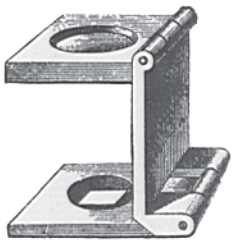
FABRIC ANALYSIS.

(Continued from November issue.)

Ascertaining the Weave.

This procedure, frequently termed *picking-out*, has for its object to ascertain and record on the point paper the plan (weave) by which warp and filling interlace with each other in a sample under consideration.



Pick Glass.

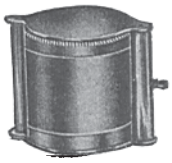
There are two methods practised for determining the weave used in a given cloth, *viz:* by *synthesis* and by *analysis.*

The first method is out of reach of the beginner, who must follow the laborious process of the second procedure, *i. e.,* of investigating the interlacing of every warp-thread and pick in the repeat of the weave in a sample, whereas the experienced designer, following the first mentioned procedure, will simply pull out a warp-thread or pick in order to confirm his surmise regarding what weave is used and proceed at once to build up the weave upon experience combined with a thorough comprehension of the theory of weave formation in all its varieties.

If dealing with heavy fulled woolen fabrics, or fabrics having their filling threads more or less broken during the process of finishing, the analysis (*i. e.,* separating picks and warp-threads from each other) will require a considerable amount of skill and patience.

Magnifying Glasses.

In connection with cotton, silk and linen fabrics the use of a low, or medium power microscope will be found of advantage, since it will reveal the interlacing of warp-threads



Doublet Magnifier.
Spencer Lens Company.

and picks most thoroughly. These microscopes, as used by the textile analyst, are known by various names: Pick-glasses, Doublet Magnifiers, Triple Aplanatic Magnifiers, Magnifiers Cloth Counting Glasses and Dissecting Microscopes.

The Pick-glass or pick-counter as also called, is a microscope of a magnifying power varying from 7 to 10 times. It is made to permit folding when not in use, and is equipped with 1 x 1 , ½ x ½ , ¼ x ½ , ¼ x ¼ or ¼ *dia.,* openings expressed in inches, and when not in use can be conveniently carried in the vest pocket. According to size of opening and power of lense, they range in prices from 50 cents to $ 2.

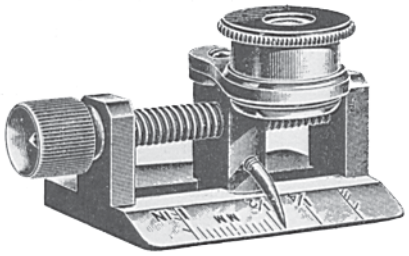
The Doublet Magnifier is a microscope of a magnifying power varying from 6 to 24 times. These doublet magnifiers are composed of two separate plano convex lenses set in a black lacquered mount and held in a nickeled framing, with handle for convenient use. They range in prices from $ 1 to $ 1.50, a 12 × lense being (considered in an average) the most useful.

Triple Aplanatic Magnifier.
Equipped with Folding Case.
Spencer Lens Company.

Triple Aplanatic Magnifiers. Their lenses are remarkable for their great working distance and their unusually large, flat field. They are perfectly achromatic and free from distortion and made to magnify in all dimensions from 6 to 24 times, and are equipped either with hexagon handle or folding case. They are sold at the uniform price of $ 3.50 each, for either magnification quoted.

The Magnifiers Cloth Counting Glass has a base divided into spaces of ¼, ½ and 1 inch, the space between the ½ and 1 inch marks being divided into 10 mm. The focusing eye-piece with pointer attached can be made to traverse the whole scale by means of quick acting screws. The price of the instrument is $ 7.50.

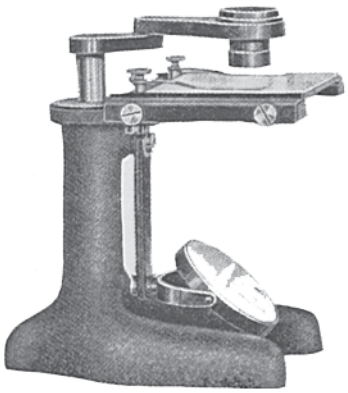
The Dissecting Microscope has its stand all brass, or of a rich black lacquered mounting, with broad circular Base and large firm Stage; Jointed Arm to carry the Lenses, with Rack-and-pinion adjustment of Focus; Concave Mirror with complete adjustments; Single or Double Lenses, of Doublet, Coddington or Triple Aplanat Formulæ. The stage has countersunk in its centre a circular shaped (removable) glass plate, and is provided with two spring clips for holding the sample securely in position while picking out weave or texture of the fabric. The price of these Dissecting Microscopes ranges from $ 6.75 to $ 15.



Magnifiers Cloth Counting Glass.

To secure the best results with all simple magnifiers, the observer must place the eye as near as possible to the eye-piece of the magnifier.

Since synthesis can only be acquired by years of practice and experience we will define our explanations, with reference to the picking-out process more particularly for the beginner. For him it will be advisable to begin his study with simple, single cloth fabric structures, of a loose texture, where every thread is readily distinguished and separated from its joining one, or its mate interlacing threads. The harder twisted these threads are, the easier he will master the subject. Coarse textured cotton fabrics interlacing with simple weaves will be the ones most suitable for him to start with, after which he then can take up low textured worsteds, to be followed by woolens. Never touch backed or double cloth samples until you fully have mastered the picking-out of single cloth, as well as the theory of constructing backed cloth and that of double cloth.



Dissecting Single Microscope.

The Point Paper.

To keep a record of the weave when picking-out a sample, a special kind of ruled paper, known as textile design, or point paper, is made use of; it is a paper ruled horizontally and vertically with lines, 8 or more to the inch, each way, every eighth line being in turn, each way, either ruled heavier than the others, or over-ruled in a different color, in

order to simplify counting-off a certain number of spaces on the paper, when so required.

Eight (8) is the number most frequently selected for this over-ruling, for the fact that it is the most suitable number for this purpose; not only on account of 8 in itself comprising the repeat of the most often met with weaves, it besides claims the 4-harness weaves, on account of covering two repeats of the latter; at the same time it furnishes a convenient multiple for most all other frequently used repeats of weaves. For instance, 1½ heavy squares cover 12 threads, 2 heavy squares cover 16 threads, 2½ heavy squares cover 20 threads, and 3 heavy squares cover 24 threads, all being repeats of frequently met with weaves in practical work. Again, should a weave call for 10 threads for its repeat, instinct will tell the eye to grasp the one heavy ruled-off space (of 8 light lines) *plus* 2 light spaces, in preference to counting 10 spaces, provided the paper was not over-ruled into heavy squares.

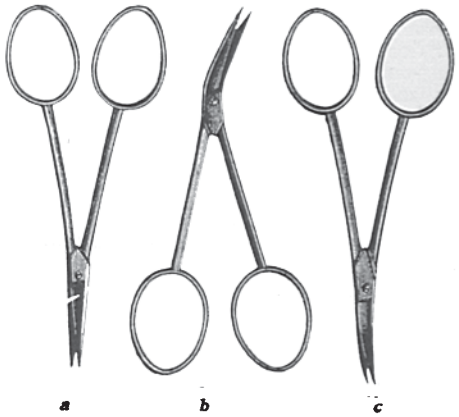
Over-ruling of the point paper, besides simplifying matters to the designer, at the same time prevents mistakes in counting-off the repeat of a weave, a feature possible to occur otherwise, more particularly if dealing with a weave of a large repeat. It, at the same time, will guide the designer when picking out samples of a large repeat, since certain fancy ends may come near one of these heavy ruled lines, which thus become a guide for him while picking out other picks.

Besides point paper ruled over in 8, each way, technically written 8 × 8 paper, we also find other kinds of ruled paper, for example, 4 × 4, 10 × 10, 12 × 12, etc.; however, 8 × 8 is the kind of design paper generally used, when picking-out the weave from a sample.

In connection with any kind of design paper, the distance between two lines, taken in a vertical direction, represents one warp-thread, and each distance between two lines, taken in a horizontal direction, represents one pick. The different small squares thus formed indicate the place where a certain warp-thread and pick meet, one of which must be up and the other down. A filled square, a cross, a dash or any other mark in said square indicates that the warp-thread in this instance is up and the filling down. Provided the reverse should be required, we then must indicate on the weave-plan that whatever marks made stand for sinkers or warp down, and empty squares then for risers or warp up; but if no memorandum to that effect is made on the weave-plan, we always will consider filled, cross, or dash or whatever mark made for risers (warp up).

Clear Face Desired.

Previously to beginning the dissecting of a sample, the first question to ascertain is whether the interlacing of warp and filling in the sample is clear and distinct to



Scissors for Dissecting.
a Straight Blades;
b Elbow Blades;
c Blades Curved on the Flat.

the naked eye, since most of the intricate picking out of samples has to be done in this way. Provided this is not the case, and the face of the fabric is covered with protruding fibres, felt or nap, as is frequently the case in woolen goods, then the sample must be prepared so that the interlacings of the threads become more or less well defined, and which can be done by removing the loose fibres, felt or nap either by cutting-off with curved scissors or shaving with a sharp knife, or said nap is singed-off over a flame. Either method requires care, since, if the surface of the structure is in any way impaired thereby, the sample may become useless for dissecting, since then, in spite of all care by the analyst the threads will draw apart (break) during picking-out. Even if the weave is fairly clear, some designers singe such samples slightly, in order to remove all the little points of fibres stand-

Scissors for Dissecting; with Spring Applied.

ing in the hollows, and which it is not possible to remove by cutting or shaving, without at the same time injuring the threads.

Distinguishing Warp from Filling.

Let us now consider a sample before us, of which nothing is known, but which has to be reproduced. Then the first consideration is to ascertain which is warp and which is filling, also whether it is single cloth, backed or figured with an extra warp or extra filling, or double cloth in one of their varieties. The latter, as a rule, can be readily ascertained after we know which threads are warp and which are filling, pulling out a few warp-threads and picks and observing whether they keep on one side of the fabric or not. If one series of threads form the face, and another series the back, while the picks interweave both face and back, then the fabric is backed with warp, and it will be necessary to find not only the face weave but also the backing ties. Filling might be used as backing instead of warp, when there would be two series of filling threads, or picks as they are termed, and one of warp, and when the interweaving of each must be obtained the same as in the case of warp backing. Should there be both, back warp and back filling, then the fabric will usually be a double cloth, in which case three points must be decided: firstly, the face weave; secondly, the back weave, and thirdly, the system of tying the back cloth to the face. Having decided by a brief examination under which heading the pattern to be analyzed comes, the analyst can proceed by details given later on.

For the beginning it is advisable for the student to analyze single cloth samples only; the harder twisted the yarn used in the samples and the looser their texture, the better for him to get used to the work.

The following points will assist in explaining the subject of distinguishing warp from filling:

With napped goods, the nap shows the direction of the warp, said nap being raised during gigging or napping, on the face of the goods warp-ways. With woolen goods which are not gigged or napped, like cheviots, meltons, etc., and provided there are no special characteristics, such as selvage (and which runs warp-ways), etc., it is more difficult to decide the direction of the warp. After shaving or singeing such samples, their face should be closely examined, since interlacings protruding a little beyond the surface, most frequently show the warp ends.

If the threads in one system are harder twisted than in the other, the former threads are generally the warp system. The filling threads as a rule are not only softer, but at the same time heavier in count than the warp.

In such structures as twills, sateens, covert cloth, etc., and in which one set is two ply yarn and the other single, the two ply is the warp.

The counts of yarn used in each system will often assist in ascertaining which is the warp and which the filling, since in most instances the yarn used for warp is of a higher count than that of the filling.

If a fabric has cotton yarn for one system of the threads, and woolen for the other (union fabrics) the cotton yarn is generally the warp.

The conditions of weaving are such that the yarn employed as warp must possess sufficient strength and elasticity to stand the strain imposed during weaving, whereas most any material may be employed for filling which will hold together while the shuttle is carrying it across the shed. Therefore, if one system of threads is stronger than the other, although alike in other respects, the stronger material will almost invariably be the warp.

If in the sample submitted for analysis, the one system of threads is found to have been sized or starched and the other not, the former is the warp.

In many fabric structures the warp-threads appear to be straighter than the filling. During weaving and finishing, the

filling is allowed to contract more than the warp, on account of the tension applied in both operations lengthwise to the fabric.

If the sample contains reed marks (or imperfections known to the weaver as can only be caused to the warp system) such imperfections readily characterize that system of threads.

If the portion of cloth under consideration contains part of the list, edge, self-edge, or selvage, as variously called, this will indicate the warp.

Another guide, for distinguishing the warp from the filling, is found in the style of the fabrics submitted for picking-out. Fabrics having a striped character, or check effects in which the one direction of the lines is more prominent, compared with the others, the direction of the stripes, or the prominent lines in the check, indicate the warp system. If the checks are of the same color but somewhat longer one way than the other, the warp, as a rule, runs the longer way.

In almost all cloths of a twill character the direction of the twill is more towards the upright or warp direction than to the horizontal. Diagonals will for this reason readily explain themselves.

In fabrics composed of two systems of filling (face and back) and one system of warp, the heavy and soft-spun filling, known as the backing, indicates itself, and thus the system of threads.

Exceptions to these instructions occur but seldom. In many fabrics the difference and the reasons for said difference in the yarn are so clear as to require little examination. That the warp-thread is usually the smoothest, strongest, also of the longest and best material is a very safe rule to follow.

If it should be found impossible to distinguish warp from filling, proceed with the picking-out, and when then the weave obtained will in most cases explain which threads are warp and which the filling.

(To be continued.)

RIBBONS, TRIMMINGS, EDGINGS, Etc.

PILE FABRICS.

(Continued from November issue.)

Fig. 101 shows us the weave for a carriage border, constructed with two ground picks and two figure picks, using every time as the fifth pick a wire. The back warp interlaces with taffeta and the face pick is bound by three ends taffeta, of which every time the first and third interlaces with the back structure. One stuffer warp-thread rests in every repeat of the weave, between face and back structure.

The four pile threads, considered in rotation from left to right in our weave, interlace respectively in:

1st end, *pile-through;*

2nd end, *pile-up,* and

3rd and 4th end, part the time *pile-through,* the other time *pile-up.*

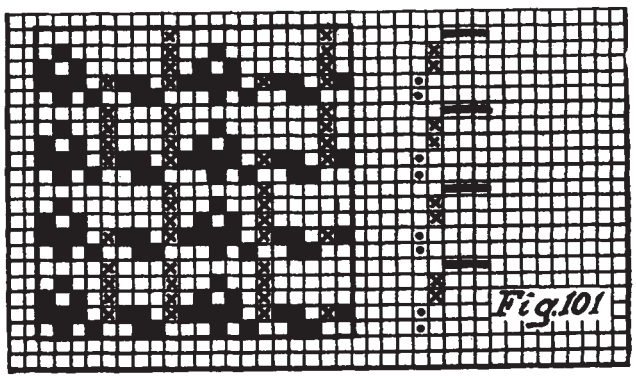
In order to accommodate the varying take-up, either pile warp must be put on a separate beam.

Threads 4, 6, 8, 10, 14, 16, 18, and 20 are back threads; threads 7 and 17 are stuffer threads; threads 1, 2, 3, 11, 12, 13 regular warp threads; rows of squares 5, 9, 15, 19 (see *cross* type) indicate the interlacing of the pile warp-threads.

At the right hand side of the weave is given the scheme for the filling and the wire; the back picks are indicated by *dot* type, the face picks, by *cross* type and the wires, by *dash* type.

Double Velvet Ribbons are frequently woven with two shuttles, both traveling in the same direction through the shed, and not, as is the case with Rubber Elastics, in opposite directions.

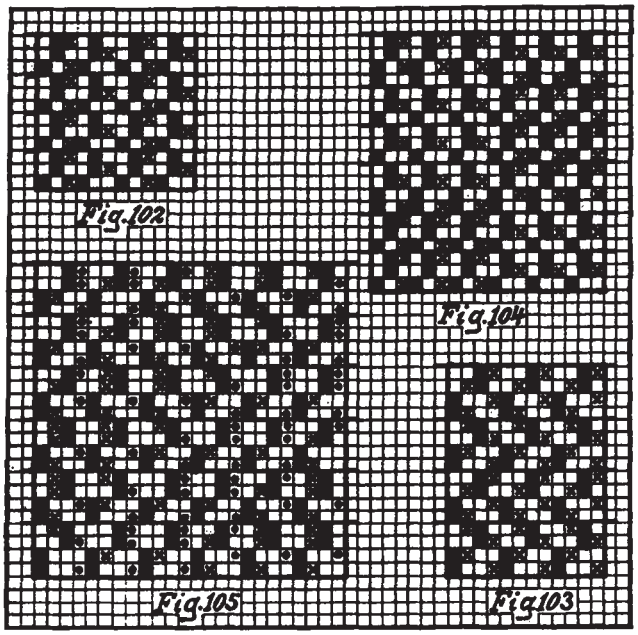
For such entering of the filling, a double shed must be formed. The warp-threads of the lower structure rise from the bottom to centre (height of the lower single shed); the warp-threads of the upper sturcture rise from centre to top of upper shed (*i. e.,* the height of the upper single shed). The pile threads in double



plush travel the same as the binder threads in Elastics do, from one ply to the other, through the centre of the fabric, hence have a considerably greater distance to travel as compared to the ground warp-threads of either ply of the double plush.

A loop pile effect, minus the use of wires, is occasionally produced in connection with ribbon weaving by using a heavy count of a cheap yarn, two picks in a shed, to interlace in place of a wire. In order that these two picks do not draw out of the fabric structure, they are made to interlace around a wire at the edges of the fabric, in the same way as is practised in connection with pearl edges.

After the fabric comes from the loom, this waste filling is then pulled out of the fabric structure, rewound and in turn re-used. This permits us in connection with ribbon looms fitted with banks of shuttles to use them for loop pile structures, minus a wire attachment.



(*c*) Terry or Loop Pile Fabrics.

In these fabrics the pile is produced, *i. e.,* raised, without the aid of pile wires. They are woven on looms specially constructed for the manufacture of this class of fabrics.

Two systems of warp (on two beams) are neces-