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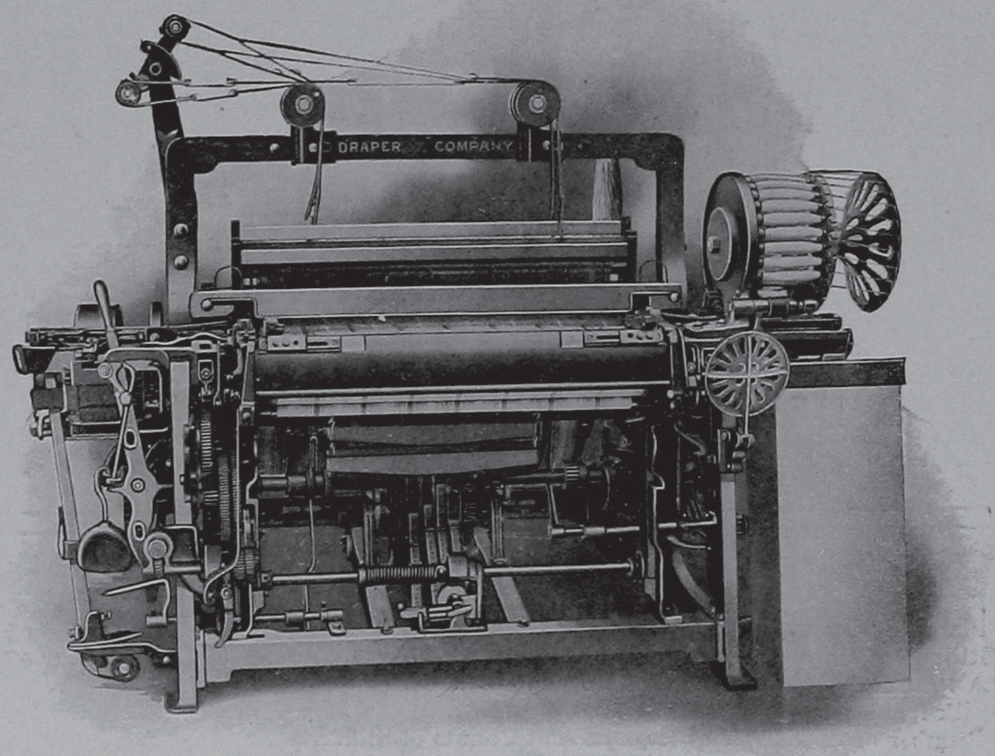

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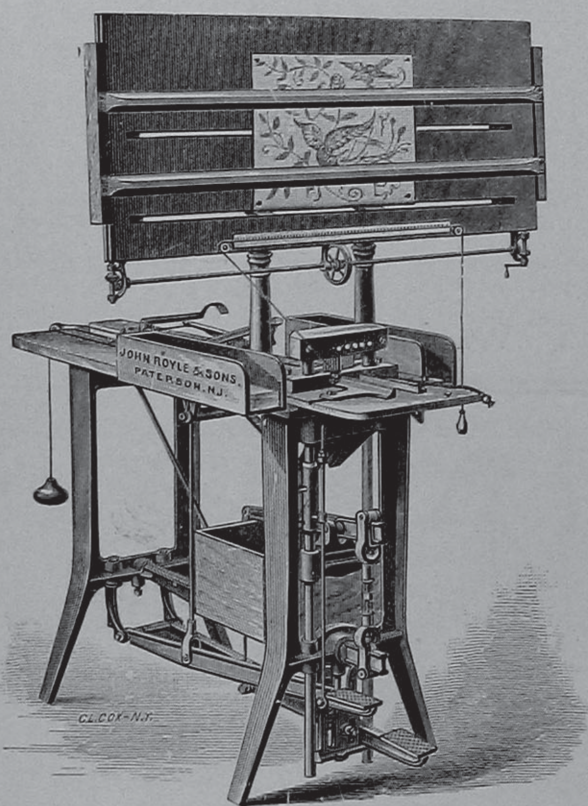

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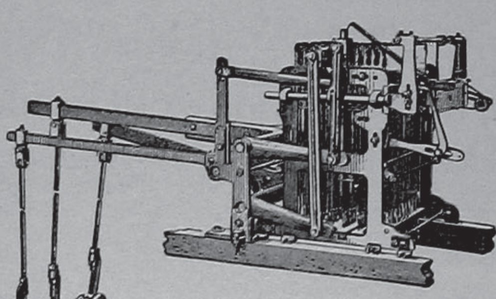

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PLAIN AND FANCY SELVAGES.

The object of a selvage is to give to the fabric, at both sides, solid edges. With reference to weaving, the selvage prevents excessive drawing in of the outside situated warp threads towards the centre of the fabric by means of the filling, giving at the same time to the edge of the cloth an increased stability, required on account of the different manipulation the fabric is subjected to during the various processes at finishing. For this reason the custom is to use a stronger and lower count of yarn for the selvage compared to that used for the warp.

In matters of width, finish and color, a selvage will vary according to the fabric applied. For instance, in low dress goods, damask, etc. three, four or more double ends of the regular warp may be all that is required. In the opposite, face-finished goods will have selvages varying from $\frac{3}{4}$ to $1\frac{1}{4}$ inches in width and in which fabrics the proper selection of the selvage is of the greatest importance.

If a selvage has to be an ornament to the fabric (and which it always should be made to be, no matter how cheap the fabric in question) it must be arranged so nicely in harmony with it as not to detract from its general appearance. To neglect this point is quite common, since it is left in some mills to the care of persons who may be very competent to conduct mechanical operations, such as dressing or weaving, but who have no taste whatever for colors, nor do they understand the nature of the raw materials of which fabrics are composed, neither the various processes of carding, spinning, dyeing or finishing.

It will be readily seen that the outside ends in a fabric in the loom have to stand more chafing from the reed as compared to the threads situated more towards the centre of the fabric. On account of the tension on the filling, its twist and interlacing, the cloth will, in the loom, shrink always more in proportion at the outside than at the centre, the affair varying according to the class of fabrics under operation. This, of course, puts the most chafing of the reed on the selvage, for which reason these threads must be made to equal the strain.

As long as not required to produce a fancy selvage, it is best to arrange for as narrow a selvage as conveniently can be used, an excessively wide selvage being either a loss to the buyer or to the mill.

Very often we hear in the mill of a selvage being either long or short. If the selvage is too long, more particularly in connection with woolens and worsteds, it will make trouble everywhere in the finishing department; working to disadvantage on the fulling mill, the napper, the gig, the dryer, the shear, the press, and even in the simple last job of winding the fabric on the cloth board. The shear tender will have his hands full in connection with such a selvage, to keep his machine from cutting the latter. In the same way there will be trouble at the press, the selvage being longer than the fabric, may in places turn over, running in on the fabric and consequently be pressed on the latter and marking the same.

Again, there will be trouble if the selvage is shorter than the fabric, since then the nearest two or more inches of the fabric will vary, more or less, as to nap, shade of color (especially if piece-dyed) etc., from that of the centre of the structure. Besides,

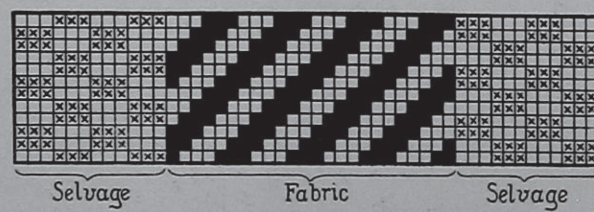


Fig. 1

great care is required with a fabric having a short selvage in any of the many processes requiring tension lengthwise on the fabric, as gigging, winding for steaming, pressing, etc., since then the whole, or nearly the whole of this tension will come on the selvage, whereas it ought to be divided equally over the body of the fabric and its selvages. Excessive tension put on such *tied* selvages may burst them, the fabric may catch, cutting part of the selvage and thus possibly tear into the fabric. In many of these cases the oper-

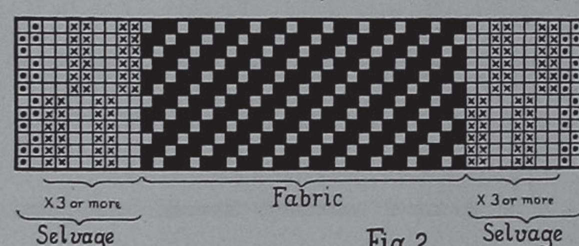


Fig. 2

ator of the machine will be blamed, whereas the blame should be put upon the originator of the trouble, *i. e.*, the party who designed such imperfect selvages.

There are a good many causes for long and short selvages, for instance, the difference of the texture between the selvage and the fabric will occasionally make the warp and selvage yarn take up differently; again, the difference in the materials used between warp and selvage threads may be at the bottom of the trouble, etc.

With heavy fabrics we can interlace the selvage with the weave used for the cloth, only we must be careful to arrange the last end so as to properly catch the filling. More difficult, however, is the production of a perfect selvage with light weight fabrics, especially such where a variety of weaves are used; for example, light weight worsted dress goods made out of single yarns, and when the use of a special reeding and weave for the selvage may become necessary, although we may use the same yarn as used for the fabric also for its selvage. A higher texture for the selvage is often produced by using two ends of the warp yarn for every alternate thread of the selvage. The weave used to the best advantage in this instance is the basket weave, it being a weave where in most cases a perfect selvage may be sooner expected than with any other weave.

A poor selvage may be also caused by weaving a fabric in a rather wider loom than necessary, and when then the filling may form loops at the end of the sel-

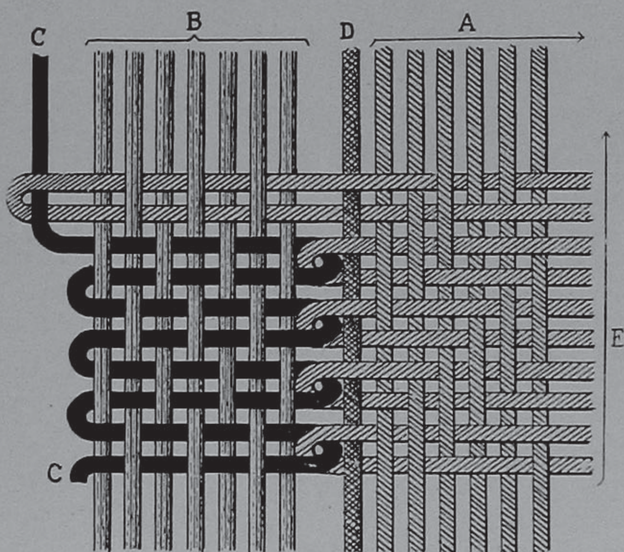


Fig. 3

vage, although the fixer should know how to get over the trouble. Be careful that you have sufficient friction on the filling end, as it leaves the shuttle; take care for the one-sided tension of the thread caused by the one-sided construction of the shuttle, and which will insert more tension upon one than upon the other edge. This necessary disadvantage in the construction of the shuttle may possibly be remedied by placing the most outside situated selvage thread one dent away from the rest. When dealing with an extra hard twisted filling, a special friction arrangement must be provided for the filling in the shuttle, so as to prevent snarling of the filling. The best plan is to insert a yarn brush into the throat of the shuttle, and which at the slackening of the tension will prevent snarling. The same object can be accomplished by fastening pigs' bristles along the lay, and which will give in certain distances a hold to the filling, the latter clinging sufficiently long on said bristles until on the backward run of the shuttle, the filling end is pulled tight without giving it time to form a loop.

In some instances imperfect setting of the filling stop motion may be the cause of loops formed by the filling. If such is the case, shorten the moment of the lift of the fork, which will reduce the touch of the filling by the fork to the least possible time.

Temples have much to do with a perfect selvage, but a fixer will know how to regulate any trouble from them. Thick and thin places in selvages (if the body of the goods are otherwise perfect) are made in the loom. The tension of the filling and the temples need to be looked at. Imperfect and rough selvages are generally nothing but the result of the neglect of the fixer or weaver. When the shed is not good at the sides, the time for picking incorrect, or one shuttle delivering loose filling, another tight, we may expect imperfect and rough selvages which will show on threadbare goods when finished, if not before.

FANCY SELVAGES. Fig. 1 shows us (see *cross type*) the application of a 6 by 4 basket selvage, used in connection with a fabric interlaced with the *3 up 3 down*, 6-harness even sided twill (see *full black type*). The selvage is to be dressed one double and to alternate with a single end, these three ends being drawn in one dent. Use 4 harness for weaving selvage.

Diagram Fig. 2 illustrates a selvage for ladies' dress goods requiring fulling and gigging. The weave for the fabric (see *full black type*) is the common *2 up 1 down*, 3-harness twill, whereas the selvage shows extra heavy floating *6 up 6 down*, with 2 ends working alike (see *cross type*), in order to interlace extra loose with the filling. 2 double ends (see *dot type*) at the ends of the selvages are made to interlace the same as the warp, and consequently are drawn on the same harnesses. 2 or 4 extra harnesses are needed for this selvage.

AN INDEPENDENT SELVAGE. The same is charterized by forming an independent structure from that of the fabric, both with reference to warp as well as the filling. Consequently we can give to this selvage in warp as well as in the filling, a different color compared to that of the fabric; again, we may use a totally different material for said selvage compared to that of the fabric, in this manner producing a special effect not possible to be obtained with a common selvage.

This selvage may be arranged in any width required, either as a plain or fancy selvage and can be attached to any weave as used for interlacing the fabric itself. With fabrics requiring a face finish, the

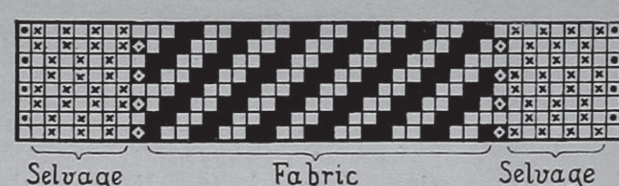


Fig. 4

advantages of such a selvage are increased strength and durability; again this selvage can be made in a lighter texture compared to that of the fabric itself, a feature which in connection with certain fabrics may be of advantage.

The mounting of the loom for the use of such a selvage is very simple and will explain itself from reference to diagram Fig. 3 and weaves Figs. 4 and 5.

Fig. 3 is a plan showing the interlacing of fabric and selvage and their connecting accordingly to weave Fig. 4.

A are the warp threads for the fabric (see *full black type* in weave Fig. 4).

B are the regular selvage warp threads (see *cross type* in weave Fig. 4), the same interlacing with the common 2 by 4 warp rib weave, *i. e.,* the plain weave with two picks in a shed.

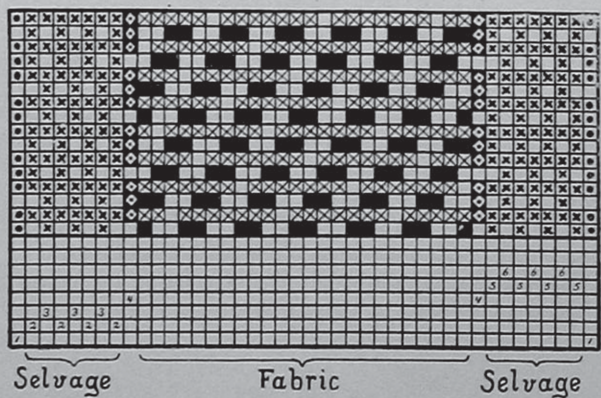


Fig. 5

■ Fabric Face weave.
⊠ " Back weave.
⊠ Selvage threads.
⊙ Binder warp thread to connect selvage and fabric.
⊡ Harness for carrying selvage warp-filling.

C is the extra warp thread (see *dot type* in weave Fig. 4) and which forms the filling for the selvage.

D is a special binder warp thread (see *diamond type* in weave Fig. 4) placed there to catch the regular filling *E* and prevent the latter from pulling into the warp threads of the fabric structure proper; the filling *E* in the meantime having united itself with the, *i. e.,* caught the warp-filling end *C* and pulled it along with it towards the binder thread *D.* This procedure is in turn duplicated on the other side of the fabric, with a corresponding number of selvage warp threads a special warp-filling end and finally a duplicate binder selvage thread. As will be readily understood, this peculiar interlacing of the selvage is repeated alternately on the left hand side, and then on the right hand side of the fabric.

A few words might now be said regarding the warp-filling end *C.* The same is wound on a small bobbin, provided with just sufficient friction to permit the unwinding of the thread as is required during weaving, but not to let the thread unwind more than taken up at a time during weaving. Said bobbin is placed on a spindle, secured conveniently to the rear arch of the loom frame, in order that the thread will unwind easily during weaving. Enter this thread, without a heavy tension, parallel and close to the regular selvage warp threads *B* through the harness and reed. In the harness the thread *C* is passed through the eye of a heddle in the usual manner.

For the interlacing of the selvage, the regular filling *E* does not tie at its outside end, as in a common selvage, but it ties against this rule, *i. e.,* it ties at the most inside situated selvage thread *D,* so that the filling *E* is always pulled out of the selvage, *i. e.,* from between the threads *B.* In this manner the selvage would remain without filling or interlacing, if not by means of the raising or lowering of the warp-filling *C* an entwining of the latter with the regular filling *E* would have been accomplished, by means of which at the return travel of the shuttle the selvage filling *C* is compelled to draw off from its bobbin and follow the regular filling *E* between the regular selvage threads *B,* and this to the place where warp thread *D* stops further pulling off; the result being the formation of a special and solid woven selvage which at the same time is solidly connected to the fabric.

Fig. 5 shows the weave required, if adding a similar independent selvage to a heavy weight structure, *i. e.,* one system warp and two systems of filling (the same face weave is shown as in the previously given example—the 4-harness even sided twill, arranged 1 pick face to alternate with 1 pick back). Since character of type used in this weave corresponds to those used in connection with the previously explained weave, no further explanation with reference to the formation of the selvage during weaving is required, any more than that the backing does not interlace with the warp-filling, and neither with the edge of the fabric, *i. e.,* binder end *D* is *up* on every backing pick, but always pulls out of the latter.

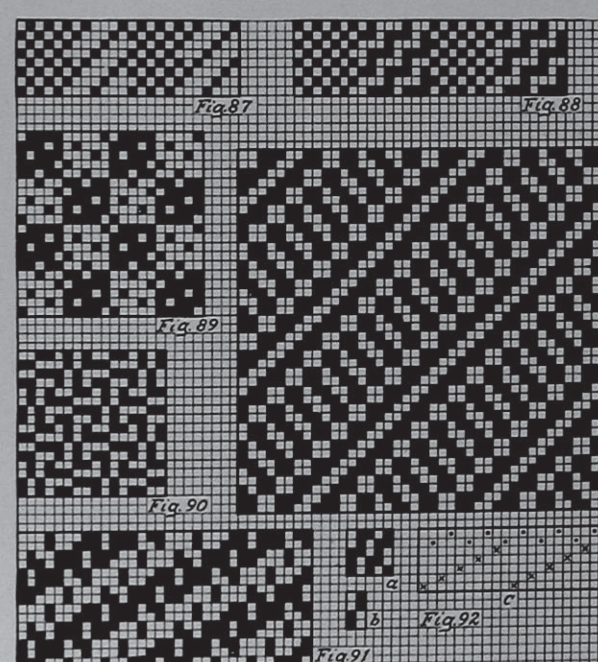
RIBBONS, TRIMMING, EDGINGS, ETC.

By O. Booth.

(Continued from page 35.)

Connected Weaves.

In designing these weaves always try to arrange a clear break where two weaves join, *i. e.* place risers



of one weave opposite sinkers of the other weave and vice versa, whenever possible. Weaves Figs. 87, 88 and 89 will explain the subject.

Weave Fig. 87 shows the proper way of connecting the plain weave (taffeta weave) with the four harness unevensided twill-filling effect.

Weave Fig. 88 shows the connecting of the plain weave (taffeta) with double plain (double cloth), and

Weave Fig 89 squares of 5-leaf satin warp effect to exchange warp and filling ways with similar size squares of 5-leaf satin filling effect.

Figured Rib Weaves.

The same are the checkerboard combinations of warp and filling effect rib weaves, imparting to the face of the fabric a well broken up effect.

Weave Fig. 90 explains the subject, showing checkerboards of 4 warp threads and 4 picks of the *2 up 2 down* rib weave-warp effect, to exchange alternately with similar size checkerboards of the same rib weave-filling effect.

Intersected Weaves.

Two or more weaves may be in this way used in the formation of a new weave. We may in this way intersect either the warp threads of the foundation weaves, or its picks; the first mentioned arrangement being the one generally used. Weaves Figs. 91 and 92 are given to explain the subject.

Weave Fig. 91 shows us a fancy twill obtained by combining, *i. e.,* drafting alternately (1 : 1) warp threads from the 4 *up* 4 *down* 8-harness regular twill with those of the 2 *up* 2 *down* 4-harness regular twill. Repeat of the resulting fancy twill weave 16 warp threads and 8-picks.

Weave Fig. 92 shows the result of intersecting (1 : 1) the warp threads of the 5-leaf satin warp effect (see diagram *a*) with those of the 2 by 4 rib weave filling effect (*b*). Diagram *c* as given below the new weave thus obtained, shows us the plan for drafting, *cross* type standing for the warp threads drafted from one weave (the 5-harness corkscrew) and *dot* type standing for the warp threads drafted from the other weave (the 2 by 4 rib weave). Repeat of the new weave obtained is 20 warp threads and 20 picks.

(To be continued.)

A PRACTICAL TREATISE ON THE KNOWLES FANCY WORSTED LOOM.

By E. P. Woodward, *Master Weaver.*

The Compound Levers and Method of Adjusting to Level Shuttle Boxes to the Raceplate.

(Continued from page 43.)

When the box lifting chain becomes badly worn, it will be found impossible to level the shuttle boxes by the method here described, as the excessive wearing of the box lifting chains is more than the levers can be adjusted to. In this case the proper thing to do is to renew the chains by turning them, building up the worn down links, or in some manner getting the side of the chain, which travels on the roll, to a condition of evenness where it will be within the compass of the box lifting levers to properly level the boxes without checking them either by the collar on the box lifting rod or by means of the chain becoming slack and the upper end of the lifter tube resting on the rocker casting.

Theoretically, there is but one position to which the adjusting points of the lever can be set and work properly. In practice, however, it is possible to level the boxes by means of the adjusting tips and chain extensions where they will run well, although they may not all stand exactly level with the shuttle race.

A careful reading of this article shows that either lever has something to do with the leveling of all the cells of the box. Since this is true, it will be seen that no set rule of measurements can be laid down and the learner is much better off by mastering the methods, he should use to work, understandingly.

The following example may help to show the principle of leveling the boxes which has been demonstrated in this article:

The first cell $\frac{1}{8}''$ high; the second and third cells $\frac{1}{16}''$ low; the fourth cell $\frac{1}{8}''$ low. This condition of the boxes would show to the experienced fixer that by giving the desired and equal lifting powers to the single and double lift levers, *i. e.,* making each lever raise the second and third cells respectively to the level of the race plate, would also bring the fourth and first cells level. He would know it could be readily done by simply thinking of the following combinations of lifts which he could and would obtain from the compound lever. Starting with the second cell, he would raise it $\frac{1}{16}''$ and likewise the third cell $\frac{1}{16}''$ by adjusting respectively the single and double lift lever. When the fourth cell was up, it would be found level with the race plate as sure as twice $\frac{1}{16}''=\frac{1}{8}''$, which was the desired lift required for the fourth cell. Also when the first cell came down, it would be found level with the race plate for the reason that a power which raised all a certain height would also lower all the same distance. The rule then would be:

(1) The single lever working alone affects a box equal to its motion.

(2) The double lift lever working alone affects a box twice the equal of its motion.

(3) Both lifting, they raise the equal of their combined power, *i. e.,* three cells.

(4) Both lowering, they lower the box the equal of their combined power, *i. e.,* 3 cells.

When the box lifting chains are unevenly worn, *i. e.,* worn much more on the chains position for one cell than another, the fixer can readily tell if it is possible to level the boxes by the following method:

1st. Locate the adjusting tips and the chain extensions (which fit their respective levers) when they should level the boxes when the chains are new.

2nd. By means of the chain extension on the box lifter tube see that the tube is properly located.

3rd. By means of the adjusting collar on the lower end of the box lifting rod, see that the top and bottom cells are level to the race when called. If not level, level them by means of the compound lever.

If by this test the second and third cells are lower than the first and fourth cells, they can only be made right by repairing the lifting chains as previously described.

The following example gives some idea of the condition of a box which cannot be properly leveled without repairing the lifting chains: The first cell level, the second cell $\frac{1}{16}''$ low, the third cell $\frac{1}{16}''$ low, the fourth cell level.

These conditions cannot be remedied by any adjusting of the levers, as any increased motion will affect the first and fourth cells as well as the second and third cells, and when the two middle cells were found to be level the first would be $\frac{1}{8}''$ low and the fourth $\frac{1}{8}''$ high.

The shuttle boxes can be well leveled when the distance of the fourth cell above the race plate equals the distance of the first cell below the race plate and the second and third cells' combined distance above the race plate, equals the distance of the fourth cell above the race plate. Also when the fourth cell below the race plate equals the distance of the first cell above the race plate and the combined distance below the race plate of the second and third cells equals the distance below the race plate of the fourth cell.

These two examples quoted will show the fixer that while the boxes apparently are in need of leveling, the conditions of the chain are such as will readily admit of leveling the boxes by means of the adjusting parts on the levers alone.

The preceding examples have been written to help the learner, master the following simple rule or principle of leverage which will apply equally to a compound lever arranged for either 3 or 4 cell boxes.

Two levers—each working singly—give a certain amount of motion to the shuttle boxes. One may give more motion to the boxes when working singly than the other, or both may be giving the same amount of motion. When working in combination (either raising or lowering all boxes) this division of power—equal or unequal—amounts to the combined motion of the two levers.

For example, the two following conditions of the shuttle boxes would appear to be decidedly different to level and yet both would be within the compass of the box motion to properly level.

First cell $\frac{1}{8}''$ high, second cell $\frac{1}{16}''$ low, third cell $\frac{1}{16}''$ low, fourth cell $\frac{1}{8}''$ low; or first cell $\frac{1}{8}''$ high, second cell $\frac{1}{32}''$ low, third cell $\frac{3}{32}''$ low, fourth cell $\frac{1}{8}''$ low. In either case, the total of the two middle cells equals the distance of the fourth cell low, or the first cell high.

It may be asked, why such range of adjustment is provided for by the builders if it cannot all be rightfully used. It can be used to advantage on many occasions to favor worn chains when running anything less than the full number of cells for which the compound lever is designed. For this reason alone practice has proven the utility of this wide range of adjustment. The builders may also have different lifts of boxes to which the same motion may apply.

In conclusion it may be well to caution the learner against leveling the shuttle boxes by checking the fourth cell by means of the retaining collar, or on the other hand by leveling the first cell by allowing the lifting tube extension to rest on the rocker casting, thus allowing the box lifting chain to become slack. Either way has its faults. In the first instance it causes an excessive wearing of the lifting mechanism. In the second instance the slack chain will have a tendency to lift the boxes with a sudden snap, or jerk, all of which makes for an unsteady lifting box. Also when the box drops to the first cell, it is a constant pound of iron against iron, all causing excessive wear and looking decidedly unworkmanlike. A careful study of this article should enable the learner to readily know when the shuttle boxes can be well leveled without repairing the chains and also when they can be leveled as they should be, only by first repairing the chains. These two things well understood, his box leveling troubles are much modified and a little labor will keep his boxes running where the builders designed them to run—free and unhampered.

(To be continued.)

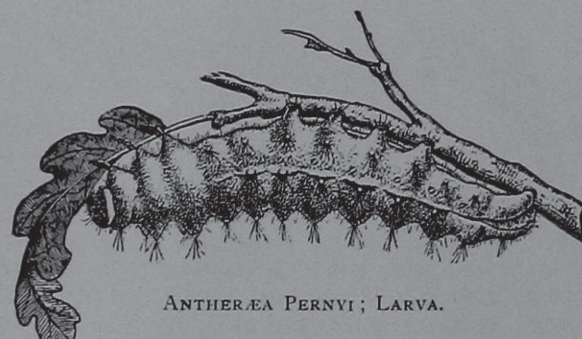
SILK FROM FIBRE TO FABRIC.

(Continued from page 4.)

Wild Silk.

(4) CHINESE TUSSAH.

Under this name there comes in the market a supply of reeled silk, which in its general appearance closely resembles the true Tussah from India, but in reference to its character is inferior to the latter and consequently considerably cheaper. Said Chinese Tussah is the product of the silkworm *Antheræa Pernyi,* and is a native of those parts of Northern China of which Chefoo is the south eastern boundary, and extending from the 27° to the 42° northern meridian. Antheræa Pernyi is occasionally also met with in India, but if so, it refers to imported worms. The provinces of Schênking, Chefoo, and Newchwang are those in which this silkworm is mostly met with, the vicinity of the river basin of the Liao are entirely devoted to the raising of the oakworm, whereas in another part (Liao-shi) of the province, Aylanthussilk is raised.



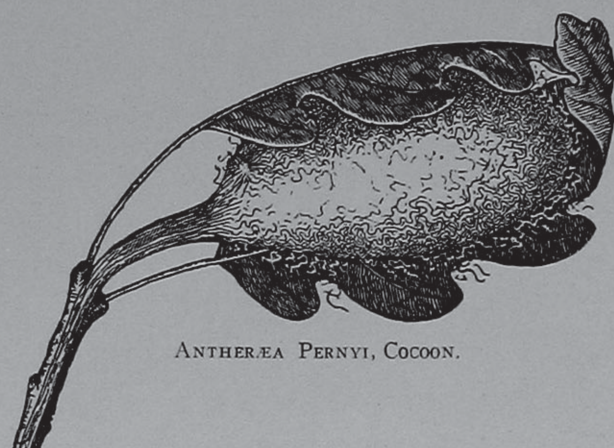
ANTHERÆA PERNYI; LARVA.

The cities of Tuchow, Suiyen and Kaichow in the South, and Haichêng in the North are the central points, and at the same time the cocoon markets, which however are closed to foreigners. If such were not the case, Schênking would be able to produce at least four times as much silk as it now does; the trouble resting with the natives, who do not collect more cocoons than absolutely necessary to earn their living.

In the province of Shantung, the production of oak silk amounts yearly to about 10,000 piculs Grège (1 picul = 60.16 *kg*), and of which a portion is exported, the other being used in the manufacture of pongee fabrics. In Chefoo there is found a specimen of a silk reeling establishment, fitted up according to European filatures, reeling and twisting such of the silk as destined for export. Shantung produces about 8000 piculs of oak silk.

Europe has, in years gone by, made several attempts to acclimate the oak silkworm, in Italy, France, Spain, Belgium and Austria, as well as in Germany. The moth of the Antheræa Pernyi is marked with four transparent spots, which are somewhat smaller than those of the Tussah moth of India. The oakworm is at the same time more unsightly than the one of the Antheræa Mylitta, which is covered with a beautiful green lustrous covering.

The oakworm produces two breeds a year; the Spring harvest producing only about one-half of the Fall harvest, the cocoons of the latter containing at



ANTHERÆA PERNYI, COCOON.

the same time more silk. The first however, furnish a finer, brighter and more lustrous silk than the Fall cocoons, which are more particularly destined for export. The oak cocoon is soft, of no special shape, has a short connection, and is spun enclosed in oak leaves; occasionally egg shaped, light cocoons are met with and are covered with a luxurious floss silk, and only attached to one leaf. The cocoons measure in an average 40x25 *mm*, and weigh in dry condition about 430 *mg* and furnish from 6 to 700 *m* reeled silk, of a count of from 6½ to 8½ *den;* one thousand cocoons weigh 10½ *kg* and furnish 600 *g* silk. Considering a cocoon in thousand parts, there are 685 parts chrysalis and 315 parts of silk material. Of the latter 45 parts are floss silk, 195 parts silk thread, and 75 parts waste silk, which cannot be reeled.

The baking of the cocoons is done in the usual manner by means of steam, after which they are at once reeled. Such of the cocoons as become dry previous to the reeling, are in turn again soaked in warm water, a process which must be more or less continually practised previous to reeling, on account of the large number of cocoons baked at one time, and which cannot be reeled at once. The Chrysalis serves as food for the poorer class of natives.

The cocoon of the Ant. Pernyi is not completely closed, the worm leaving a small opening at the end of the cocoon where the latter is secured on the leaf, in order to assist the moth later on to easier bore itself out of the cocoon. At a superficial examination this hole will not be noticed, the cocoon presenting at said place, a rough, wrinkled appearance; again in some instances, the opening is of such dimension that the reeling in the general way is impossible; since such cocoons fill with water and in turn sink to the bottom. The Spring cocoons either have none of these openings, or they are so minute that they can be reeled in the regular way (swimming in the basin containing water). The reeling is for this reason in the two provinces of Shantung and Shênking done both dry and wet, the first process predominating.

Dry reeling is carried on thus: After soaking the cocoons for a short time in a strong solution of soda or nitrate of potash and lye of wood-ashes, they are then upon a *uso doppio-slate* (to reel double cocoons) without the use of a fluid, reeled off.

By another system, the cocoons are soaked in an oak bark solution (which will still more darken the silk) after which they are packed in baskets and subjected to hot steam, which will soften the bast and gum, so that the reeling can then be done without having to resort to the use of a fluid. The silk reel, as used in Shênking is of a most primitive construction, also the spinning wheel as used for working up the floss and the waste silk, the same being the old fashioned spinning wheel, employed for home use in olden times, previous to the introduction of spinning machinery.

The best qualities of raw silk are reeled from 8 to 12 cocoons, medium qualities from 16, whereas the poorest qualities are composed of from 20 to 25 cocoon ends. The raw silk is occasionally weighed with nitrate of potash, in which solution the cocoons are steamed, containing also the tannin, dye stuffs and glue obtained from the vegetable lye. The nitrate of potash contained in the fibre, on account of being a very hygroscopic salt, will in damp days form a prominent weighting item. Raw Chinese tussah loses during boiling-off only little of its dark tint, and only takes with difficulty a durable shade, possibly on account of the alkaline and salt solutions used in the process of preparing the cocoons for reeling, and which influence the absorbing power of the fibre for the dyestuff. In connection with the European process, using a mixture of soda and glycerine for preparing the cocoons for reeling, after boiling-off the yarn, a much brighter color will be the result.

The color of Chinese tussah varies considerably, from a very light (like the silk from the province of Honan) she changes to gray, brownish yellow, dark brown to black. The latter is obtained from Kaichow and its vicinity, the worm eating not only the oak leaves, but also the stems.

Reeled silk is known in China as *koang,* spun as *fang,* and such as twisted as *niu* or *nien*. The general name as used for oak silk is *icht-san-ssé*.

The most important market for Chinese tussah is Lu-shan, in the district of Yu-tscheu-fu.

The first lot of Chinese tussah reached Europe (France) in 1873, and when this brownish, coarse and dirty silk could be used only for special fabrics, said silk losing in the boiling-off from 30 to 35%. Since then the quality of this silk has improved considerably, the same being used at present for furniture fabrics, fringes, trimmings and fancy articles in all its varieties.

Number of Cocoon Ends for Different Counts of Silk.

Editor of Posselt's Textile Journal: I would like a table showing the number of cocoon ends for the different counts of silk, so when a piece of silk cloth is dissected, and an average of cocoon ends are found in a thread of silk, it would be possible to find said silk's count by merely looking at the table. I am well pleased with the journal. C. R.

We found the above question from the superintendent of a most prominent silk mill of general interest to our readers, hence quote a reply on the subject by Mr. James Chittick, the well known Silk Expert of New York.

Regarding the inquiry as to the number of cocoon ends for the different sizes of raw silk I would reply that there is no exact number and therefore the making of any table on the subject is impracticable.

Various breeds of cocoons differ widely in their thickness of filament, various cocoons of the same kind differ widely, and the same cocoon filament varies in thickness throughout its length. As a rule the outer end of the fibre is the thickest and it gradually tapers towards the interior until it is as attenuated as a spider web, so fine in fact that it does not pay to completely unreel it.

As the great object in reeling silk, while producing a thread within the limits of the size ordered, is to make that thread as regular as possible, it will be seen at once what difficulties confront the reeler.

It is necessary first to sort the cocoons with much care the granulations on the surface indicating, in a measure, the coarseness or fineness of the thread. According to the size of thread required, the order will be given to reel together so many cocoons of a certain grading. With very fine cocoons, for instance, it might require six filaments to produce a certain number of deniers; with medium cocoons five; and with coarse cocoons four.

Not only this, but the number joined together by the reeler will vary from time to time as the operation proceeds.

As explained before, the thread of the cocoon generally tapers towards the interior. If, therefore, the ends from five fresh cocoons were joined together the thread would run from very thick when they were starting to very fine when they were exhausted, thus making a most irregular thread.

To overcome this tendency, it is good practice to have one cocoon about full, one nearly exhausted and the others spaced between with various degrees of fullness, the coarse and fine places thus balancing each other.

In spite of even this precaution the thread will vary and the reeler must be ever on the alert to observe any change in size, and so, if the silk be running coarse she will break off a cocoon and run with an end less as long as necessary, or, if the thread becoming too fine, she will join on an additional cocoon to compensate.

The silk, as it issues from the orifices of the silk worm comes out in a double filament the two ends lying side by side and adhering by reason of their gummy nature. The single fibre is called the *brin* and the double fibre is the *bave*.

When, therefore, a dyed or boiled-off silk is being examined, there will be found to be just double the number of filaments that there were of raw silk threads.

With most of the regular silks produced by the bombyx mori, whether of European or Asiatic origin, the average number of cocoons that it takes to produce a 13/15 denier silk is five, making ten ultimate filaments. As already explained, no reliable deduction can be made by counting the filaments. There might be three, four, five, six, or even seven cocoons in a 13/15 denier silk, and of extra fine kinds of cocoons, such as Cantons, even more.

When trying to determine the size of a silk it is not uninteresting to count the filaments but the best that can be said of it is that it is only a sort of corroborative testimony. There can be no certainty in any deductions made from it.

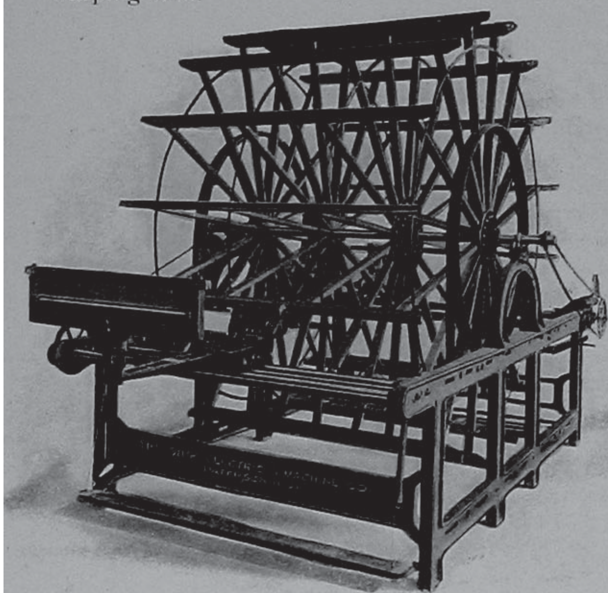
THE MAKING OF WARPS IN SILK MILLS.

This is one of the most important items in a silk weaving plant, since upon it not only depends production in the warping and the weave room, but at the same time, also the quality of the goods produced. Tight or slack ends produced by overrunning sections, etc., will make trouble during transferring the warp (beaming) from the reel of the warper on the loom beam, they are apt to show on the face of the fabric; again the general plan observed, in feeding the sections on the reel and beaming the completed warp on the loom beam, is of the greatest importance.

The warper or *warping mill*, or *mill* as often termed for shortness, which does this work superior to others, *i. e.*, older styles of machines of this class, is the Sipp Horizontal Warper, with the Hover Patent Swiss Attachment. The latter attachment is a most ingenious device for doing work automatically, what in connection with other makes of warping mills has to be done by the operator; at the same time all chances for section marks, laps as well as other imperfections, always more or less characteristic to warping mills not supplied with this attachment, are overcome.

In connection with this Hover Patent Swiss Attachment, the operator starts running sections on the reel from the right hand side towards the left, hence the operator has both, his work as well as the clock of the warper continually in sight; the lease cords are always pulled through by the operator toward himself, the same as if making warps on a plain horizontal mill.

As will be easily understood, this Hover Swiss Attachment can be easily applied to any make of plain warping mill.



The Sipp Horizontal Warper with The Hover Patent Swiss Attachment. (Front View, *i. e.*, Warping End.)

Setting of Carriage for a New Section. The carriage is made for this purpose in two parts. The lower part, *i. e.*, the spacing part, moves the entire carriage completely the width of a section on reel, the distance of each new section movement being gauged semi-automatically by means of a most simple device, a feature which secures absolute uniformity in the warps being made, and without resetting, any number of warps may be made, exact duplicates in every particular. The upper part of the carriage moves by means of a rack engaging with a worm or screw in the lower part previously referred to. To this upper part of the carriage are secured the guide rolls, as well as the reed. Of the first, the large guide roll nearest the reel can be set by the operator to best suit the yarn under operation, *i. e.*, regulate the slant under which the sections travel on the reel. The reed is in the same way secured adjustably to the carriage so as to be able to change its slant.

The Reel. The same rests on the frame of the machine, revolving on roller bearings of highly improved designs, making a side play of the reel an impossibility, in turn making a variation in the sections as wound on the reel an impossibility.

The Beaming Attachment. The same belongs to the Hover Attachment and itself is a safety device, preventing any chance for breakage when the operator reverses the mill to start a new warp. It works smoothly and with a minimum of power.

The Sipp Head Motion. The same is a most important item, it being what we might say a saver in floor space, and any manufacturer will know what that means to him. With this head motion you can beam off the warp the full width of the reel, whereas the head motions of other warping mills are placed in the way of the end portion of the reel, hence not as much surface of the reel at your disposal for filling up with yarns, and for which reason a wider build machine, *i. e.*, reel, must be used, as compared to the Sipp Warper to accomplish the same results. Less power is required for beaming, besides less wear on the head motion.

As will be readily understood, all necessary supplies that go with the mill complete, are furnished by the builders, *The Sipp Electric and Machine Co. of Paterson, N. J.*

ABOUT ARTIFICIAL SILKS.

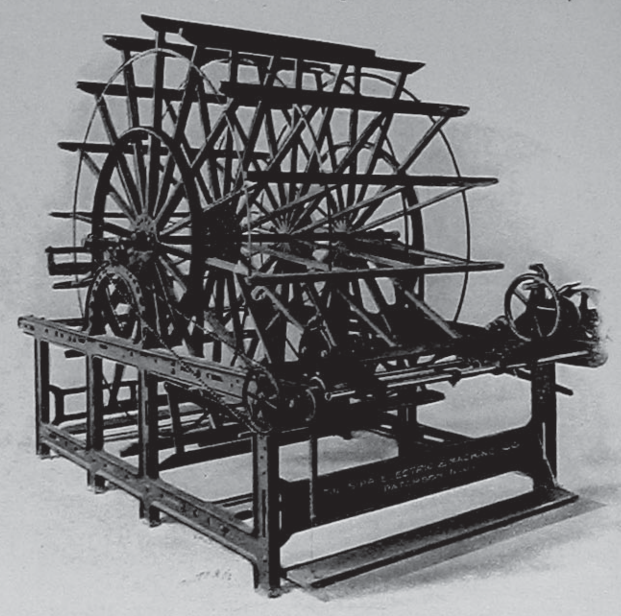
By V. Clemens.

(Specially translated for "Posselt's Textile Journal" from "Färber Zeitung")

The most important artificial fibre is *Artificial Silk* as used extensively in the manufacture of Trimmings. Neckties, etc.

Others are, Artificial Horsehair and Straw, as used in the manufacture of ladies' hats, and which fibres are thin 0.08 to 0.12 inches wide, high lustrous, transparent, cellulose strands or ribbons

Artificial Wool is another artificial product, the same being a mess of strong curly artificial threads, added to cheap grade woolen and shoddy yarns. This fibre differs from those referred to first, in that it is without lustre, or only has a slight lustre, caused by



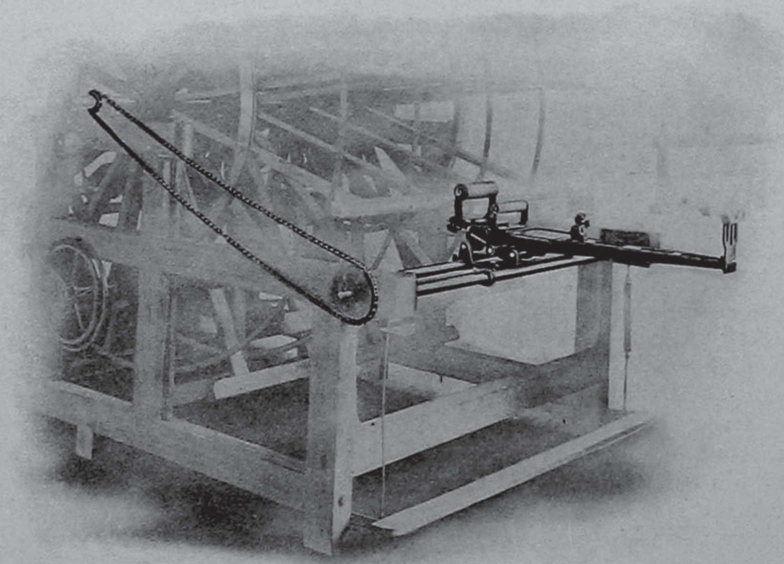
The Sipp Horizontal Warper with The Hover Patent Swiss Attachment. (Rear View, *i. e.*, Beaming End.)

the absence of tension exerted on the thread in its manufacture.

Besides the artificial fibres thus referred to, we meet in the market Fancy Yarns made from carded artificial silk waste.

Artificial Fibres Are Obtained by Various Processes:

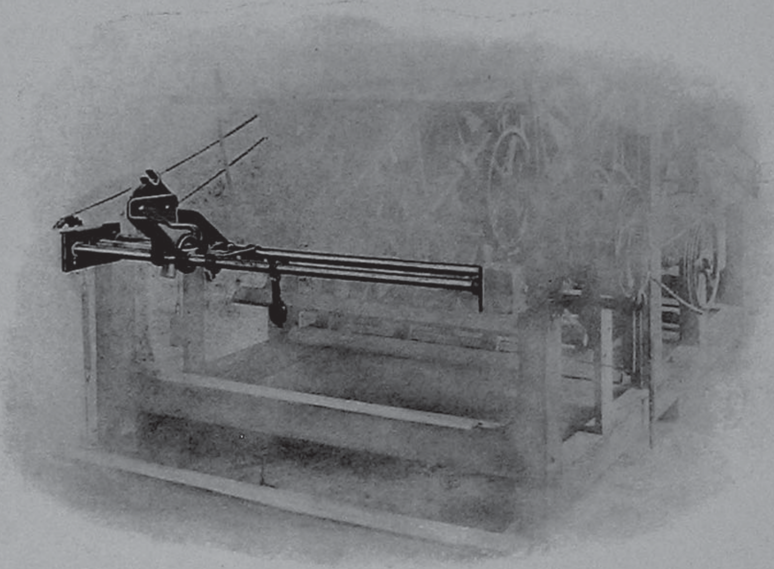
(1) out of Nitrocellulose (Collodion),
(2) out of Cellulose dissolved in Cupricoxide-ammonia,



View showing The Hover Patent Swiss Attachment (shown prominently) applied to older makes of Warping Mills, as shown in faint printing.
(Front View, *i. e.*, Warping End.)

(3) out of Viscose (Cellulosethiocarbonate),
(4) out of Celluloseacetate,
(5) out of Animal substances (Glue, Casein).

1 and 4 are Celluloseester, 2 and 3 Cellulosefibres.



View showing The Hover Patent Swiss Attachment (shown prominently) applied to older makes of Warping Mills, as shown in faint printing.
(Rear View, *i. e.*, Beaming End.)

The two first mentioned kinds are those most frequently met with.

In the manufacture of Nitrocellulose-silk, Nitrocellulose is dissolved in organic dissolving solutions and the product obtained spun into threads, which in turn harden by evaporation, or the washing out of the dissolving agent, previously used, after which, by means of denitrating, the largest part of the combined nitric acid is removed so that the final product 30 Celluloseresidues $C_6 H_{10} O_5$ contains a Nitric-acidresidue of about $N O_2$. Even this small amount of nitric acid changes its behavior at the dyeing against basic dyestuffs completely.

Normal Cellulose (Cotton) as is well known, hardly takes any color in connection with most of our basic dyestuffs; chemically treated Cellulose (Oxycellulose, Hydrocellulose, Hydratedcellulose) only in light and medium shades; slightly nitrated Cellulose (Collodionsilk) however, has a great affinity for basic dyestuffs, taking as deep a shade as cotton mordanted with tannic acid. In connection with Cellulosesilks, Collodionsilk is characterized by its greater elasticity, however, it has less stability against water. In a hot bath it will lose its lustre and the skeins will lengthen themselves irregularly.

In opposition to Collodionsilk, Cellulosesilks (Cupricammonia and Viscosesilk) receive, during their spinning process, watery solutions. The hardening of the threads is obtained by a chemical process, in turn resulting in poor looking threads loaded with water, which in turn receive their lustre by drying them under tension.

Artificial Silk obtained by means of cupricammonia solutions has the copper extracted by means of acids; whereas Viscosesilk calls for a tedious treatment with acids and sulphides in order to remove the sulphur combinations they contain. The finished thread is clear of sulphur and chemically, as well as at the dyeing, resembles the artificial silk obtained by means of cupricammonia solutions.

Pure Viscosesilk is thus far of no market value; heavy counts of these yarns, known as Viscellinyarn and consisting in a cotton thread as its core with Viscose as a covering, when met with in the market are used as horsehair imitations.

Celluloseacetatesilk is similar to Collodionsilk obtained by spinning the soution of a Celluloseester in an organic solvent. Low Celluloseacetates and Sulfoacetates can be spun. After spinning, there is no necessity to remove the acid residues by means of saponification, as must be done when dealing with Collodionsilk. Since Acetatesilk, contrary to all other artificial silks, is hard to soak and for this reason is hard to color, it has been lately suggested to dye this silk by the use of alcohol. At present this silk is of little practical value.

Artificial silks having for their basis glue and casein, are chemically closer related to true silk than such as have Cellulose or its derivatives for their basis; however, they are very sensitive to water. In spite of this disadvantage, on account of its high lustre, they are used.

The lustre of artificial silk, more particularly that of Collodionsilks is more brilliant than that of true silk, presenting however, a restless metallic glitter, caused by twice breaking the Cellulose. This peculiarity is fully presented in the transparent fibres, which for this reason fluoresce a number of dyestuffs on artificial silk, a feature which in many cases acts disturbingly.

The price between artificial silk and true silk, at a first glance looks big, which however is not entirely so, since artificial silk is specific heavier and besides more transparent than true silk. These two features will readily explain to us that a greater amount of yarn is required in connection with artificial silk as compared to true silk to cover a certain space in the fabric. Certainly, in connection with fringes or trimmings, and where artificial silk has its strong point, this feature does not come prominently into consideration and which is the reason why in this branch of textiles, on account of its high lustre, it has driven weighted true silk to a great extent out of the market.

The strength of artificial silk in its dry state is also less than that of true silk, this difference becoming more pronounced when soaking, for which reason the dyeing of artificial silk with reference to its mechanical operation presents somewhat difficulties, and why the dyeing process must be shortened to its lowest, absolute necessary duration, using at the same time for the process as low a temperature as possible and carrying on the mechanical procedure of dyeing with as much care as possible. A frequent turning of the skeins of yarn during the dyeing process is not necessary, since artificial silk is readily wetted and that the dye easily penetrates the thread.

Uneven (streaky) dyeings, if met with, as a rule are not caused by the dyer, but are caused by differences in the fibre itself. As a rule, such imperfections show up as regular, darker or lighter stripes in the length of the thread, again, in many instances complete skeins in a lot dyed vary in this way. In the latter case, when sorting such skeins, it will be noticed that lots manufactured at different times have been dyed at one time, each lot taking its own shade of color.

Examining such stripes in connection with an example of Collodionsilk, I found the cause of it seemingly to rest with an irregular denitrating process, the amount of nitrogen varying:

for the bulk of the lot dyed O, 29% N = 1, 16% HNO_3

for the darker stripes 1, 16 % N = 7, 25% HNO_3

In connection with lustre cloth and Viscose similar stripes may appear; however in this instance the Cellulose has chemically changed. A record giving the quantity of each constituent as forming the fibre is impossible to be obtained, since Cellulose, Hydratedcellulose, Hydrocellulose and Oxycellulose have no strong chemical distinction and for this reason cannot be given (analytically tested) correct. For a change in the Cellulose speaks the fact that similar stripes as caused in the dyeing also appear when samples of this class of artificial silk are subjected to Oxycellulose-reaction. For this reason such stripes will become of a brownish shade during steaming, obtaining a deeper color if treated with *Schiffs* reagent and with alizarine. Both, with the Copper as well as with the Vicose process, a Hydrolose is artificially introduced into the Cellulose, since normal Cellulose has no spinning properties. Besides this, there occurs a change in the Cellulose on account of her great capability of reaction in an alkaline solution. The change which the finished threads obtain by means of treatment with chloride and acids has little influence upon their dyeing process. Tests have shown that excessive bleaching, carried on until destroying the life of the fibre, does not influence its affinity towards dyestuffs, sufficiently to show a difference between artificial silk thus treated and such as handled in the regular way. In the same way, it is still less possible to obtain Oxycellulose by means of oxidation from Cellulosesilk which with basic dyestuffs, will take as deep a shade as denitrated Collodionsilk. This will explain that it is wrong (as some claim) to consider the dyeing action of Collodionsilk simply as a chemical change of the Cellulose.

It is impossible to prevent differences in various lots of artificial silk manufactured, *i. e.*, spun, for which reason it is advisable to keep different lots separated from each other; it will greatly facilitate the work for the dyer.

At the spinning of artificial silk, it is impossible to keep the count of the thread even, for which reason the spun yarn is wound into skeins of 1000 *m*, *i. e.*, 1093 $\frac{11}{18}$ yards, which in turn are then upon titrating-machines (Patent Dr. Lehner) sorted according to weight. Winding these 1000 *m* skeins will be the cause of mixing threads from different lots, with the result of stripes in the dyed skeins. As will be readily understood, such stripes could be obviated by keeping each lot of spinning separated until they are titrated and are not mixed until their behavior at the dyeing process has been ascertained. Such a procedure however, considerably increases the cost of manufacture of artificial silk thus handled.

(*To be continued.*)

NOVELTIES IN HEAVY WEIGHT MEN'S WEAR.

Worsted Suiting.

Weave: Fig. **A**, Repeat 16 by 16.
Warp: 7440 ends, 2/48's worsted; 16-harness straight draw.
Reed: 14 × 8 = 66½ inches wide.
Dress: 4 ends, dark grey-green
2 " dark red
2 " dark grey-green
2 " dark red
14 " dark grey-green
24 " medium grey-green
24 " dark grey-green } 5 times
24 " medium grey-green }

288 ends, repeat of pattern.
Filling: 100 picks per inch, single 24's worsted, grey-green.
Finish: Worsted Finish; fulled, and clear shorn face.

Worsted Suiting.

(Tricot Imitation.)

Weave: Fig. **B**, Repeat 8 by 4.
Warp: 6450 ends, 2/48's worsted, 16-harness straight draw.
Reed: 15 × 6 = 71½ inches wide.
Dress: 1 end dark grey-mix
1 " light grey-mix

2 ends, repeat of pattern.
Filling: 100 picks per inch, 2/48's worsted, arranged thus:
1 pick dark grey-mix
1 " light grey-mix

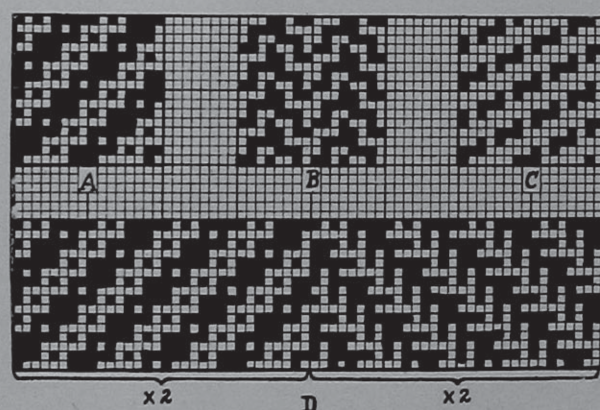
2 picks, repeat of pattern.
Finish: Worsted Finish.

Worsted Suiting.

Weave: Fig. **C**, Repeat 16 by 8.
Warp: 8512 ends, 2/48's worsted, 16-harness straight draw.
Reed: 16 × 8 = 66½ inches wide.
Dress: 4 ends, black
2 " bordeaux
16 " black
2 " dark green
4 " black
4 " dark brown } 7 times
4 " black }
28 " dark brown } twice
28 " black }
28 " dark brown

224 ends, repeat of pattern.
Filling: 68 picks per inch, 2/48's worsted, arranged thus:
2 picks dark brown
2 " black

4 picks, repeat of pattern.
Finish: Worsted Finish.



Worsted Trousering.

(Herringbone effect)

Weave: Fig. **D**, Repeat 120 by 16.
Warp: 7400 ends, 2/48's worsted, 26-harness fancy draw.
Reed: 13 × 8 = 71⅛ inches wide.
Dress: 32 ends grey-mix
32 " black
30 " grey-mix
2 " black

96 ends, repeat of pattern.
Filling: 120 picks per inch, 2/48's worsted, arranged thus:
1 pick grey-mix
1 " black

2 picks, repeat of pattern.
Finish: Worsted Finish; fulled, and clear shorn face.