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WOMAN'S INSTITUTE DOMESTIC ARTS SERIES

TEXTILES AND SEWING MATERIALS

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TEXTILES, LACES
EMBROIDERIES AND FINDINGS
SHOPPING HINTS
MENDING, HOUSEHOLD SEWING
TRADE AND SEWING TERMS

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PREFACE

This book is arranged for the convenience and ready reference of students, homemakers, and dressmakers, giving historical information, descriptions and uses of laces, textiles, embroideries, and findings, and showing their values, purposes, and uses in dressmaking work. It is not enough to know how to cut and fit garments unless one knows how to complete them artistically by using the proper materials for the need or the occasion.

Detailed illustrations and instruction are given for the mending of practical, every-day garments, as this work is required in the average home. In the study of this part of the text, it will be evident that thrift and economy have been prominently considered. To mend well is not only an economy but one of the womanly arts that have come down through the ages, few women considering themselves too distinguished to do their own mending.

Information is given for household sewing, including the making of draperies, bed coverings, scarfs, and art needlework, as well as the miscellaneous articles that a housewife may need to mend, remodel, or replace.

A dictionary of trade and sewing terms completes the volume. By a careful study of this part, fashion news will be more easily and more accurately interpreted and the vocabulary of the modiste and the fashion writer will be better understood.

A mystery often surrounds dressmaking work, which some persons attribute to the terms used. To make all such words, clear, and to provide a ready reference for those interested in dressmaking work, this dictionary of trade and sewing terms is supplied.

CONTENTS

CHAPTER I

DEVELOPMENT OF TEXTILES

ORIGIN AND GROWTH

1. The preparation of materials for body covering, chief of which are cotton, flax, silk, and wool, whether for ornament or for warmth and comfort, has demanded consideration from the earliest times. Primitive women, who were concerned with providing shelter and clothing for the family while the men were engaged in seeking food and in warfare, played an important part in the early development of the textile industry.

At first, women made clothes from the leaves and bark of certain trees or from the skins of animals, depending on the climate in which they lived. In tropical countries, the inner bark of one kind of tree was pounded until it was sufficiently thin and pliable, and then it was decorated and used for garments.

When skins were worn, the hair or wool was generally placed next to the body; so, in some cases, such as in wool, the fibers felted from the oils of the wearer's body. This marks the beginning of one form of textiles. Later, the dried skins of animals were tanned to make them smooth.

2. Probably weaving originated through the using of the reeds and grasses that primitive folk found in their wandering life. These were twisted, knotted, interlaced, and tied to make mats and baskets. Gradually, the fibers of plants and the coats of animals were woven, the first woven articles being used for floor coverings. With the occupations of men and women becoming somewhat stable, a pastoral life gradually came into existence and brought with it more desire for personal adornment. Weaving thus became an important industry and experienced many improvements.

During the agricultural era which followed, flax and cotton plants were widely cultivated and sheep were raised for wool. By degrees, life became more settled, households were established, and private ownership became the rule. In fact, by the time that America was going through her colonization, each home was a unit in itself, the mother and daughters spinning and weaving, while the father and sons prepared the fibers and made and repaired the machinery and tools.

3. The textile industry received considerable impetus through the various inventions that helped to perfect spinning and weaving. At first, only human power was used; then horse and water power were employed; and finally steam and electricity replaced both of these. With the increase of the demand and consequently of the production, the industry left the home and entered the factory. Thus, women have gradually given up the making of cloth except as they are employed in factories to do certain parts of the work.

SPINNING

4. Early Development.—The origin of spinning, which is a process of drawing out and twisting fibers in such a manner as to produce a continuous thread, is difficult to trace. One story is that of a shepherd boy who, while watching his sheep one day, noticed a bunch of wool hanging on a nearby bush. In his idleness, he began to twist the fiber and, as he twisted it, he drew the fibers apart and found that he could make a long thread from these comparatively short fibers. Some authorities entirely discount this story, claiming that, due to necessity, primitive woman was the inventor of spinning. Whatever its origin, it was with this invention that the true art of textiles began.

5. In the beginning, the spinner held the fibers in her left hand and twisted and drew them out with her right into a continuous thread, which she wound on a stick, called a *spindle*, as shown at *a*, Fig. 1. She had no means of keeping the fiber in order or even of cleaning it before it was spun. Very soon, however, the *distaff* made its appearance and shortly after it came the *whorl*. On one end of the distaff, which was a stick 12 to 18 inches long, the fibers were loosely fastened, as shown at *b*, the other end being held under the left arm or stuck in the belt of the spinner so that both hands were left free to work with the fiber. The spinner soon found that it was much easier to spin with a full spindle than with an empty one, so she conceived the idea of weighting it with a whorl and it then consisted of a stick with a weight on the lower end, as shown in Fig. 2.

With these twoimprovements in equipment, the *spinster*, as she was called, would draw out the fiber from the distaff with her left hand, attach the end to the spindle, and give the spindle a sharp twist with her right. She would then allow the thread and whorl to twist in the opposite direction. After twisting a considerable length, she would wind the yarn on the spindle, fasten it to prevent its unwinding, and begin the process again. The *rock*, a later improvement, was merely a distaff made with a standard, as shown in Fig. 3, so that it stood on the floor beside the spinster.

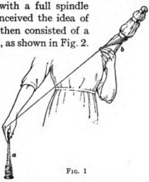

FIG. 1

6. At the present time, the Navajo Indians of Arizona have an interesting method of spinning. With a slender stick for a spindle, the point of which is stuck in the ground, the spinner, sitting on the ground, pulls out the fiber and twirls the spindle to twist it. The yarn, when first spun, is very slightly twisted so that it must be gone over several times before it is ready for use in a loom.

7. Kinds of Spinning Wheels.—Up to the 14th and 15th centuries, the distaff and weighted spindle constituted the spinning equipment. Then, they were replaced by the spinning wheel, the spinners of India fastening a wheel to a spindle and making it rotate by means of a band. This first spinning wheel known to history was called the Gharka wheel of India. It was a very crude instrument and spun only very coarse yarns, but it had the advantage of providing a more rapid method.


FIG. 2


FIG. 3

8. The *great wheel, wool wheel,* or *muckle wheel,* as shown in Fig. 4, was the next to make its appearance. It was called the *great wheel* because it had a large wheel. As it was used extensively in Scotland, it received the name of *muckle wheel,* muckle meaning great in the Scottish dialect. The term *wool wheel* was applied because it was best adapted to the spinning of wool fiber on account of the shortness of the fiber and the slow, intermittent motion of the wheel.

FIG. 4

To spin with this wheel, a portion of the fiber was drawn out and attached to the spindle; then the great wheel was struck with the hand or a wooden peg, the blow causing it to revolve, turn the spindle to which the fiber was attached, and twist the fiber. To wind up the yarn, the wheel had to be revolved in the opposite direction. When the spindle was full, the thread was wound off on a reel. It has been estimated that spinners who worked at this type of wheel walked as many as 20 miles a day as they spun. The principle of the great wheel is still used in our modern wool manufacture, but the mechanism has been so greatly improved that practically all of the work is now done by the machinery.

9. The *flax,* or *Leipsic, wheel,* shown in Fig. 5, which is the one we ordinarily see as an heirloom, with its distaff, spindle, and flyer, and which is adapted to flax spinning, was a complicated piece of machinery when compared with the great wheel. It was a labor-saving invention in that it had a treadle for transmitting the power and permitted the spinner to sit down while spinning. The flyer, which was not found on the great wheel, revolved very rapidly, twisting the fibers and winding them on the bobbin. However, the spindle's motion was held back by the spinner, who changed the yarn from one hook to the other of the flyer and gradually filled the bobbin evenly. The motion of this wheel is continuous, that is, the fiber is drawn out, twisted, and wound up at the same time.

FIG. 5

10. Carding.—In order to have a smoothly spun, clean yarn, it was necessary to clean the fiber and make it fine and soft before spinning. This was done by means of *carding.* Primitive woman used her fingers for carding, opening up and straightening the fibers into a soft lap. Later, *cards*, which were flat brushes containing bent wires set closely together in strips of leather tacked to the wood, were made for this purpose. With two of these cards, one in each hand, as shown in Fig. 6, fibers could be made very clean and fluffy and laid out to form parallel strands.

Fig. 6

11. In 1748, Lewis Paul invented a machine for carding, which consisted of revolving cylinders covered with wire cloth. John Lees, in 1772, invented an *apron feed*, a device that made it possible to put a large quantity of fiber in the machine at one time. Richard Arkwright was responsible for an invention by which the fiber was delivered from the carding machine in *laps*, but a short time after the apron feed was invented a funnel was attached to the card, thus making the raw material into a *sliver*. After being carded, either by hand or by this machine, the fiber was ready for spinning on either the great wheel or the flax wheel.

12. Improvements in Spinning.—About the middle of the 18th century, there came an increased demand for materials. While the improved machinery made it possible to card the fiber ready for spinning and to weave the cloth on power looms, still the yarn was spun by hand. This, of course, held up production. To John Wyatt is due the honor of producing the first yarn spun without the use of the human fingers, a feat he accomplished in 1737. His machine drew the fiber through two moving rollers, which also used the flyer of the flax wheel.

13. Up to this time, but one thread was spun at a time. James Hargreaves, an Englishman, was the first to work out a method of spinning a number of threads at the same time. The idea came to him one day when he saw a spinning wheel overturned, leaving the spindle revolving in a perpendicular instead of a horizontal position. Seeing at once the possibility of having a number of spindles revolving in this position, he made his *spinning jenny*, which spun eight threads at one time. It had an intermittent motion like the great wheel, but it spun thread that was not strong enough for warp. Hargreaves' invention made him very unpopular with his fellow workmen, who persecuted him bitterly, for they felt that he was taking their work from them.

14. The next improvement in spinning was Arkwright's *water frame*, which was brought out in 1768. This machine was too heavy to be driven by hand, so that mule or horse power was required. Later, water power was used, which gave it the name of water frame, and in 1790 steam was employed. The action of the water frame was continuous like that of the flax wheel and that used today in ring spinning. In fact, the principles of both the modern mule and the ring-spinning frame are the same as those of the great wheel and the flax wheel. The differences lie in the mechanism that has been devised to take the place of the hands.

15. Samuel Crompton, in 1779, patented his spinning machine under the name of the *mule-spinning frame*. Containing the good features of both Hargreaves' and Arkwright's inventions, it was more valuable than either of these before steam power was used. Later, when steam could be utilized for power and when Whitney invented his cotton-ginning machine in 1793, cotton spinning received a great impetus.

It was when water and steam were used for power that the textile industry was taken from the home to the factory. But the principles of the machines used today in the largest factories are practically the same as those set forth in the inventions of Hargreaves, Arkwright, and Crompton, with merely the substitution of machinery for the hand work formerly done by spinners.

WEAVING

NATURE AND HISTORY

16. Weaving is the process of interlacing into a fabric two sets of threads or strips of pliable material that cross each other at right angles. The threads that run the entire length of the material and form the foundation for weaving are called *warp threads*, as indicated in Fig. 7. The threads that cross and interlace with the warp threads are called *weft*, *woof*, or *filling*, threads. At each side, the weft, or filling, threads, are woven very closely and bind the warp threads into a firm edge, which is called the *selvage.*

As the warp threads have to bear a very great strain, they are very strong and nearly straight, as can readily be determined by observing and testing the ravelings. Weft, or woof, threads are often softer, less wiry, and of less even weave than the warp threads. A sharp sound usually accompanies the tearing of material across the warp threads, whereas a dull sound results if a lengthwise tear, or one across the weft threads, is made.

FIG. 7

17. History of Weaving. — Textile weaving dates back into prehistoric times, for in the earliest written records are to be found occasional references to a weaving industry well developed. Silk, wool, linen, and cotton of rare quality were all in use in those early days; in fact, the textiles that were woven in various parts of the Orient have perhaps never been excelled in richness of fabric, splendor of color, and intricacy of design. 'Even though everything points to an early and flourishing industry in weaving, very few of the looms of antiquity are preserved to us either in picture or in literature. In their pottery painting, the Greeks have handed down the looms of Penelope and Circe, which are examples of the early Greek looms. A picture of an early Egyptian loom is also available.

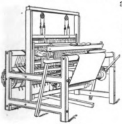
FIG. 8

Both the Egyptian and the Greek looms are *vertical,* or hold the warp threads in an upright position. The chief difference between these two looms is that the Egyptian began to weave at the bottom, while the Greek wove from top to bottom, small weights being attached to each warp thread.

18. The vertical loom existed until the 15th century. Then the *horizontal loom,* which is shown in Fig. 8, and in which the warp threads lie in a horizontal position, took its place.

19. The invention of the *fly shuttle*, in 1738, by John Kay meant a great deal in power weaving. In 1750, he made some improvements on it and, in 1760, his son invented the *drop box*. Both of these inventions made the work of weaving easier and quicker. Later, when Cartwright brought out his power loom, in 1789, and steam was applied to Arkwright's spinning frame, the work of making textiles by power was established.

20. Principles of Weaving.—In weaving, whether done on a primitive loom or on the modern power loom, three operations are included: shedding, picking, and battening.

21. *Shedding* is the process of raising the warp threads as needed. At first, it was accomplished by raising each warp thread with the hand and slipping the weft thread through the space made. After a time, a simple contrivance known as a *harness* was devised, by means of which one set of warp threads could be raised at one time, the weft slipped through, and then the other set of warp threads raised.

22. *Picking* is the process of throwing the weft threads across the warp. In the primitive methods, picking was accomplished very laboriously without even the use of an elementary shuttle. Later, however, the shuttle came into use and by means of it the weft threads were carried through the *shed* very quickly and easily.

23. *Battening* is the process of pressing the weft threads against the finished cloth to make a firm fabric.

VARIETIES OF WEAVES

24. The two ways in which weaving is done produce two main classes of weaves: straight-line warp weaving and curved warp weaving.

25. Straight-line warp weaving includes the three foundation weaves: (1) the plain, taffeta, or tabby, weave; (2) the twill, or diagonal, weave; (3) the satin, or sateen, weave.

26. The *plain weave*, as illustrated in Fig. 9, is the simplest of all weaves and, if coarse yarns are used, may be made on a two-harness loom. In it one weft thread merely passes over and under one warp thread, as shown in Fig. 10. The plain weave is used principally for light-weight goods, such as voile, muslin, gingham,

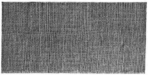

FIG. 9

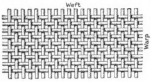

FIG. 10

linen, and nainsook. It is the least expensive weave to produce and requires the smallest amount of yarn or thread.

Variations of the plain weave are found in the basket and Panama weaves. The basket weave is made by weaving two or more weft threads over two or more warp threads. The Panama weave is really a plain weave, but a different effect is gained by having the weft thread much heavier than the warp.

27. The *twill*, or *diagonal*, *weave* is more elaborate than the plain weave. In its simplest form, the twill weave consists of one weft thread passing over two warp threads and then under one warp thread, this being sometimes called the prunella weave. Twill weaves vary greatly and consequently give us a large variety of materials, such as tricotine, serge, and gabardine. In serge, which is illustrated in Fig. 11, one weft thread passes over two warp threads and then under two warp threads, as Fig. 12 shows. In twill materials, the twill may run to either the right or the left, but in the majority of cases it runs to the right, a characteristic

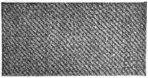

FIG. 11

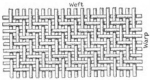

FIG. 12

that helps to determine the right side of twilled materials. Many threads are used in the twill weave, making firm. durable materials.

28. The *satin*, or *sateen, weave*, shown in the satin in Fig. 13, is an important one for it is used in all fibers. In reality, it is a

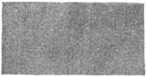

Fig. 13

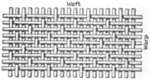

Fig. 14

form of twill, as shown in Fig. 14, but the interlacing of the fibers is done so that the twill does not show and a smooth, lustrous surface with many loose, or floating, threads is produced.

The satin weave differs from the sateen weave in that the warp threads form its surface, whereas in the sateen weave the filling, or weft, threads form the surface. Usually, the satin weave is used for silk and wool fibers, and the sateen, for cotton. It is also an excellent weave for a combination of fibers, such as silk and cotton, as in cotton-backed satin.

Besides in satin and sateen, the satin weave is found in such materials as galatea, Venetian cloth, messaline, and foulard.

29. Curved warp weaving includes the leno weaves, the pile weaves, the double-cloth weaves, the figure weave, and the lappet weaves.

30. *Leno weaving*, which is shown in the marquisette in Fig. 15, consists of weft threads with the warp threads wound around them,

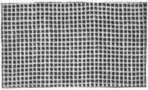

Fig. 15

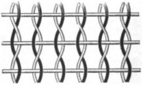

Fig. 16

as shown in Fig. 16. This weave is used extensively in curtain scrim, but as it will not permit of having its threads drawn lengthwise, such material should not be purchased with the idea of hemstitching it by hand. The leno weave is found also in silk grenadine and marquisette. When it is closely woven, it is durable, but often it is very open and loose.

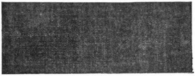

Fig. 17

31. The *pile weave*, shown in the velvet in Fig. 17, is the one in which the beautiful velvets of the world are produced. In this weave, the ground may be a plain, a basket, or a twill weave. As shown in Fig. 18, there are generally two sets of warp threads, as at *a* and *b*, which are held by the weft threads, as at *c*. One set of warp threads forms the pile, and in weaving these are held loosely so they may be drawn over wires to form loops, which are afterwards cut to produce the pile surface. Plushes, corduroys, bolivia, chinchilla, rugs, and carpets are other examples of this weave. Some of the plushes and velvets are in reality double cloth, being cut between the cloth.

Fig. 18

In another group of pile fabrics, such as terry cloth, which is used for towels and wash cloths, the pile is in the form of loops of threads instead of ends.

These materials should not, under any circumstances, be confused with those that are napped, such as outing flannel or broadcloth. The *nap* is produced by brushing the loosely woven cloth until a rough appearance is obtained. In duvetyn and velour, the fabric is matted, but in the case of broadcloth, it is pressed after napping to give it a smooth, mirror-like appearance.

32. The *double-cloth weave* is used in fabrics that are woven with two sets of warp and two sets of weft threads. Special warps and a double harness are needed for weaving of this kind. Often, double-cloth materials are held together by means of catching an occasional weft thread through to the opposite surface, and thus they become reversible, as heavy coating, polo cloth, rugs, and double-faced ribbons. Other times they are made by fastening two materials together with glue or mucilage. Again, they may be woven so as to be fastened on one or both edges to make tubular materials for lamp wicks, hose, and bags.

33. The *figure weave* is a combination of the three foundation weaves—plain, satin, and twill. The simple figure weaves, such as diaper patterns, huckaback, and granite, are done on a regular loom, but for intricate figure work, such as is found in damasks and brocades, the Jacquard loom is required.

Brocades have a right and a wrong side, whereas damasks are figured on both sides and are therefore reversible.

34. The *lappet weave* consists of a plain weave with patterns woven on the surface to resemble hand embroidery. It is done by means of an attachment called a *lappet*, which is applied to a regular loom. The extra threads on the wrong side are cut off after the pattern is applied. Lappet weaving produces many pretty materials, dotted Swiss being the principal example, but they are not very durable as the process through which they pass during the weaving weakens them considerably.

35. Bedford cord and piqué have characteristics peculiar to themselves. They are sometimes known as cord weaves, but they may be called "backed" fabrics because they carry an extra set of warp threads at the back of the fabric. The one set of warp threads weaves in the usual way with the weft, while the extra set carried at the back of the fabric interlace with the weft threads at regular intervals, producing a lengthwise ribbed effect of a rather wide wale. Sometimes, a crosswise rib is produced by reversing the warp and weft, the weft forming the filling at the back of the material.

36. Certain materials, such as bobbinet, maline, and tulle, contain weaves that cannot be classified as any of the regular textile weaves because of their construction. They have two sets of threads that correspond to the warp and weft of other materials, but these threads are woven on lace machines that permit varying degrees of tension and therefore cause the weft, or bobbin, threads to become twisted with the warp threads. To distinguish them from other materials, they may be designated as lace weaves.

KNITTING

37. Knitting is the process of making fabrics by looping a single thread, either by hand or by machine, each succeeding line of the thread being looped into the one before it. This art has been known for centuries, our grandmothers having knitted by hand large quantities of wool into stockings and mittens. The modern knitting machine has a great number of hooked needles, which open and close automatically and hold each loop as the knitting is done. If one loop is dropped, the whole web is threatened with destruction.

Knitting yarn, which is softer and less twisted than weaving yarn, produces an elastic material that is used principally for underwear, hosiery, gloves, scarfs, etc. Sometimes it is plain and other times, ribbed, the ribbed varieties being more expensive and usually better wearing than the plain ones.

The chief knitted fabrics are tricolette, Jersey, and stockinette. Some materials, such as eiderdown and chamoisette, have a knitted background through which soft yarns are passed to make a fuzzy surface.

CLOTH FINISHES

38. It must not be thought that a fabric is ready for use as soon as it comes from the loom or the knitting machine. Just the contrary is true, for it is then in an unfinished condition and is called *raw thread*. It must be treated in various ways, depending on the nature of the material and the finish to be applied.

39. Practically all materials must be *scoured*, or washed in hot water and soap, in order to remove any dirt, oil, or other foreign substance, such as *size*, a starch-like dressing put into certain warp yarns to make them easier to handle. Often it is necessary to *burl* materials after weaving, that is, to pick out any knots, burrs, and similar imperfections found in them.

40. *Singeing* consists in treating the surface of material to make it smooth after taking it from the loom. This is done by passing it over heated metal rollers to remove the loose nap.

41. *Fulling* is another operation through which many woolen materials are put to give them a stronger and firmer body. This process shrinks the threads and makes the fabric compact and smooth. In the case of broadcloths and other nap-finished materials, the fulling is carried on until the fibers become densely matted and cover up the weave. Tweeds, on the other hand, are fulled only to the extent of giving them a dressed surface, and certain other materials merely have their texture strengthened in the fulling.

During the fulling process, the material is frequently taken out, stretched, straightened, and inspected. When it has been sufficiently filled, it is freed from the soap by being rinsed, first in tepid water and finally in cold water.

42. To raise the nap of woolen material that has been fulled, it is *teasled;* that is, the surface fibers are pulled out or broken to produce an unequal nap. For this purpose, a thistle-like plant covered with a hook-like growth and called the teasle, is employed in the production of high-grade fabrics, although a metal device, also, is used to nap materials. After the nap is raised, it is cut to make it uniform. Sometimes the nap is pressed, and again it is allowed to stand upright.

43. Many materials are put through a process called *calendering* to give their surface a smooth, even finish and sometimes to glaze them, as in sateens and silesias. Calendering is accomplished by running the material over warm cylinders, pressure and steam being employed in the process. The glazing of materials is brought about by putting them through rollers that move at different velocities.

BLEACHING

44. Before materials can be dyed or printed, they must be freed of their natural coloring matter and any oily substances that they contain. Sometimes it is found sufficient to scour the fabrics, but usually bleaching is also necessary.

45. The process of bleaching consists of freeing textile fibers and fabrics from their natural color in order to whiten them. In ancient times, bleaching was done by exposing the material to the direct rays of the sun and wetting it at regular intervals. This method, while followed for many years, and even now used in some parts of Ireland, proved unsatisfactory because of the changeable weather conditions, the length of time required, and the possibility of losing much of the material through theft.

The increase in the demand for cotton materials created a need for quicker and better bleaching methods. The use of powerful chemical preparations has practically supplanted the former methods, especially where large quantities of material are to be bleached in big manufacturing plants. Chlorine is generally used for the vegetable fibers, that is, for cotton and linen, and sulphurous acid for the animal fibers, silk and wool. In the case of linen, grass bleaching is sometimes combined with the chemical treatment.

DYEING AND PRINTING

46. The final step in the preparation of material for the market is dyeing or printing or both. *Dyeing* is the art of fixing coloring matter in the substance of a textile by immersing the fabric in the color solution, while *printing* consists in applying color to only certain portions of a fabric by means of a machine. In some materials, these processes are combined. As would naturally be expected, printed colors are not so lasting as dyed ones, although many attractive and unusual designs can be produced by the printing method.

47. Origin of Dyeing.—Dyeing was known in the most ancient times, for we find mention of it in the oldest writings and some of the mummy clothes found in the pyramids contain borders of colors. However, it is thought that dyeing was not a common art in those early days, for dyed materials were put to only certain uses and were worn chiefly by persons of unusual distinction.

The early dyers used only the products of nature or very simple preparations, such as brickthorn berries, gall nuts, sumac, sandalwood, madder, cochineal, and logwood. These natural dyes are still used in the East for the dyeing of the yarn for Oriental rugs, a fact that accounts for the wonderfully soft and beautiful colorings of these rugs even after long use, the natural dyes fading in tones of the same hue.

48. Origin of Artificial Dyes.—It was not until 1856, when Perkin, an Englishman, discovered the first coal-tar dye, mauve, that synthetic dyes, or artificial coloring matter, came into use.

This discovery produced a revolution in dyeing methods, for the products of coal tar, the pitch distilled from bituminous coal and condensed in the manufacture of coal gas, chief among which is aniline, have formed the basis for practically all dyeing materials since. Many other discoveries followed, chemists producing from time to time materials that closely resemble the natural dyes in effect although they bear no similarity to them in chemical composition. In fact, these synthetic dyes have nearly supplanted the natural ones.

A very important step in the history of dyeing was the discovery in 1870, by a German chemist, of a way to transform an extract of aniline into alizarine, a coloring matter identical with madder, one of the most ancient of natural dyestuffs. When this material was available for the trade, it practically drove the natural product, madder, from the market.

49. Methods of Piece Dyeing.—Dyeing cloth with coal-tar dyes is done in three ways: by direct, basic, and vat dyeing.

50. *Direct dyeing* consists in subjecting the cloth to a dye bath and, by means of frequent turnings of the cloth, transferring the color to it. Dyeing of this sort is not likely to produce such good results as that done by the other methods.

51. *Basic dyeing* is that which requires the services of a mordant to make the dye permanent. By a *mordant* is meant a substance that will fix colors. To accomplish this, it must both penetrate the fiber of the material and combine with the dye-matter in such a way as to form an insoluble compound in or out of the fiber. Various substances, such as tannin, gelatine, gluten, albumen, soda, and lead salts, are used as mordants. The most common method of dyeing with a mordant is to work it into the cloth and then to apply the coloring matter. The art of the dyer consists in combining the cloth, the mordant, and the dye so as to obtain a color that will be chemically combined and permanent.

52. *Vat dyeing* has long been in use in Germany but has only recently come into use in the United States. This form of dyeing is interesting in that the cloth may not have the desired color when it is removed from the dye bath but assumes the correct color on being exposed to the air. Indigo is one of the colors that develop by oxidizing, or exposure to the air.

53. Methods of Fiber Dyeing.—In contrast with these methods of dyeing in the piece are several methods of dyeing fibers before and after they are spun. *Dyeing in the wool* consists in dyeing the wool after it has been washed and scoured and before it is dry. *Dyeing in the slub* means the dyeing of wool after it is carded and combed but not twisted. *Dyeing in the skein* is the dyeing of yarn after it has been spun and is in skein form, a form of dyeing used for ginghams, wool plaids, and novelty effects.

54. Dyeing Figured Material.—Practically all the dyeing methods that have been explained produce plain-colored materials. If a figured or striped material is to be manufactured, it is usually dyed by means of resist or discharge dyeing.

55. *Resist dyeing* is used for material containing a combination of fibers, such as cotton and wool, or for fabrics in which a stripe or a design of another color is found. One of the fibers or colors is treated so that it remains unchanged in the dye that colors the other part. In the case of the Batik work of Java, which is a form of resist dyeing, the part that is not to be dyed is covered with wax, which is later removed.

56. *Discharge dyeing* consists in dyeing the material in the piece and then removing some of the coloring by means of chemicals in order to produce figures, dots, and stripes. Considerable experiment is required in discharge dyeing to determine the right bleach for each dye.

57. Printing of Fabrics.—Printing, which has come to be a science in itself, is done chiefly in the case of such materials as calico, voile, percale, and galatea. The cloth is first prepared by singeing, bleaching, scouring, and starching it. Then it is printed by being put through a machine that contains engraved copper rollers bearing the design, a different roller being required for each color that the pattern contains. If a dye is used that will mix with the cotton without the use of a mordant, the process is very much simplified.

When a mordant must be used to fix the dye, it is usually applied first by means of a roller over which the cloth is run. The cloth is then dried by steam-heated cylinders, after which it is relieved of its acid by various processes so that its mordant is left in the pure form. A thorough washing in soft water completes the preparation for the dyeing.

With the material properly cleaned and containing only a faint outline of its pattern, it is immersed in a bath of alizarine, from which it comes out a completely printed fabric. This solution has the power to produce all the colors that were printed on the material by the mordants. A final boiling in soap and water to brighten the colors brings the fabric up to its finishing processes—calendering, folding, or rolling for the market.

58. Block Printing.—The earliest form of printing was known as block printing. Now it is used chiefly in art work, having been superseded by machine printing in the manufacture of fabrics. In block printing, the design is cut out on a block of wood, the parts that are to make the impression being left prominent and the rest of the block being cut away. The color is supplied to the block, which is then pressed firmly on the fabric in order to transfer the design. As can be imagined, this is a process that, while it produces extremely beautiful, artistic effects, is too slow to be used commercially.

FABRIC CHARACTERISTICS

59. Right Side of Materials.—Many materials appear practically the same on both sides and, therefore, may be used without any concern as to keeping a particular side outermost. When materials are not alike on both sides and there is doubt as to which is the right side, there are various ways of determining it.

Usually, the right side has a smoother and more finished or more attractive appearance than the wrong side, and any design in the fabric stands out more prominently on the right side. If only one side of a fabric is glossy, this may generally be taken as the right side. If any novelty of weave or finish is more apparent on one side than on the other, the more unusual effect is, as a rule, considered the right side, even though this is sometimes contrary to the general rule that the smoother and more finished side should be kept outermost.

60. In fabrics of twill or ribbed weave, the ribs, in most cases, stand up more prominently on the right side. When both sides of a twill weave appear very much the same, the right side may be determined by observing the manner in which the diagonal lines run. To determine the right side in this way, hold the piece of material up against you with the selvages up and down. In this position, the diagonal lines should run from the left down toward the right.

Most double-width materials are folded in the piece with the right side in so as to prevent counter soiling.

61. Materials Having "Up and Down" and "Right and Left."—Materials are said to have an up and down when they have a nap, a pile, or figures that are not the same on their opposite ends and are not arranged in reverse positions, which causes them apparently to "run" in one direction.

As a rule, a napped fabric should be developed so that the nap runs in the same direction in all parts of the garment, although there are exceptions to this rule mentioned in the Instruction Book that deals with the cutting out of garments. The manner in which the pile runs in a fabric may be determined by running the hand over it in the general direction of the lengthwise threads; when the hand is moved against the pile, it causes a feeling or appearance of roughness, but when the hand is moved in the same direction as the pile, the feeling is of smoothness.

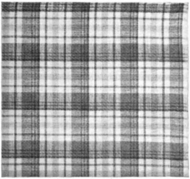

Fig. 19

62. In figured material, the correct position of the figures may be determined by their appearance; the portion of the figure that appears broader or heavier is usually regarded as the lower end, except in the case of natural figures or familiar objects, which should maintain their natural or familiar positions.

Materials are said to have a right and left when they have stripes, plaids, or figures, as in Fig. 19, that appear heavier or darker on one side of the design than on the other.

CHAPTER II

COTTON

PRODUCTION AND MANUFACTURE

1. Cotton is a downy vegetable fiber obtained from the boll, or seed pod, of the cotton plant. This plant grows from 3 to 6 feet in height and is native principally to the island and seacoast regions of the tropics, although it is raised successfully in other places. A sandy soil and a warm climate are necessary for its growth.

The earliest cotton was produced in India, Dacca muslin being among the first cotton fabrics ever made. India was the center of the cotton industry for hundreds of years and still produces cotton in large quantities. It was from this country, in the 16th century, that cotton was brought to America. Although the United States was the last to take up cotton growing, for almost a hundred years it has exceeded all other countries in the production of this fiber, and at present it raises about three-fourths of the entire world's crop.

2. Classification.—The cotton plant, the botanical name of which is *gossypium*, is a member of the mallow family, its flowers closely resembling the hollyhock of our gardens. Numerous classifications have been made of its varieties, some authorities giving a large number, but the majority place all cotton in four classes, namely, herb cotton, *gossypium herbaceum;* shrub cotton, *gossypium hirsutum;* tree cotton, *gossypium arboreum;* and lintless cotton, *gossypium barbadense.* Growers and buyers of cotton, however, prefer to classify it according to its place of growth, their chief classes being Sea Island, Egyptian, Upland, Indian, and Peruvian. The characteristics of these classes are as follows:

3. Sea Island cotton is grown on the islands along the coast of the Carolinas, Georgia, and Florida. It has long, silky, fine fibers and is used for making the finest cotton thread, such as that utilized for laces, sewing thread, silk mixtures, and silk imitations.

4. Egyptian cotton ranges in color from white to brown, the brownish color being due to the coloring matter in the Nile. Its fiber is unusually long, from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches, and it is used to some extent in the manufacture of spool cotton. Its greatest use, however, is in the manufacture of fancy knit goods, such as the better grades of hosiery and underwear, it being next in value to Sea Island cotton.

5. Upland cotton is grown in the United States on the uplands of some of the South Atlantic States. It is a cotton that varies greatly according to the cultivation of the plant and the character of the soil in which it is grown. The fibers of this cotton range from $\frac{3}{4}$ inch to $1\frac{1}{4}$ inches in length and form a source from which we obtain the bulk of our cotton for use as sheeting, gingham, calico, and similar materials.

6. India cotton is used for making very coarse yarns, such as those used in denims and drilling, as it is shorter and weaker than the American upland cotton. The United States uses very little India cotton; its greatest markets are Japan and European countries.

7. Peruvian and Brazilian cotton, or *South American cotton*, as it is sometimes called, has fibers of a harsh, wiry character, which make both of these varieties useful in the adulteration of wool. The fiber is about the same length as that of Egyptian cotton.

8. Growth of Plant.—Cotton is planted some time from March until May and matures from August until the frost comes, often as late as November or December. It is ready to pick as soon as the boll bursts open and shows its downy center. The picking is practically all done by hand, for although machines are sometimes used, they are not very satisfactory because they cannot distinguish between the ripe and unripe bolls and not all the bolls ripen at the same time. Each picker picks from 150 to 200 pounds of cotton a day.

9. Cotton Ginning.—After being picked, the cotton is taken to a *ginnery*, where the seeds are removed from the fiber by the *cotton gin*. This device, invented in 1793 by Eli Whitney, has played a very important part in the history of the cotton industry. Up to the time of its invention, the seeds and fiber were separated by hand, but this was a very slow process for no one was able to clean more than 6 pounds of cotton in a week. Now, with the modern gins in use, two men can remove the cotton from the wagon and attend six gins, which clean 24,000 pounds in a day.

The cotton gin consists of a series of saw-like teeth that draw the fiber of the cotton through holes too small to permit the seeds to pass. The lint is carried on by rollers, whereas the seeds are sent to the oil presses, these being frequently installed in the gin houses, where the seeds are pressed through special machinery and yield cotton-seed oil, the hulls being used for fuel and fertilizer.

10. Sorting, Baling, and Opening.—After cotton is ginned, it is generally made into bales of 500 pounds each and shipped to a manufacturing center. Owing to the difference in the length and the condition of the fiber, the cotton must first be graded. To do this, the bale is broken and the cotton is placed in a machine known as a *cotton opener*, which tears the cotton apart. With the fibers opened, they are sorted according to length and whiteness. Bale breaking and opening are not necessary operations if the cotton is hauled from the gin directly to the cotton mill and it is to be graded at once.

11. Carding, Combing, Drawing.—The cotton passes through several intermediate steps that prepare it for the *carding* process. By means of a machine containing a card and a comb, the action of which has been compared to that of a comb and brush on the hair, the fibers are cleaned of their impurities and laid approximately parallel. From the card, which delivers the cotton in the form of a sliver, it is run through the *combing machine*, if it is intended for very fine material. Otherwise, it goes straight to the *drawing frame*, which combines several slivers and draws them out so that they are the size of one. After going through the drawing frame several times, the fibers are sent to the *fly frames*, where they are drawn still smaller and twisted very slightly. Then the yarn is wound on bobbins.

12. Spinning.—The next step in cotton manufacture is spinning, which is usually done on an upright frame by the flyer or the ring system. A humid atmosphere is more satisfactory for cotton spinning than is a dry one. Consequently, England is more suitable for this work than America, although large quantities are spun in both the Southern and the New England States. The chief purpose of spinning is to unite and draw out the fibers and to twist them into yarn.

There is a difference between the spinning of yarn for warp and that for weft. Since the warp yarn must be stronger than the weft, longer fiber cotton with a harder twist is used for it. For the weft yarn, the short fiber is employed.

The invention of the cotton gin by Whitney made possible a large supply of cotton for spinning. Also, improvements in spinning wheels gave a great impetus to the industry. In fact, spinning was practically taken out of the home and made a problem for factories, where it has been kept ever since.

13. Dyeing.—As soon as the yarn is spun, it may be dyed at once, when it is known as "dyed in the yarn"; or it may be woven first and then dyed, when the material is called "dyed in the piece." Most of the cotton yarn is dyed before weaving. Sometimes, the yarn is bleached and mercerized before dyeing.

14. Weaving.—Before cotton cloth is woven, the warp threads are sized to increase their strength and to make them withstand the wear of the loom. The warp is then placed on a warp beam and each of the warp threads is drawn through its particular *heald*, or vertical wire containing an eye, in the harness and its space in the *reed*, or a heavy frame set close with straight wires, between which the warp threads pass. The reed presses the weft threads up close to the finished piece to make it firm and even. Two operators are required to thread a loom for the first time, but after it is once threaded, the ends of the old warp may be tied to the ends of the new with a weaver's knot and the new warp drawn through. The pattern to be followed in the weaving is, of course, worked out before the warp is threaded in the loom.

The principle of weaving is practically the same in all looms at the present time. The harnesses automatically raise and lower the warp threads and with each opening of the *shed*, which is the space between the warp threads, the shuttle flies through, leaving a trail weft thread; then the harnesses raise another set of warp threads and the shuttle flies back. The majority of cotton weaves are plain, but twill weaves are seen in some materials, such as drilling and khaki.

15. Cotton Finishes.—The varied finishes given to cotton materials account for the large variety of cotton materials on the market. Nearly all cottons are sized to some extent, the kind of material used for sizing depending on the effect desired. Thus, organdie is sized to give it a very crisp appearance and percale is treated with mucilage or gum to give it a glossy finish.

16. By **calendering**, or putting the cloth between heated steel rolls and using warm dressings, a high luster may be obtained, as in the case of sateen. Mulls are softened by means of oils; cretonnes are treated with clay to give them a solid appearance.

17. Mercerization is a finish given to various cotton materials. It is done in either the yarn or the cloth, usually before bleaching, and consists in treating cotton under tension with a solution of caustic soda to provide a high luster. Unless the yarn or cloth is stretched very tight when treated with the soda, it shrinks both lengthwise and crosswise and takes on a crinkled appearance. At one time, this was the method used for maufacturing cotton crêpe.

18. Printing.—In cotton manufacture, printing is an important process. It consists in impressing, or stamping, a design on the surface of a woven fabric or on the warp threads before the weaving is begun. The designs in calico, percale, organdie, and many other figured cotton materials are produced by means of printing.

PURCHASING COTTON MATERIALS

TESTS FOR QUALITY

19. Before you buy cotton fabrics, there are several tests that you should make in order to determine their quality. Because of the comparative cheapness of cotton fiber, it is seldom adulterated, but an inferior grade of cotton is often made to appear heavier by the addition of dressing. To test a thin fabric for the presence of dressing, when making a purchase, simply hold it up to the light and examine it. In this position, the starch that it contains will show between the threads. Or, rub the material in the hands to remove a part of the dressing and thus determine the firmness of the cloth. In the laundering process, such material loses both its weight and its firmness. So, if you wish to make the most convincing test for the presence of dressing, wash a sample of the material and compare it with the original piece.

20. Fastness to sunlight and washing is a very important quality of cotton material. To test for this, cover one end of a sample with a piece of cardboard or something else that will keep out light and expose the uncovered end to sunlight for several days. If the color remains unchanged, the fastness of the color to light is practically assured. Then wash the sample in a warm soap solution, repeating this process several times. If the color still remains intact, you may rest satisfied that it is fast.

Guaranteed, fast-color material is more expensive at the outset than materials which are not guaranteed, because of the special dyeing process required to produce fast colors. However, the additional expense is justified by the attractiveness of the material throughout its life.

21. Dark-colored materials that have not been properly dyed have a tendency, when worn, to crock and discolor other garments or the skin. To test for this condition, rub a sample of the material briskly on a white, unstarched cotton fabric. If the color in the dark material does not rub off with this treatment, you may feel quite certain that the dyeing was properly done.

22. In buying material that is desired for long service, examine its warp and weft threads. These should be in good proportion as to strength and firmness, for the unequal tension produced by threads that are too decidedly unlike will soon cause the material to split or wear. Besides considering the strength and firmness of the fabric, test its quality by untwisting one of its threads and noticing the length of the separate fibers. Long fibers provide additional strength and have good wearing qualities.

TABLE OF COTTON MATERIALS

23. The materials, or fabrics, made from cotton are large in number and variety. In order that you may become familiar with most of them, all those in common use for home dressmaking are given in Table I. In it the materials are listed in alphabetical order, and, in addition to a description of each, the names of the weaves, the usual widths, and the normal prices are mentioned. Also, in this table, as well as in the tables for linens, silks, and wools, trade names are omitted, except those which have become generally known through advertising, such as "flaxon," "Georgette," etc.

It is advisable to study these tables and refer to them as occasion demands. This information, together with the tests for materials, will, if you are inexperienced, assist you materially in purchasing materials. Not only will you quickly learn to buy intelligently, but you will have the assurance that you are not making mistakes about prices. In addition, this information will aid you in the selection of materials for garments.

TABLE I

COTTON MATERIALS

Name	Weave	Usual Width Inches	Price per Yard	Description
Batiste....	Plain	38 and 45	25c. to $1	A fine, light, semitransparent cloth made in white and a few colors. Used for lingerie dresses, blouses, and underwear; coarse weave used for lining.
Bedford cord....	Cord	27 to 54	15c. up	Heavy goods having raised, lengthwise cords that vary in width from $\frac{1}{16}$ to $\frac{1}{2}$ inch. Used for dresses, skirts, and children's coats.
Bobbinet..	Lace	45, 54, 72	59c. to $1.50	Machine-made netting woven to produce six-sided figures; commonly called *net*. Used for linings in blouses and dresses, and for overdrapes and window draperies.
Buckram..	Plain	24	29c. to 75c.	Coarse, open-weave material, made stiff with glue sizing. Used in garments for stiffening. Chiefly used for millinery purposes.
Bunting...	Plain	18	12½c. up	Soft, open-weave fabric used for flags and decorating purposes. Also comes in wool.

NOTE.—The prices in this table are based on normal trade conditions.

Name	Weave	Usual Width Inches	Price per Yard	Description
Calico.....	Plain	24 and 27	10c. up	Closely woven, thin cloth, usually with figured designs printed on one side. Used for inexpensive dresses and aprons. Often called *cotton print.*
Cambric...	Plain	24 and 36	15c. to 50c.	Fine fabric with a glazed finish. Used for handkerchiefs, linings, and undergarments. *Kid-finish cambric* is narrower in width and cheaper in price.
Canton, or Cotton, flannel..	Twill	27	10c. to 50c.	Heavy cotton with long nap on the right side. Used for children's underwear, interlining, etc.
Canvas....	Plain	32 to 40	15c. to $1	A coarse, firm material. Used for stiffening coats, facings, etc.; also, for making mail bags, tents, and sails. There is also an open-weave canvas used in embroidery work known as *cross-stitch canvas.*
Challis....	Plain	24 and 36	19c. to 50c.	A fine fabric, both plain and figured. Used for inexpensive dresses and for comfortables.
Chambray.	Plain	27 and 32	15c. to $1	Light-weight material with colored warp and white filling. Used for dresses, aprons, and sunbonnets.
Cheesecloth	Plain	24 and 36	12½c. to 50c.	Thin, light-weight fabric. Used for wrapping cheese, butter, etc.; also, for dish towels and for window decorating. Colored cheesecloth is used for masquerade suits and dresses.
Chintz....	Plain	27 to 50	25c. to $5	Material similar to cretonne, usually glazed-finished.
Corduroy..	Pile	36	89c. to $5	A durable, ribbed fabric in white and colors. Expensive qualities have cotton warp and silk pile. Used mostly for outing suits, lounging robes, and children's coats.
Coutil.....	Twill	36 to 54	30c. to $5	A stout material, sometimes in figured weave, used for corsets, brassières, bed coverings, and draperies.

Name	Weave	Usual Width Inches	Price per Yard	Description
Crêpe.....	Plain	24, 32, 36	39c to $1	A crinkled, light-weight fabric. Used for underwear, blouses, and dresses. Some grades have floral and Japanese designs. Used for kimonos and lingerie robes.
Cretonne..	Plain Twill Fancy	24 to 50	25c. to $12	A medium-heavy cloth, usually printed in floral and striped designs. Used for upholstery and draperies.
Crinoline..	Plain	27 and 36	19c. to 50c.	An open-weave fabric filled with sizing. Used in cuffs, belts, coats, and hats for stiffening.
Damask...	Figure	36, 54, 64, 72	75c. to $2.50	A figured fabric used for table linen and towels. See Damask, Table II.
Denim....	Twill	29, 32, 36	30c. to 50c.	Strong, durable fabric in plain colors. Used for overalls and for furniture and floor coverings.
Diaper....	Figure	18 to 30	20c. to 25c.	Soft fabric, generally made with small diamond or bird's-eye pattern; used for towels and undergarments.
Dimity....	Plain	27 and 36	19c. to $1	Corded or crossbar, light-weight material, plain and figured. Used for infants' garments, and for aprons and lingerie dresses.
Drilling...	Twill	32 to 36	25c. up	Coarse, firm cloth. Used for men's outing suits and for interlinings.
Duck.....	Plain	18, 27, 36, and 126	25c. to $5	A heavy-weight, highly finished fabric. Used for outing skirts and coats and for tents and awnings.
Flannelette	Plain	27 to 36	29c. to 59c.	A soft fabric with a slight nap. Comes in white and colors. Used for sleeping and baby garments and for kimonos.
Flaxon....	Plain	32, 36, 40	29c. to $1	A mercerized lawn of fine quality. Used for blouses, dresses, and lingerie. *Flaxon* is a trade name.
Gabardine.	Twill	36	25c. to 50c.	A stout material used chiefly for tailored dresses and skirts. See Gabardine, Table III.
Galatea...	Twill	27, 29, 32	35c. to 75c.	A heavy, firm material for boys' clothes, outing skirts, middy blouses, and dress-form coverings

Name	Weave	Usual Width Inches	Price Per Yard	Description
Gauze.....	Leno	36	10c. to 20c.	Loosely woven, flimsy material, but very strong because of the weave. Used as foundation for collars and yokes, but principally for bandages. See Gauze, Table IV.
Gingham..	Plain	27 to 40	19c. to $1	A firm material dyed in the yarn before weaving. Many combinations of warp and weft are made to form stripes and plaids. Used for dresses and aprons.
Grenadine.	Leno	27 to 36	25c. to $2	Loose-weave fabric, usually with satin stripes. Used for party dresses and for draperies. Also made in silk and wool.
Huckaback	Figure	18 to 36	20c. to 75c.	A rough-weave cotton. Used for toweling. See Huckaback, Table II.
India linon.	Plain	30	18c. to 75c.	A cotton lawn in imitation of linen. Name is applied to many qualities of lawn. Used for children's dresses, for aprons, and for fancy work.
Indian Head...	Plain	27 to 54	23c. to $1	A coarse, firm material used as a substitute for plain, heavy linen. *Indian Head* is a trade name.
Khaki.....	Twill	29	25c. to 39c.	Dark tan cloth. Used for men and boys' clothes, army uniforms, and women's riding skirts.
Kindergarten cloth.	Plain	32	25c. to 45c.	Stout, closely woven material with a smooth surface. Usually in stripes. Used for children's clothes.
Lawn.....	Plain	30	25c. to $1	Sheer fabric filled with starch or sizing. Used for dresses, aprons, and curtains.
Linene....	Plain	33 to 54	29c. to $1	A substitute for linen. Much like *Indian Head*, except that it is softer and has a smooth finish.
Long-cloth.	Plain	36	12½c. to $1	Closely woven, fine, bleached muslin. Used for underwear and infant's clothes.
Madras...	Plain	27 to 32	35c. to $1	Firmly woven material, usually having stripes, which may be woven in satin, basket, or fancy weaves.

Name	Weave	Usual Width Inches	Price per Yard	Description
Marquisette	Leno	40	25c. to 75c.	Soft open weaves in fine and coarse qualities. Used for dresses and curtains. Coarser qualities identical with scrim.
Mull......	Plain	27 to 40	35c. to $1	Very soft, sheer, light material in white and colors. Used for dress foundations and blouses and for inexpensive party dresses. Firm quality sold under the trade name of *seco silk*.
Muslin....	Plain	36 to 90	19c. to $1.50	A firm and loose weave, bleached and unbleached. Unbleached often referred to as *raw muslin*. Used for undergarments where durability is desired and for sheets and pillow cases.
Nainsook..	Plain	36	20c. to $1	A light-weight, soft, bleached, muslin suitable for dainty lingerie and children's garments.
Organdie, or organdy.	Plain	36 to 45	25c. to $2	Very fine, sheer, crisp material, in white and colors. Used for dresses, aprons, collars, and cuffs. "Permanent-finish" organdie retains crispness after laundering.
Outing flannel..	Plain	27 and 36	12½c. to 40c.	Similar to flannelette, with a nap on both sides. Made in colors, stripes, and checks. Used for sleeping and infants' garments.
Percale....	Plain	36	17c. to 50c.	A close, firm fabric, plain and in colors. Used for dresses, shirts, and children's clothes.
Percaline..	Plain	36	35c. to 60c.	Closely woven fabric with glazed or watered finish. Used for linings and for drop skirts.
Piqué.....	Cord	27 to 36	25c. to $1	A firm fabric in lengthwise corded effect. Used for dresses, vests, cravats, and children's coats.
Poplin....	Plain	27 to 40	19c. to $1	Fabric having fine crosswise ribs. Used for draperies, dresses, and children's coats. Also made in silk and wool.
Rep......	Plain	27, 32, and 36	25c. to 75c.	Firm material woven with heavier weft than warp, giving it a ribbed effect. Used for draperies, dresses, and children's coats.

Name	Weave	Usual Width Inches	Price per Yard	Description
Ratiné....	Plain	36 to 40	50c.to$1.50	Rough-surface fabric made with knotted yarn. Used for summer suits and dresses.
Sateen....	Satin	36	25c. to 75c.	Closely woven material, with lustrous, smooth finish, like that of satin. Used for underskirts and linings. Heavy quality known as *surf satin.*
Scrim.....	Leno	24 to 60	29c. to 40c.	Open-mesh weave in white, cream, and ecru; light in weight and transparent. Used for draperies.
Seersucker.	Plain	29	25c. to 50c.	A thin fabric with an irregular, crimped surface. Used for dresses, coats, and underwear.
Silesia.....	Plain	36	30c. to 60c.	A light-weight fabric, similar to percaline; soon loses its luster. Used for linings.
Silkaline...	Plain	36	25c. to 55c.	A thin, soft, glazed fabric. Used for draperies and comfortables.
Soisette...	Plain	36	35c. to 75c.	Soft, mercerized fabric. Used chiefly for negligée shirts and pajamas and sometimes for comfortables. *Soisette* is a trade name.
Swiss.....	Plain	32 to 44	25c. to $3	A soft dress muslin, usually in cross-bar and dotted effects. Used for dresses and curtains.
Tarlatan...	Plain	36 to 72	19c. to 59c.	Open-mesh, slightly stiffened fabric. Used for Christmas stockings, as a stiffening in garments, and for fancy costumes.
Terry cloth	Pile	18 to 40	15c.to$1.50	Cloth woven with a raised loop giving a rough surface. Used principally for towels, draperies, and bath robes.
Ticking...	Twill	32 and 36	25c.to$1.25	Firm fabric in stripes and in floral and herringbone patterns. Used for pillows and mattress covers.
Velveteen..	Pile	27 and 36	$1 to $5	A cotton velvet, with short, close pile. Used for dresses and children's wraps and for draperies.
Voile......	Plain	36 to 44	25c.to$2.50	Material having hard-twisted, warp-and-weft threads woven in open mesh. Extensively used for dresses.

CHAPTER III

LINENS

NATURE AND USES

1. Linen was probably the first textile woven by man, for it is known to have been in use centuries before the Christian era. And the treatment given to the fibers in these early linens was so excellent that napkins discovered in the wrappings of mummies were not only well preserved but were able to withstand several washings. The Phenicians are said to have carried linen production into Ireland, where it has always been an important industry, linens from Ireland being in great demand because of their beauty.

2. Linen has ever been regarded as the textile of luxury, for its rather high price, due to its methods of production, prevents it from being used as commonly as many of the other fabrics. It is used less frequently, also, because textile manufacturers have so perfected cotton materials, producing almost indescribable colors and weaves, that, whenever it is possible, cotton, which is much cheaper and does not wrinkle so easily, is substituted for linen. However, because of its sterling properties, there are some uses for which no substitute can be found for linen. This textile is practically free from lint, absorbs water very rapidly, gives up its moisture just as quickly, is easily cleansed, has exceptionally good endurance, can be had in the finest of fabrics, has threads that are smooth, strong, and lustrous, and is pure and hygienic for constant service. In addition, because of the length of its fiber, linen does not possess the fuzzy surface that characterizes cotton and that eventually results in a gray and dingy look through the constant accumulation of dust.

3. The cost of linen is well justified for household and surgical purposes, as well as for wearing apparel, handkerchiefs, neckwear, and fancy work. Because of its long history, its reliability, its purity, its expense in production, its exclusive use for many needs, linen should receive a respect which can hardly be accorded to any other fabric. And every effort ought to be exerted to prolong the life of a piece of linen to the fullest extent. Tablecloths, napkins, and other household linens should be laundered with the greatest care, as well as mended to make them last as long as possible. Housewives of today may well emulate the women of olden times, who spent more time caring for the treasures they had acquired and less time in procuring new things than we do.

PRODUCTION AND MANUFACTURE

4. Cultivation of Plant.—Linen is made from the fiber contained in the stalk of flax, an annual plant that may be produced in nearly all climates. Practically all European countries cultivate flax for the fiber, while India and the United States cultivate it for the seed and its products. When full grown, the flax plant, which has an erect, slight, and willowy stem, ranges from 20 to 40 inches high, and has small flowers that vary in color in the different varieties from pale yellow to bright blue. In the cultivation of flax, successive plantings are not made in the same ground, for it requires well-cultivated and well-nourished soil, an interval of from 5 to 10 years being allowed between flax plantings in Belgium. It is planted early in the spring, and as soon as it is a few inches high the women and children begin to weed the plants. In late July the harvesting begins, the flax being in the best state for fiber when the leaves and the stem of the lower part of the plant turn yellow and the seed pods begin to open. Instead of being cut, the flax plants are pulled up by the roots a handful at a time so as to save all of the precious, long fiber possible.

5. Removing Leaves and Seeds.—The manufacture of flax into linen consumes much time and, for the finer grades of linen, requires much hand work. After the flax is harvested, it is allowed to dry and the seeds are then removed from the stalks. Then the stalks are *rippled*, that is, they are separated from the leaves and any seeds that may still be attached by being drawn through a large iron comb.

6. Retting.—The next process through which the flax is put is called retting, the purpose of which is to separate the fiber from the bark and the woody core. It is accomplished by cold water, steam, dew, or in a chemical way, but the most satisfactory method for color and strength is by cold water. This is sometimes done in the neighboring streams, as in the river Lys in Belgium, this being one of the best known flax-raising districts in the world.

7. When the cold-water method is employed, the flax is put in open crates of wood, which are covered on the four sides with jute burlap, often from 2,000 to 3,000 pounds being put into one crate. The crates are covered with fresh straw, are floated in position in the stream, and then are weighted down with stones and sod until they are entirely covered with water. They are left in the water until the flax is sufficiently fermented, usually 14 or 15 days, the crate then rising above the water and bubbles appearing on the surface. Sometimes, for very fine fiber, the flax is removed from the water after 5 days, dried for a part of a day, and then put back for further action.

8. A different method is that practiced in Ireland, the flax being placed in stagnant pools of water. But the color of the linen is not so good when this kind of retting is done. In Russia, the fiber is left on the field to be retted by the dew. Retting is also done with the use of chemicals, but as these are apt to harm the fiber, this method is used less often than the natural ones.

9. Breaking and Scutching.—After being retted, the bundles are allowed to dry for a short time and are then turned inside out so that the air will reach all parts of the flax. As the fiber dries, it bleaches and becomes pretty well separated from the bark and woody pitch. It must be put through still more processes, known as breaking and scutching, or beating, before it is thoroughly cleaned of the particles of straw and dirt that cling to it. The linen *hackle* performs the service for linen that the card does for cotton in its manufacture; that is, it lays the fibers in order and removes all the short lengths of fiber that are known as *tow*, which is rescutched, spun like cotton, and used for coarse cloths. Sometimes the scutching is done by hand and sometimes by machine, but hand-scutching is considered less wearing on the linen.

10. Hackling and Drawing.—For very fine yarns, the fiber is sorted and cut into three divisions. The middle cut is the best and is known as *cut line.*

Before being spun, the fiber is combed many times and then put through a series of hackling machines to clean it more thoroughly and to separate the line from the tow. At the end of this treatment, the line is smooth, fine, and glossy. After being sorted and cut, it is again put into a machine and combed through fine wires, until it is made into a continuous ribbon or sliver. This process, which is called drawing, is repeated in other machines according to the fineness of the thread desired.

11. Spinning.—The spinning of the flax, which is the next process, is done by the wet, dry, or semidry method, depending on the purpose for which it is to be used. The tow is treated differently from the line, it being spun much like cotton. Dry-spun flax is more silky and has a greater firmness than that produced by wet spinning, but it is not so fine. The thread produced by wet spinning is twisted tighter and the flax is more subdivided, but these points are an advantage for certain classes of thread. Care must be used in wet spinning, however, to have the yarn dried quickly in order to avoid the forming of mold.

12. Sizing, Bleaching, Weaving.—With the spinning of the thread completed, it is usually sized to give it strength, and then it is often bleached wholly or partly before it is woven. The weaving, as can well be understood, depends on the purpose for which the linen is to be used. Sheetings, lawn, and cambrics are done in plain weaves, while towelings usually show twills. Damasks are generally woven on the Jacquard loom, and these cloths can be used on either side.

13. Finishing Processes.—The finishing of linen cloth does not vary greatly for the different weaves. After being woven, the web of cloth is bleached. *Chemical bleaching, dew bleaching,* and *grass bleaching* are in use. In Ireland, where grass bleaching is the method used, the cloths are spread out on large grass plots, where they become a snowy white upon being subjected to the rain and sunshine. In addition to being bleached, linen is often *washed, blued, starched,* and *mangled.*

14. *Dressing* is needed to some extent in even the best linens to bring out their designs. In poor grades, it is used to cover the defects of the linen. Different dressings are used to obtain different effects in the finished material.

15. *Beetling* gives linen its "leathery" feel. After the cloth is dampened, it is placed on a roll and is struck with a series of wooden mallets to give it the flat appearance that is so familiar to every one. The final processes include *calendering, pressing, inspecting, folding, marking*, and *packing*.

16. Countries Producing Linen.—The linens produced in the various countries seem to possess distinctive characteristics. Linen from Ireland has the distinction of being the purest white of all linens, and while it is not always showy, it possesses the best appearance and wearing qualities. The dazzling whiteness of Irish linen has been compared to new snow on which the sun is shining. These qualities are perhaps due to the climate in which the flax is raised, as well as to the method of bleaching, nearly all Irish linen being bleached on the grass, where it is subjected to sunshine and rain. Belfast, Ireland, is noted for its excellent wearing Irish linen.

In Scotland is produced linen that is much in favor, too, as it is usually sun- and grass-bleached, this method of bleaching being less injurious to the fibers than bleaching methods in which chemicals are employed. Scotch linens, as a rule, are much heavier and more showy in pattern than Irish linens.

The linen made in France is noted for its beautiful patterns, and especially is this true of French table linens. The French, as a rule, spin their linen thread round and fine with the result that they are able to produce some unique weaves and designs. Many linen dress fabrics are produced in France, too.

Belgium grows the finest flax of any country in the world, and the Belgians weave many beautiful linens as a result of having splendid material with which to work; also, they manufacture the finest linen threads used in lace making. It is said that the Belgians use more dressings in their linens than do the Irish.

The linen produced in Germany and Austria is silver white in color and very fine in texture and is produced in beautiful designs. Germany produces great quantities of unbleached table linen, also, which many prudent housewives buy and then bleach. The bleaching is done by placing the muslin, every time it is washed, on the grass, where it is allowed to dry and at the same time is acted on by dew and sunshine.

The United States imports practically all its linen, and this fact accounts to a great extent for the seemingly high price of pure linen in America. In this country, the raising of flax has not reached a point to be profitable, except for the seeds and the making of linen thread and coarse linen toweling. America is recognized everywhere as the chief cotton-producing country, but Europe claims all honors in regard to linen fabrics.

Experiments in flax production, however, indicate that flax can be raised in the northwestern part of the United States. New York state, also, has produced flax from which linen has been woven.

PURCHASING LINENS

TESTS FOR LINEN

17. It is often a very difficult matter to distinguish between linens and fine cotton fabrics, especially when the cottons are slightly starched and ironed with a gloss. Consequently, much care should be exercised in the purchase of linens. Many authorities contend that only with a microscope or by means of certain chemical tests is it possible to distinguish linen from fine cotton. Of course, such tests are impossible to make when shopping; nevertheless, until the government passes laws that insist on pure, unadulterated cloth, certain precautions must be taken in buying linens. And there are a few tests that can readily be applied and that should be familiar to every housewife.

18. Because of the absorbing quality of linen, some kinds may be tested by pressing a dampened, or moistened, finger on the wrong side of the material. If the moisture is taken up quickly and shows through considerably, this is a fairly good indication that the material is linen. If the material is cotton, the frayed warp and weft threads will take up the moisture before it can penetrate the material. It takes an excellent cotton fabric to withstand a test of this kind.

19. Another test for linen that may be quickly made consists in pulling out a thread and jerking it in two. If the thread breaks easily and the ends appear fluffy or fuzzy, similar to cotton twine when it is broken, the material is cotton. If, though, the thread breaks hard and the ends show an uneven, drawn-out break caused by the flax threads, which form the strand of warp or weft, not being broken off abruptly, it is almost certain that the fabric is good linen. Pressing the material firmly between the thumb and forefinger will help to determine whether it is all linen or contains some cotton, for if it fuzzes up, it gives evidence of cotton.

20. A drop of glycerine on unsized linen makes it appear transparent, but does not have this effect on cotton. This is, therefore, a very good, as well as a very simple, test.

21. A test that may easily be made and that will aid in deciding definitely whether a given fabric is cotton or linen consists in placing a sample in a strong solution of washing soda. Both cotton and linen will shrink in this solution, but cotton will become a light gray, whereas linen will turn a faint yellow.

Another test is to drop the sample into a boiling solution of caustic potash, which may be purchased in any drug store, and let it remain there a few minutes. If it is linen, it will turn dark yellow, while if it is cotton it will remain nearly white or turn a light yellow.

22. The tests given for finding the amount of dressing in cotton can be followed to very good advantage when testing linen cloth, namely, holding the material up to the light or rubbing it in the hands. If the linen is colored, the tests given under cotton for exposing the material to the light and washing it may also be employed.

TABLE OF LINENS

23. Table II gives the name, the usual width, and the usual price per yard of all linens in general use. In connection with each kind of linen are also mentioned its nature and the purpose for which it is commonly used. As is true of similar tables of materials, this information will be of valuable assistance to all women in the selection of linens for garments and other purposes.

TABLE II
LINEN MATERIALS

Name	Weave	Usual Width Inches	Price Per Yard	Description
Art linen..	Plain	18 to 45	69c. to $3	Smooth fabric with flat thread, for stenciling and embroidery.
Butcher's linen....	Plain	36	$1	A coarse, durable weave of long-fiber linen. Used for butchers' aprons, fancy work, dresses, and suits. Also made in cotton.
Cambric...	Plain	36 and 45	$1.25 to $5	Sheer, crisp fabric. Used for lingerie dresses and handkerchiefs.
Canvas....	Plain	18, 27, 32	30c. to $1.50	A coarse, firm material. Used as a body in tailored coats and sometimes in upholstery.
Crash....	Plain	36, 45	65c. to $2	A coarse weave with even weft threads. Used for towels and fancy work.
Crash toweling		18	25c. up	
Damask...	Satin	15 to 108	$2.50 to $10	Firm, glossy linen generally made in brocaded figures. Used for towels and table linen.
Diaper....	Figure	18 to 36	40c. up	See Diaper, Table I.
Dress linen	Plain	16, 18, 22, 36, 45	50c. to $5	A plain, firmly woven material in either white or colors. Used for blouses, dresses, and towels.
Glass toweling	Plain	16 and 24	15c. to 60c.	A soft, fine, loosely woven material, usually having blue or red stripes or checks. Used for towels.
Handkerchief linen	Plain	36 and 45	$1 to $5	A sheer, fine, fabric; launders well. Generally made of Irish linen. Used for handkerchiefs, neckwear, blouses, and dresses.
Holland...	Plain	32 to 60	$1 to $2	Coarse, firm weave. Used for window shades and in photography.
Huckaback	Figure	15, 16, 18, 22	75c. to $3	Absorbs water; weft threads prominent; warp threads often of cotton. Used for towels and fancy work.
Lawn.....	Plain	36	50c. to $1	Fine, sheer fabric made of short linen fibers. Used for handkerchiefs and baby clothes.
Round-thread linen....	Plain	18, 22, 36, 45, 54	$1 to $4	Soft-finished material, made with round, hard-twisted yarn. Suitable for drawn work, hand hemstitching, and hardanger work.
Sheeting...	Plain	36 to 108	$1 to $10	Used for pillow cases, sheets, towels, wash dresses, and suits.

SHRINKING AND SETTING COLORS IN WASH FABRICS

24. Cotton materials, particularly ginghams, chambrays, and percales, as well as linen fabrics, almost always shrink and often lose their colors when washed for the first time. Therefore, it is generally advisable to shrink them and set their colors before making them up into garments. If you attempt to keep correct proportions in cutting and fitting and at the same time make allowance for shrinking, you are likely to encounter difficulties, because it is hardly possible to estimate the exact amount of shrinkage. However, some materials, particularly soft, sheer fabrics, lose much of their "newness" in washing; so, instead of following the definite rule that all cotton materials must be shrunk and have their colors set before washing, you will do well to exercise your own judgment about the matter. Also, the style that is to be followed in making a garment should influence your decision in regard to shrinkage, for this will not prove so noticeable in some designs as in others.

25. For material that requires only shrinking, water alone is used, but for material that is to be shrunk and at the same time have its color set, a mordant, or color-setting substance, is required.

Because of the different chemicals that are used in dyeing each color, it is impossible to form specific rules to follow in setting any color. Therefore, before you use any solution, try out its effect on a sample of the material, letting it dry after the solution is used and then washing it to determine whether or not the color runs. You may find it necessary to experiment with several solutions, especially if the salt solution here suggested does not prove effective.

26. Using Salt to Set Colors.—Common salt is a very practical color-setting substance, because, in addition to being generally effective, it is comparatively cheap and on hand in every household. For materials containing more than one color, you will find that a salt solution is especially desirable, as other mordants are usually effective for only a limited variety of colors, while salt may be used for almost any.

The effect of a salt solution as a mordant, however, is not always lasting and in some cases it is advisable to use a different solution. You can generally tell what to do by observing the quality of the material and the nature of the color, for, as a rule, in the more expensive cotton fabrics having soft or rather subdued colors, a salt solution is all that is needed to set the color. If you prefer not to shrink the material before using it and find, in washing a sample of it, that the color is practically fast, you may postpone the use of the salt solution until the garment is ready for laundering and then leave it in the solution for a short time before washing it.

27. To make a *salt solution* for setting colors, follow the proportion of 1 cupful of salt to 1 gallon of cold water. After preparing enough of the solution to cover all the material that is to be treated, place the material, folded as it comes from the store, in the solution, but lift each of the folds so as to make sure that every part of the material is thoroughly soaked. Let it remain in the solution for 2 hours. Then rinse it well in clear, cold water, taking care not to unfold it, and carefully press the water out with the hands. You may run it through a wringer if you fold it lengthwise a sufficient number of times to permit it to be laid out flat in the wringer and thus prevent the crowding of the material and the wrinkling that would naturally result, but do not, under any circumstances, wring it out by twisting. After the water is pressed out, unfold the material and hang it up to dry in a shady place, being very careful not to pull the straight edges out of shape. Never hang a colored fabric in the direct rays of the sun, because such sunlight will take the life out of the color and often cause the material to become streaked. After the material is dry, press it on the wrong side. It will then be ready for use.

Material that requires simply shrinking should be handled in the manner just described, except, of course, that plain water should be used. It is not necessary to leave the material in the water any longer than complete saturation requires.

28. Additional Color-Setting Solutions.—Following are recipes for other solutions that prove very effective for some colors. Use these in the same way in which you would a salt solution.

A *sugar-of-lead solution* is generally recommended for delicate colors, especially lavender, but it also proves effective for many darker colors. To make this color-setting solution, follow the proportion of 1 ounce of sugar of lead to 1 gallon of boiling-hot water. Try to dissolve every particle of the sugar of lead, but should any insoluble substance remain, strain the solution in order