \$40,537,945; narrow, 7,236,000 yds., \$3,518,479.

Worsted stuffs, dress goods, linings, lastings, etc., 126,410,000 yds., \$31,797,711.

Damask tapestry and other furniture stuffs, 2,608,000 yds., \$1,202,025.

Wool and mohair plushes, 3,077,000 yds., \$1,605,945.

Flannels and delaines, 47,380,000 yds., \$8,496,909.

Carpets, 26,159,000 yds., \$16,239,510.

Rugs, other than traveling rugs, 3,859,000 square yds., \$2,949,090; number, 178,000, \$199,526.

Blankets, 3,071,000 pairs, \$7,046,692.

Shawls, 1,290,000, \$1,104,695.

Coverlets, traveling rugs or wrappers, 828,000, \$1,148,494.

THE GERMAN CHEMICAL INDUSTRIES,

which have heretofore generally involved an increase in the number of persons employed, show an increase of only 0.72 per cent in the year 1908, the total amount of wages paid having increased only from \$57,548,400 to \$59,190,600, or 2.6 per cent. The exports of German chemical products decreased in the same year to the value of \$7,378,000, of which the decrease under the head of coal-tar colors alone amounted to \$6,664,000. The decrease in sales brought about an increase in the cost of production, and in the meantime prices had to be cut on account of keener competition. The average profit on the capital invested receded in 1908 from 11.16 per cent to 9.25 per cent. The transactions in the tar color industries fell off 32.7 per cent as compared with 1907.

KILBURN-LINCOLN LOOMS FOR FALL RIVER.

The Tecumseh Mills have placed an order with Kilburn, Lincoln & Co. for 400 wide looms to replace the narrow looms now in use in the company's plant. With the installation of the new wide looms the output of the plant will be almost entirely wide goods.

Northrop Filling Bobbins.

On the inside front cover of this Journal, eight of the patterns of Northrop filling bobbins most frequently used are shown. Either pattern is furnished by the Draper Company, in any one of their regular standard lengths, viz.: $6\frac{3}{4}$ inches, $7\frac{3}{8}$ inches, 8 inches or $8\frac{3}{4}$ inches.

Patterns marked *A*, *E* and *G* are feeler bobbins with the long step used with feeler and have three rings each. They also make, for certain customers, the long step bobbin with two rings, in place of the cone bobbin as shown in diagram *D*; for other customers they make three ring cone bobbins as shown in diagram *B*. Most mills using coarse filling prefer bobbins with steps on the barrel as in *E*, rather than the grooves as shown in *A*, *B* and *G*.

The importance of using only the best quality of filling bobbins can not be too strongly emphasized. The Draper Company has, at large expense, fitted up a plant for manufacturing Northrop loom bobbins so as to insure to their customers, the best quality of goods with reasonably prompt deliveries.

It is self evident that no other makers of bobbins can have the same incentive as the Draper Company in furnishing the best bobbins, for the fact that the former are not interested in the success of the Northrop loom. Two recent complaints of breakage of shuttle springs were directly traced to bobbins with rings and butts too large, and referred to bobbins not made by the Draper Company. In another case, feeler bobbins were made by outside concerns in connection with which the looms produced such an excessive amount of waste that these bobbins had to be destroyed.

In most cases the Draper Company has a record of the spindles operated by users of Northrop looms and is in a better position to fill orders understandingly, than any other concern.

Pratt's New Type of Circular Shuttle and Block for Narrow Fabric Looms.

The improvement consists of a fibre shelf screwed to the front of the block, acting as a support for the shuttle. The shuttle is specially shaped on the under side so as to bear on the shelf, what takes nearly all the wear off the runs of shuttle and block, and prevents the nose of the shuttle from dropping down and breaking out the warp. When the fibre shelf begins to wear it may be replaced at trifling expense.

Practical mill men who have seen the new type of shuttle and block predict that one set of these shuttles will out-wear two sets of the old kind, and that one set of the new blocks will out-wear *three* sets of the old kind.

The first cost of the new patent blocks is a trifle more than the old kind. The price of the new style shuttles is the same as before.

Any shuttle or block for any type of Ribbon, Tape or Webbing Loom can be duplicated.

If you are interested, address the manufacturer, Mr. Robert G. Pratt, and he will send you a sample shuttle and block, or if so desired will call.

Testing Yarns and Apparatuses for it.

The requirements exacted by the trade with reference to the quality of a fabric, makes the testing of yarns a necessity to the mill. The Superintendent, in order to be successful, must have the most approved testing apparatuses at his command; any error in the choosing of the yarn gives the buyer a chance for claims—loss to the mill financially as well as in reputation. It is to the interest of the mill to have these apparatuses on hand, in order to be able to make tests at a moment's notice.

The yarn must be tested for its count or number, strength to breaking point, elasticity, twist, regularity, cleanliness and moisture. A good deal depends upon

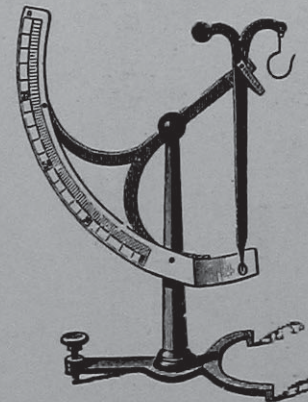


FIG. 1.

the condition of the yarn as well as the kind of apparatus which may be used. Yarn may have to be tested from the cop, the bobbin, the hank, or the fabric.

With reference to apparatuses for this work of testing yarns, Mr. Alfred Suter, the Textile Engineer of 487 Broadway, New York, has made it a special study to introduce to the trade, the most approved yarn testing machinery from abroad, as built by Henry Baer & Company, of Zurich, Switzerland, and Guiseppe Corti of Milan, Italy.

TESTING FOR COUNT.

The points to be taken into consideration are:

- (1) The most suitable length of material to test to arrive at an accurate result;
- (2) What are the differences to be found in the count of a yarn when various lengths are tested;
- (3) The effects of testing the material from various parts of a cop or bobbin and to note what differences, if any, exist;
- (4) The most suitable method of measuring the yarn, the tension to be put on during reeling and the effect on the length of yarn reeled due to tension and possibly the speed of reeling.

These cardinal points are well taken care of in connection with Mr. Suter's machinery, both in connection with his hand and belt driven reel.

The hand-drive reel is adopted for making four to seven skeins at once, fed from skeins, spools or cops; has a handle with multiplying gear and a direct acting clock with signal bell attachment.

The belt-driven reel is adopted for making ten

skeins at once; is fitted with an electric stop motion for stopping the reel immediately when a thread breaks, also when total length of skein is attained.

The skeins of standard length so obtained are placed on the sizing balances or quadrants (see Fig.

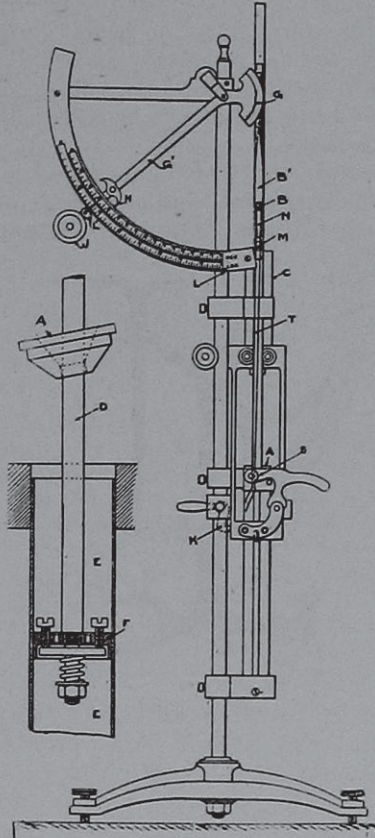


FIG. 2.

1), with direct denier reading scales in the case of silk, or numbers in the case of cotton, spun silk, wool or worsted. The lever suspension is very sensitive. These scales can be fitted for two systems of sizing and with additional weights for thrown threads.

TESTING FOR STRENGTH AND ELASTICITY.

The strength and elasticity of a thread are two of its most important features, as during the process of weaving these properties are often severely taxed, and if they fall below the necessary standard, much trouble is caused and the quality and product of the loom is often materially reduced.

The most approved apparatus, having besides the merit of moderate cost, is the single or double thread testing machine made by Henry Baer & Company, and handled by Mr. Suter. In order to make the reader familiar with the ingenious construction of this machine, the accompanying diagram, Fig. 2 is given, showing us how the speed of the Plunger is regulated, and all vibration during the test is eliminated.

The action of the machine is somewhat as follows: A thread is looped over a small pulley at B, and the two ends are clipped by a screw clip at S. This is attached to a frame which, when the apparatus is at rest, is held up by a catch K. This frame carries a

perforated plunger F working in an oil cylinder E, the upper part D of the plunger terminates in a lead weight covered with brass. The quadrant and arm G, G' carry a pair of catches H and a weight J, which latter supplies the necessary strain required to break the yarn. When a test has to be made, the arm G' is brought down, and a square catch L' takes into the detent L until the thread is placed in position as already mentioned. L' is now lowered, and catch K lifted. This allows the frame to descend and put strain on the yarn; the weight J is slowly raised until the thread breaks when the load is shown on the quadrant. Whilst the frame descends, and the thread is still unbroken, the graduated scale M descends at the same speed, but as soon as the thread breaks, the scale is released and stops, and the elongation is shown on the scale by the pointer N, which is connected with B, and consequently comes down at the same rate.

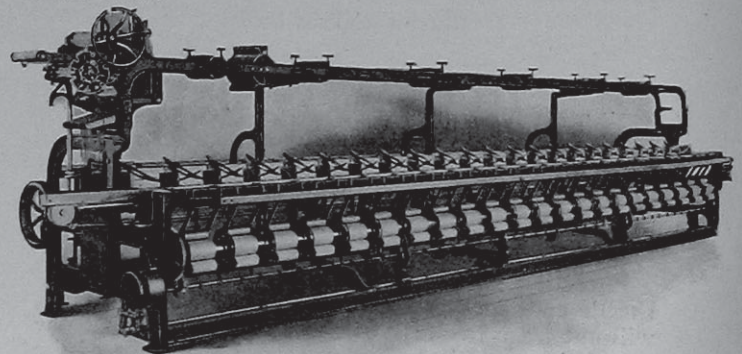
The machines are provided with two scales on the quadrant, one having a range of up to sixteen ounces, and the other a range of up to six pounds; for the finer yarns, the front portion of the weight is removed, when the break is read on the upper or sixteen ounce scale. The speed of the plunger is set to one inch in five seconds by regulating the aperture through which the oil flows.

In practice, a double thread test is found most convenient, and a large number of tests can be made in a short time by a girl or a youth. The length of yarn tested is $\frac{1}{2}$ meter (nearly twenty inches) for single, and twice this length for double thread tests.

(To be continued.)

THE CROMPTON & KNOWLES RIBBON LOOM. The Take Up Mechanism.

This mechanism refers to what is known as their double deck narrow ware looms, and has for its object to wind the two ribbons (or tapes) as woven above each other on the loom, on separate spools, arranged one over the other, in the front part of the framing of the loom.



THE CROMPTON & KNOWLES SILK RIBBON LOOM.

Referring to our two illustrations, Figure A is a front view of the take up and winding mechanism, and Figure B a section on line x — x, Fig. A, looking in the direction of arrow b, same figure.

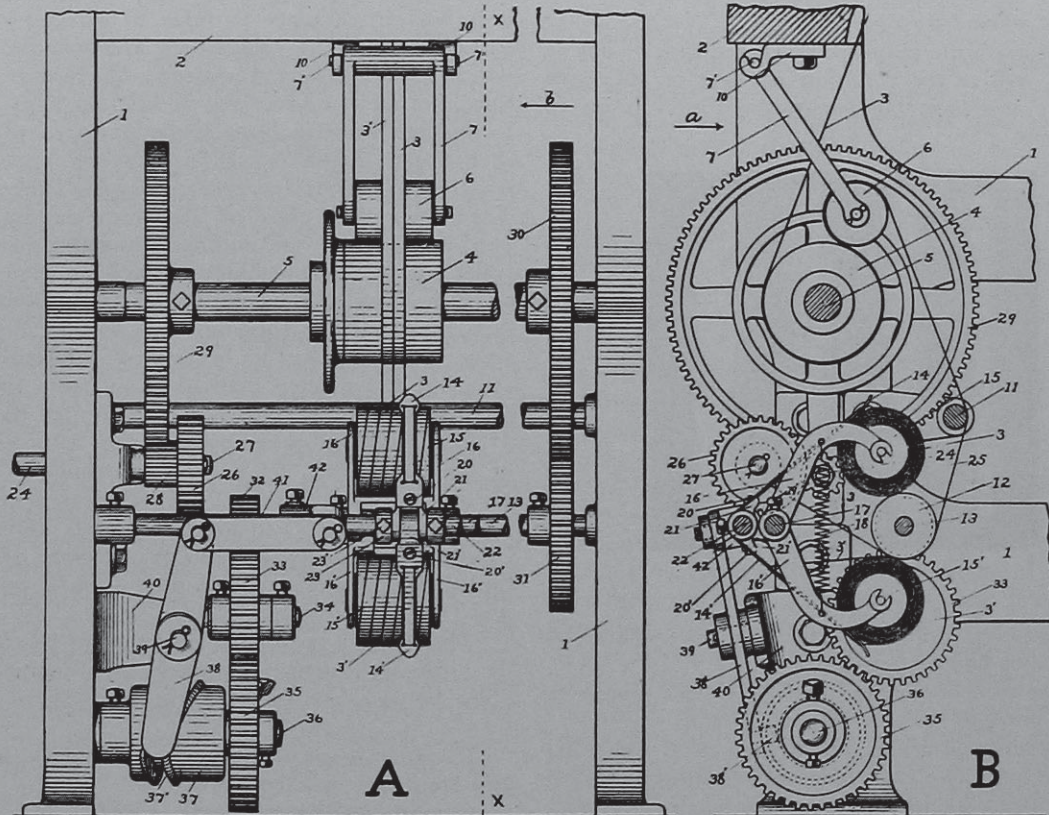
Numerals of reference accompanying our illustrations, indicate thus: 1 the loom sides and 2 the breast

beam. The two woven ribbons 3 and 3' pass under the take up drum 4 as is fast on the rotary shaft 5, over roller 6 mounted in the frame 7, pivotally supported by studs 7' extending loosely into open end recesses in the brackets 10, secured upon the under side of the breast beam 2. From the roller 6, the ribbons 3 and 3' pass over a guide rod 11 and under a roller 12, fast on a rotary shaft 13. After leaving the roller 12, the two ribbons 3 and 3' separate, and one, as 3, passes through a slot near the attached end

which meshes with and drives a gear 26, mounted on a stud 27 and attached to a pinion 28, which meshes with a gear 29, fast on the shaft 5 of the drum 4.

The latter revolves with said shaft and also a second gear 30, fast on said shaft, gear 30 meshing with and driving a gear 31, fast on the shaft 13 of the roller 12, and through the rotation of said gear 31 rotary motion is communicated to the shaft 13 and the roller 12.

The rotation of the roller 12 communicates rotary



FRONT VIEW AND SECTION OF TAKE UP MECHANISM OF THE CROMPTON & KNOWLES DOUBLE DECK RIBBON LOOM.

of a guide finger 14, and then through a second slot near the free end of said finger 14 onto the rotary spool 15, upon which it is wound. The second ribbon 3', passes from the roller 12 through a slot near the attached end of guide finger 14' and then through a second slot near the free end of said finger 14' onto the spool 15', upon which it is wound.

Spool 15 is detachably mounted in the ends of frame 16, provided with hubs pivotally supported on a rod 17. The other spool, 15', is detachably mounted in the ends of frame 16', provided with hubs also pivotally supported on the rod 17, said spool 15' being held in frictional contact with roller 12 by a spring 18.

The upper guide finger 14, is attached by a screw 20 to a fork shaped hub 21, loosely mounted on a rod 22, and the lower guide finger 14', is attached by a screw 20' to a hub 21', loosely mounted on the same rod 22.

OPERATING THE TAKE UP MECHANISM.

The driven shaft 24 has a pinion 25 fast thereon,

motion to the spools 15 and 15', which are in engagement, in turn winding ribbons (or tapes) 3 and 3' thereon.

A pinion 32, fast on the shaft 13, engages a gear 33, loose on a stud 34, and the gear 33 engages a gear 35, loose on a stud 36 and connected with a cam 37. In the groove 37' of this cam 37, a roller 38' on a lever 38, extends and travels. The lever 38 is centrally pivoted at 39 on a stand 40' and is connected by a link 41 with a hub 42, fast on the rod 22, which has a longitudinal reciprocating motion. The revolution of the driven shaft 24, through pinion 25, gear 26, pinion 28, gear 29, gear 30, and gear 31, communicates rotary motion to the roller 12 and through said roller to the wind up spools 15 and 15'. At the same time, through pinion 32, gear 33, gear 35, cam 37, lever 38, link 41, and hub 42, a longitudinal reciprocating motion is communicated to the rod 22, carrying the guide fingers 14 and 14', to cause said fingers to have a traverse or reciprocating motion to guide

the ribbons (or tapes) 3 and 3' onto the spools 15 and 15'.

Only one set of spools 15 and 15' and guide fingers 14 and 14' are shown in our illustration, it being understood that there is a series of them extending across the loom; the rotary movement of all the spools and the transverse movement of all the guide fingers being governed by the gearing and the worm mechanism described and illustrated.

WOOL SORTING.

(Continued from page 132, Vol. V, No. 5.)

To illustrate the influence of taking care or not of sheep, as well as the variation in fibres on the same sheep, the accompanying illustration Fig. 1 is given, representing:



Fig. 1.

A. Specimen of a fibre taken from the shoulder of a sheep which had proper care;

B. Specimen of a fibre taken from the breech of the same fleece as fibre A was taken from;

C. Specimen of a fibre taken from the shoulder of a sheep of the same class from which fibres A and B had been taken but where the animal was poorly-bred, *i. e.*, neglected;

D. Specimen of a fibre taken from the breech of the same fleece as fibre C was taken from.

In some mills, making an average class of fabrics, grading or sorting or both is omitted, the mill in this case running on one or possibly two standard qualities of yarn only and where they rely on the judgment of the commission merchant, with reference to a lot of wool, for their wants, from which it will be seen that by such mills the services of a grader or sorter are not required.

SORTING.

The first task for the sorter when the fleeces reach him, from the grader, is to open the first fleece, *i. e.*, undo the strings placed by the wool grower about the fleece in order to keep the latter compact by itself in the wool bag. The grader was not compelled to cut this string for the reason that he has been able to determine the grade of the fleece in question by pulling out bits of staple here and there from the fleece, thus averaging the whole fleece.

After the strings are removed, the fleece is shaken

out by the sorter on his sorting table, thus separating from the whole fleece any loose pieces of wool, called *locks*, as well as bits of short, coarse, and dirty wool which are occasionally rolled up inside the fleece and which are called *stuffings*. These droppings from the fleece must in turn be separately sorted, since coarse and fine fibres are apt to be mixed up together.

The fleece is now spread out by the sorter on his table, so that he can readily separate the coarser and finer parts from the fleece.

Before explaining and illustrating Sorting proper, it is not out of place to refer to what is known as *Clips* or rejections, and which are portions of wool which must be treated entirely different in the mill than the other wool of the fleece. By clips we refer to portions of wool heavily contaminated with burrs, or hardened paint, tar or hard lumps of manure; or possibly to be badly, perhaps irremediably stained. The sorter then clips off the wool containing such hard bits of paint, tar, and hard lumps of manure, and tears out any irremediably stained portions as well as such filled with burrs not easily removable, and puts these various clippings in a sort by themselves, since such wool has to be treated differently during scouring and picking than the wool from the rest of the fleece. It must be mentioned here that the amount of these clippings varies considerably with certain lots of wool, fine, high priced and consequently carefully raised wool having little if any, whereas in connection with cheap grades of wool, carelessly raised, these clippings are of considerable proportions, and consequently increase the cost of such a lot of wool to the mill.

The fleece is now in a condition to be sorted into its different grades. As previously mentioned, two main divisions are fixed for the classification of wools, *viz.*:

Clothing wools and which are wools to be carded and spun into woolen yarns; and

Combing wools which are wools combed during their manufacture into worsted yarns.

For either kind, a different sorting of the fleece is used, the two diagrams Figs. 2 and 3 showing the procedure as practiced in either case.

Fig. 2 refers to grading clothing wools. In this diagram, 1 indicates the portion of the fleece where the best wool grows, and the other numerals indicate successively lower or coarser portions of the fleece. The different grades on the fleece have regular terms and are as follows: 1—Picklock; 2—Prime; 3—Choice; 4—Super; 5—Head; 6—Downrights; 7—Seconds; 8—Abb; 9—Breech.

The grading of the fleece of combing wools, with reference to diagram Fig. 3 is as follows: 1—Fine; 2—Blue; 3—Neat; 4—Brown; 5—Breech; 6—Downrights; 7—Seconds; 8—Abb. The grades 6, 7 and 8 are rarely used for spinning worsted yarns on account of their unsuitability for combing, and hence find their way into low grades of carded yarns.

We will thus see that the finest and most even grown staples are found on the shoulders and sides of the fleece, the lower part of the back yielding a

staple of fairly good quality, resembling that from the shoulders. On the loin and the back of the sheep the staple is shorter and of a more tender nature. The upper parts of the legs yield a long and strong wool, which hangs in large, open locks. It is this part of the fleece which comes in contact with the

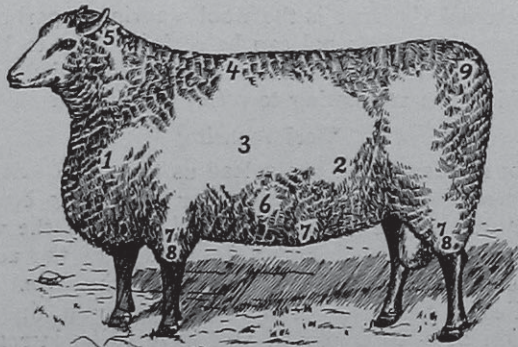


FIG. 2

burr plant if such is found on the pasture land, and causes the burrs to become entangled in the wool. This item also refers to that portion of the fleece as grown on the lower portions of the sides of the animal. The upper part of the neck gives an irregular staple that is often infested by the spinose leaves of wild prairie plants and seeds. If there is any gray wool in the fleece, it is generally found here. The wool grown on the belly is short and fine, but as a rule, dirty, said wool having been cramped in its growth when the sheep has been lying down, for which reason it is always more or less matted, and besides this, it is apt to be stained by material on which the sheep has lain. That portion of the fleece which is taken from the vicinity of the ears is invariably coarse and of an inferior grade. On the chest and throat, the wool is usually short and apt to be worn

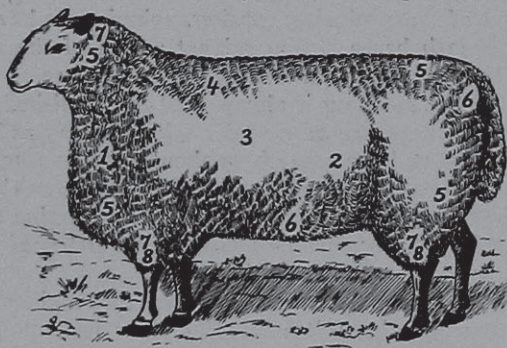


FIG. 3

from rubbing. The coarsest part of the fleece grows about the hind quarters or breech, and on the tail.

Sometimes, however, the fleece has a dingy brown color, called a *Winter stain*, which is a sure indication that the wool is not in a thoroughly sound state. Such fleeces are thrown out by the wool sorter, being suitable only for goods that are to be dyed black or dark colors.

ANTHRAX OR WOOL SORTER'S DISEASE.

This is a disease the wool sorter is liable to con-

tract, more so if handling foreign wools. It is caused by *Bacillus Anthracis*, which may enter the system either by the skin or by the internal organs. In the former case it gives rise to pustules, which become painful and cause perspiration, fever, delirium, and other disorders. In the latter case it produces the most serious ailments, such as blood poisoning and inflammation of the lungs, which often prove speedily fatal.

Washing Wool in Australia.

Washing wool on the sheep's back was the general custom in the 60's and 70's. Wool was shipped in the grease also, but only in small quantities. If water was scarce or bad, the flocks were shorn without washing, but this was looked upon as a last resource, for growers had no mind to pay freight on greasy wool, and if there was any fall in prices the greasy wool came in for more than its share of the depression. The flock owners, therefore, strained every nerve to accomplish the washing, and vied with each other in the get-up of their clips.

In the early days primitive methods of creek washing prevailed. A site was found on the banks of a creek or river, or even by the side of a large lagoon or waterhole, on which the wash pen was built. A strong square enclosure rudely floored and intended to hold forty or fifty sheep was first made, and a series of narrow yards led up to this. These again communicated with a large roughly-fenced yard capable of holding the flock. The wash pen would overhang the water in a tolerably deep place, so that the sheep could be plunged in from the *stage*. Leading from this were water yards formed with piles and horizontal poles on a level with the water.

The first enclosure was small and square, holding from a dozen to twenty sheep. The sheep were thrown in and permitted to swim about from five to ten minutes. The sheep were then pushed under the horizontal sapling dividing the soaking pen from the next division by one of the sheep washers armed with a crutch, and rapidly turned about in the water by men stationed on the side timbers. They were passed along from one division to another by the simple process of pushing them under until the last pen was reached. Finally they reached the *long swim*, which took them out on the farther bank. When the sheep staggered out they were taken in charge by the shepherd and put in small and well grassed paddocks to graze and dry at their leisure.

Day and night the shepherd would stay with them and keep them on clean thick grass, away from black stumps, bare, dirty places, yards or roads. At night they would be camped on clean grass and nothing was grudged either in attention or expense to keep the wool clean and bright until the sheep entered the shearing shed. The great object was to get the sheep into the shearing shed the moment they were dry. They would then be carefully and quietly driven to the shearing shed, and not until they were in the shed was the vigilance relaxed. A careful shepherd would cheerfully go a mile out of his way to avoid a dusty

road, and if a gateway became dusty it was shut up and a fresh opening made in the fence.

On the larger stations, with 80,000 to 200,000 sheep, everything was done in a most complete and efficient manner, and the expense spread over a large number of sheep brought down the cost per head to below that of the owner of 8,000 to 10,000 sheep, and the work could be done more effectively. In some cases steam engines were installed at the wash pen to pump and heat the water, spouts were erected, under which the sheep were placed, and hot and cold water soaks or covered pens provided, soft soap and soda used in abundance, and scores of men took part in the operations. With the aid of such appliances the sheep were turned out with their fleeces white as driven snow. They were placed in a small green paddock and gently moved on to another enclosure day by day until the shearing shed was reached. Then with 50 to 70 shearers on the board, the wool would soon be safe in the bales.

At length one or two owners tried shipping their wool in the grease with success, and soon all sheep owners followed with a rush, the reason being that buyers in London for a season or two did not make sufficient allowance for the loss in weight by scouring, and paid too much for it. According to old authorities, the prices obtained were a revelation to local growers, and it is probable that old world buyers burned their fingers. The squatters knew roughly what they had been getting for the fleece of each sheep, and when they got so much more they jumped to the conclusion that it would pay them better to sell in the grease. It certainly paid them very much better until the London buyers learned to make proper allowance for the loss. Users now prefer to receive the wool in the grease, and about 90 per cent of Australasian sales are greasy wools.—*Dalgety's Review*.

PREPARATION, DYEING, AND FINISHING OF LADIES CLOTH.

By Dr. Louis J. Mátos, *Textile Chemist*.

The purpose of the present article is not to detail the various technical processes necessary to produce the finished fabric referred to in the title, but to describe in a clear and explicit manner, if possible, those things that should be done to the goods while in the several stages of manufacturing. It is a fact now becoming more and more recognized by the more progressive mill men, that the quality of a finished fabric is greatly dependent upon the care and attention to the little details which, together, go to make up any process or operation to which the pieces are subjected. One expects to find in a finished piece of goods, besides uniformity of weave, evenness of shade, freedom from specks, absence of folds and creases, etc., not to mention impurities due directly to imperfect scouring and rinsing, either of the original raw wool or of the woven cloth.

The following observations are based upon long practice and close attention to the many perplexing problems which have arisen in the mill, and which

were solved there, so that all the conditions of cause and effect could be taken into consideration.

It has been said by many able manufacturers that the most important point in a mill for observing the commencement of operations is the picker house, but in the writer's opinion, the one place in a mill requiring eternal vigilance is the wool scouring department, because there the wool can be so injured as to baffle the best skill in all the other departments of the mill combined, in attempting to offset the damage.

Wool Scouring

is not as easy as the books lead us to believe. Scouring cannot be learned in a day or a week; to become an expert scourer requires careful study of the various grades of wool, and a knowledge of the action of soap, alkalies, and temperature on the fibre. According to the grade of wool to be scoured, the proportion of soap employed will have to be increased, dependent upon the probable shrinkage. As a rule for fine wools, such as are used for ladies cloth, the amount of soap required will vary from 3 to 5 pounds per 100 gallons of scour liquor, and which may be *strengthened* by adding a little ammonia, if *pitchy* wools are going through. Caustic soda should not be used under any circumstance, and soda-ash rarely employed. If a carbonated alkali is to be used, it is much better to use GRAN-CARB-SODA, the highest grade of soda crystals made, which is very pure, and quite free from traces of caustic. It is a mistake to add unknown quantities of soda to the scour liquors, no solutions of soda or soap should be used unless made up to definite strength so that each gallon represents so many ounces or pounds.

For fine wools, it is always best to use soft soaps, *i. e.*, soap made from olive oil and potash, which, while more costly than soda soaps, leave the stock in a much better condition; aiding in reducing the amount of waste during carding, spinning and weaving. Potash has a strong solvent action of the wool yolk, but without action on the fibre substance.

Effective scouring is always best accomplished at a general temperature of 125° F., seldom going as high as 140° F., and the scour boss should always regulate the temperature by means of a thermometer. With all due respect to the *expert* who can determine temperature by *testing with the hand*, it will be safer to check up with a thermometer.

Rinsing after scouring should be thorough, not a mere passage through a bowlful of water becoming dirtier every minute, but rinsed in clean water to ensure the complete removal of all remaining traces of soap. Carelessness at this point leads to difficulties further on in this way. Traces of soap on the stock, when the latter is dried, become so fixed on the fibres—often becoming decomposed in the elevated temperature of the drier—that they resist further cleansing. Too high a drying temperature is, of course, responsible for this, and where fine wools are handled, due regard should be given to the proper design and construction of the driers,* bearing in mind that it is not temperature alone that effects the drying of the wet wool, but rather the moisture ab-

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sorbing properties of the heated air forced through the dry box.

The Picker Room.

The proper mixing of wool in this department is important, the details of which do not concern us, except in so far as they relate to the condition of the wool as delivered to the picking floor and the oils used. Under no circumstance should oil be sprinkled on hot wool, nor should hot oils be used. The purpose of oils at this stage is to lubricate the fibres so that they may be handled properly in the various machines through which they must pass before spun into yarn. Only sufficient oil should be employed to do this properly, some wools requiring more oil than others—it being noticed that finer wools take up more oil than coarse wools. In applying oil, it is intended that it should be a surface application only, so that the condition of the wool and oil should be such that the latter is not soaked up by the fibre substance; after the wool has been dried, sufficient time should be allowed for it to take up its normal amount of moisture from the atmosphere before oiling, otherwise, if any oil is applied to *bone dry* wool, while hot, it is at once taken up by absorption, and is then removed with extreme difficulty when the scouring in the cloth takes place.

Now, a word about oils. There are on the market at the present time a great variety of *wool oils*, each possessing the ideal properties that a wool oil should have, but one thing should always be remembered by the mill buyer, or the superintendent, that a wool oil, which contains any mineral oil (petroleum product) should be rejected. There should be no middle ground to stand upon where fine and high class fabrics are manufactured. *Mineral oils will not saponify with*

any alkali, no matter how treated. The best they will do is to become emulsified in the presence of animal or vegetable oils and an alkali. The following test is usually shown when wool oils are under discussion: A sample of the oil is dropped into a test-tube or bottle containing water together with some soap, and then vigorously shaken. The result is a turbid or milky fluid, which is asserted to be *proof* that the mineral oil in the mixture *saponifies*, but such is not the case; what actually happens is only the separation of the mineral oil from the other mixing oil. The point to be made clear regarding a wool oil containing mineral oil is the ability to scour it out completely from the woolen yarn or cloth by the usual means generally adopted for olive oil or olein oil, and this is somewhat difficult to do.

Olive oil is always the best wool oil, it lubricates and scours out easily and this is all that is wanted. It is somewhat costly, but its increased cost over ordinary wool oils is counterbalanced by a clean and undamaged condition of the wool. Next to olive oil in choice is the now well known distilled, or saponified, oleine oil, a product of the tallow industry, and which, on account of its ready solubility in soap solutions is used extensively as a wool oil. As a rule it should be partly saponified by means of ammonia, added in the proportion of about 1 pint to a gallon of olein, and then used in the same manner as an ordinary wool oil.

The intermediate operations from the picker house to the loom do not directly interest us, but

Washing after Weaving

demands some attention. If the wool oil used is of the proper kind and quality, the actual washing should offer no difficulties. The washer can well be of the ordinary type, the pieces going through in rope form and side by side. The water used should be soft, and if not naturally so, should be softened by proper chemical treatment, it being an error of judgment to attempt to produce high class fabrics from wool where

*The two best makes of Wool Dryers in the market are the "Stone" Dryer as built by the James Hunter Machine Co., of North Adams, Mass.; and the "Proctor" Dryer as built by the Philadelphia Textile Machinery Co. A description of the construction and operation of these two makes of dryers was given in the July and August issues of Posselt's Textile Journal, and to which the Reader is referred.—*Editor.*

the wool, soap, and the *hardness of the water* are likely to come together. The temperature of the scour liquor should not exceed 100° F., and the volume only so large as to work the goods in conveniently. As the cloth is being scoured, there should be poured on from a sprinkling can, a solution of sal soda standing at 7° Tw., and not exceeding 60° F. The amount of soda necessary to pour on depends on the quantity of wool oil actually contained in the pieces, and if a few trials are made with a cutting of the cloth, or with a carefully weighed sample of the olein oil, the exact amount of soda can be ascertained. As an example, a regular batch of six pieces of cloth, total weight of which was 274 pounds, required 15 gallons of the soda solution. During the washing considerable lather should show, and the presence or absence of it is an index as to how the wool was oiled. If the lather is weak, or thin, it is a positive sign that not sufficient olein oil was used, in which case soap must be added to the machine. It will be noticed now that the olein oil serves as the basis of its own scouring soap in connection with the added alkali.

The rinsing after scouring is effected by first using soft water at 100° F. (not higher) then ordinary water with the chill removed, if in winter, and finally with cold water. The one injunction to have prominently in mind is to keep soap away from hard water, the reason is obvious, soap decomposes in the presence of lime or magnesia bicarbonates, or other alkali earth compounds which impart to water its *hardness* with the formation of corresponding lime or magnesia soaps of the fatty acids of the soaps used in scouring. These lime or magnesia soaps will not dissolve in either hot or cold water, nor are they broken up by treatment with alkalies, consequently, when such impurities become deposited upon a batch of yarn or cloth, serious consequences follow, and which as a rule do not show until the pieces are dved and finished. Such deposits are mainly responsible for *shades* or *clouds*, and, according to the chemical nature of the various dyes used, produce dark shaded areas where the color is taken up by the lime soaps, or where the lime soap deposit acts as a resist, by preventing the taking up of the color by the fibre.

(To be continued.)

Practical Talks for the Commission Merchant.

TO ASCERTAIN WEIGHT OF CLOTH FROM A SAMPLE.

Frequently the commission merchant is compelled to ascertain from a small sample the weight of the fabric in ounces per yard. The more experienced person certainly will be able to promptly judge said weight to a nicety, by simply handling the sample between his thumb and forefinger, *i. e.*, ascertaining its bulk in this manner, as well as by lifting the sample in his hand, taking into consideration in this instance the size of sample. However, it will also be of benefit to the most experienced person connected with a commission house, to test the correctness of his practical guesswork by weighing the sample on hand on accurate scales, and ascertaining from it, by figur-

ing in proportion, the weight in ounces per yard for the fabric.

How to Proceed: Trim your sample, most accurately, to the greatest possible size, for the greater amount of surface you can obtain, the more accurately your figures will be. After thus carefully trimming sample to a known size, put it on the scales and ascertain the weight in grains, calculating then, by proportion, the weight in ounces per yard, from the size of sample and its weight in grains previously obtained.

The whole procedure will be best explained by a practical example.

Suppose we trimmed our sample, which was a 56 inch wide fabric, to 3 × 3 inches = 9 square inches, and found it to weigh 45 grains; thus:

56 × 36 = 2016 square inches in one yard of the fabric structure, and

$$\left(\begin{array}{c} \text{sq. inches} \\ \text{in sample} \end{array} \right) : \left(\begin{array}{c} \text{its weight} \\ \text{in grains.} \end{array} \right) :: \left(\begin{array}{c} \text{square inches in one yard} \\ \text{of the piece of cloth.} \end{array} \right) : \left(\begin{array}{c} \text{its weight} \\ \text{in grains.} \end{array} \right)$$

$$9 : 45 :: 2016 : x$$

and 45 × 2016 = 90720 ÷ 9 = 10080 grains.

10080 ÷ 437½ (grains in one oz.) = 23.04 ounces or practically 23 oz. per yard. Ans.

Above rule given in the proportion might thus be expressed for a standing

Rule: Multiply weight in grains of sample with number of square inches in one yard of the piece of cloth and divide the product by number of square inches in sample; the quotient divide by 437½, thus obtaining the weight of the fabric for one yard expressed in ounces.

The same result is obtained if proceeding after

Another Rule: Cut your sample to a known size and divide the number of square inches thus derived into the number of square inches one yard of the fabric contains, multiply the quotient of this division with the weight in grains of your sample and divide the product by 437½.

The previously given example will figure accordingly to this calculation:

56" wide fabric = 2016 square inches.

2016 ÷ 9 = 224 × 45 = 10080 ÷ 437½ = 23.04 oz. weight of fabric per yard, being the same answer as before obtained.

Crimps in Wool Fabrics.

Of the many irregularities produced in manufacturing fabrics, it is fairly safe to say that there are few which are more difficult to account for, and which are of more serious consequence, than is crimpiness or irregular shrinkage in connection with wool fabrics, more especially in lustre goods. This is a type of defect, says Eber Midgley in "Textile Manufacturer," which, while it may or may not be the direct consequence of unsatisfactory treatment in the dyeing and finishing processes, is certainly developed in these stages of production. That its cause may be many-sided there can be little doubt, and results also force the conclusion that the recurrence of this defect cannot be prevented until both the materials employed and the treatment accorded them in all processes be standardized, and strict adherence to the limits fixed. It is worth while to note that the prevalence of this

defect is more or less periodic—a feature that would suggest that under certain conditions of trade activity some laxity in one or other sections of production obtains, which under other circumstances is absent.

DEFINITION OF THE CRIMP.

The defect in common form is generally shown by a sharp crease in the finished cloth. It would seem as if certain of the warp threads have been drawn on one side, through the influence of the filling, and have permanently become displaced. The first cause of this is doubtless irregular shrinkage. Filling composed of a stock which will shrink much from some cause, is placed alongside, before, and after filling which shrinks less—the former yarn having drawn up, the latter gives the effect named. Whatever is done during finishing—tensioning, heating, or pressing—this defect once produced defies total elimination, and remains a disfigurement which often ruins the sale of the fabric.

SUGGESTED CAUSES.

The fact that uneven shrinkage can only be the cause of such a defect as crimpiness, naturally leads the investigator to study the materials employed and the conditions under which they have been treated. Should there be an absence of uniformity in either material or treatment, it stands to reason that the finisher having no method by which he can quickly and conveniently vary the character of his treatment to suit the ever-changing condition of the cloth, must admit of the production of the irregularities complained of. At the same time, the finisher, knowing the probability of the defects occurring, might modify his treatment and reduce the risks to a minimum. For example, the cloth which is treated during finishing at an open width, during every process is much less likely to develop irregular shrinkage than when treated in rope form. Further, when a cloth is of a doubtful character, the more thorough the fixing process or blowing, the less opportunity the irregular material or yarn has of developing. The results of a fairly comprehensive examination of crimp fabrics suggest the following as being the cause. They also bring the responsibility mainly on to the shoulders of the spinner.

First: Unevenness of the Twist of Yarns.—It is fairly well known to those who handle tightly twisted yarn, that in proportion as the twist increases, so does the tendency of the yarn to contract. In view of this fact, no spinner would deliberately spin his yarn so as to contain a varying amount of twist. Still, he may and does spin yarn of varying twist. When it is considered that the yarn from one spinning frame may come from 144 different spindles—each driven by individual bands, all twisting and winding on to bobbins yarn from separate rovings drawn through separate rollers,—it is not difficult to imagine how this variation may occur. To refer to one part of the spinning frame only—the spindle band: a new band will lick the spindle wharfl, and will drive it with the minimum slippage; but when it becomes old and is saturated with grease, its power to grip grows less. Such spindles running side by side and spinning the

same yarn will be responsible for a variation in the amount of twist. Of the fact that this does occur, and that it has a considerable influence in regard to irregular shrinkage, many evidences might be given. The recording of the simple fact that in yarns recently taken from three crimp pieces there was a twist variation shown to the extent of from 7 to 20 per cent in the respective cloths, may possibly suffice. It should, however, be added that a reasonable degree of uneven twist does not invariably produce crimps. For example, tests have been made with cloths composed of yarns of various twists, in which it was noted that the treatment employed during finishing does not develop any irregularity. It is likely, however, that irregularity in twist produced frequently and markedly in one bobbin length of yarn in the cloth is a more fertile source of crimpiness than the irregular twist occurring evenly throughout the fabric. When the variation of twist is evenly distributed in the cloth, the irregular shrinkage is not so striking as when the variation is only at intervals.

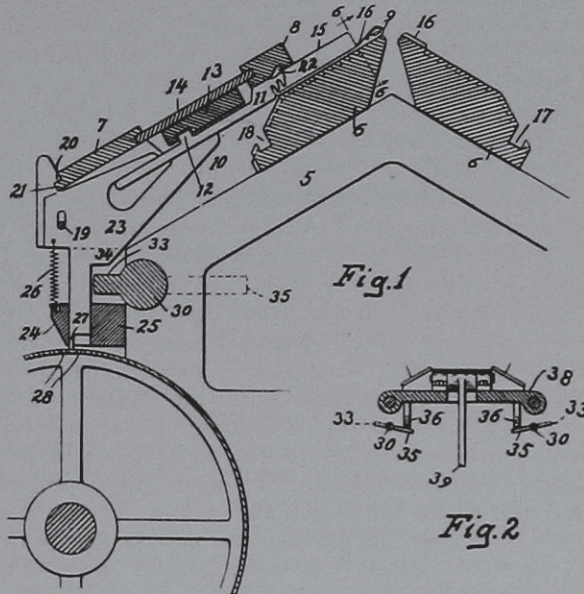
Second: Imperfect Blending of Unsuitable Wools in the Drawing and Spinning Processes.—Owing to trade conditions, there are few spinners who make their lustre yarns solely from typical lustre material. Whereas formerly the English long lustre wools were alone employed for this purpose, to-day crossbreds—which are somewhat different in characteristics—are employed in conjunction with the English wool. When such a material of reduced length and fineness, and possessing less power to *bed* in a yarn, is adopted, it is remarkable that more defects are not produced during finishing. The mixing of these fibres may be so imperfectly done that certain portions of the yarn may contain a predominance of one or other of the materials employed. The mixing of the fibres in a parallel order, as in the case of a worsted thread, is not readily effected. They need combining and elongating, or doubling and drafting again and again, before the mixing is thoroughly effected. The effect of insufficient mixing is that the different materials behave differently, especially during shrinking, and the result is a crimp fabric.

Third: Variation in the Count of the Yarn.—On account of there being so many individual points of adjustment in the machinery employed by the spinner, unremitting care and attention are required if the yarn delivered by each spindle is to coincide in all respects. Should the rovings, for example, be of unequal thickness, the counts will show similar variation; or, again, should the rollers be unevenly weighted, the thickness of the yarn will vary. Further, there will be a difference in the twist, and in consequence the defect in question arises. A badly working roller, also, with a weakness either in running or in condition, can produce unevenness, having much the same influence as regards the defect in the cloth. It will thus be clear that in the spinning processes referred to, there are certain grave elements of danger which if neglected may produce irregularities of far-reaching results. The crimp defect is of course not altogether confined to the spinner. In the

weaving, the unwinding of the filling from the varying position it occupies on the bobbin in the shuttle may cause the difficulty. The reeding of the warp threads may be unsuitable, as well as the application of the material to the structure of the cloth. Similarly, the finisher with too little control or too violent or irregular treatment in crabbing, blowing, or drying, is just as likely to create a crimping fabric.

Improvements in the Construction of Straight Knitting Machines.

Straight knitting machines have two parallel rows of needles mounted on suitable frames, with an opening between them for the knit fabric to pass through.



The improvement, in the new construction, consists in a quick acting mechanism whereby the pattern cylinders control the positioning of the needles.

Of the accompanying illustrations, Fig. 1 is a partial cross section of the machine, showing the needle mechanism and a portion of the pattern cylinder. Fig. 2 is a detail section.

A description of the improvement is best given by quoting numerals of reference accompanying the illustrations, and of which 5 represents portions of the frame of the machine, 6 the base bar, and 7 and 8 the spacing bars forming the needle beds.

9 is one of the needles, the series of which are supported in the beds between the division plates 10 and are projected into acting position and withdrawn therefrom by jacks 11, the upper ends of which have notches adapted to engage the turned up lower ends of the needles. The jacks 11, upon their upper edges have lugs 12, which are engaged by the cam devices 13 of a longitudinally moving cam bar 14, traveling in ways formed in the spacing bars, and by these cam bars the jacks are slid in and out, so that they carry the needles longitudinally into and out of their acting positions. Above each needle is a filler plate 15, arranged endwise between the wall plates, preventing vertical movement by the needles.

The upper surfaces of the base bars 6 are provided at their front edges with raised surfaces 16, having grooves cut in them in proper positions relative to the needles, to enable them to hold the needles equidistant from each other, and to guide the needles after they have been projected beyond the division plates. The grooves also assist in shedding the loop over the needles in knitting. The inclined surfaces at the rear of said base bars are provided with grooves 17, adapted to engage the lugs 18, formed on the under and corresponding edges of the division plates, which are further secured in position by guide rods 19 extending through the series of plates. By notching the rear end of the plates, as seen at 20 and entering such notches over the rib 21 of the spacing bar 7, this construction supports the rear end of the plates vertically and prevents horizontal movement. The spacing bar 8 is recessed longitudinally (as at 22) to give room to the jack when it is tipped to its non-acting position, serving also the further and very useful purpose of preventing the needles from being drawn forward by the yarn, when the jacks are out of action.

The jacks are lifted to the position shown in the illustration, to cause their engagement with the cam bars 14 by controllers 23, having a vertical sliding movement between bars 24 and 25, located below the needle beds; the jacks are depressed from the position shown in order to destroy such engagement by the downward movement of said controllers, caused by springs 26. The controllers 23 are guided in their vertical movement by the guide rods 19, which pass through elongated openings in them. These guide rods have large openings, into which the jacks enter and which allows them all necessary freedom of longitudinal movement; at the same time the projections at the mouth of the openings are adapted to rise and depress the jacks when the controllers are raised and depressed. The controllers all have feet 27 adapted to enter the openings 28 in the pattern cylinder, and are actuated, when vertically raised, by rock shafts 30, working in stationary bearings as are secured to the framing of the machine, also having laterally projecting wings 33 adapted to engage shoulders 34 formed in the controllers. These wings are each long enough to engage all the controllers upon one side of the machine at the same time. The shafts also have on the opposite side from the wings 33, horizontally projecting pins 35 which are engaged by rounded cams 36 depending from the cross head 38 which is actuated by a swinging lever 39 and operates the yarn guides. There are two of the pins 35, and they are located as shown, so that they rock the shaft at each end of the stroke of the cross head, the rocking of the shaft causing the lifting of the controllers, so that they are all freed from the pattern cylinder. As the cross head reverses its motion almost immediately after lifting the controllers, the rock shaft will then be free to rock back to its normal position, and allow the controllers to fall back, such of them as are over openings 28 in the pattern cylinder entering the same and carrying their corresponding jacks down

out of engagement with the cams 13; the others rest upon the surface of the cylinder and continue their corresponding jacks in service.

The lever 39 is joined to a crank gear wheel (not shown) receiving power from a pinion, and the pattern cylinder is driven by a gear on the same shaft therewith.

FAULTS IN THE DYEING AND FINISHING OF FABRICS.

By P. F. Crosland, B.Sc.
Hard and Brittle Goods.

At the very outset it is necessary to consider the nature of the wool fibre. The same consists essentially of a very complex substance, possessing many different characteristics. The same, as a very complicated machine is liable to break down at a large number of places—indeed its very complexity often causes it to break down—so the substance of the wool fibre is rendered, by its very complexity, very susceptible to all sorts of treatment. This is both an advantage and a disadvantage. It is an advantage, for example, because through it wool has an attraction for and can be dyed with dyestuffs of widely different constitution, and through it wool has the attraction for chlorine and for metallic salts, which has in turn widened the scope of the wool dyer. But, on the other hand, this complexity has also laid the wool fibre open to attack by all sorts of different chemical reagents. Its acidic components, for example, have laid it open to attack by alkalis, its basic components have laid it open to attack by acids, and, most important of all, the keratin, if subjected to a prolonged treatment with acids, alkalis, and even with steam, is altogether broken down into simpler substances, having totally different properties. The milder the treatment a dyer or finisher has to give to the material under treatment in order to produce a certain result, the better the result is. The true dyer, and the true finisher—men who take pride in their work—will handle the goods under their care most tenderly, almost as if they were flesh and blood. If a certain shade has to be got, the dyer will get it with the fewest possible number of passages through the dye bath. If the goods have to be dried, he sees to it that they are dried and not baked. In short, if the goods under his care have to be subjected to any extreme treatment, he curtails that treatment to an irreducible minimum, for he knows that every time the fibre is exposed to it, it loses in elasticity, in strength, and in handle.

There are some points, a careful study of which will help in the consideration of the possible causes of hardness and brittleness in fabrics.

The first cause is the use of too strong or too hot a scouring liquor, for it must be remembered that as soon as the wool is cleaned, any further exposure to alkali is detrimental in its effects.

Carbonised wool is never so good as the untreated material, but this deficiency is vastly increased if the goods are not washed off and neutralised immediately after carbonisation. There is one particular point in regard to the carbonisation process which must be

carefully considered, *viz.*, the necessity for a thoroughly efficient neutralisation of the acid with a mild alkali, since if improperly neutralised, it is highly probable that the man who will finally have to bear the blame for bad goods is not the one really responsible, because the tendering or rotting effect of the acid on the wool is a cumulative one, it goes on and on, and may not have shown markedly till the goods are woven. There are many instances on record where carbonised wool had passed the spinning all right, but had become rotten in the interval which passed before the yarn was woven. Brittle yarn should always be tested for acid with moistened blue litmus paper, before dyeing.

A third possible cause of hard and brittle goods is the keeping of the goods in a hot dye bath longer than necessary. A batch which needs four or five additions to the dye bath before the desired shade is obtained, will always be harsher and less mellow to the handle than goods which are dyed the correct shade at the first or second attempt. This defect is particularly noticeable with yarn dyeing, and it is no uncommon occurrence to find that yarn which before dyeing reeled 9,000 yards to the pound, after a prolonged immersion in the dye bath only reeled some 7,000 yards per pound; this contraction being accompanied at the same time by a loss of some 10 per cent in strength.

LOOSE COLOR AND UNEVEN SHADES.

The chief cause of loose color, and which is generally accompanied by cloudiness, is an incomplete cleansing of the wool, whether as loose wool, yarn, or pieces, before dyeing. A good washing with a good soap will be found sufficient in most cases, but special care must be taken to wash out every trace of soap afterwards, since for many purposes soap remaining in the goods is as harmful as grease or dirt. If the shade to be dyed is a very delicate one, or if the water at our disposal is hard, it will be found advisable to insure absolute cleanliness of the goods under treatment by soap scouring and washing, and in order to remove all lime soaps, to treat the piece with a very dilute hydrochloric acid, followed by treatment with GRAN-CARB-SODA solution and a final washing with water. All this may appear a very troublesome business, but the time taken up will really not be long, and anyhow it will be found much easier and simpler, and give far better results than cobbling; the more so since the shades for which this treatment is recommended, namely, for vatted indigoes and for delicate shades, are the worst classes of work to cobble.

The dyeing up of shoddy often results in uneven and loose dyeings. Many dyes which are fast to rubbing, when dyed on pure wool, will rub badly when dyed on shoddy. A possible cause of this is that, especially with shoddy which was previously mordanted in dyeing, the material had become more or less waterproof, and the color was thrown down on the surface of the fibre.

Another very common cause of unevenness on

shoddy goods is the fact that the topping color does not work well with the original color, in much the same way as the chrysophenine colors which give beautiful even shades alone, are almost impossible to use with mixtures. A dyer, who will notice that two pieces dyed in the same batch, in the same bath, come up uneven at the perch, will do well to examine them for uneven gitting, for that has a chance to produce a markedly uneven shade. Improper fulling is another exceedingly common cause for unevenness; soda and strong soaps should never be used with delicate shades, especially if the piece contains different colored effect threads.

STAINS.

These are perhaps the greatest bugbear of the dyer and finisher. Spinning stains are generally due to the use of unsuitable oil for spinning. Oils may be divided into two classes: Such as contain minerals, like petroleum and which are not touched by scouring agents, and in the second place saponifiable oils, *i. e.*, oils which are readily attacked by scouring agents and converted into soluble soaps. It is obvious, of course, that the latter kind of oil should only be used in the picker room when oiling and mixing a lot of wool. Unfortunately, however, petroleum is cheap, and works smoothly, with the result that a good deal of it is still used to-day, generally in admixture with olein or some other saponifiable oil, for spinning purposes. The result however is that the petroleum will remain in the wool after scouring and in turn will show up in form of stains after dyeing. If the wool is dyed in the yarn, nasty stripe effects will be produced.

The best way of removing such stains is by treating the material with a 3 per cent solution of monopot oil at the boil.*

Another, but much rarer stain, which might be mentioned, is caused by the breaking off of card teeth, and which are spun into the thread, with the result of rust specks. These are best treated by removing the broken tooth, if still in the fabric, and then dipping the affected part in a warm solution containing 5 per cent of oxalic acid. When the rust has dissolved, wash the place well and dry.

Loom stains are also met with, but such are easier to remedy than spinning stains, since they are generally the outcome of a local mishap rather than a wholesale mistake.

Thus, for example, if a tinned iron harness is used, which has lost its tin, the same is liable to be the cause of rust stains, especially if moist yarn is used. Such trouble, however, should not occur in a well managed mill, it should be noticed and prevented. If they occur, they are best removed by an oxalic acid

*The best plan however to overcome this trouble of stains, is to use a good reliable brand of wool oil, and none has a higher reputation among woolen and worsted manufacturers in this country, than the BRETON Brand. They are adapted for all grades and kinds of woolen and worsted goods, and although they cost 25 per cent less, they are equal to lard or olive oil. BRETON Oils assure a free and easy scouring of yarn or cloth, and have the desirable features of scouring and fulling possessed by red oil. Another feature in favor of the BRETON Oils in connection with wool and worsted spinning, is the fact that wool oiled with them can be stored in bins for months without loss or danger of spontaneous combustion. Professor Ordway of the Massachusetts Institute of Technology, who has carefully tested these oils, pronounces them the safest product to be used in oiling wool stock. Editor.

treatment. Over-lubrication of the working parts of the loom often may be the cause of nasty stains, which are best removed by treating them with hot solution of monopot mixed with ammonia. What stains then remain are treated with petrol, and finally, if a dark stain remains as is often the case, the same may probably be due to small particles of iron.

Occasionally, pieces, especially if dyed with natural indigo, allowed to remain wet in damp weather are attacked with mildew, which attacks first the color and then the fibre. There is no way of removing these stains except painting them, or if they are very bad, re-dye the piece. In warm weather, it is advisable to treat indigo dyed goods, which are to be stored, with a weak solution of sodium salicylate or bone acid.

Decatising stains, generally speaking, are fairly easily recognisable from their shape and situation. The commonest are produced by water carried over by the steam, and they are best cured by a careful steaming. Goods which have a marked pattern on the face and a plain back, are liable to produce a watered effect in decatising. The only way to remove these stains is by a light fulling.

Some Unsolved Dyeing Problems.*

By E. Feilmann.

Considering the great antiquity of the art of dyeing, and more especially the large amount of scientific work which has been done in recent years, it is remarkable how little is understood as to the real nature of the process. There are many theories, all more or less contradictory, and also, in most cases, more or less vague. Any more definite ideas which one may form from time to time are very liable to be completely upset by new sets of phenomena, usually arising out of the rapidity of technical progress, which in this field is far greater than the progress of our knowledge of the true nature of dyeing. New types of dyestuffs, new textile fibres, mainly artificial, and new processes of dyeing and finishing, arrive in bewildering succession, and as yet it can hardly be said that any adequately comprehensive explanation of this vast array of facts exists, though a clearer insight into the matter would undoubtedly be followed by more methodical investigation and important technical developments.

I propose to point out some of the more obvious and less abstruse questions still awaiting solution in this field of work, in the hope that it may be helpful to others. Most practical operations connected with dyeing obviously involve a transference of a colored substance from vat to fibre, and the same feature is characteristic of most experiments which have been performed on the subject, partly for experimental convenience, and partly, I suppose, so that the experiments shall be more in conformity with practical operations. The question arises: Is it a peculiarity of certain colored substances to be absorbed by fibres in the precise way which we associate with the term

*A paper read before the London Section of the Society of Dyers and Colorists.

dyeing, or if not, do they possess these *dyeing* properties in any special degree as compared with colorless substances of similar constitution or properties? The answer is not so simple as might appear at first sight. Undoubtedly colorless substances have a certain affinity for the fibre. We have, for instance, the affinity of tannic acid for both silk and cotton, of which regular technical use is made; but these *dyeings*, if one may call them so by an extension of the term, are much less fast than those produced by ordinary dyestuffs. Quantitative experiments are difficult to carry out in these cases. In all dyeing phenomena the relative increase of weight of the fibre is small, rarely exceeding 5 per cent, and the weight of the fibre is very liable to vary by amounts approximating to this quantity after very slight alterations in the conditions, or changes produced by the character of the dyebath; therefore determinations of the increase in weight of the fibre are not sufficiently reliable for purposes of research, and of course the ordinary method of comparison of depth of shade is impossible in these cases. It seems to me that problems of this nature could be more advantageously attacked if we had more refined analytical methods of investigating the dyed fibre than are at present available, and that such methods would also allow of far greater accuracy than is at present attained in investigations into the absorption of dyestuffs themselves. At present, in cases where the bath is not exhausted, one of two methods is generally employed. Either the amount of dyestuff on the fibre is estimated by comparison of the shade with that of a standard dyeing, or the amount of dyestuff remaining in the bath is determined. The first method is an excellent one, perhaps the only right one in determining the value of a dyestuff for commercial purposes; but as a method of research it suffers from lack of accuracy, as shades cannot be compared with an accuracy of more than 5 per cent at the very most, and, moreover, a given amount of dyestuff by no means always gives the same depth of shade on the fibre, through causes which are not so well understood as could be wished. The second method is indirect, and also suffers from the disadvantages that in many instances the dyestuff is partially decomposed, that decomposition products of the fibre and other substances in solution in the dyebath may interfere with the analytical determination, and that there is a difficulty due to the liquor and dyestuff more or less mechanically retained by the fibre, which can often only be removed by considerable washing.

Then, again, what is the nature of the action of direct cotton dyestuffs on the fibre, and whence do they derive their peculiar properties? Are they deposited bodily on the fibre, or mainly or partially as the color acid, or in some other form? There are more or less definite statements on this latter point in some of the text-books, but I am unaware of any detailed experiments which adequately settle the question, and it is surely important, and does not appear impossible of experimental solution. The connection between direct cotton-dyeing properties and chemical

constitution appears to be less clear than ever, and anyone who devoted time to attacking this problem on purely theoretical lines would earn the thanks of all interested in the subject. In this connection the fact that the affinity of cellulose for direct dyestuffs can be diminished and finally eliminated by the introduction of nitro or acetyl groups, is of interest, and it is at any rate conceivable that other classes of dyestuffs may be discovered which dye these substances without mordants.

The number of problems awaiting solution in connection with sulphide dyestuffs and other vat dyestuffs, such as those of the Indanthrene series, is legion. What is the nature of these dyeing processes? Why does the introduction of sulphur into the molecule lead to such characteristic results, and what precisely is the function of the alkali sulphide in the sulphide vat? Can compounds containing selenium and tellurium be obtained possessing similar properties? This last is a question of no direct technical importance, but an investigation on these lines might throw further light on the subject by the production of crystalline substances possessing similar properties, or in some other fashion. The action of bichromate, copper salts, and other metallic compounds on fabrics dyed with sulphide and other colors is another matter which, in view of its importance, appears not to have received the investigation which it deserves—for instance, does after-treatment with these agents affect the well-known tendering produced by sulphide dyestuffs, or does it not? Do the dyestuffs in the fibre and the metallic compounds react in molecular proportions, and what is the nature of the reaction? These various points may, of course, have been investigated very fully by those interested, but as far as my knowledge goes little has been published.

It seems to me that a very large amount of work of a not very elaborate kind remains to be done on these lines. A large number of very valuable researches are on record on the absorption of dyestuffs by non-fibrous absorbents of the most varied kind, but these behave in many respects very differently from the animal and vegetable fibres with which the dyer deals. For example, the amount of absorption by fibres appears to be much more dependent on the temperature, and in many cases is more selective. I am at present engaged in working out analytical methods for the determination of dyestuffs on the fibre, as I think that further progress in our knowledge of what goes on in the dyebath is likely to be largely dependent on accurately quantitative investigations of the absorbent properties of the fibres themselves.

The China Export, Import and Banking Company, which for the last two years has distributed dividends of 50 per cent, has been able to do this because the company worked as the agent of the Hoechst Farb-Werke (of Strassburg, Germany), whose articles the China Export Company sold in the Far East. These color works now intend to do the business themselves, and to put the profits in their own pockets. They are, therefore, about to buy as many shares of the China Export Company as possible, in order to be able to vote for the winding up of the concern.

COLOR MATCHING.**HOW TO EFFECT IT.**

Color matching has always been a source of difficulty to the dyer and colorist, the impure atmosphere of large cities, the many different classes of cloth, and the variation of the numberless shades which the tastes and fashions of the present day demand cause this.

Before a good match of any colored material can be made, either on dyed cloth or on the palette, the eyes must be able to distinguish the finer grades of hue, and to see the colors in a proper manner. They should be viewed with a good white quality of daylight.

FUNDAMENTAL COLORS.

Little difficulty will be experienced in matching the fundamental colors like red, orange, blue, green, and so on. The numerous dyes obtained from coal tar supply all the colorists' requirements. The next color characteristic is the brightness or clearness of the color, and is discerned by the amount of light reflected to the eye. The most luminous surface is white, which reflects all the incident light to the eye, and the several fundamental colors have degrees of varying brightness or luminosity. The purity of a color is its freedom from admixture with the white light or with any other color, and in examining the various dyed colors for their purity of hue it is needful to have for comparison a series of typical examples of as pure hues as it is possible to obtain. The solar spectrum gives the perfection of hues in their ideal purity. Every spectrum color is simple, but as dyed colors cannot be made to match those of the spectrum, and as the spectrum itself cannot be kept in the laboratory, all ready made to refer to at once, it is more practicable for the dyer to have a set of dyed swatches of the purest hues which can be chosen and dyed on a fibre which is fine and lushed like silk. These fundamental colors can run from deep red through the different grades of scarlet, &c., to violet, and an artificial spectrum of dyed hues should be kept carefully preserved from strong sunshine and dust for reference and comparison as needed. When the colorist has a number of bright hues placed in front of him to look over, he is provided with a piece of material beside him of a color complementary to those he has to make an examination of; this is so that the eye, which becomes dazzled and weary from the continued effects of the bright colored light upon the delicate color nerves of the retina, may be turned for a short period on the complementary colored material, which rapidly restores it to its normal sensitive condition. This is especially the case in large Turkey Red works and warehouses, where the many descriptions of Turkey Red goods, bright shade, blue shade, etc., after calendering and finishing more or less brightly, have to be gone over, each overlooker is given a piece of green-colored material, or green paste-board, such as is used for making up patterns, at which they gaze from time to time to restore the retina of the eye to what experts term its normal color sensitive condition. Other methods which are much better are recommended by writers who have gone deeply into the subject, which

is one of very considerable commercial importance when one considers the heavy losses which can be sustained by the dyer and calico printer, in particular in the way of claims if he despatches from his works, often against a foreign order, a large lot of goods not in accordance with an indent sample submitted to him by his customer. By these a more correct estimate is obtained, and many differences in hue and evenness, and faults in the dyeing and printing which would pass unnoticed in the ordinary course, are at once detected.

CONTRAST OF COLOR.

Another matter which the color matcher requires to study is the simultaneous contrast of color, and shades will often appear greatly altered in hue if they are placed close to one another, in particular if that color is a bright and decided one, if a calico printed pattern, as an example, is composed of a number of black spots upon a bright green ground, the black will look to the eye of a rusty red hue, and not a pure black; if the ground be red, the black has a bluish tint. The colors of dyed yarns and fabrics require to be examined by regular methods. Ordinarily two are used—namely, by reflected and by transmitted light. In going over dyed fabrics, the colored fabrics act in a manner somewhat like dye solutions. There is reflected in all dyed materials to the eye along with the colored light a large proportion of unchanged white light from the surface of the fibres of the material, and this white light, entering into combination with the colored light, gives a poorer appearance to the colors.

In the reflected light method, the rays of light fall straight down upon the dyed material and having penetrated to a certain depth within, the dyed fibre is reflected back, and is taken in by the eye as colored light. The transmitted method is also called the *overhand* mode of matching, and it shows variations in hue which cannot be seen in the ordinary reflected light, or *underhand* method. For many shades it is absolutely necessary to adopt this means. The two dyed samples to be examined must be held up to the light, and in viewing over the surface of the material, the eye sees only the colored light which is transmitted through the fibres on the surface. The dyed portions of material are put over the finger, and the eye catches the ray of light which is transmitted across the dyed fibres. This is the best method, as the colors assume a rich appearance, which cannot be had by the reflected light. Some dyestuffs give shades which appear normal by transmitted light, but dyes which have any striking optical attributes appear somewhat changed in hue when their surface fibres are looked through by transmitted light. A good colorist can, by studying matching by transmitted light, tell, in many instances, whether a shade is dyed with natural dyestuff or the aniline group, it is stated; and another matter deserving of the close attention of the color-printer and dyer is the slight difference in the appearance of shades when they are dyed on fibres, or cloths of different classes, the lustre and degree of transparency of the dyed fibre, construction of the textile, whether it has a plain surface or not,

and optical characteristics which the dyestuffs possess all exercise an influence here.

In dyeing also two shades after being compared carefully in the open air will look different when examined in-doors, and are no longer good matches as when examined out of doors, this is due to the optical nature of the dyes acting in combination with a high lusted fibre, and shows most in bright weather when the quality of the daylight is more variable. Colors further which appear good matches in daylight show different under artificial light: this was not so much the case prior to the introduction of the aniline dyes. Dichromism and fluorescence possessed by the dyes, and also the optical properties of the fibre itself, affect in a slight degree the gaslight aspect of various dyed colors, and in order to explain the difference in the conduct of two seemingly identical dyed cloths it is necessary to call to assistance the spectroscope, when the absence or absorption of the colored rays of the spectrum on the cloth will be seen in different parts. "Indian Industries and Power."

DICTIONARY OF TECHNICAL TERMS RELATING TO THE TEXTILE INDUSTRY.

K

KALA-PATADAR:—The Hindu name for a fabric made in the Maldah District of Bengal, India, consisting of a cotton and silk mixture; having a purple ground, with hair line stripes, alternately of crimson and white, and crimson and yellow.

KALI:—A large felt mat of brown velvet, embroidered with flowers in colored silks and silver threads, used for covering the centre of Persian rooms.

KALICHE:—A name for a small pile carpet or rug in India.

KALMUCK OR CALMUCK:—A coarse, shaggy cotton cloth, resembling bearskin, made in Persia.

KALMUCK WOOL:—A Russian coarse-haired wool, under-laid with a thick, downy covering, used only in the manufacture of the coarsest fabrics.

KAMIS:—A long, loosely fitting shirt, having sleeves; worn by men in Mohammedan countries.

KANOKE:—The Japanese name for a peculiar, light, crape material, used by women of that country as a hair ornament or neckband; formed into a roll, and having tassels at each end.

KAPOK OR KAPPE:—A silky fibre covering the seeds of a tropical tree found in both the East and West Indies; when curled, used as a stuffing for mattresses, cushions, etc.

KASHIDA:—An Indian fabric of *Muga* silk, or *Muga* silk and cotton; embroidered afterwards.

KAYA:—A variety of mosquito netting made in Japan.

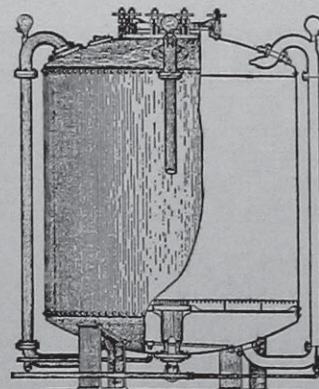
KAZACK OR KAZAKS:—A variety of Oriental Rugs.

KECHI OR KECHE:—The Turkish name for a carpet made of goat's hair.

KEEN:—The amount of the angle of card teeth, as used in the manufacture of card clothing.

KIER:—In bleaching, a large boiler in which are carried on the various processes comprising bleaching, known respectively as Lime Boil, Brown Sour, Lye Boils, Chemicking, and White Sour. In their principle of construction, Kiers can be of the Open, the Low Pressure, or of the Pressure type. The first type is more or less out of date, on account of the excessive loss of heat by radiation, and the large amount of steam necessary to keep up circulation. The low pressure kier is a modification of the former, with a slight gain, and refers to a system occasionally met with in older bleacheries. Pressure kiers are the kiers used by bleacheries at present, as we might say, universally. They are made either of wrought or boiler iron, cylindrical in shape, and are placed in an upright position. They vary in size to suit the capacity of the bleacheries, about 7½ feet diameter by 10 feet high,

being a size frequently met with. They are mostly used with an average pressure of from 35 to 50 lbs., although some bleacheries, in connection with certain grades of



BLEACHING KIER.

(Wm. Allen Sons Company.)

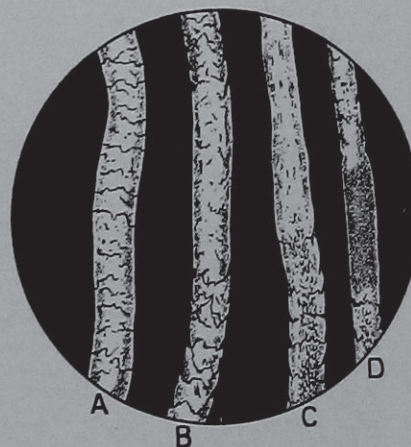
goods, may run them at a lower pressure, in fact running them sometimes at as low as 10 lbs. pressure.

KEKCHI COTTON:—A kind of cotton raised by the Kekchi Indians in Guatemala.

KELT:—A Scotch name for cloth made of a natural black and white wool mixed yarn.

KERMER:—Waist shawls for women, of pure silk, or silk mixed with cotton, made in Egypt.

KEMP:—Kemps are a kind of imperfect fibres met with in wool. The characteristics of an ordinary kemp fibre is a hair of dead silvery white, thicker and shorter than the good wool. Kemp fibres do not seem to differ considerably in their chemical composition from the good or true wool fibres, but possess no absorbent power, thus resisting

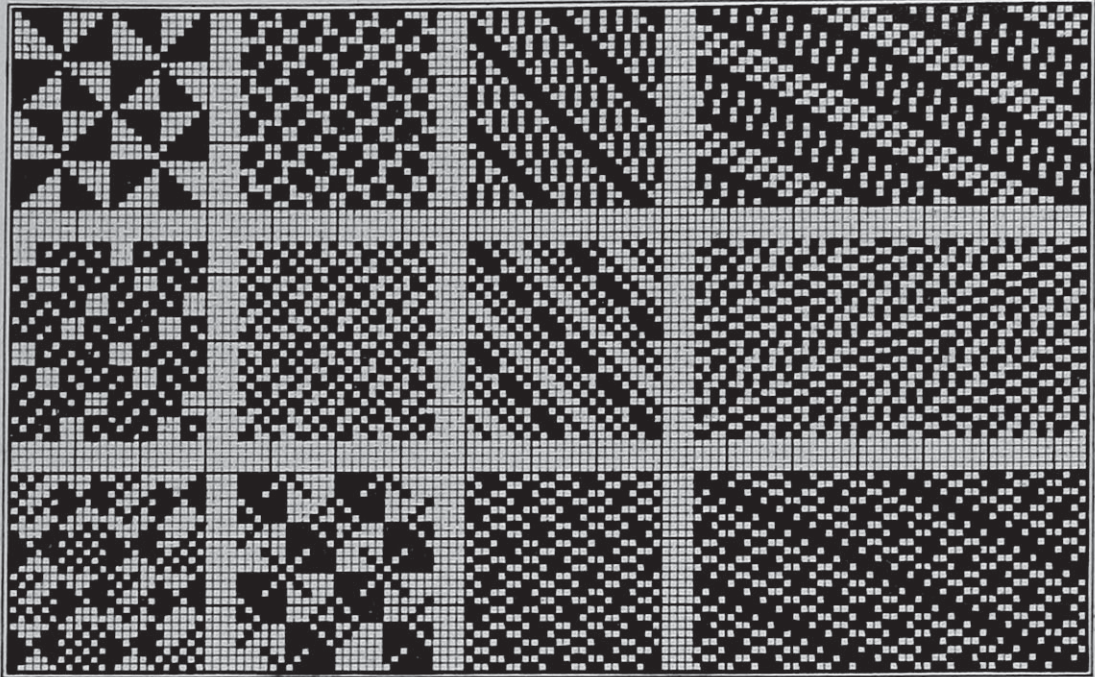


A Kempy fibre, seen by reflected light.
B Fibre, part wool and part kemp, seen by reflected light.
C Fibre, part wool and part kemp, seen by transmitted light.
D Fibre, part wool and part kemp, with kempy part opaque when seen by transmitted light.

either entirely, or partly, the entrance of dye stuffs; producing a different shade from that imparted to the good fibres of the same lot, hence kemp fibres will be readily detected in dyed lots of wool, yarns or fabrics. The presence of kemp fibres in a lot of wool will also result in poor spinning and poor yarn, since they will not thoroughly combine with the good wool, and will show prominently on the face of the yarn or fabric. Neither will they felt. In the wild breeds of sheep kemp is plentiful and appears to be part of their nature; and in domestic sheep it may be looked upon as an inherent tendency to reversion to the original and native type of the animal. It is sometimes found in the finest grades of wool as well as in the coarsest. In the fine wool sheep, kemp occurs most frequently in the neck of the fleece and on the legs, whereas in the coarse woolled sheep, it may be found on any part, especially if there is a lack of truthness in the blood. The presence of kemp in a fleece greatly depreciates the value of the lot of wool, and a buyer is always cautious to ascertain if wools contain them.

DICTIONARY OF WEAVES*

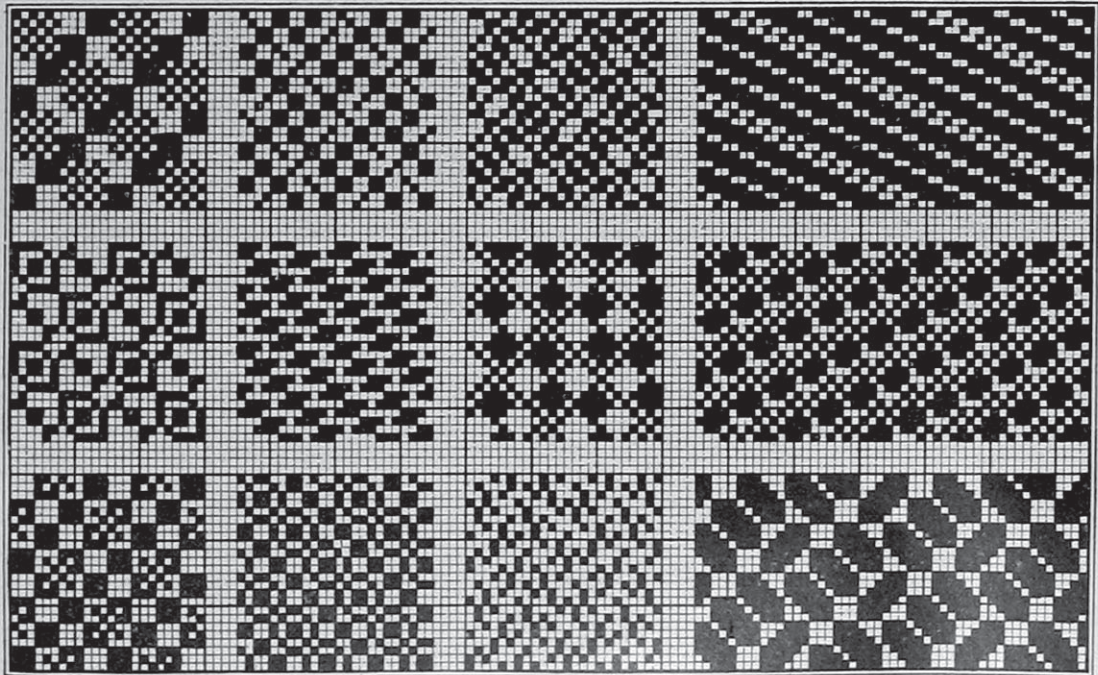
TWELVE HARNESS



12 X 24

12 X 12

TWELVE HARNESS



12 X 24

12 X 12

* Complete, this Dictionary will contain over TWENTY THOUSAND PRACTICAL WEAVES, taken from woven Fabrics. Over two thousand of them have thus far appeared, and can be obtained by ordering back numbers.

Allen, William, Sons Co., Worcester, Mass.....	XII
Altemus, Jacob K., Philadelphia.....	V
Berge, J. & H., New York.....	XV
Borne, Scrymser Co., New York.....	23
Brinton, H., Co., Philadelphia.....	IX
Buhlmann, A. W., New York.....	XIII
Calder Machine Works, Philadelphia.....	XIX
Cassella Color Co., New York.....	XIII
Chapin, Geo. W., Philadelphia.....	IX
Chemische Aniline Works, New York.....	XVIII
Cheney Brothers, South Manchester, Conn.....	VII
Climax Machine Co., Philadelphia.....	XI
Commercial Photo-Engraving Co., Philadelphia.....	XVII
Crompton & Knowles Loom Works, Worcester, Mass.....	Outside back cover
Crosby & Gregory, Boston.....	XV
Curtis & Marble Machine Co., Worcester, Mass.....	XIV
Draper Company, Hopedale, Mass.....	Inside front cover
Farbenfabriken of Elberfeld Co., New York.....	XX
Fernbach, R. Livingston, New York.....	XI
Firth & Foster Co., Philadelphia.....	IX
Fries, John W., New York.....	XI
Globe Machine and Foundry Co., Inc.....	X
Governor Works, The, Quincy, Ill.....	XI
Haedrich, E. M., Philadelphia.....	XV
Halton's, Thomas, Sons, Philadelphia.....	III
Helick, Dr. Chauncey G., Philadelphia.....	XIV
Holbrook Mfg. Co., The, New York.....	XX
Hotel Cumberland, New York.....	XIV
Howson and Howson, Philadelphia.....	XV
Hunter, James, Machine Co., North Adams, Mass.....	V
Johnson, Van Vlaanderen Machine Co., Paterson, N. J.....	XII
Keystone Law and Patent Co., Philadelphia.....	XIV
Kilburn, Lincoln & Co., Fall River, Mass.....	XV
Klauder-Weldon Dyeing Machine Co., Amsterdam, N. Y.....	XII
Klipstein, A. & Co., New York.....	XVI
Knapp, Chas H., Paterson, N. J.....	X
Lentz, F. G., & Co., Philadelphia.....	X
Lever, Oswald Co., Inc., Philadelphia.....	XV
Littauer, Ludwig, New York.....	IX
Marshall Bros., Agts., Philadelphia.....	XV
Mason Machine Works, Taunton, Mass.....	IV
Maywald, Frederick J., New York.....	XVI
Metallic Drawing Roll Co., Indian Orchard, Mass.....	III
Metz, H. A. & Co., New York.....	XX
Mossberg Wrench Co., Central Falls, R. I.....	XVII
New England Butt Co., Providence, R. I.....	XX
Oliver Typewriter Co., The, Philadelphia.....	XII
Palmer, The I. E. Co., Middletown, Conn.....	V
Philadelphia Textile Machinery Co., The, Philadelphia.....	XIV
Pratt, Robert G., Worcester, Mass.....	XVII
Royle, John, & Sons, Paterson, N. J.....	III
Ryle, William, & Co., New York.....	IX
Schaellbaum, Rob., Co., The, Providence, R. I.....	XV
Schlatter, Karl, Dye Works, Inc., Philadelphia.....	XXIII
Scholler Bros. Co., Philadelphia.....	XIV
Schwarzwaelder Co., The, Philadelphia.....	XIII
Singer Sewing Machine Co., New York.....	XX
Sipp Electric & Machine Co., Paterson, N. J.....	VII
Steel Heddle Mfg. Co., Philadelphia.....	IV
Suter, A., New York.....	XXI
Textile Publishing Co., Philadelphia.....	XVII
Troemner, Henry, Philadelphia.....	X
Weimar Bros., Philadelphia.....	XVII
Whitaker Reed Co., Worcester, Mass.....	XVII
Whitin Machine Works, The, Whitinsville, Mass.....	II
Widmer Bros., Paterson, N. J.....	XVII
Woolford, G., Wood Tank Mfg. Co., Philadelphia.....	XIX
Woonsocket Machine & Press Co., Woonsocket, R. I.....	XX

BUYERS' INDEX

Air Compressors. Governor Works, The.	Bobblins. Buhlmann, A. W. Draper Co. Marshall Bros., Agts.	Card Stampers. Lentz, F. G. & Co.
Architects. Helick, Dr. Chauncey G.	Boilers. Allen, William, Sons Co.	Carpet Machinery. Altemus, Jacob K.
Attorneys at Law. Howson & Howson. Keystone Law & Patent Co.	Books on Textile Subjects. Textile Publishing Co.	Chemical Manager. Maywald, Frederick J.
Battons. Crompton & Knowles Loom Works. Widmer Bros.	Braiding Machinery. New England Butt Co.	Chemicals. Berge, J. & H. Cassella Color Co. Chemische Aniline Works. Holbrook Mfg. Co., The. Klipstein, A. & Co. Metz, H. A. & Co. Scholler Bros. Co.
Bleachers. Firth & Foster Co.	Calico Printers' Machinery and Supplies. Buhlmann, A. W.	Consulting Chemists. Fernbach, R. Livingston. Maywald, Frederick J.
Bleaching Kiers. Allen, William, Sons Co. Buhlmann, A. W.	Card Clothing. Buhlmann, A. W.	
	Carbonizing Machinery. Hunter, James, Machine Co. Philadelphia Textile Machinery Co.	