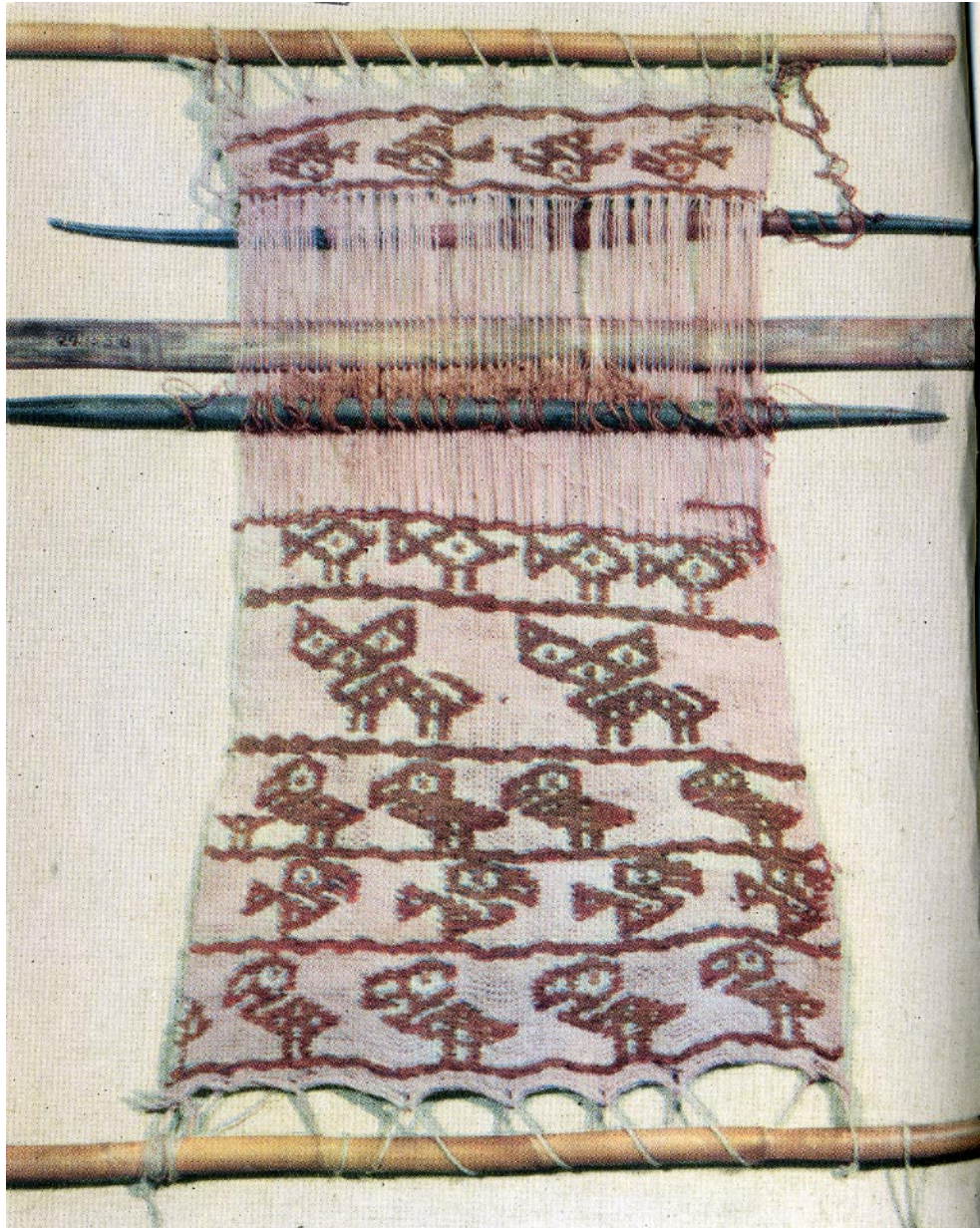


The book cover features a repeating pattern of red flowers with green leaves on a light beige background. A dark red spine is visible on the left. A dark red rectangular label with a thin black border is centered on the cover, containing the title text. A small white rectangular sticker is attached to the top of the floral pattern, and a larger white irregular mark is at the bottom center. The library call number '677 E92' is printed in black on the spine.

THE STORY OF
TEXTILES

677
E92



THE HOME ECONOMICS SERIES

*Edited by Helen Judy Bond, Head of Home Economics
Teachers College, Columbia University*

The Story of Textiles

BY MARY EVANS

Associate Professor of Household Arts, Teachers College
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Illustrations by Harry Daugherty

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The Story of Textiles

TEXTILES OF THE PAST

THE STORY of textiles began many long centuries ago, and is being continued by those of us who make and use the marvelous fabrics of today. It is a story which takes us far afield, in place as well as in time. It carries us far from our own doorsteps into other lands and other sections of our own country, where the raw materials are produced and skillful people turn them into the textiles with which we each live. And the more we know of the whys and wherefores of textiles, the more happily and wisely we can select, use, and take care of them.

When men first discovered that by twisting and interlacing grasses, twigs, and leaves they could make shelters

from sun, wind, and rain, they laid the foundation of an industry that in recent centuries has grown by leaps and bounds.

We have no actual record of the earliest attempts at spinning and weaving. But, from objects belonging to peoples that lived hundreds and even thousands of years ago, we can learn something of what textiles they had, and how they probably made them. They naturally had the crudest of tools. When we realize this fact, and remember that our modern textiles are made for us by intricate machines, we are amazed not only at the beauty of the ancient textiles but at the skill of those who made them.

That people living several thousand years before the Christian era had linens much finer in texture than our own we learn from the fragments found in ancient Egyptian tombs. The Christianized Egyptians, known as Copts, decorated their textiles with beautiful designs in wool, in what is known as tapestry weave. Using a similar method the Peruvians, long before the Spaniards arrived in their country, wove cotton and wool fabrics in rich, warm colors.

Greek women were expert with the spindle and loom, spinning and weaving both flax and wool into shining veils, cloaks, and tunics for all the members of the household. In the *Odyssey* of Homer we read of "beautiful purple rugs . . . blankets . . . and woolen mantles," of "sea-purple yarn," and of an embroidered robe "which sparkled like a star."

Ancient Greek vases show us something of the delicate allover patterns and vinelike scrolls and borders which decorated the shining linen tunics of such beauties as Helen of Troy and her fair ladies.

During the Seventeenth Century the people of India, where cotton was first grown, made such exquisitely fine muslins that some were poetically named "Running Water," "Evening Dew," and "Woven Wind." Our sheerest of chiffons would seem coarse beside such cobweblike textures.

The East Indians had not only these delicate muslins,

which were for royal use only, but thicker ones which they painted and printed in bright colors. For this purpose they used wooden blocks carved with designs. These small blocks were the ancestors of the copper rollers in our own mighty printing presses.

Further west, the Persians were early weavers of beautiful cloth with patterns both woven and printed. They evidently learned the art of printing with blocks from the craftsmen of India. Especially beautiful were their damasks and brocades, intertwined with threads of gold, showing hunting and garden scenes with great quantities of flowers and trees.

The Persians of a later period left us examples of their skill in designing and making fabrics. Their fine rugs, so highly prized by their owners today, serve as models for modern machine-made rugs and carpets.

The Chinese, who wove the first strand from the silkworm's cocoon many thousands of years ago, were skilled weavers and created very beautiful designs in their textiles. Practically all of the motifs used by them symbolized something in their culture. An umbrella signified authority, waves and mountains indicated the water and the earth, while different flowers represented the four seasons. Color, too, was important in Chinese textiles. Yellow was reserved for the use of the emperor and red for that of the priests.

The arts of weaving and embroidery were cherished by the Chinese not only for the beauty they created but also for the trade they brought from the west. Their silks were sent by caravan to the countries bordering on the Mediterranean Sea, but where and how they got the silk fiber was kept a secret as long as possible.

From portraits by early Italian painters we learn about the handsome fabrics woven by native craftsmen for people of wealth and importance. The colors were rich, the designs intricate and large. Vases, flowers, crowns, birds, and animals in action were favorite motifs. Rich brocades threaded with gold and silver strands, gleaming damasks, and deep

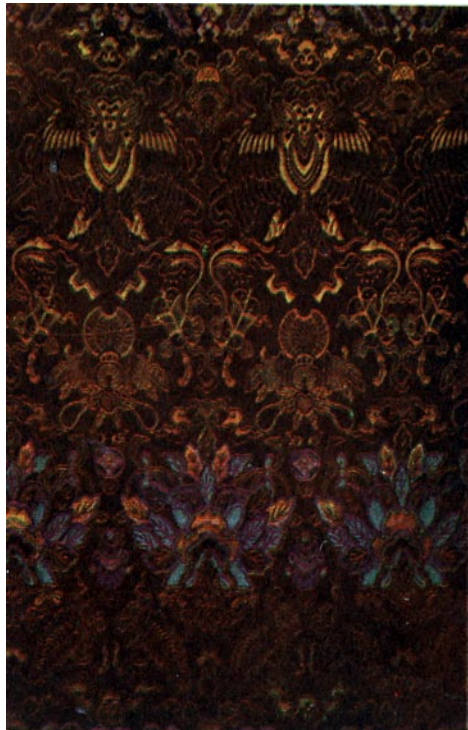
green and ruby-red velvets clothed the wealthy. Luxurious textiles hung from balconies, covered the pillows of the high-backed wooden chairs, and kept the draft off the high-canopied beds.

For the peoples living in cold climates wool was a warm and precious fiber. It was woven into strong, rich fabrics by European weavers of the Middle Ages. Skilled artisans in Flanders and France also made wonderful tapestries to hang in churches and on the cold stone walls of medieval castles.

Silk fabrics of such great beauty were woven by the French in the Seventeenth and Eighteenth Centuries that examples now treasured in museums form the inspiration for many of the designs used in modern textiles. Near Paris were beautiful parks where designers went to get ideas for the charming floral designs used in their satins and taffetas.

When Marie Antoinette was Queen and Benjamin Franklin was our American ambassador to the court of King Louis XVI, colors were bright and delicate. Narrow stripes, bands

Chinese Brocade



Indian Print



of lace, bouquets and scattered flowers, bowknots of ribbons, and musical instruments added their gay notes to the crisp and soft fabrics with which the members of that luxurious court surrounded themselves.

The early settlers in America were too busy wresting a living from the soil of the new land to produce their own materials. They had to order all their clothing and furnishings from the mother countries. Later, the Colonial housewife with her own spinning wheel and hand loom turned out useful and attractive homespuns for the members of her household. Colorful coverlets of flax and wool, embroidered and handblocked linens, soon filled her stout wooden chests.

Today the American woman, unskilled in the handicrafts of a bygone age, enjoys to the full the textiles, ranging from the sturdiest to the most luxurious, produced for her by one of the largest and most important of the world's industries.

Products of the entire world contribute to her comfort.

French Brocade (18th Century)

Brooklyn Museum Collection



Early American Coverlet

Brooklyn Museum Collect



Cotton Blossom



Cotton Boll



FIBER, THE BACKBONE OF FABRIC

Like those of older civilizations, our materials are made for the most part of the same fibers which mother nature so generously provides. In addition, we have the magical ones which the ingenuity of man has invented within the past ninety years.

India is no longer the sole source of cotton, for this valuable plant is now cultivated in both North and South America, in Egypt, and in some parts of Asia where climate and soil are suitable. Those fields of white cotton which you see when motoring through our Southland furnish us with the same type of fiber so cleverly spun by the peoples of India. The snowy short hairs on the seeds contained in the pods after the yellow flower has disappeared are twisted into fine yarns for the finest or the stoutest of fabrics.

Picking Cotton

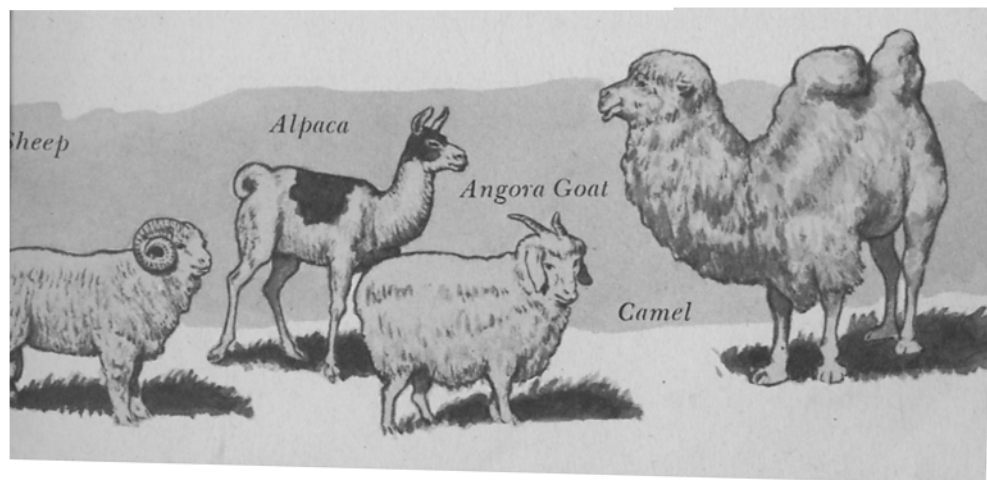


The fields of Ireland, Scotland, France, Belgium, Russia, and Germany are rippling seas of blue or white when the tiny flowers of the flax plant are in bloom. There are produced the stem fibers for our gleaming table damask, summer dresses, and dainty kerchiefs. As yet but little flax is grown in the United States, so we must import this treasured fabric of biblical days.

Wool, however, we have in abundance. But much of this, too, we import—from Australia, New Zealand, and countries in Europe and South America where sheep are raised especially for their soft and warmth-giving fleece.

If your home is in one of our western states, where sheep-raising is a large industry, you know something of its importance to the livelihood of our ranchers. You know, too, that sheep must be well bred, and with what pains they must be cared for so that the long silky wool will be of good grade for the best of our blanket, dress, suit, and coating materials. The coarse, long wools used in carpets we import chiefly from Iceland, Scotland, China, and Argentina.

Proud owners of camel's hair coats know that the ungainly "ship of the desert" gives its silky hair for what can be the softest and warmest of coats. Another animal native to Asia,



the Angora goat, provides a fine, wavy hair which we use for many of our drapery and upholstery materials. From South America we get the hair of the alpaca, the llama, and the vicuña, though few people can afford the costly coats made from the hair of the comparatively rare vicuña.

A very diminutive member of the animal kingdom, the silkworm, supplies us with the fiber that, woven into rich tunics, was once paid as a ransom for Imperial Rome. This tiny cousin of the green caterpillar we see on our trees and shrubs during the summer excretes the substance we know as silk, and spins a three- to seven-hundred-yard thread about itself into a silken tent. It is this cocoon which skilled hands unravel or "reel" (pages 15-16) and wind into skeins in countries where the silkworm is cultivated. Japan, China, France, and Italy produce most of the world's silk.

The cultivation of the silkworm forms a very large industry in Japan, where all members of a household have a share in caring for this tiny animal in all stages of its development. So important to the nation is the industry that it is very closely regulated by the government.

Silk fabrics are much prized by women of small means as well as by those who have more to spend. They buy silk for their dresses, lingerie, hosiery, draperies, and furniture covering, feeling that its beauty is well worth the cost.

The Empress Hsi-Ling-Shi, wife of an early Chinese ruler, must have been thrilled when she discovered that the fine filament could be reaveled from the silkworm's cocoon into a very long strand—the longest then known. How great, also, must have been the thrill and satisfaction of modern chem-

The Silkworm, from Larva to Moth





The Chemist Is a Creator of New Fibers

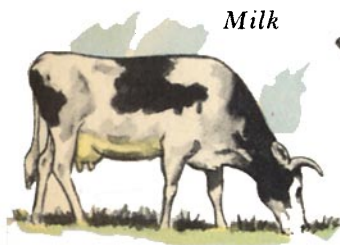
ists when their long researches produced a filament that compared well with that of the silkworm—not only in length, as there was no limit to that, but in luster, size, and strength as well.

This newest of the world's textile fibers was first made commercially possible by a Frenchman, Count de Charbonnet, in 1885, and called artificial silk. Today it is known as rayon, and has taken its place as one of the most popular of the fibers used for clothing and household furnishings. Spruce wood cut into small chips, cotton linters, and certain chemicals form the basic materials from which this fairylike filament is made.

Up to the present rayon has been the chief competitor of the natural fibers; but other man-made fibers are making their appearance in the textile world. Nylon, vinyon, lanital, and fiberglas, all products of the chemist's laboratory, are the newest filaments from which attractive and satisfactory fabrics can be made.



Coal



Milk



Spruce Trees



Cotton

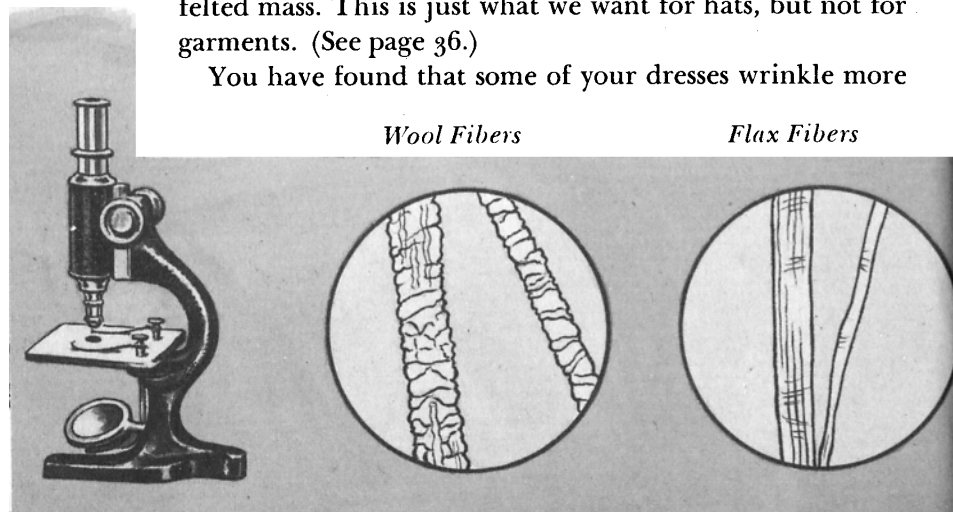
DIFFERENCES IN THE FIBER FAMILY

Have you noticed that your sweater or that attractive plaid wool skirt were a trifle smaller and shorter after they were washed? And do you recall how much longer the cotton towel you used when wiping dishes stayed dry than did that linen one Mother let you use for her best glassware? Experiences like these make you wonder why some materials “behave” as they do. There are several reasons, of course, but one very important one is that the fibers used in textiles have their own peculiarities, just as people have. In fibers these peculiarities are known as properties.

Look at the illustrations below, showing fibers as they would appear under the microscope. Some look very smooth, like glass rods, while others appear to be rough or twisted. Materials made of smooth fibers, like silk, rayon, and linen, stay clean longer than do those made of the rough-surfaced, short fibers.

As you can see through the microscope, the irregularity of the wool fiber’s surface is caused by tiny overlapping scales. These give wool a very important characteristic, the tendency of the fibers to tangle together and hold in their meshes still air, which is a poor conductor of heat. This is why wool keeps us warm. When the cloth is napped, as is done in blankets, it seems warmer. A napped cloth has a fuzzy or downy surface. When you rub a wool sweater in hot, soapy water, the scaly fibers soften and melt together into a hard, felted mass. This is just what we want for hats, but not for garments. (See page 36.)

You have found that some of your dresses wrinkle more



than others. This is because the linen, rayon, or cotton fibers from which they were made lack the power to spring back to their original position after they have been crushed or sat upon. An interesting way for you to test this, and to compare cotton with wool, is to hold in one hand a skein of soft knitting wool and in the other a fluffy mass of absorbent cotton. Squeeze these tightly, and notice that the wool springs quickly back into position, while the cotton remains a lifeless, crushed mass.

Fibers differ greatly from each other also in length. The shortest fiber in the textile family is that of cotton, which is only about three-quarters to one and a half inches long. Wool is considerably longer, from one and a half to six inches, while flax averages about eighteen inches in length. Silk is the longest of the natural fibers, measuring from three hundred to seven hundred yards. Rayon can be as long as the manufacturer wishes to make it. For what is known as spun rayon he cuts the continuous filament into short lengths of from one to six inches. The smoothness and strength of any yarn depend in great measure on the natural length of the fiber.

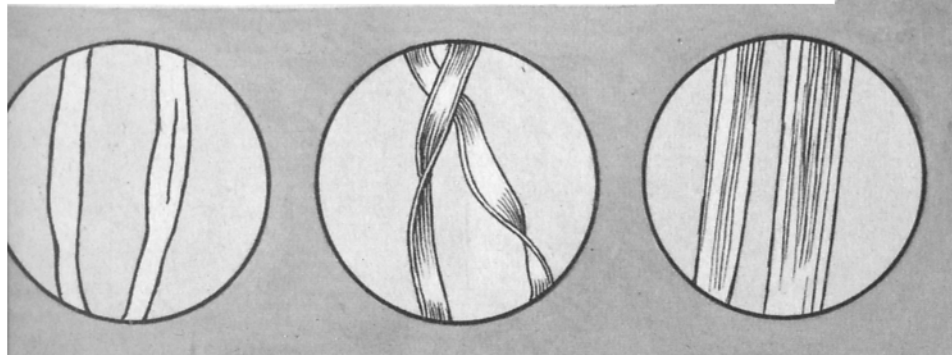
One manner in which rayon differs from other fibers is in its great loss of strength when wet. This is something to remember when washing "undies." Wet rayon cloth should not be rubbed or pinned up to dry.

Much of the beauty of colored materials depends on the ability of the fibers to take and hold dyestuffs. Some fibers have this ability to a much greater degree than others. It is greatest in wool, silk, and rayon, and smallest in cotton and flax.

Cultivated Silk

Cotton

Viscose Rayon



DIFFERENT FIBERS MAKE DIFFERENT MATERIALS

While the way in which a material is constructed, the manner in which the yarn is spun, and the kind of finish the cloth receives influence its character, the fibers used also play a very important part.

The naturally smooth fibers, rayon, silk, and flax, tend to make a cloth that is smooth, one that stays clean and usually has some luster. Naturally short fibers make a slightly rough cloth, although sometimes the surface is singed or sheared to remove any protruding fibers. Long rayon fibers are frequently cut into short lengths to produce the effect given by the short fibers of cotton and wool.

Rayon, silk, and flax are all smooth, and most fabrics made of them are cool to wear unless they are closely enough woven so that air cannot pass freely through the tiny spaces between the interlaced yarns. Short or spun rayon fabrics, like some cotton ones, are napped on the surface to make them hold still air and provide warm garments that are less expensive than those made of wool.

Flax fibers have the power to absorb moisture rapidly and in large quantities; linen material is therefore excellent for towels for any purpose. Cotton fibers spun into loosely twisted yarns make a fabric that absorbs moisture fairly quickly. Cotton is much cheaper than linen, so most housewives use cotton towels in the kitchen.

Have you ever noticed that your white rayon gloves, blouses, and slips remain white after many washings? This is a characteristic of the rayon fiber, so that one can always expect garments of white rayon to hold their color in this manner. White silk, on the other hand, always turns cream-colored. If one wishes washable garments to retain their pristine whiteness, silk should not be chosen.

Everyone, probably, has at one time or another had the misfortune of damaging a rayon slip by pressing it with a hot iron. It is a characteristic of acetate rayon, one of the three

types of rayon manufactured today, that it melts or fuses when in contact with a hot iron that would in no way affect a piece of cotton cloth. Care must also be taken not to drop on acetate the acetone nail-polish remover we use on our finger nails. Acetone is one of the substances that cause fabrics made of this type of rayon to fall into pieces.

FROM FIBER TO YARN—A LENGTHY PROCESS

The old saying that there is strength in numbers certainly holds true in the field of textiles. Single fibers are too weak and too short to be used either alone or in very small numbers. But when many are combined and twisted together into long, slender yarns, they acquire a strength which makes possible a variety of materials for all purposes.

The older fibers, wool, flax, and cotton, must be put through a lengthy series of operations before they are fit to be spun into yarns. Silk, however, requires few preparatory steps. The new fibers, rayon, nylon, and glass, are so made that when they come from the spinneret (see page 20) they are ready to be twisted into yarns.

The silkworm so deftly spins its silk filament into a cocoon that its conversion into yarn is a simple matter compared to the number of processes required for wool or cotton. The unwinding of the filament is done either on the small farms where the silkworms are cultivated or in building which house special equipment.

Have you ever watched a butterfly come out of its cocoon? If you have, you realize that if the moth, into which the silkworm turns after it has finished the cocoon, pushes through the silk in order to get out, the filament is broken into many small pieces. In order to avoid this, the cocoon, soon after it is spun, is placed in hot ovens or in hot water to kill the worm before it changes into a moth. Only enough moths are permitted to come out of the silk wrappers to provide more worms to spin more cocoons.

The filament from one cocoon is too fine to use alone; and so it is combined with that from four or more others and wound together to form one strand. The young woman operator removes the loose silk covers from the outside of the cocoons and drops them into a shallow basin filled with hot water. When the gum is softened, she catches the ends of the filaments on a brush with one hand, and twists them slightly in her fingers with the other. She threads them through a smooth glass eye, attaches them to a reel, and by turning the reel winds them into skeins.

These single threads are satisfactory for weaving certain types of cloth, but for others they are not strong enough. The throwster combines two or more of these singles and twists them together so that they are strong enough to be used as the crosswise yarns of cloth. He calls these combined threads tram.

Still stronger yarns are needed for warp, so the throwster, or spinner, joins two or more well-twisted singles and twists them firmly in the opposite direction.

Cotton and wool must be put through so many operations that are somewhat similar for both that the processes can be most easily described together.

Cotton must be freed from the small black seeds, and dust, twigs, and fragments of leaves must be shaken out. Then it is further cleaned by being passed between revolving rollers and boards covered with fine, short wires. If you use a wire hairbrush on your hair you will have some idea of this cleaning and opening process, which manufacturers call carding.

If it is to be used for sewing cotton, laces, or especially fine sheets and dress materials, the carded cotton passes through a machine very appropriately called a comb. This machine actually does comb out short and matted fibers, making the cotton very silky in appearance.

Wool varies greatly in length and quality even on an individual sheep. It is necessary first of all to place wool of the same kind together, so that in making up certain types

of cloth wool of the same grade can be used alone, or a controlled blend of several types can be arrived at.

The wool fleece, filled with twigs, dirt, torn fibers, oil, and perspiration, is anything but clean when it reaches the mill. The wool must be thoroughly and carefully washed before being put through the many machines which do for it what the brush and comb do for your hair after a shampoo.

Like cotton, all wool is put through the carding machine, which opens it into a filmy white veil. The veil enters a trumpetlike device at the end of the machine and comes out as a soft, untwisted strand somewhat larger than your thumb. This is known as a sliver.

If rather long wool fibers have been carded they are next put through the comb, so that they can be made into the silky, smooth yarns used in serge, gabardine, and similar fabrics, known as worsteds. Those that are carded but not combed are called woolens. Flannels and soft, downy coating materials are of the woolen family.

After carding and combing come the processes which have as their purpose drawing out the sliver to the thickness of a matchstick. As each sliver is drawn out and becomes gradually thinner it must be combined with other slivers to prevent it from breaking. These operations are called drawing and doubling.

When finally drawn to the required size, the wool or cotton is ready for the spinning frame, which twists it to give it the necessary strength. (See page 24.)

Flax is a fiber that requires a great deal of preparation, much of it by hand, before it can be spun. The finished linen is, therefore, expensive.

First the flax plants are pulled from the soil by hand, tied in small bundles, and left on the ground to dry thoroughly. The seeds and leaves are removed by pulling the dried plants through a coarse comb. The stems are then ready for retting—the rotting or dissolving of the gums which hold together the wood and the fiber of the stem. It is accom-

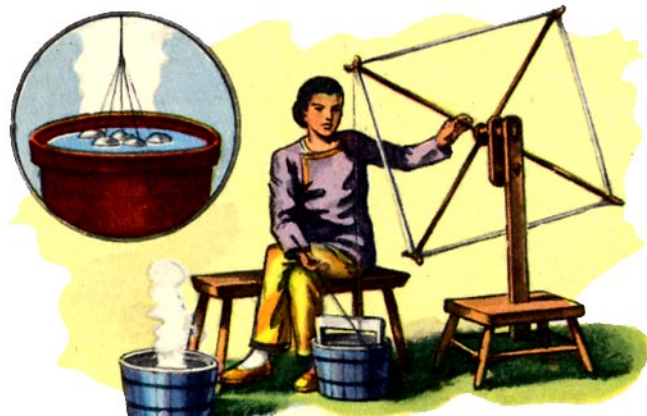


Colonial Spinning Wheel

plished by stacking the flax straw in pools or in running streams, or by spreading it on the grass and exposing it to sun and dew.

After retting, the flax is dried and run between fluted rollers to break the woody bark, which is then shaken and beaten off. The flax is next thoroughly combed into very fine strands, the short fibers are removed, and the material is at last ready for the spinning frame.

Reeling Silk from Cocoons in Ancient China



THE SILKWORM AS A MODEL FOR THE MODERN SPINNERET

Some of the fabrics most popular today are the product of man's resourcefulness and ingenuity in trying to replace natural fibers which, because of scarcity or cost, are difficult for him to obtain. Silk, chiefly because of its price, is being replaced by rayon and, more recently, by nylon, which has just entered the family of textiles. Lanital, made from the casein of milk, is the result of an effort on the part of the Italians to find a substitute for the wool which they normally import in large quantities. Scientists all over the world continue working their magic with test tubes and chemicals, trying to find inexpensive and satisfactory filaments.

One of the greatest assets of the new fibers is the enormous saving in time, labor, and costly machinery in their preparation and spinning. Wool, flax, and cotton, as we have seen, must go through many steps before they are ready for use.

The new fiber which is used in the largest quantity today is rayon. There are at present three different processes used for the manufacture of this filament. All these processes follow the same general pattern. The basic material, combined with chemicals, is turned into a viscous or molasses-like form, and then forced through what is called a spinneret. This is a small metal nozzle with many extremely fine holes at one end. The syruple substance comes from the holes as water comes from a garden spray, and is passed through an acid bath. In the case of acetate rayon the solution passes through a current of warm air. The bath and air harden the filaments so that they can be handled.

These long strands are known as continuous filament. For some types of cloth, designers wish a less smooth yarn, so the continuous filament is cut into lengths measuring from one-half to nine inches. These short lengths are called short staple. They are spun as are cotton and wool.

The basic materials used in the manufacture of rayon are

cotton linters (the tiny hairs left on the cotton seed after the ginning), and the wood of spruce trees reduced to a pulp. The slash pine trees of Georgia are now adding their contribution to the abundance of material suitable for the three types of rayon: viscose, cuprammonium, and acetate.

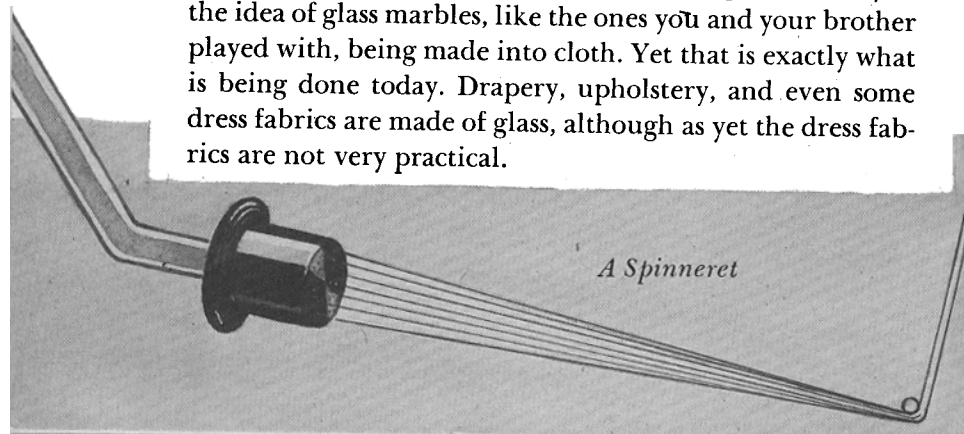
Most of the rayon used today is of the viscose type. We find rayon in practically every kind of textile used for clothing and for the house—in stockings and in carpets.

Recently a large corporation dealing in chemicals spent a long time experimenting in its research laboratories trying to find a substance which would have all the desirable qualities of silk fiber. The chemists finally evolved, from certain substances found in air, coal, and water, a new filament known as nylon, which has already proved to be a very valuable addition to the fibers used for textiles.

Nylon, like rayon, is forced in a viscous mass through spinnerets. The filaments are smooth, much stronger than silk when dry, and very elastic. These good points make it a filament highly prized for stockings. It is also being used to some extent in woven fabrics.

Still another synthetic filament being experimented with for use in clothing and other textiles is vinyon. The resinous substance from which vinyon is made is placed in a chemical, filtered, and passed through the spinneret. The filament is next stretched and twisted. It has great strength, and resists water, stains, and dirt. These properties make it valuable for a number of uses. You may find that the gloves you are wearing are knitted of vinyon instead of silk.

A few years ago everyone would have laughed heartily at the idea of glass marbles, like the ones you and your brother played with, being made into cloth. Yet that is exactly what is being done today. Drapery, upholstery, and even some dress fabrics are made of glass, although as yet the dress fabrics are not very practical.



The glass cloths are made in this way: Marbles of refined glass are heated in an electric furnace and the molten glass passed downward through tiny holes in the bottom. The glass strands are then wound on large spools. As many strands as may be necessary to make a certain size yarn are twisted together.

The long filament of glass, like that of rayon, can be made into staple fibers and then spun on the regular spinning frame used for cotton or wool. Instead, however, of being cut, as is rayon, the molten strands of glass are caught by steam as they flow through the holes and blown downward through a flame to a revolving drum. The resulting eight-to fifteen-inch strands are drawn off and wound on revolving spools.

The round, smooth fibers of glass will melt under very great heat, but they will not burn. Curtain and upholstery fabrics of this fiber are, therefore, highly desirable both in homes and in public buildings.

Another surprising source of a new textile is the cow, which supplies us not only with leather and food but with a good substitute for wools as well. In both Italy and the United States scientists have evolved methods of making what is sometimes spoken of as "milk wool," because it is made from the casein in cow's milk. Skim milk is curdled, and the resulting casein is dissolved in a chemical solution and forced through a spinneret. The fine filaments are then hardened in a chemical bath. In order to make it resemble wool as much as possible the filament is cut into short lengths and spun. Lanital, of course, does not have scales.

The success of lanital has caused scientists to experiment with many other sources of similar nature, and another new fiber is being made from soy beans. Because of the abundant supply of soy beans and the satisfactory qualities of the textile made from them, we shall probably see this new fiber used in great quantities, both in upholstery fabrics and mixed with wool for men's suitings.

After the oil has been removed from the crushed soy beans the protein is extracted, dissolved into a viscous solution, and forced through a spinneret.

This, very briefly, is the story of where and how we obtain the yarns which the loom and knitting machine turn into the fabrics our needs and fancy dictate. But the simple yarn must sometimes be strengthened, in which case two or more yarns are twisted or "plied" together on a twisting machine.

In order to make an interesting texture, novelty yarns are sometimes used. For one type, singles of different fibers or colors are so twisted together that small loops are formed around the base yarn. This is bouclé yarn, which adds roughness to the surface of the cloth. It is frequently used for knitted dresses, hats, and sweaters, and for woven fabrics.

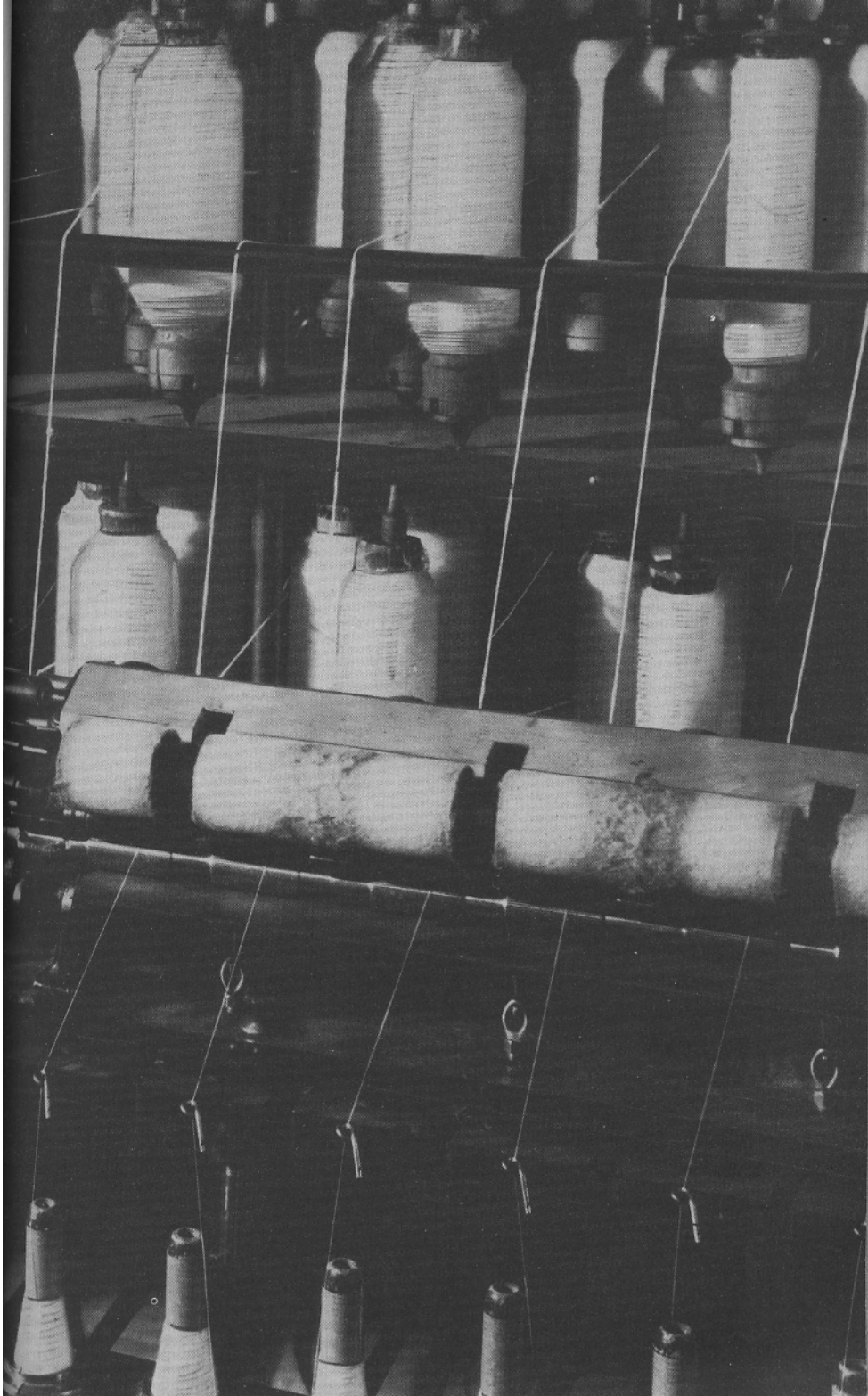
Another novelty yarn which we see in our cotton and rayon dress fabrics is a slub yarn, which is made intentionally thicker and thinner at short intervals.

While these fancy yarns make fabrics attractive they do not add to their strength or durability. Loop yarns, for example, catch on rough objects and are easily pulled. Soil and lint attach themselves to novelty yarns, so that the wearer of materials made of them must brush them frequently if she wishes to appear well groomed.

MORE WAYS THAN ONE TO SPIN A YARN

From such sources as the drawings on the tombs of ancient Egyptians and old Greek vases we learn the early methods of spinning. They tell us how the worker, usually a woman, would draw a few fibers from a bundle bound to a stick. She would stretch them out as far as possible, twist them between her fingers, and wind the newly formed yarn on a notched stick called a spindle. You might try this yourself with absorbent cotton.

As civilization advanced special wheels were used to hasten the work, one type known as the wool wheel, the other as the flax wheel; each operated one spindle. Today



we have huge machines—the upright frame, containing as many as 240 spindles, and the mule. Both work on the same principle as that used by the earliest spinners. The size of a modern mill is indicated by the number of spindles it can operate. What a contrast is its output to the amount of yarn a Colonial housewife could spin in one day!

The older fibers, wool, cotton, and flax, are all spun on either the mule or the upright frame. Spun silk, the short fiber from pierced cocoons and mill waste, and the cut staple of rayon are also spun on this machinery. The continuous filament of man-made fibers, however, does not require its services.

YARN INTO FABRIC-WEAVING

A huge loom in operation appears to be a complicated mass of metal and yarns working at a tremendous rate of speed. Nevertheless, the fundamental movements are very simple. In fact, when you darn stockings you are actually doing a small piece of weaving. When you put the strands of darning cotton across the hole you are doing what the weaver calls setting up the warp yarns. When you darn back and forth, under and over these threads, you are imitating the weaver when he throws the shuttle back and forth through the shed.

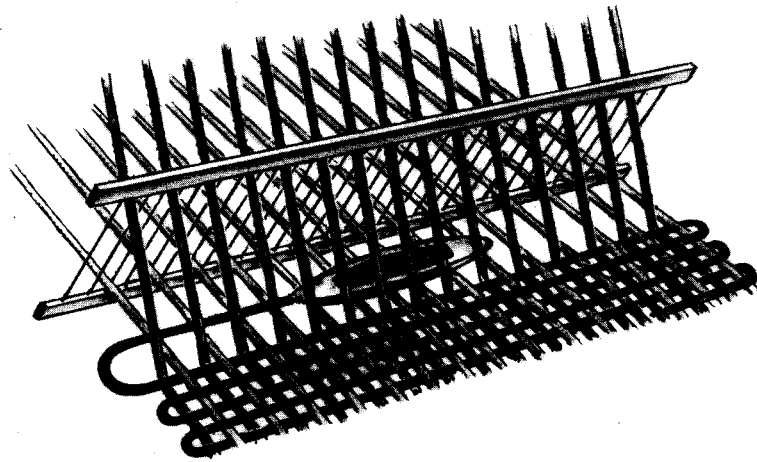
If you have never seen a loom at work it might be easier for you to understand its operation if you will look carefully at some of the simple types of looms. On pages 26 and 27 are illustrations of two of the hand looms on which people wove in the past, or, for that matter, on which Navaho Indians and many craftsmen weave at the present time.

In the picture of the Navaho loom you will notice a series of yarns, the warp, tightly stretched between two crosswise beams. The worker passes the filling yarns between the warp yarns. This type of loom is extremely simple, but it has all the essentials for weaving beautiful cloths.

Once the lengthy processes of preparing the raw fibers and making a suitable yarn have been completed, the cloth must be designed, the warp and filling yarns prepared, and the loom threaded. It seems unbelievable that so many months of preparation are required for the few hours it takes a power-loom to weave cloth by the hundreds of yards.

In any type of loom the warp threads must be prepared and the loom properly threaded before the weaving can begin. These are tedious operations, requiring great exactness on the part of the workers. The first step is known as warping. This consists of drawing yarns from a great number of bobbins set in an upright frame and winding them on a large wooden cylinder, all, of course, in regular order. From that they are usually passed through a thin solution of starch to make them smooth and slightly stiff, so that they will stand up under the severe strain of weaving. The starch is removed when the cloth is put through the final finishing processes. The cylinder holding the warp yarns, called the warp beam, is placed at the back of the loom. The ends of yarn are then passed through the holes in thin wires, or heddles, according to the directions set by the pattern or type of weave. For a wide cloth there must be a great number of warp yarns.

*The Shuttle Passes through the Shed Formed
by the Warp and the Reed*





Weaving an Oriental Rug

Finally the ends of the yarn are drawn between the fine wires of the reed to keep them evenly spaced, and tied to the beam at the front of the loom. This is called the cloth beam because, as the weaving progresses, the newly woven cloth is wound on the roller to keep it out of the way.

With these preparations completed the worker is ready to fill the shuttle with the bobbin carrying the filling yarn, and weaving is begun. The operator of the loom pushes a button, and quickly, back and forth, right and left, flies the shuttle on its busy way through the shed, which automatically opens, changes, and opens again.

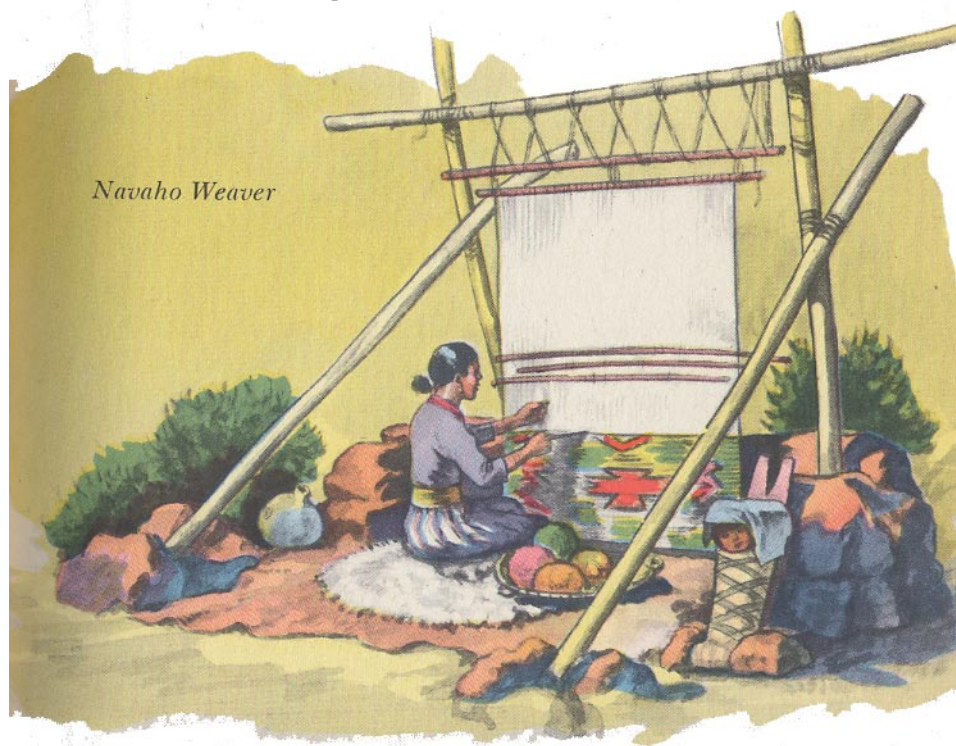
The shed is the opening made by some of the warp yarns as they are lifted by the harnesses which hold the heddles. Different harnesses lift different sets of warp yarns as determined by the design. The shuttle is shot through after each change in the shed.

In order to bind the interlaced warp and filling yarns together in a compact web the reed, which moves back and forth between the harnesses and the cloth beam, is beaten forward toward the finished fabric each time the shed

changes. In this way the last filling yarns are pushed close together.

As the shuttle passes back and forth between the warp the filling yarn winds part way around the two end threads and forms a firm selvedge along each side of the cloth. The selvedge will not ravel.

Chambray, taffeta, and many other materials of simple design are woven on this plain loom. Complicated designs and those of large figures are woven with an attachment called the Jacquard. This is an intricate arrangement of cords attached to the warp yarns and to a series of hooks high above the loom. As they catch in the punched holes of a chain of revolving cards these hooks lift the warp threads, thus forming the shed for the shuttle to pass through. Picture someone working a great number of marionettes all at the same time with a lot of strings in his hands. This will give you a faint idea of the maze of cords in this attachment. Before its invention in 1801 the weaving of large patterns was a tedious process.



The machines that knit sweaters and make lace of intricate design also use this type of mechanism. So, too, do the mammoth broad looms which weave our modern carpets.

The picture on page 26 shows the makers of a hand-tufted rug. They work sometimes for a year or more on one rug. This seems a long time when we learn that a machine can weave one type of rug in about half an hour.

WEAVES OF MANY TYPES

Some weaves are simple to recognize and make; others require intricate machinery. The simplest, and probably the oldest and most commonly used, is the plain weave. Examine carefully with a strong magnifying glass the sheets and pillowcases on your bed, a handkerchief, a gingham dress, or a scrim window curtain. In all of these materials you will notice that one thread passes first over, then under, the threads at right angles to it, just as you weave under one and over one when darning stockings. This means that the filling threads pass regularly over and under the warp threads, giving much the effect of a checkerboard.

The plain weave is also varied in what are called basket and cord weaves. In the basket type two filling and two warp yarns are each treated as one. When examining the oxford cloth in a man's shirt you will see two warp threads.

The cord weave we find in dimity. There several fine yarns are grouped together when the loom is threaded. This gives a lengthwise corded appearance to the material. In the poplin used for nurses' uniforms we see a crosswise rib made by using filling threads that are coarser than the warp threads.

We find plain weave in the sheer organdies used for graduation dresses, in sturdy muslin sheets, and in a majority of the printed materials made of rayon, silk, or cotton.

Have you noticed the diagonal lines in the khaki cloth in the uniform of a Boy or Girl Scout, or in the serge of a

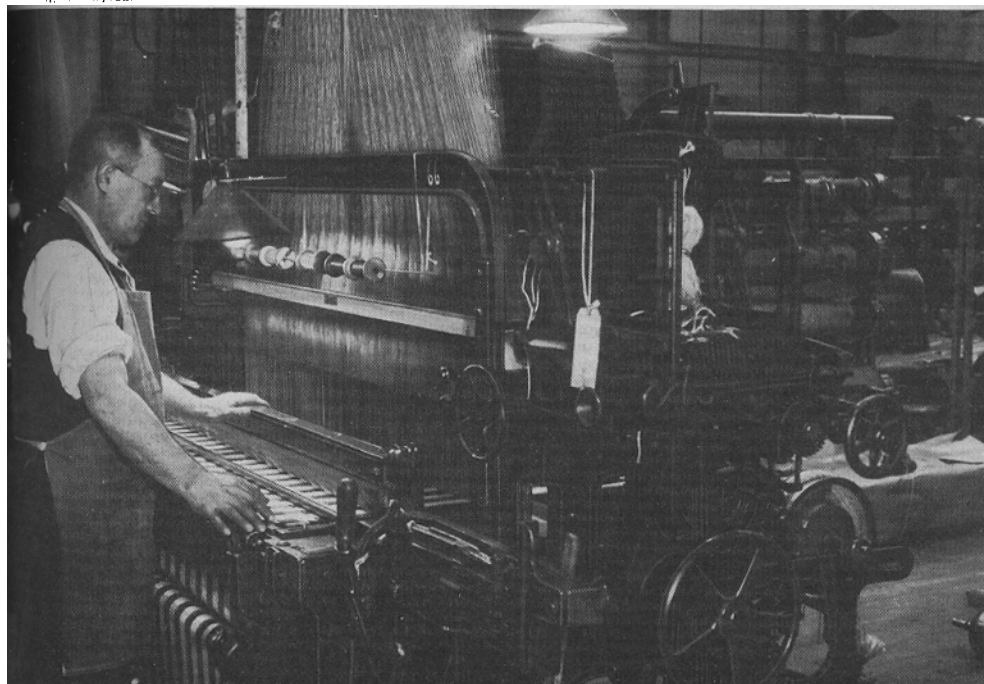
man's suit? Those lines are characteristic of the twill weave. In one type of twill fabric the filling thread passes over two warp and under two warp threads. In its return trip the filling continues to go under and over two warp threads, but only one of the new grouping of two belongs to the group it interlaced with on the previous trip. This produces a diagonal line across both sides of the fabric.

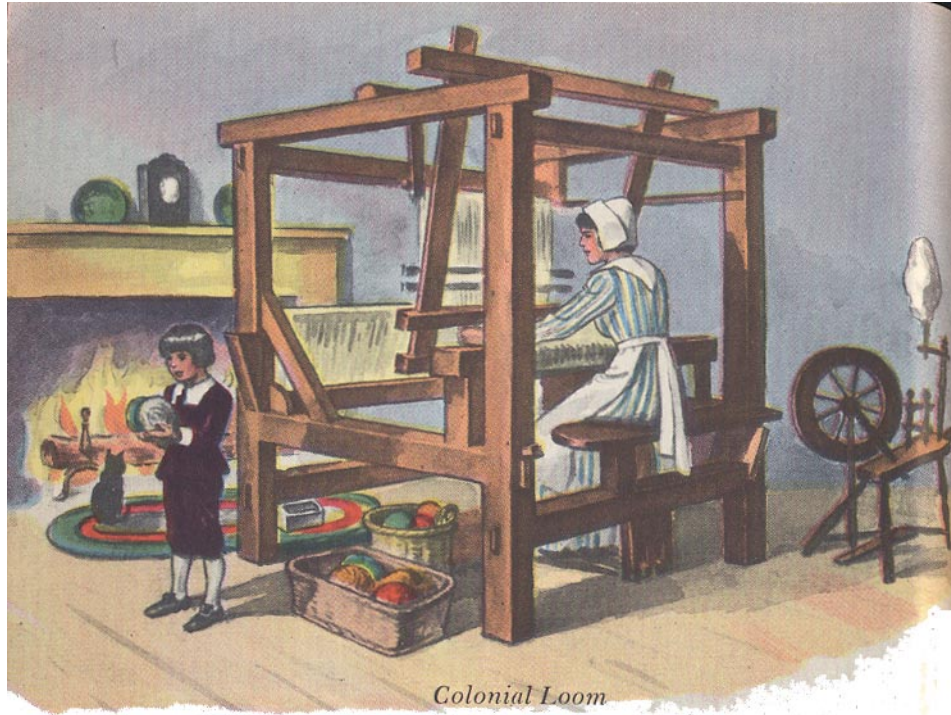
There are many variations of this weave, and all make strong, interesting textures. Some tweed fabrics, flannels, cheviots, and men's suitings are woven in this manner.

One form of weave, related to twill, is used to make satin fabrics. In this weave some warp threads lie on the surface of the cloth for a short distance, not bound in by the filling in the weaving. The glossy rayon or silk warp so exposed catches the light and reflects it, so that the surface of the satin-weave fabric is very lustrous.

Sometimes it is the filling threads that float on the surface of the cloth. This variation is known as sateen weave, and is used chiefly with cotton yarns.

Power Loom





Colonial Loom

The huckaback face towel, the rayon damask tablecloth, the tapestry upholstery at home, all have some kind of figure or design which appears on both sides of the cloth. These three materials are all woven in figure weave, combining the plain and satin or twill weaves in such a way that a pattern appears in the cloth. If the pattern is large we may be safe in saying that the Jacquard attachment was used on the loom. The small geometric design in the huckaback was probably made on a plain loom with a dobbie attachment. This dobbie is used for some figure weaves that are not sufficiently complicated to require the use of the Jacquard mechanism.

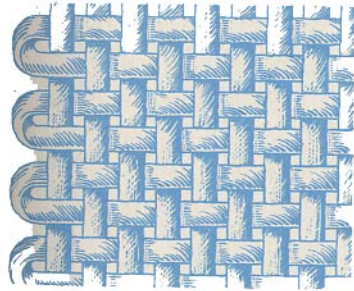
If you will fold back crosswise a piece of velveteen, an Axminster rug, and the mohair-covered pillow on the davenport at home, you may be surprised to see that all three materials have short tufts of yarn standing upright. All three appear dark and rich when you look at them from one direction, and light and shiny when viewed from the opposite direction.

These are only a few examples of the pile weave, sometimes made with two sets of yarns, the extra set being looped over wires placed in the shed parallel to the filling. As each wire is drawn out a razor blade at its end cuts the looped yarns, which then stand up, brushlike, forming a pile.

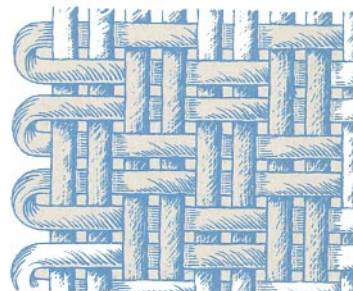
Pile fabrics are luxurious in appearance. But they must be brushed frequently, for dust is readily caught in the upright tufts.

Strange as it may seem at first, the bathroom Turkish towel belongs to this family of weaves. The extra warp yarns wound on a separate warp beam are at a looser tension than the regular ones. As the reed pushes the filling threads together, the warp threads at loose tension form loops, some on the upper side, some on the under side of the cloth.

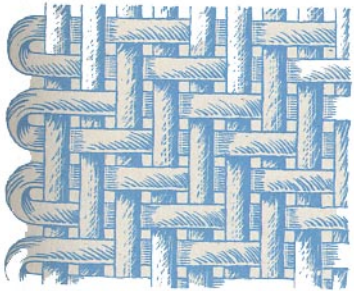
When a wise customer wants a warm blanket she will probably select one in double-cloth weave. This means that



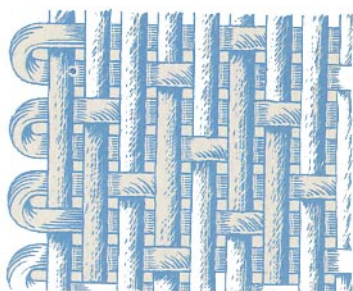
Plain Weave



Basket Weave



Twill Weave



Satin Weave

the two sets of warp and the two sets of filling used in making the two fabrics at the same time are occasionally interlaced, so that the fabrics are joined and actually form one cloth. If the material is cut crosswise one can pull the front and back of the cloth apart along the cut edge and see the connecting threads.

Dotted Swiss and some sheer curtain materials have small figures woven in by devices attached to the loom near the reed. One, by means of a series of needles, stitches in the designs so that both sides of the cloth look practically alike. This is known as the lappet weave.

In the other device, small shuttles actually weave in extra threads to form the designs while the body of the cloth is being woven. This swivel weave has cut ends of thread at the edges of each motif on the wrong side. These short ends can be pulled out easily.

In the gauze weave every other warp yarn is half twisted about its neighbor and the filling is shot through; then the movable warp threads are twisted in the opposite direction. This creates a lacy, open fabric. Marquisette is a curtain material woven in this manner.

With all these methods of weaving two or more sets of threads, manufacturers can turn out for us a huge variety of materials, in all fibers and colors. How shoppers of long ago would envy the wide choice we have today!

FABRICS THAT SPRING AND RUN

While weaving may be the oldest method of making fabrics, it is by no means the only one. So accustomed are we to the comfort of knitted hosiery that it is difficult for us to believe that, in the Sixteenth and Seventeenth Centuries, it was something of which kings and queens were exceedingly proud. Up to that time all leg covering was made of woven cloth, cut and sewed to fit the leg and foot. But woven cloth, as we know, has no elasticity, and we can

readily understand how King Henry II of France and Queen Elizabeth of England cherished gifts of hand-knitted silk stockings from courtiers seeking royal favor.

If you have watched someone knitting, you know that hand knitting is done by working one long yarn back and forth in a looped stitch with two or more long needles. As the direction of the work is crosswise, like the filling or weft in weaving, this type of knitting is called, whether done by hand or by machine, weft knitting. The knitting may be plain as in women's stockings, ribbed as in the tops of socks, or in designs with yarns of different colors and textures.

Knitted fabrics of the weft variety are elastic. They stretch to fit the shape of the body, and when removed spring back to their original shape. They are comfortable to wear but have the decided disadvantage of dropping stitches at most inconvenient times.

But there is another form of knitting which does not drop stitches in this disconcerting manner. It is known as warp knitting, and is used chiefly for underwear. The large, flat knitting machines making this fabric use many parallel yarns, as does the loom in weaving. But the yarns are not interlaced with a crosswise yarn; instead, the numerous small needles of the machine loop them one upon another in a slanting direction, interlocking them so that warp-knit fabrics rarely run. If laddering does occur it is usually in one direction, not both up and down the length of the cloth. Some weaves of this type are known as run-resist. For this reason underwear of warp-knit construction is very satisfactory, even though it lacks the elasticity of weft-knit cloth.

Warp Knitting, Right and Wrong Sides





Making Bobbin Lace

THE LACY TOUCH

When we wish an especially dainty type of dress for parties we frequently select a net or allover lace fabric. Or we may buy lace trimming to give lightness to a dress of less delicate texture. Most laces are fragile and need great care, but for our best underwear, party handkerchiefs, and luncheon sets, the eternal feminine in us craves cobweb textures.

Today complicated machinery twists and turns delicate threads of cotton into hundreds of yards of net or lace in widths that are later separated into narrow edgings and insertions. And, thanks to the inventors of this machinery, we are able to buy for a mere song the delicate textures which lords and ladies of three hundred years ago bought at fabulous prices.

Before the invention of a netting machine, in 1809, all lace was made by hand of linen thread. The skillful fingers of women plied the needle or bobbins and fine threads used in the making of the finest and costliest examples of the art.

Many different methods were used, each technique giving its name to a kind of lace, such as crochet, bobbin, or

needlepoint. For bobbin lace, small bobbins were wound with threads whose ends were pinned to a pillow holding the sketched design; they were then braided and twisted into a fabric. Fine needles and thread were required for the buttonhole stitches that formed the pattern and background of needlepoint.

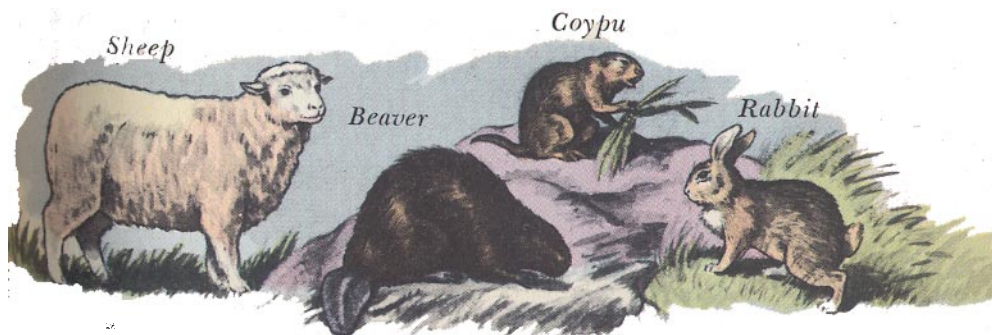
The different kinds of lace, such as Valenciennes, Venetian point, and many others, were named after the towns in which they were first made. Those manufactured today in imitation of the old, real laces retain the same names, but there is, naturally, an enormous difference in their cost. Very little lace is now made by hand except in countries where wages and living costs are low.

CLOTH FROM FELTED FIBERS

While practically all fabrics are made by interlacing yarns, there is one type of cloth that is made without yarns. This is felt, which is used for such articles as handbags, hats, pillows, and banners. The basic substance employed in making felt is wool, which may be used alone or in combination with hair and fur.

The manufacturer of felt takes advantage of the softening and fusing of wool fibers when they are rubbed in hot water. He places the washed, blended, and fluffily carded wool in many layers between hot metal plates, moistens the fibers, and interlocks them firmly by vibrating the heated plates back and forth.

A continuation of this process is carried out in an operation known as fulling. The resulting fabric, much thinner



and narrower than at first, undergoes certain finishing operations which include dyeing, shearing, and calendering. It is then ready to be fashioned into many articles which receive little strain or pulling. It is a good idea not to tug at the brim of our felt hat when we put it on or take it off.

Felt for hats is made somewhat differently from that sold by the yard, although the principle of felting is the same for both.

For hats of good quality the hair of rabbits, nutria (the hair of the coypu), and beaver fur are used. The hair is blown onto a tall metal cone about 30 inches high. The clinging hairs are covered with burlap and a metal hood, removed from the cone, and plunged into hot water. A number of operations follow, all involving hot water and much pounding. In this manner the fabric is made firm and shrunk to the proper size for blocking into the desired shape.

DESIGN APPLIED TO CLOTH

Many of the fabrics used in clothes and household articles are of one color, without a suggestion of pattern. Others are gay with bright colors and dancing designs that enliven a costume or a room.



The ways in which cloth receives its pattern, unless it is actually woven in, are many and varied. Some of the methods you could use yourself, and probably have done so in classes where crafts are taught. But, while it takes you hours or weeks to apply a pattern to a short length of cloth, modern machinery accomplishes the task in a few minutes.

Some of the earliest craftsmen applied pattern to their textiles by printing it with a series of small blocks of clay. The designs were drawn on while the clay was moist. The dried block was then brushed over with a dyestuff made from native plants and pressed on the cloth.

Later, workers in Asia and Europe used wooden blocks, but about the middle of the Eighteenth Century these were replaced by engraved copper plates. In the early Nineteenth Century a Scotsman named Thomas Bell had the happy idea of bending the flat plate into a cylinder. Rolling cylinders, etched with the design and carrying the dye over long stretches of cloth, saved a vast amount of time and labor. When mechanical power was used to run machines with many rollers, one for each color in the design, the price of printed cloth tumbled considerably.

Printed patterns are applied to all types of materials used for dresses, shirts, slip covers, curtains, and many other household articles. For inexpensive Swiss and voile the pattern may be printed with a paste containing the extremely short fibers, or flocks, sheared from fabrics that have a nap or pile. (See page 31.)

In one type of printing the design is applied with a chemical after the cloth has been dyed. The chemical removes the color from the cloth, leaving the pattern in the original color of the material. This is known as the discharge method, and is used most frequently for materials with a dark background and white-spot designs.

If you have watched "no parking" signs being painted on pavements you have noticed that the letters are cut out of sheet metal. This forms a stencil which is laid on the pave-

Tool Used in Applying Wax to Batik

do not wished dyed. Next they dip the entire cloth into a cool bath of dyestuff. For the third color they cover with wax all sections but those they wish to take the color of the second dyebath. This process they repeat as often as necessary to complete the design.



Many, many years ago, when knights rode forth to war all clad in metal armor, they left behind their women folk to pass the long days as best they could. It was then that embroidery was an art. Fair ladies sat many an hour before their embroidery frames decorating rich materials with threads of silk and gold. Some of the fabrics were used in the tall-spired churches, in the banners carried in battle by the bold warriors, or in rich costumes.

Today we usually use machines to stitch in the patterns we like for trimming, for dainty dress and underwear materials, and for the linens in our homes. In some countries, France, China, Puerto Rico, and the Philippine Islands, women and girls still ply their needles and send us exquisitely embroidered garments.

The machines which apply designs to embroidered yard goods work on the same principle as an ordinary sewing machine. As many needles as there are motifs across the material work at the same time, stitching up and down, in and out of the cloth as it passes through the machine.

Printing Cloth with Wooden Blocks



Copper Rollers for Printing Cloth



ment and the paint, applied with a large brush, goes through the cut-out sections to the surface to be lettered.

This is really the method used in stenciling a design on a fabric with dye or oil paint. If there are several colors in a pattern, separate stencils are cut for each color. Once the cutting of the stencils has been completed the actual printing proceeds at a rapid pace.

A somewhat similar method is found in screen printing. The design is drawn on a transparent fabric stretched on a frame. The parts of the design that are not to receive the dye are coated with varnish. The screen is then placed on the length of cloth stretched on a padded table and a paste containing the dye is scraped over the screen. The paste is later removed by washing the fabric in soap suds. As in stenciling, separate screens must be used for each color that is to appear in the finished design.

In most printed materials the design shows only on the right side of the selvedge, examination of which is one way of detecting a printed design.

Another type of printing is done on the warp threads only. This is accomplished while they are found on a huge drum just before they are threaded into the loom. In such warp-printed materials the design shows clearly on both sides of the cloth but the edges of the pattern are blurred and softened. In direct printing the edges of the motifs are sharp and clear-cut.

There is another very fascinating way of applying design and color to cloth, known as batik. This craft is practiced by men and women in far-off Java to decorate the scarflike strips of cotton cloth which they drape around themselves as clothing.

The Javanese first draw the design on the cotton cloth; then they fill in with beeswax the parts of the design they

In machine embroidery the two sides of the work are quite different in appearance. In most types of hand embroidery the right and wrong sides look alike, except for the ends of threads and possibly a few knots on the under side.

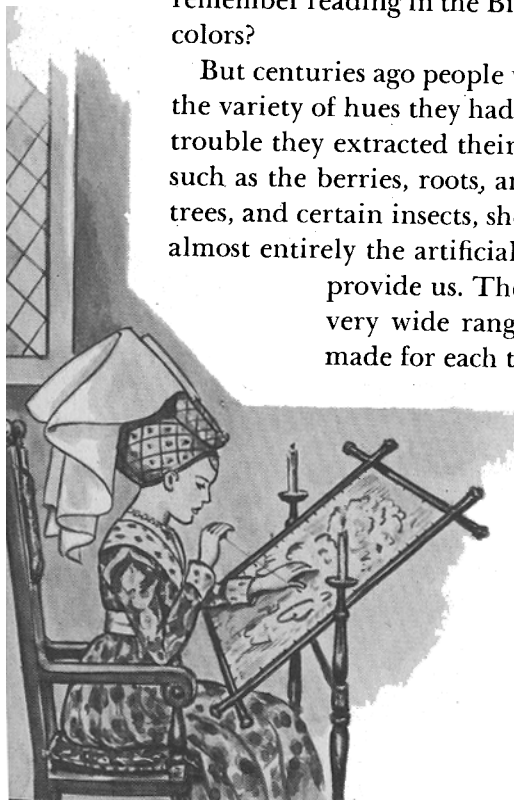
One type of embroidery, intended to imitate lace, is made in a rather unusual way. A thin silk fabric is used as the background. On that the design is embroidered by machine in a cotton thread. Then the fabric is dipped in a chemical solution which destroys the silk but leaves the cotton embroidery untouched. This is still another of the interesting ways in which science helps to provide us with attractive materials at a reasonable cost.

FABRICS OF MANY COLORS

“Dressed in the colors of the rainbow” is an expression we often hear, and many indeed are the colors of the textiles in which peoples of all times have clothed themselves. Do you remember reading in the Bible about Joseph’s coat of many colors?

But centuries ago people were somewhat more limited in the variety of hues they had than we are today. With much trouble they extracted their dyestuffs from natural sources such as the berries, roots, and leaves of plants, the bark of trees, and certain insects, shellfish, and metals. Now we use almost entirely the artificial dyestuffs with which chemists provide us. These are made from coal tar in a very wide range of colors, special dyes being made for each type of fiber.

Many textiles of light colors must be bleached before they can be dyed. A chemical is used to re-



Embroidering by Hand

move all natural coloring matter in the cloth. If the cloth is to remain white it is ready for the finishing processes.

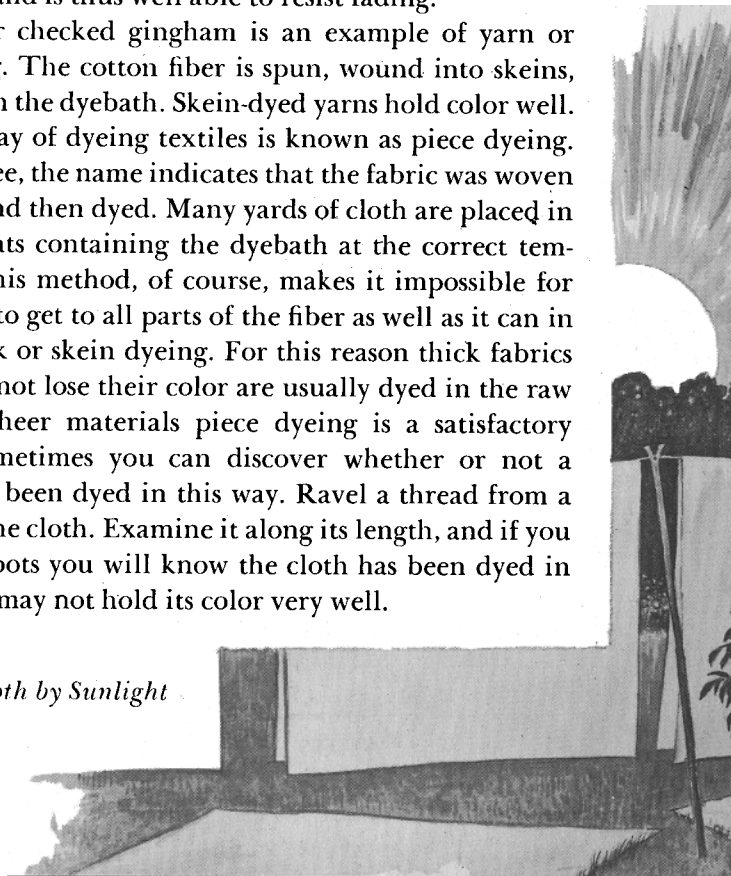
Not all fabrics receive their color at the same step in their manufacture or take the same kind of dye. The animal fibers, wool and silk, can be dyed readily with certain dyes classed as acid or basic. Cotton takes what are known as vat dyes with great ease, while acetate rayons require special dyes. These are just a few of the many classes of dyes used in this extremely technical and interesting part of the manufacture of textiles.

The dark blue cloth used in the uniforms of policemen, firemen, and sailors is worn in all kinds of weather. Because it must stand up against sun and rain without losing its color the raw wool is dyed soon after it is received at the mill and before it goes on to any other of the manufacturing processes. In this "raw stock" dyeing the dyestuff can penetrate every fiber, and is thus well able to resist fading.

Striped or checked gingham is an example of yarn or skein dyeing. The cotton fiber is spun, wound into skeins, and placed in the dyebath. Skein-dyed yarns hold color well.

A third way of dyeing textiles is known as piece dyeing. As you can see, the name indicates that the fabric was woven or knitted and then dyed. Many yards of cloth are placed in enormous vats containing the dyebath at the correct temperature. This method, of course, makes it impossible for the dyestuff to get to all parts of the fiber as well as it can in the raw stock or skein dyeing. For this reason thick fabrics which must not lose their color are usually dyed in the raw stock. For sheer materials piece dyeing is a satisfactory method. Sometimes you can discover whether or not a material has been dyed in this way. Ravel a thread from a cut edge of the cloth. Examine it along its length, and if you find white spots you will know the cloth has been dyed in the piece. It may not hold its color very well.

Bleaching Cloth by Sunlight



A very interesting type of dyeing, cross dyeing, is found in materials in which acetate and viscose rayons have been used together. These rayons do not take the same kinds of dye. If a dye for viscose has been used, only the viscose yarns will be colored. The acetate yarns will remain their original color.

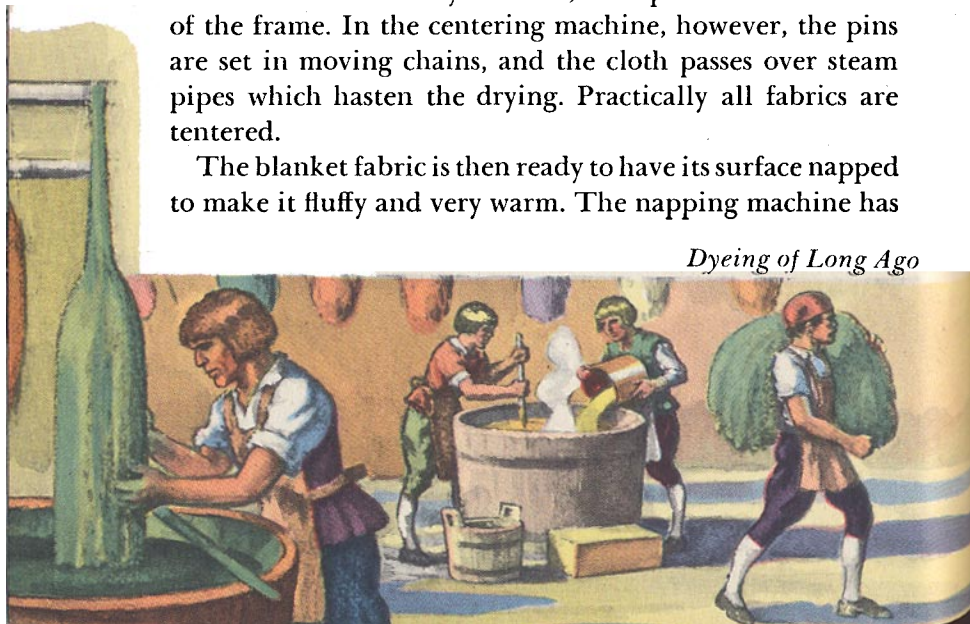
FINISHING TOUCHES FOR BEAUTY AND SERVICE

When a fabric comes from the loom it is by no means ready for service. Like a girl getting ready for a party, it must take on some finishing touches to give it added charm. And, as in the case of girls, some fabrics need more "finishing" than others. The variety of ways in which fabrics can be treated is great. Chemists seem always to be working to develop new and intriguing ways to turn Cinderella-like textures into ravishing beauties, to make them look like their richer-appearing kinsmen or help them perform their tasks more satisfactorily.

If we follow a wool blanket through its treatment we find that, first of all, it must be shrunk considerably, to make the weave closer and the blanket stronger. Warm, soapy water is used in this process. In order to dry it and keep warp and filling yarns at right angles to each other, the blanket is stretched on a long frame, or tenter. This is similar to the frame on which we dry curtains, with pins set at each side of the frame. In the centering machine, however, the pins are set in moving chains, and the cloth passes over steam pipes which hasten the drying. Practically all fabrics are tented.

The blanket fabric is then ready to have its surface napped to make it fluffy and very warm. The napping machine has

Dyeing of Long Ago



a roller covered with closely set short wires which catch the short fibers on one side of the cloth and lift them to the surface. When one side has been napped the other is passed over the wires.

Napping is a finish given to many woolen fabrics used for dresses and coats. Cotton blankets, outing flannel, and Canton flannel are all inexpensive materials which are napped to enable them to take the place of more expensive woolen fabrics. Knitted rayons are now napped for use in night clothes.

Napped and pile fabrics must have the upstanding fibers cut to the same height. This is done by a shearing machine with sharp revolving knives like those of a lawn mower.

For some materials the opposite effect is desired. After weaving, the upstanding fibers on the surface are burned off by passing the stretched material quickly over heated copper plates or the flame of gas jets.

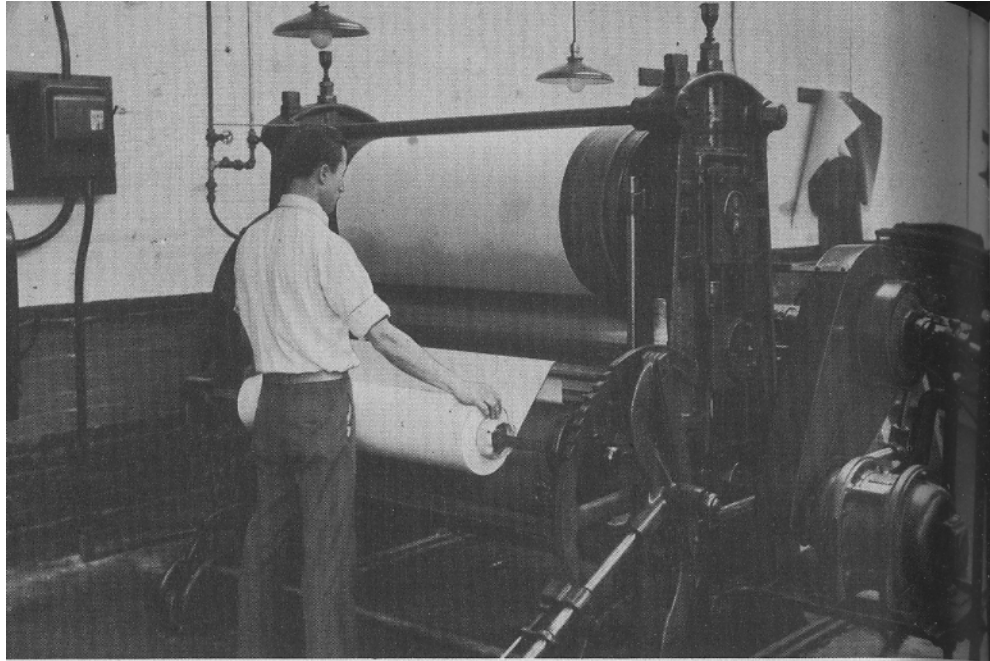
A number of finishes are used to give cotton materials certain characteristics. If a cotton is to be crisp and stiff it will be treated with a starch or glue. If it should have more weight and body it will be put through a sizing of starch or clay. An oil or glycerin dressing will give it softness, while hot wax pressed on one side will make a glazed surface that will not catch dust or soil quickly. Organdie may be treated with a chemical giving this sheer cotton a crispness that remains after many washings.

The lustrous cotton broadcloth used for shirts has been mercerized. This chemical treatment increases permanently both the luster and the strength of the cotton.

The natural luster of fine linen damask is greatly increased by the process known as beetling. Wooden stamps rise and fall on the linen as it revolves on a drum and flatten the yarns.

Tentering a Curtain





Ewing Galloway

Calendering Machine

A silk fabric woven "in the gum" is a very unattractive piece of cloth when removed from the loom. The gum, or sericin, still surrounds the true silk, or fibroin, and must be boiled off in a soap-and-water bath before the natural luster of the fibroin can be really seen. Silks made of very fine yarns are woven in this manner, for the yarns are easier to handle when the gum is still on.

When the gum is removed, the silk fabric loses weight. In order to make up the loss the manufacturer usually adds salts of tin or lead to the dyebath. A weighting of 10% is considered satisfactory for silks sold as "pure dye" silks. Black silks may have 15% weighting and still be considered pure dye silk. Too much weighting weakens the fabric and causes it to split.

The natural luster of rayon is very great, so when dull materials are in fashion the manufacturer of rayon may use a chemical or spin the yarn tightly to lower the luster. The chemical treatment is always given before the fabric is woven.

In stormy weather we like to have our clothes protected. Cloth finished with a coating of rubber or certain water-repelling chemicals now gives us that protection. Delicate velvets as well as stronger materials for outer garments are treated to prevent water spotting.

We all dislike the wrinkling of cotton, linen, or rayon dresses. Now we can avoid a rumpled appearance and many tedious hours of pressing by buying garments made of fabric treated with resin in a crease-resistant finish. The wrinkles drop out of such materials very quickly.

We have all had the unhappy experience of having a dress or slip shrink so badly during the first washing that we had to give it to a smaller sister. A new method of finishing cotton fabrics removes that danger by thoroughly preshrinking the material. The process known as Sanforizing guarantees that material so treated will not shrink more than a small amount—about a fourth of an inch in a yard.

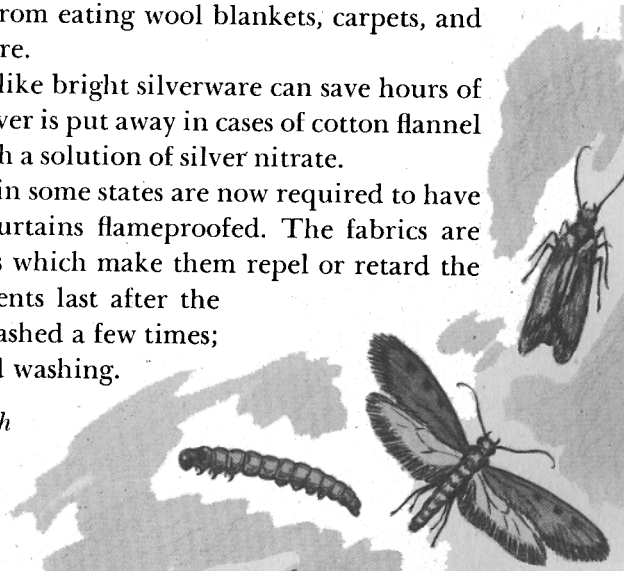
A new finish used for collars, cuffs, and shirt fronts treats cotton and acetate yarns woven together with chemicals and heat in such a way that they remain crisp after washing, and need never be starched.

There are two finishes that please particular housewives. The first is mothproofing. Chemists have recently put on the market three or four chemicals which can be put on a fabric during the dyeing or shrinking process. They prevent moths and carpet beetles from eating wool blankets, carpets, and upholstered furniture.

Housewives who like bright silverware can save hours of polishing if their silver is put away in cases of cotton flannel specially treated with a solution of silver nitrate.

Public buildings in some states are now required to have all draperies and curtains flameproofed. The fabrics are dipped in chemicals which make them repel or retard the flame. Some treatments last after the material has been washed a few times; others will not stand washing.

Clothes Moth



A finish applied to most textiles is called calendering. Those of you who iron your own clothes know that wrinkles are removed and something of a luster given to the cloth when you press with a heated iron. The textile finisher secures this effect with the calender, a machine with several highly polished and usually heated metal rollers. The cloth is passed between these tightly pressed rollers just as sheets and plain garments are mangled at home. When calendered, the cloth is ready to be packaged and sent to the wholesaler or the merchant from whom we buy.

These are only a few of the many special finishes which can be given to cloth to make it serve special purposes. There are many others which add to its appearance and attractiveness.

OLD AND NEW FABRIC FRIENDS

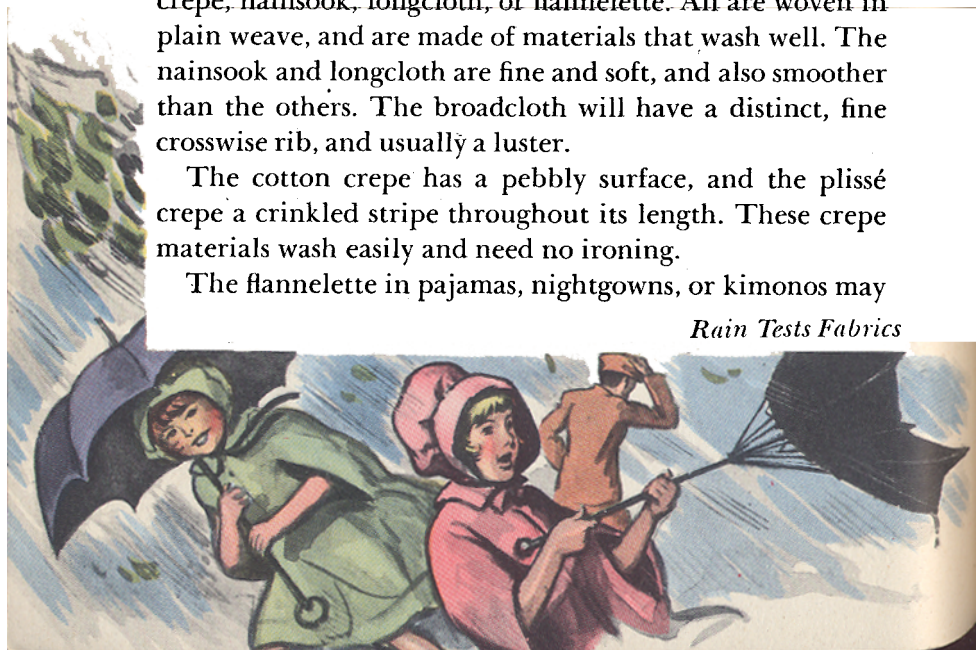
Now that we have seen something of what fabrics are and how they are made, let us look over the clothes in our wardrobes to see if we recognize old friends and understand them better.

The night clothes in which we greet the morning may be made of such cotton materials as broadcloth, crepe, plissé crepe, nainsook, longcloth, or flannelette. All are woven in plain weave, and are made of materials that wash well. The nainsook and longcloth are fine and soft, and also smoother than the others. The broadcloth will have a distinct, fine crosswise rib, and usually a luster.

The cotton crepe has a pebbly surface, and the plissé crepe a crinkled stripe throughout its length. These crepe materials wash easily and need no ironing.

The flannelette in pajamas, nightgowns, or kimonos may

Rain Tests Fabrics





Dry Goods Company

Yard Goods Department in a Modern Store

be in plain colors or have printed checks or stripes. The right side is napped so that the garment is soft and warm as long as the nap is not flattened or worn off. The nap will catch fire very quickly, and the person wearing a flannelette garment should stay away from fire.

Our best nightgowns, pajamas, and slippers may be made of

rayon, flat silk crepe, or satin. The satin has a smooth, glistening surface because it is made of loosely spun yarns and in the satin weave. The yarns in the plain-weave crepe, on the other hand, are more tightly twisted and do not reflect the light. Because of the high twist the crepe fabric tends either to shrink or to stretch when washed. When drying and ironing crepe materials we should usually stretch them slightly.

Another fabric which we find in our slips is rayon taffeta, which has practically replaced silk taffeta for this purpose. Taffeta is closely woven in a plain weave. It is slightly stiff and very smooth, so that dresses slip over it very easily.

Pajamas and nightgowns, like slips, panties, and vests, may be of knitted rather than woven material. Rayon, cotton, silk, and wool are usually weft knit for these purposes. The run-resist and Milanese-knit fabrics are not found quite so commonly, although we are beginning to recognize the advantages of these types over the weft knit.

Blouses are frequently made of batiste, which is a sheer cotton cloth woven in plain weave of fine-combed yarns. Its silky sheen is due to the mercerized finish it has received. Sometimes batiste is embroidered by machine in dainty patterns.

Tailored blouses may be made of printed percale—which is also used for pajamas—or of chambray. Both are made of cotton and in plain weave. In chambray the filling threads are always of white and the warp of colored yarns. The selvages are of all-white yarns.

Some of our blouses for “dress up” are made of dotted Swiss, a dainty sheer material with dots of white or colored yarns. The dots are woven in by the lappet attachment while the cloth is being woven in the plain weave. You can tell dotted Swiss of this type by the dot, which looks the same on both right and wrong sides except for the two ends of thread on the wrong side. These dots do not drop or pull out.

The dots are frequently printed on the Swiss with a

colored paste. This type of material is much less expensive than the woven dotted Swiss.

The skirts or jumpers which we wear with blouses are usually made of heavier, firmer materials. If made of cotton they may be of piqué, which has a lengthwise rib known as a wale. This rib varies greatly in width from one piece of goods to another. The wrong side shows extra threads, proving that this is a novelty weave.

Poplin is another cotton material used for skirts. It has a crosswise rib made by using heavy filling threads and fine warp threads in a plain weave.

The skirt we use for dress wear may be of velveteen, which is a velvety-looking cloth made in pile weave of cotton yarns. If the material has a lengthwise wale it is called corduroy.

You may find that your wool skirt is made of flannel, serge, or tweed, all good wearing materials. The flannel is woven in either a plain or a twill weave, with a slight nap on the surface; it is soft and warm. Serge has a crisper feel than flannel, and is always in a twill weave. Dark-colored serges usually show a shine after much wear, because the combed worsted fibers are very smooth and have a natural luster. Dampening and pressing the serge will usually remove the shine for a time.

Tweed makes a very satisfactory skirt for hard wear. It is made in twill or plain weave of yarns of at least two colors, and has a rather rough, unfinished surface.

Your coats and suits may be of whipcord or gabardine. These are both twilled fabrics; unlike serge, however, they have sharply defined diagonal ridges on the right side only. The ridge in gabardine is narrower than that in whipcord. Both are worsteds and, like serge, tend to become shiny with wear. Gabardine is made in cotton as well as wool.

Camel's hair cloth is another twilled coating material. It is made of the silky down hair of the camel and is soft, warm, and sturdy.

Our warm dresses may be made of plain-weave wool challie, either in one color or with a printed pattern. We find wool jersey a satisfactory knitted material that wears well and is not too warm for use in heated buildings. Flannel of lighter weight than that used for skirts makes an excellent dress fabric.

Afternoon and party dresses are made from a variety of cotton, silk, and rayon materials. Two of these are georgette and chiffon. They are sheer fabrics made of tightly twisted, very fine yarns, either silk or rayon, in plain weave. The chiffon is frequently printed in gay, bright patterns, and makes a dressy frock which is easily cared for. It is less like crepe than is georgette.

The bright silk or rayon prints used so much for dresses today are usually of plain-weave crepe. We sometimes use also the same twilled and printed materials that men use for their ties.

For warm-weather dresses we like voile, organdie, dimity, or gingham, all of cotton and plain weave. Voile is soft and sheer, made with tightly spun yarns. It is frequently printed, making very dainty frocks. Organdie is the sheerest of these materials, and is very crisp because of its finish. Dimity is crisp and thin with lengthwise stripes or small checks made of heavy yarns. It is often printed in attractive floral designs.

In our practical tailored dresses we find gingham very pleasing. It comes in plaids, checks, and stripes, made of skein-dyed yarns that hold their color. Seersucker is another cotton material woven with a lengthwise crinkled stripe between two plain stripes. This material will not lose its crinkled appearance when it is washed, and it never has to be ironed.

Nearly every girl's wardrobe will have in it many, if not all, of these fabrics. You will recognize these old friends also in the clothing of other members of the family. You will make many new friends when you study the materials used in the house itself.

IT PAYS TO TREAT FABRICS WELL

In order to keep fabrics looking fresh we must care for them properly. We know that all people cannot be handled or treated in exactly the same way. The same is true of materials; some must be handled much more carefully than others, although all must be well cared for if we expect to enjoy their services.

We should be very careful not to rub or twist knitted garments in washing them. Rubbing or twisting may break a yarn, and the looped stitches will ladder. To wash most types of knitted fabrics, we should squeeze the warm, soapy water through them gently, rinse them thoroughly, and roll them in a Turkish towel to get out as much of the moisture as possible. We must avoid a hot iron on garments containing wool or rayon. One of the advantages of knitted underthings, however, is that they do not require ironing. They look well if they are gently patted into their original shape and spread on a flat surface to dry. Hanging knitted garments on a line causes them to stretch very much in length and shrink in width.

The socks and stockings in our wardrobes are knitted and, like all weft-knit articles, will run when caught on rough objects or improperly cared for. They should be washed after each wearing in warm, soapy water, without being rubbed or twisted, and hung to dry. If wool socks are washed in hot water and rubbed, felting takes place. The socks will not only feel harsh, but will shrink so that they cannot be worn. Socks and stockings should not be dried near a hot radiator or stove.

This Is Hard on Fabrics



Sweaters, knitted gloves, and scarves should be washed and dried in the same way as stockings. Before washing, place the sweater on a large paper and draw its outline. After squeezing out the moisture in a towel, place the sweater on the paper and gently pat it to the size of the outline. Leave it on the paper to dry slowly, and either press it with a warm iron after it has dried, or place weights on it and leave them until it is almost dry.

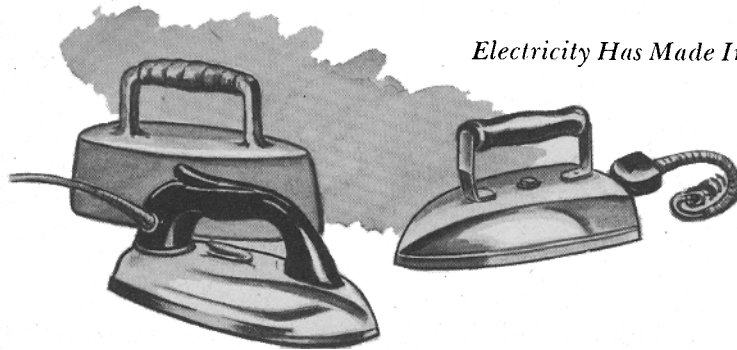
Sometimes, after many washings, delicately colored undergarments begin to look faded and "washed out." It may be that we have hung them in the sun, which bleaches the color, or that we have used strong soap and very hot water. We should, of course, do neither of these things, for such treatment removes the color and somewhat weakens the fiber, particularly if it is silk, rayon, or wool.

The delicate tint of some garments can be restored by using a small amount of dye in the last rinsing water. Special dyes can be bought for this purpose, and the directions on the package should be carefully followed. It is necessary that you tell the clerk the kind of fiber the garment is made of. You will remember that all fibers do not take the same kind of dyestuff.

In pressing wool skirts and dresses, place a cloth of heavy cotton on the wrong side of the garment. With a wet sponge or cloth, dampen the pressing cloth, then press firmly, with an iron that is not too hot, until the cloth is almost dry. Leave a little moisture in the wool to prevent a shine. Press with the warp and the filling threads to avoid stretching and twisting the garment out of shape.

Do you remember reading that acetate rayons melt under heat that does not affect other fine materials? We must be

Electricity Has Made Ironing Easier



especially careful, then, to work with a warm iron, not a hot one, when pressing underwear and dresses of this type of rayon.

No one likes to see or to wear clothes that are stained or spotted, but the stain must be carefully removed in order not to damage the fabric or remove its color. Spots on wool, silk, and rayon garments, particularly those of dark color, should be treated by an expert cleaner who knows exactly what chemicals to use on certain stains and textiles. It is not always wise for us to attempt to remove spots ourselves. Gasoline and naphtha are almost too dangerous for home use, as both of them are highly inflammable liquids. Some cleaning fluids give off poisonous fumes, and some contain a chemical that injures the fabric. This is worth noting in the case of acetate rayons, which fall apart if the cleaning fluid used on them has in it certain chemicals. If you know what the spot is, tell the dry cleaner when you send the garment to him. Stains should be removed as soon as possible, for they "set" when left in the fiber for any length of time and are difficult to take out.

There are spots which can be removed at home. Some ink spots will disappear if washed out at once in cold water. Others need to be soaked for several days in milk and then washed in warm water and soap. Bloodstains can be removed if the garment is soaked in cold water before being washed.

Fruit, coffee, and tea stains require more strenuous treatment. Stretch the fabric containing the spot over a bowl and hold it in place with a rubber band. Pour boiling water over the stain, holding the cup about twenty inches above the bowl.

Chewing gum must first be carefully scraped from the material; the spot should then be placed over white blotting paper. Next moisten a clean cloth with carbon tetrachloride and rub the spot very lightly. Salad-dressing spots can be removed in the same way.

WHEN WE SHOP

All too few of us know textiles well enough to be expert judges of fabric. We must depend on clerks and labels to give us the information we wish. And when buying ready-made garments we usually wish to know more than just their price and size, though both, of course, are of great importance. Both must be satisfactory when we buy the garment. But it may happen that a garment when washed has shrunk so much that it cannot be worn again. That makes it very expensive. We should have asked the clerk about the possibility of its shrinking, or better still, looked for a label saying that it would not shrink more than a certain amount.

Labels are found on garments now more often than they were a few years ago. They can be of great help to shoppers. In some cases Federal regulations or laws make it compulsory that labels be placed on articles. Fabrics containing rayon must carry a label stating its presence. Those containing wool must bear a label stating the kind of wool and its percentage.

Knowing that the fabric you wish to buy has rayon in it helps you to remember that you should care for it in certain ways. The same is true for wool, but the description of the wool tells you, also, something of its quality. If the label has on it "wool" or "virgin wool," you know that the wool has come directly from the sheep's back to the manufacturer. If it contains the word "reprocessed," you know that scraps of cloth left from cutting garments or sweaters have been taken apart and brought back to the original fibers. The fabric marked "reused wool" has been made from wool cloth that has been used by a customer, returned to fibers, and woven again into cloth. Such a fabric is not as soft or as springy as a material that is made entirely of wool. Its price is also much lower.

If you are buying yard goods for a dress you may wish to

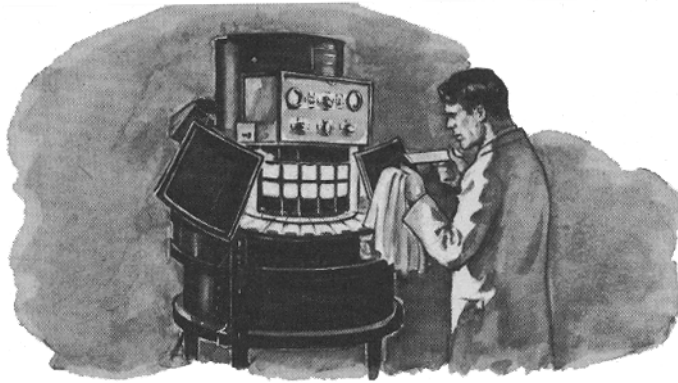
know if it will crush. Look for a label telling you that it is crease-resistant or non-crush. If you do not want an organdie collar to lose its crispness when washed you should find out if it has a “permanent” finish, and buy accordingly.

A great many garments now carry labels giving directions for washing and ironing. Follow them carefully if you wish success. If the label says the article should be dry-cleaned, do not buy it if what you want is a washable dress.

There is no fabric that can be counted on not to fade at all. It is wise, nevertheless, to find out from the label or stamp on the selvedge what the manufacturer says about it. If a cotton article is marked “vat-dyed,” you can be pretty sure that its color will last if the article is properly cared for.

Modern Fabrics





The Fade-O-Meter

LET'S SEE FOR OURSELVES

It is not always possible for us to get answers to our questions from labels or clerks. Sometimes we must try to find out for ourselves by means of very simple tests.

If you wish to know whether a new rayon dress or slip contains acetate rayon, there is a quick way of finding out. From a seam on the inside of the garment, cut a piece of material. Put it in a saucer and cover it with the liquid with which you remove polish from your finger nails. Acetone causes acetate rayon to become gummy and soft, and the material will fall to pieces. If after fifteen minutes the sample you are testing acts in this manner you know that it contains acetate rayon. Knowing this fact should make you careful not to drop polish remover on the garment while manicuring and not to press it with too hot an iron.

Should you wish to know which of the two materials you are considering for a slip is silk and which rayon, you can test them by one of two simple methods. Place samples of both materials in a saucer and cover them with a strong solution of washing soda or Javelle water. After a few minutes examine them to see which sample has been destroyed. The bleaching substance will cause the silk to fall to pieces, but will not destroy the rayon. This test should tell us not only which material is silk and which rayon, but that we must not use these bleaches when washing silk garments.

A second test for distinguishing silk from rayon is also very simple. Put a quarter of a teaspoonful of a household dye labeled for all silk in a glass of warm water. Place the two samples in the dyestuff and after a few minutes rinse them in clear water. You will find that the silk has been dyed, the rayon only stained.

If you have two materials which have a silky appearance, but you believe one may be mercerized cotton, try the burning test. Using great care, hold one fringed sample with the end of an old pair of scissors and touch it to the flame of a lighted candle. If the sample burns quickly, smells like burning paper, and leaves a very small, gray ash, you know it is cotton. If it burns slowly, smells like burning hair, and leaves a ball of crisp, black ash, you know it is silk. If it chars and blackens, keeps its shape, and has smooth edges, you know it is a heavily weighted silk material.

The wool material you are buying for a skirt may have some cotton or spun rayon in it. To test, ravel the yarns from one end of the sample and burn them. The wool will burn very slowly, go out quickly, and smell like burning hair. The cotton or rayon will burn quickly and have the odor of burning paper. If the rayon is of the acetate type it will melt and drop from the sample.

An easy way to tell whether a handkerchief is of cotton or of linen is to wet and fold it, and press the fold with a hot iron. The crease will be much sharper in linen than in cotton.

Another way is to place a drop of olive oil or glycerin on the handkerchief or other piece of material you wish to test for linen. The oil will leave a translucent spot if the fabric is linen, an opaque one if it is cotton.

If you wish to know whether or not a material will shrink after it is made into a garment and washed, try the following test. On a sample measuring three inches along the filling and five inches along the warp, draw with indelible ink a rectangle measuring two by four inches. Or you may mark

the rectangle with basting stitches if you prefer. Wash the sample in the same way you would wash the garment. Dry and press it carefully, without stretching the cloth. If the marked rectangle is much smaller than before it was washed, either shrink the cloth before making it into a garment, or buy other material that is guaranteed not to shrink.

If you are looking for colored material to make into a dress or slacks to wear at the seashore or in the country in the summer, you should be sure to ask about its fading quality. If there is no label giving you information on its color-fastness you can test a sample at home. The best test is carried out on the Fade-o-meter, but only testing laboratories have such machines.

Place the sample of cloth in the sunniest window of the house. Cover half of it with an old magazine and leave it for at least two weeks. If, at the end of that time, the exposed half of the sample shows little difference in color from the covered section, you may be sure that the sun will not leave your dress faded at the end of the summer.

Some materials are guaranteed not to lose their color when washed. If the fabric you wish to buy is not labeled in any way you can easily find out for yourself how it will take washing. Baste a sample of the cloth to a larger piece of white cloth, and wash them in lukewarm water and mild soap. If the white cloth is stained with the dye of the colored sample you will probably decide not to buy that fabric.

When your mother is buying a sheet she may find a label attached telling the thread count of the sheet. This indicates the number of warp and filling threads to the square inch. A well-balanced material will be so woven that there are about the same number of each. A great many more threads one way than the other means that the material will not wear well.

You can readily find the thread count of a fabric. Cut a hole a half inch square in a piece of paper, and pin the paper on the cloth so that the edges of the square are par-

allel to the threads of the cloth. Looking through a strong magnifying glass, count the threads along the two adjoining sides of the square. Multiply each count by two. This will give you the "thread count" of the cloth.

We must be certain that the threads of cloth to be used for garments that must bear some strain, possibly at the hips or elbows, will not slip or pull. Fold a sample of cloth lengthwise. Take a few running stitches with a needle a quarter of an inch from the fold. Leave the needle in position, separate the two thicknesses of cloth, and pull rather severely. If the threads separate, the garment will "pull" at the seams, and will not wear satisfactorily.

Another quick test for the slipping of the threads is the "thumb" test. Grasp a sample of the cloth in both hands between your thumbs and first fingers, with the thumbs on top. Press the thumbs down and turn the hands so that the thumb nails touch each other. Try this both ways of the cloth, along the warp and the filling threads. In loosely woven fabrics one set of threads will slip along the other. Materials made of weak or very fine yarns may break.

Some loosely woven materials, such as the white cottons used for towels, sheets, and underwear, are finished with a heavy dressing of starch. This makes the cloth look and feel heavy, but it washes out and leaves the material thin and sleazy. A small amount of starch is considered quite all right, but too much is not fair to the customer. Try this test to help you decide which material to buy. Hold the material over a dark cloth and rub it briskly. If you can see bits of the starch fall on the dark cloth, and can plainly see the warp and filling yarns on the material you are rubbing, it has been rather heavily starched.

There is another very interesting test for starch which

Simple Tests for:

Linen

Weighted Silk

Slipping of Yarns

Acetate Rayon



you can make at home. Put a few drops of iodine in a glass of water. Place a sample of the cloth in the glass and watch its color change. If it becomes a strong blue you know that there is a great deal of starch in it.

HOW MUCH DOES IT COST?

People often wonder why there should be such a wide range in the price of fabrics. Two fabrics that look alike may be very different in price. Unless we know something about how they are made and what are their characteristics we are not always able to select wisely. Let us consider a few of the many things the manufacturer and merchant must keep in mind when setting the price of the textile.

First, of course, is the kind and abundance of the raw material. Some fibers are produced in larger quantities than others and are easy for the manufacturer to obtain. The large supply of cotton linters and spruce wood in this country makes it possible for the manufacturer to produce rayon so reasonably. Cotton fiber is also very abundant, and costs comparatively little to grow and pick. Silk and flax, on the other hand, are not produced in this country, and it is expensive to transport them from abroad.

It takes many years, trained chemists, and a great deal of money to carry on the experiments necessary to produce a new synthetic fiber or a new finish. In order for the manufacturer to be repaid for all this expense he must at first charge fairly high prices for the new materials.

Raw materials are not all of the same quality. We know that wool from the same sheep is not all of the best grade, so it must be sold at different prices. We pay more for a wool coat or suit made of all new, high-grade wool than for one containing wool that has been used before. The short fibers of flax, known as tow, are not considered the same in quality as the long fibers, because the short ones "lint," or leave tiny flecks of fiber, when used in cloth. For this reason towels or tablecloths made from this type of flax

are comparatively inexpensive. Spun silk made from silk waste and the strands of broken or pierced cocoons is of poorer grade than that made from long, unbroken strands.

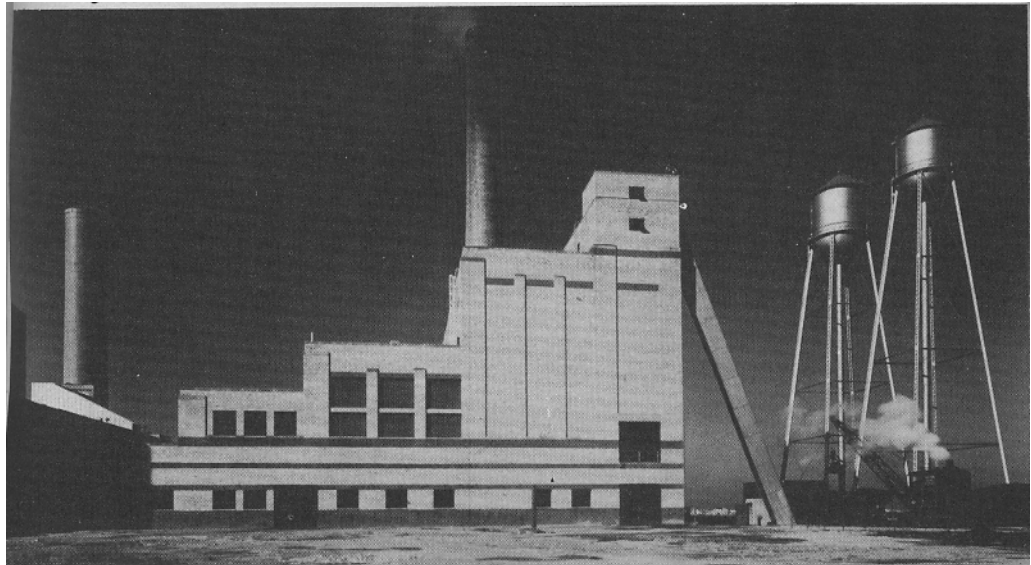
The amount of fiber used in a cloth also helps to determine its price. A closely woven material contains more fiber than a loosely woven one. Sometimes the manufacturer, in order to keep the price low, will weave the cloth with few yarns to the square inch and fill the spaces with starch or some other substance known as a filler. This will wash out, of course. The closer weave costs more, but it wears better.

In order to keep the price of a cloth low enough for a great many people to be able to buy it, the manufacturer frequently mixes small amounts of a fairly costly fiber with large amounts of a less expensive one. In many wool suits worn by men and boys we find large amounts of spun rayon combined with the wool. In women's slips, silk is frequently used for the warp, and rayon for the filling. The leg of a stocking may be knitted of silk, the foot and top of rayon or cotton. If you examine silk stockings of different prices you will probably find that the less expensive one has fewer lengthwise ridges, or wales, than the other. This requires less silk and consequently reduces the price of the stocking.

The width of the cloth must also be considered in setting

A Modern Textile Mill

King Galloway





Fabrics Come from Many Places

its price. A fifty-four-inch material requires more fiber than the same quality fabric of forty-inch width. We may find, however, that the wider cloth will cut to better advantage.

The intricacy of the weave and the number of colors in printed designs also affect the cost. The cutting of the designs on the copper rollers is an expensive process, as is designing the pattern and threading the Jacquard attachment.

The kind and number of finishes which the cloth receives increase or decrease its cost. But many times a special finish costs only a few cents a yard more, and in the end gives greater satisfaction. A waterproofed fabric that really protects us from rain saves us many tailor's bills for pressing.

The amount of cloth made at once is also important.

When you visit a mill of any kind you are always impressed with the machinery and the amount of work it can turn out. We do not always realize that machines are very expensive, some costing thousands of dollars each. Many of them are so heavy that they must be used in strongly constructed buildings. The machines that manufacture Milane-knit goods are much more intricate and expensive than those making circular weft-knit fabrics. The machines that knit full-fashioned hosiery are more expensive to buy and to operate than are the circular machines which make stockings without seams along the back and the foot. These are a few of the reasons why there is such a difference in the price of knitted goods.

It requires many people to produce and prepare the raw

materials, and many more to manufacture, transport, and sell textiles. It also takes a lot of time, and today both labor and time are costly.

In some of the stores where you shop you have a great many services, such as charge accounts, delivery of the parcels to your house, and the privilege of returning goods should you wish to do so. All these services must naturally be added to the price of the articles you buy.

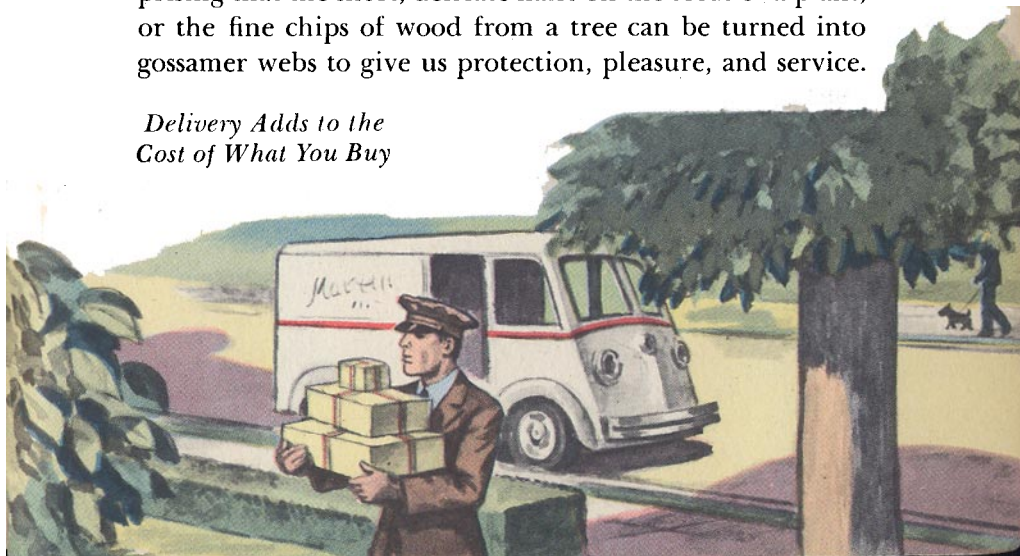
The store where you buy dresses or yard goods may be in a neighborhood where rents are high. It may carry only the latest designs in cloths and materials. In both cases the price of the dress or cloth must be higher than that of those we buy in a less expensive neighborhood, or those that are not the "last minute" in fashion.

Fashion has a great influence on the price of textiles. Changes in fashion mean the scrapping of expensive machinery, a procedure costly to manufacturer and customer.

These are some of the factors which must be taken into account when we wonder at the cost of yard goods or ready-made clothing. The surprising thing is that, everything considered, textiles are as inexpensive as they are.

A textile is a wonderful thing when we think of the number of countries, people, materials, and machines that are involved in its production. It may be beautiful or ugly, strong or fragile, expensive or cheap, but all in all it is surprising that the short, delicate hairs on the seeds of a plant, or the fine chips of wood from a tree can be turned into gossamer webs to give us protection, pleasure, and service.

*Delivery Adds to the
Cost of What You Buy*



Glossary

Cotton linters—The tiny short hairs left on the cotton seed after the raw cotton has been put through the gin.

Crease-resistant—Cotton, linen, and rayon materials are sometimes treated with a resin which makes them wrinkle and crease less than they ordinarily do.

Filament—An extremely fine fiber or thread.

Fulling—The felting or shrinking of woolens to make a very close, firm fabric.

Ginning—The removal of the cotton fiber from the seed.

Milanese knit—A type of warp-knit fabric made on the Milanese machine. It is used for underwear and does not ladder.

Real lace—Lace made by hand. This name is usually given to lace made with the needle or with bobbins.

Reel—A frame on which the silk filament from cocoons or yarn from spools is wound into skein form.

Screen—A wooden frame over which sheer fabric is stretched and fastened, then used in printing fabrics.

Selvedge—The finished edge of woven material formed by the filling threads turning back over the end warp threads on the loom.

Shuttle—A boat-shaped piece of wood which holds and carries filling yarn, wound on a bobbin, back and forth between the warp threads on a loom.

Sliver—A soft, untwisted rope of fibers prepared for spinning.

Spinneret—The two small holes in the silkworm's head from which come the silk filaments. It is also a metal nozzle with many tiny holes used in making such filaments as rayon and nylon.

Throwster—A person who spins filament into thread.

Woolens—Fabrics made from short, carded wool fibers.

*Worsted*s—Fabrics made from long wool fibers that have been carded and combed to make them parallel.



