Take a cost-wise perspective on your mill operations and you'll find that your best buy in bobbins is U S equipment.

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Textiles Need More Graduates

DR. HUGH M. BROWN
Dean of Textiles

At the last meeting of the National Textile School Deans two facts were stressed with great force. First, the whole textile industry is clamoring for far more graduates than are available and, second, that at even a time of such need the number of graduates was at the lowest level since the war. Studies showed that this was not due to any lack of real opportunity in textiles; indeed, statistics indicate that advancement in salary and responsibility was faster in textiles than most other industries.

The main causes for the condition seem to be stepped up appeals of all the so called "glamor" industries causing students to go into other fields, and the fact that the textile industry has not been bringing its unlimited opportunities to the attention of high school and college students.

Representatives from the textile press met with the textile deans and in the last few months there have been several fine articles giving analysis of the
opportunities in textiles in comparison to those in other fields of engineering. Top textile executives have published statements showing that advancement in textiles usually more than makes up for the abnormally high starting salaries some other industries have been offering to get graduates. Often these high starting salaries will be offset by a policy of slower advancement.

Many textile concerns are now going to the high schools with the real facts about opportunities in textiles. Many are conducting open house visits so every high school senior may see the modern, interesting working conditions in today's industry. They are bringing to public attention the many new engineering and research openings made necessary by so many new fibers and new processes in the mills today.

Everyone in the industry has a vital interest in helping to give the youth a full, true picture of textile opportunities. When and if this is done, more college students will chose textiles.

THE STATE FLAG
OF SOUTH CAROLINA

C. H. Ferguson

The cover of this magazine is a picture of South Carolina's state flag. If the blue flag, which flies over our state institutions does not coincide with this flag, it is a natural thing because no law has been made governing its structure. The law states that the colors shall be blue and white, and that the symbols shall be a crescent and a palmetto tree, but further details are not given. Therefore, the color blue could be any of the various shades of blue and the palmetto tree, a picture of any of the different kinds of palmettos.

Gov. Byrnes established a law that the Clemson College Textile School would manufacture the state flag and would sell it at cost to anyone who wishes to purchase this flag.

Clemson's first step was to establish a standard palmetto and its flag's color. This tree is the one pictured on this on this magazine and the color is National Blue. This will be the standard state flag until the State Legislature establishes a law stating the exact design and color of our state flag.
Principal Properties which New Fibers Impart to Fabrics

Howard R. Hart

Editor's Note:
(Address delivered by Mr. Howard R. Hart, manager of Burlington Mills' Brighton Division, before the spring meeting of the National Council of Textile School Deans at Panama City, Fla., April 29, 1953)

In any discussion concerning the future of the textile industry, we of Burlington Mills feel that the new and so called miracle fibers occupy a large place. These fibers—Orlon, Dacron, Acrilan, Dynel, and Viscara—are called new and rightly so. They are so new we don't know all we would like to know about how to construct the best fabrics from them, nor do we have all of their properties under control. However, we do know the major properties which each of them adds to a piece of cloth, and we also know some of the shortcomings which remain to be overcome.

Some of the first questions that naturally come to mind are these: "Where do they belong—what types of apparel will they be used in—what will they replace—what will they compete against?"

We know that these fibers were not brought out as substitutes. They are, rather, fibers that are in some cases better, both from a standpoint of performance and aesthetics, than the natural fibers. They are the result of attempts to improve on the natural fibers.

These new fibers fall into three broad groups, which differ from each other just as rayon does from acetate (which difference the Federal Trade Commission has finally come to recognize).

These three groups are:

1. Acrylics—Orlon; Acrilan; Dynel; X-51
2. Polyesters—Dacron
3. Polyamides—Nylon; Perlon

I would like for a moment to enumerate the outstanding characteristics of each of these fibers, with the exception of nylon. I would like to point out the characteristics which are important to the user of the fabrics and to the apparel made from them. I will not attempt to discuss specific fabrics as there are too many of them for the time available.

The first of these is Orlon—made in both filament and staple form.

What makes filament Orlon desirable?

It has a good hand, is warm, is the nearest to silk of any synthetic.

It has a good drape, crisp and lively.

It does not pucker in sewing as readily as does nylon, and is easier to cut and sew.

It has good dimensional stability, that is the shrinkage in washing is good.

Its resistance to wrinkling is good. No special finishes are necessary.

It takes pleats that are durable to washing—creases can be ironed out and put back in at the same temperature.

Its sunlight resistance is the best of any synthetic fiber.

It is quick drying.

It can be cross dyed with nylon and silk readily and with viscose in most shades.

These characteristics indicate that its use will be in:

Washable woven and knit dress and blouse fabrics, shirts which dry quickly and require little if any ironing. In combination with silk, and with cotton chambrays. It's one of the best fibers for curtains. It also has minor uses in industrial and diversified outerwear fabrics.

Filament Orlon has been in production since mid-1950.

Orlon staple has these characteristics:

Outstanding warmth. It has 20% more bulk than wool. It offers warmth without weight—for the same thickness, it's lighter than wool in weight. Even 25% added to rayon increases its warmth.

Although warm, it does not always have a wool like hand—it depends on the construction and the finish.

Crease retention. Pants or pleats wet in the rain or washed retain their crease. It has 85% retention against 20% for wool after wetting and drying.

Its wrinkle resistance and recovery from wrinkling is good.

It dries more quickly than wool.

It is not attacked by moths or mildew.

Resin is not necessary for shrinkage stabilization. It will not shrink or felt like wool.

Orlon staple is very adaptable to the woven system of spinning. It can be readily spun on cotton systems, meaning that fabrics can be woven at a lower manufacturing cost than worsteds. Blended with viscose, it gives loft, bulk and warmth.

The principal initial uses of Orlon will be these:

Suitings and coatings for fall and winter—men's and women's.

(Continued on page eighteen)
Young men always seek new frontiers, geographically or in fields of endeavor. Thirty years ago the textile frontiers in this state were relatively undeveloped, though the great native South Carolina pioneers had brought the industry into real being. New England still was the giant, but was beginning to lose its grip.

It happened that the writer was among those who left New England to come to South Carolina in 1925. That circumstance of having had some experience in both areas perhaps is the reason why The Bobbin and Beaker kindly offered this opportunity to make a few comments addressed especially to the young men who are getting ready for careers in the textile industry.

Why was the industry slipping away from New England?

1—Adverse attitudes of shortsighted local and state politicians, who for reasons of their own joined with other radical elements in the false notion that the owners and managers of industry should have their responsibilities usurped.

2—The failure of many workers to understand the danger of following unwise leadership, and the resulting trend away from the everlasting fundamental that a man must work for his pay.

3—The tragic failure of whole communities and states to protect the advantages they enjoyed, and to strive to advance farther in the forefront of sound and constructive development.

While New England thus was faltering, the South was waking up. Where the young men of South Carolina formerly had been compelled to seek new frontiers in other states, the frontiers of industrial progress were rising, and more and better opportunities were opening up at home. The story of South Carolina's growth is new and fresh in the minds of all. Since World War II, for example, the fine Textile School at Clemson has become the largest and best in the nation.

The future looks bright after nearly a decade of phenomenal development with dozens of new plants in operation and most of the older ones modernized and expanded. But we should pause and remember New England, not forgetting either that as late as the thirties and the early forties, South Carolina barely escaped the tragedy of that section. There were the same kind of radical forces influencing some of the politicians and some of the working people. Drastic and destructive pieces of legislation not only were being proposed at every session of the General Assembly, but they were often on the verge of adoption. There came abrupt halts in the state's progress as industrial prospects saw the dangerous borderline on which the shortsighted politicians and radical elements were treading.

Fortunately, however, there were enough honest, aggressive and intelligent leaders in the state to reach out desperately and hold in check the men who espoused socialism and "something-for-nothing." Crisis was survived, all the while costing the state dearly. Then almost suddenly the tide swung unmistakably at the polls and in the legislative halls. New confidence in South Carolina spread over the nation, replacing the former widespread belief that every

(Continued on page twenty)
New Weaving Machine

H. B. Hunter

The Warner & Swasey Sulzer Weaving Machine as you see it today in operation in many of the textile mills has taken a great many years to bring to its present state of high perfection. The original patents are held by the Sulzer Brothers Limited of Switzerland. Between 1935 and 1943 Sulzer Brothers designed and built five different models of the machine. Each successive model showed changes and improvements. In 1945 just two days after VE day, the Warner & Swasey Company successfully negotiated contracts to build the machine in this country.

In 1946 four of the Swiss machines were brought to Cleveland for test purposes. Weaving tests were carried on to an exacting degree while the design of the machine was studied and cost estimates of its production were made. The studies proved that the machine was especially practical from a weaving point of view but the design of the machine had to be simplified to fit American methods of manufacture. This change in design was a tremendous job because it required going over every detail of its construction with the idea of redesigning for simplicity and ease of manufacture. Every dimension had to be changed from millimeters to the inch system of measurement. The weaving machine as it was built by Sulzer was a beautiful example of sound design and precision workmanship, but cost of manufacture had not been particularly considered and it would have been impossible for us to build and sell the Sulzer machine as originally designed.

The first Warner & Swasey machines were completed and placed in various textile mills sometime in 1948. These prototype machines caused considerable confusion because the industry felt these were the completed machines when actually they were (Continued on page ten)
Be fussy ... be choosy ... when you pick out Shirting Plisses, and you are sure to pick Riegel. You will get the quality you need (Riegel's reputation assures you of that). But what's more, you will get your pick of patterns that are really different—smart, fresh, original—patterns you know your customers will like.

See them now and you'll see what they can mean to your sales!
NEW WEAVING MACHINE
(Continued from page eight)
prototype machines and were put into the field for testing purposes only. Their sole purpose was to find out how they would operate under regular working conditions. From these tests emerged the Warner & Swasey Sulzer machine that is now operating in the field. At the present time there are more than 500 of these machines operating in various phases of the industry. There are a few operating on cotton and a few on spun rayon while the rest of the machines are operating on woolens and worsteds. At the beginning the majority of the machines were purchased by worsted manufacturers because a large number of their fabrics readily lend themselves to the present limitations of the machine namely; an eight harness capacity with a six pick repeat and a single color filling. At first it did not seem that a machine with these limitations could fit into the worsted field because the majority of worsted looms have a twenty-four harness head motion and a four by one selective color box motion. However, a quick analysis of a large percentage of worsted fabrics shows a single color filling and the two up, two down, 450 twill. A large percentage of the remaining fabrics are either a plain weave or a two up, one down, three harness twill.

The machine soon proved itself both practical and economical in the weaving of worsteds and woolen manufacturers quickly became interested in it for the weaving of such plain fabrics as bed blankets, flannels, automobile sidewalls, dress goods and coatings.

In the beginning there was a strong reaction against weaving woolen and worsted fabrics without mixing the filling. This feeling is still quite a challenge and as a result we are building a pick and pick filling mixing motion. However, there are a large number of fabrics that can be successfully run with only one filling on the weaving machine that would cause trouble when woven on a conventional loom. This can be attributed to the unique device of tensioning each and every pick after it is inserted into the shed.

There are several important features of the Warner & Swasey weaving machines that are obvious at first glance. Perhaps the most obvious of these features and the most important is the large filling supply package located at one end of the machine. The large cone of yarn that is normally placed on the quilling machine is placed directly on the weaving machine. Normally two of the packages are tied together by the conventional heel-to-toe tying, thus forming a continuous supply of filling that will sometimes last for several hours. This filling supply package is important because the impact of it is felt in many other places besides the weave room. There are no bobbins to bother with, no magazines or batteries to fill and where each cone is completely exhausted there is no bobbin stripping. The cost of quilling which sometimes amounts to several cents per pound is completely eliminated. In addition to the savings of the operating cost of quilling there is less floor space required, elimination of the capital investment for quilling machinery and many miscellaneous items such as identification marking, handling and transportation.

Other items which will attract your attention are the absence of overhead works and the clean smooth lines of the machine with practically all the moving

(continued on page thirteen)
Work at USDA Clemson Cotton Laboratory

By J. M. Cook

The development of a basis for evaluating the quality of cotton has required continuous research over the years. Various methods of evaluating quality have been used, such as the comparison of samples in question with samples of known quality or "types," purchasing on the knowledge of place of growth, and purchasing on the basis of standards for grade and staple length. In recent years these methods have been supplemented to some extent by laboratory tests of specific physical properties of cotton fibers.

Standards for grade are based on the color of a sample, the foreign matter present in the cotton, and the preparation of the sample. Staple length reflects the length of the typical portion of fiber in cotton.

The idea of using selected samples of cotton and processing them to determine their spinning qualities in relation to grade of cotton was first used by the United States Department of Agriculture about 40 years ago. This information was needed in connection with the proper development and use of standards for grade and staple of American cotton. Tests were run at mills in different sections of the country. Samples in quantities of several bales were used as individual lots and processed through cooperating mills. Data were obtained at all the processes and analyzed and put into report form. Some cooperative work was also done at the New Bedford Textile School. Later, a staff of cotton technologists was located at North Carolina State Textile School, Raleigh, N. C., where spinning tests were carried on. In the late 1920's, after the project was moved from Raleigh, N. C., to Clemson, S. C., the quantity of cotton necessary to run a spinning test was reduced to less than 250 pounds. By the use of individual machines with fewer spindles, the quantity of cotton was further reduced to 50 pounds. This quantity was used until the middle 1930's. Special techniques were then developed so that reliable data could be obtained from samples of 5 pounds. Testing through research has developed rapidly since that time.

(Continued on next page)
WORK AT U. S. D. A.

(Continued from page eleven)

For a number of years the Department's research and testing work has included fiber testing along with the spinning work, as well as a study of the relationship between the fiber properties and the spinning quality. This work has yielded such valuable information that it is now possible to predict, through the use of fiber tests and classification, the relative spinning quality of different samples of cotton with a fair degree of accuracy.

An accumulation of spinning test data along with the classification of each lot has been built up over the years. From these data the average spinning quality criteria have been determined, and these serve as “benchmarks” for yarn skein strength levels for different staple lengths, and percentages of manufacturing waste extracted from different grades. The average skein strengths for 22s and 36s counts of carded yarn for different staple lengths are as follows:

<table>
<thead>
<tr>
<th>Classer's staple length (inches)</th>
<th>Average skein strength for 22s</th>
<th>Average skein strength for 36s</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pounds</td>
<td>Pounds</td>
</tr>
<tr>
<td>7/8</td>
<td>95.0</td>
<td>59.9</td>
</tr>
<tr>
<td>29/32</td>
<td>99.1</td>
<td>53.5</td>
</tr>
<tr>
<td>15/16</td>
<td>103.3</td>
<td>56.0</td>
</tr>
<tr>
<td>31/32</td>
<td>107.4</td>
<td>58.6</td>
</tr>
<tr>
<td>1</td>
<td>111.6</td>
<td>61.1</td>
</tr>
<tr>
<td>1-1/32</td>
<td>115.8</td>
<td>63.6</td>
</tr>
<tr>
<td>1-1/16</td>
<td>119.9</td>
<td>66.2</td>
</tr>
<tr>
<td>1-3/32</td>
<td>124.1</td>
<td>68.7</td>
</tr>
<tr>
<td>1-3/16</td>
<td>128.2</td>
<td>71.3</td>
</tr>
<tr>
<td>1-5/32</td>
<td>132.4</td>
<td>73.8</td>
</tr>
<tr>
<td>1-7/32</td>
<td>136.6</td>
<td>76.3</td>
</tr>
<tr>
<td>1-1/4</td>
<td>140.7</td>
<td>78.9</td>
</tr>
<tr>
<td></td>
<td>144.9</td>
<td>81.4</td>
</tr>
</tbody>
</table>

The average waste percentages extracted at the laboratory from different grades are as follows:

| Grade                          | Average picker and card waste percent
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Middling</td>
<td>6.3</td>
</tr>
<tr>
<td>Strict Middling</td>
<td>7.2</td>
</tr>
<tr>
<td>Middling</td>
<td>8.1</td>
</tr>
<tr>
<td>Strict Low Middling</td>
<td>9.3</td>
</tr>
<tr>
<td>Low Middling</td>
<td>12.5</td>
</tr>
<tr>
<td>Strict Good Ordinary</td>
<td>15.6</td>
</tr>
<tr>
<td>Good Ordinary</td>
<td>18.3</td>
</tr>
</tbody>
</table>

It was found that the twist inserted in the yarn to give optimum strength has a definite relationship to the fiber properties. Generally, the length is the most important fiber property in this connection. Accordingly, comprehensive tests were run to determine the optimum twist for different lengths. These were found to be as follows:

<table>
<thead>
<tr>
<th>Staple length (inches)</th>
<th>Twist multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/8</td>
<td>4.70</td>
</tr>
<tr>
<td>29/32</td>
<td>4.60</td>
</tr>
<tr>
<td>15/16</td>
<td>4.45</td>
</tr>
</tbody>
</table>

31/32  4.35  
1     4.25  
1-1/32 4.20  
1-1/16 4.10  
1-3/32 4.05  
1-1/8  3.95  
1-5/32 3.90  
1-3/16 3.85  
1-7/32 3.80  
1-1/4  3.75  
1-9/32 3.70

IMPOR TANCE OF FIBER PROPERTIES

The Cotton Branch of the Department of Agriculture operates testing laboratories at the following locations: Clemson, S. C., College Station, Texas, Mesilla Park, N. M., Stoneville, Miss., and Washington, D. C. The fiber properties measured in these laboratories for a number of years have been fiber length, fiber length uniformity, strength, fineness, and maturity. These properties bear a definite relationship to manufacturing processing and the quality of the end product. Generally, the influences are as follows:

Fiber length contributes to the fineness of the count of yarn that can be spun from a cotton. It also influences the strength of yarn manufactured.

Fiber length uniformity has an influence on the uniformity as well as the strength of the yarn spun.

Fiber strength is an important factor in determining yarn strength. Cottons with good fiber strength usually give less trouble in manufacturing than do the weak-fibered cottons.

Fiber fineness also contributes to yarn strength. Fineness imparted by immature fibers, as may often be the case if an airflow instrument alone is used as the measuring instrument, is not desirable in a sample.

Fiber maturity has an influence on the nepliness of the product made from a sample of cotton. Maturity contributes to the manufacturing performance, the less mature samples giving more trouble in processing. Cottons differing in degree of maturity do not dye uniformly.

TWO IMPORTANT DEVELOPMENTS

The research and testing work in the United States Department of Agriculture is designed to benefit not only the cotton farmer, but also the cotton breeder, the cotton merchant, and the textile manufacturer. One great difficulty, which is being overcome slowly, is to convey the proper meaning of the test results to laymen who are unfamiliar with the terms used. The development of the Yarn Appearance Grade Standards, which was accomplished at the Clemson Cotton Laboratory and adopted and which are now being sold by the American Society for Testing Materials, was an outgrowth of the need to measure the
NEW WEAVING MACHINE
(Continued from page ten)

parts totally enclosed. The harnesses are operated from the bottom and instead of the lay projecting beyond the machine it operates between the two main parts namely; the picking box and the receiving box.

Basically the operation of the weaving machine is the same as any method of weaving. That is, heddles strung on harness frames open the warp yarn into two groups forming a shed. A pick of filling is passed through this shed and this pick is pushed to the fell of the cloth by a reed. At this point the similarity ends because the mechanical methods used to perform these basic operations is entirely different. The shedding motion is cam operated with the cams located at the side of the machine. It operates the harnesses positively in both directions because each cam is in reality a pair of cams permanently fastened together. One cam for raising the harness, the other cam for lowering the harness. This cam housing is shown in the photograph W-117 and as may be seen from the photograph it has an eight-harness capacity. At the top of each lever or roller arm are adjustment points for controlling the size of the shed opening and for positioning the shed height. The motion of these cams is transmitted to the harness drive rods and lifter rods shown in photograph W-105. Each harness locks in position at the top of these vertical lifter rods. This eliminates the necessity of levelling off the harnesses when changing warps because one set of harnesses will always be in the same position as any other set. All the cams are of the same diameter and have the same throw, therefore, it is unnecessary to keep them in sets. The cams are reversible which means that the cams for a warp twill form a filling face twill when reversed. There is a levelling bar for levelling the harnesses and with this done the entire cam shaft and cams may be lifted out after removing only our cap screws.

The machine may be equipped with a harness leveling and pick back attachment. The harness levelling attachment automatically levels the harness each time the machine stops for a warp or filling break. The pick back allows the operator to find the pick by running the harness motion backwards without operating the rest of the machine. This attachment is necessary for finding the pick when a machine is equipped with the pick and pick filling mix unit.

The reeds used are similar to standard metal or pitch band reeds except they are heavily reinforced by two metal strips 3/4” high soldered to the bottom of the reed. This bottom reinforcement is securely clamped to the lay bar, the top of the reed is free using no reed cap or hand rail and thus making it easier for a weaver to pass ends through the reed. The width of the reed must be exactly the same as the spread of the yarn in the reed. For example, a (Continued on next page)
warp of 3,600 ends set 40 ends per inch over 90-inch es dented 2 ends per dent would require a reed 90 inches wide and with exactly 1,800 dents. This is necessary because as stated before, the reed operates between the picking box and receiving box.

The shuttle is guided across the machine by metal guide teeth spaced 1/4" apart assembled in blocks of four teeth per block. These guide teeth are precision made and must align perfectly with each other because there is only .008 clearance between the guide teeth and the shuttle. With this type of shuttle guiding it is impossible for a shuttle to come out or be deflected which eliminates long filling skips or shuttle floats and as the shuttle does not touch the reed at any time, reeds last indefinitely.

The lay is operated by a cam and counter cam driving a roller shaft. These cams and shafts are very carefully fitted and matched so that all play is removed. The lay bar is stationary for 2/3 of the machine's cycle or while the pick is being inserted and tensioned. During the other 1/3 of the cycle the lay pushes the pick to the fell of the cloth and returns. This action is quite different from the conventional in that the lay arms or lay swords are only about 7 1/2" long and the lay makes a short arc forward and downward. The reed hits the fell of the cloth perpendicular to the fabric and the guide teeth pass below the cloth. These guide teeth are open at the back and as they move forward and down they leave the pick in the shed just ahead of the reed.

The shed opening is rather small because the shuttle is only 1/4" high, therefore, as long as we get a clean shed opening the shuttle will pass through without interference. The maximum lift of the harnesses is close to the minimum lift on a woolen and worsted loom but because the harnesses are closer to the fell of the cloth the angle is slightly greater. This reduced harness motion aids in reducing end breakage. In addition, the shed is fully open while the shuttle is travelling through it. As a further aid to reduce end breakage, the reed travels about 3 1/4" which is about 1/2 the distance normally travelled.

The heart of the picking motion is the torque rod which supplies the lightening fast power used to shoot the shuttle across the machine. This rod is cocked or set by a heavy winding cam and when set the torque rod is twisted about 250° to 30°. The pick is fired by the firing cam tripping a toggle joint and the power is transmitted to a picker arm about 7" long. Attached to the top of the picker arm is the picker shoe which is guided top and bottom by two tracks, one of which also guides the shuttle. These tracks always keep the shuttle and picker in perfect alignment.

There are a number of shuttles in operation at one time. While one is being picked through the shed there are others that are slowly being returned by a conveyor chain and others are being held at the receiving box to be dropped on the conveyor at the proper interval. An approximate rule to follow is, there will be a basic number of six shuttles plus one for every 10" of cloth width. That is, a 70" piece of cloth will require 13 shuttles. As each shuttle in turn is positioned, supplied with filling and fired across the machine the filling runs free without tension for approximately 2/3 of the passage. For the last 1/3 of the passage two independently operated brake feet press the filling against a flexible steel strip called a filling cushion. At the receiving box the shuttle is slowed down and stopped by two adjustable shuttle brakes. In slowing down and stopping the shuttle passes an inch or two past the selvage and must be accurately returned to a definite position after each pick.

While the shuttle is being positioned, a tensioner arm at the picking side of the machine rises to tension the pick. The rise of the tensioner arm is always greater than the return of the shuttle, therefore, when the tension of the pick is equal to the frictional force of one filling break, the additional rise of the tensioner arm pulls the filling through the brake foot. This means that regardless of how each pick is inserted, either tight or loose, it is uniformly tensioned before the reed pushes it into the cloth. As soon as this pick is properly tensioned grippers on each side of the machine reach forward and grasp the pick close to the selvages. At the receiving side the shuttle springs are opened to release the pick. At the picking side the shuttle feeder moves forward and closes on the yarn before the pick is cut by scissors operating between the feeder and gripper. The reed and grippers move forward simultaneously to bring the pick to the fell of the cloth. The shuttle that has just completed its passage is pushed sideways into the expeller box where it awaits its turn to drop on the conveyor and be carried back to the picking side. While the next pick is being inserted a pair of tucking needles, one on each side, reach through and pull the ends into the shed to be bound by the following pick. Here it should be pointed out that these ends which have been tucked are approximately 1/2" long. This means that when they are doubled back and bound into the cloth there will be a 1/2" selvage with twice as many picks as the body. These additional picks are compensated for by reducing the number of ends in the selvage and sometimes by reducing the size of the selvage yarn.

For preventing damage to the machine and to the fabric, there is a detector system which releases the clutch whenever anything interferes with the proper operation of the various levers and motions in the picking and receiving box. When this detector sys-

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The filling detector operates at the side of the machine and fells the filling as it is being picked. If there is a filling break or if the filling is slack, the machine stops immediately. The warp stop motion is the conventional type using a top contact electric drop wire. Or the machine may be equipped with adapters for using other electric stop motions.

The take-up motion has a semi-low take-up roll with a constant worm drive. An item worthy of mention is a complete range of picks from 13 to 102 are provided by 8 pick gears. Various combination of four of the eight gears are used as indicated by a chart located on the inside of the hinged door. Space is provided in the bottom of the take-up housing to store the four gears not in use.

The let-off is a fully automatic let-off incorporating a spring loaded vibrating whip roll. Once the let-off is correctly adjusted for the style being run it does not have to be changed for the duration of the warp or as long as that same style is being run in the machine.

It would not be correct to discuss the Warner & Swasey Weaving Machine without mentioning its advantages for weaver and loom fixers. The weaver's job is lightened considerably. The machine is very easy to operate and it operates entirely under power. It always stops at a different position and one which is correct for repairing a filling break. There are signal lights which indicate why the machine stopped. A red light indicates a warp stop and a blue light a filling stop. If the machine stops without a light showing and the detector rod is tripped, it indicates a mechanical stop.

The loom fixer’s job is not any harder than it was before but it is different. Of course, he must learn an entirely new technique and use different equipment and tools. The majority of adjustments are made with feeler gauges and a set of small allen wrenches. Once adjustments are made, they remain as they are set. All setting and adjustments are timed by the index wheel located on the drive end of the machine. By using this simple system all the guess work and differences of opinion between loom fixers is eliminated. Each setting must be made to an exact degree position.

Burling and mending is greatly reduced because some defects such as filling drag-ins or side lines and filling kinks are completely eliminated and other defects are greatly reduced.

OCTOBER 1953

FIFTEEN
IOTA CHAPTER NEWS

The news from Iota Chapter of Clemson at the present time is concerned mostly with new pledges, a banquet, and Honorary Degrees, with an item on Phi Psi men who have recently graduated.

As soon as possible the chapter will take in the new pledges for the first semester. Just how large this pledge turn-out will be is unknown as yet. Pledge invitations will be sent out and a smoker party held for the new pledges within the next few weeks.

The first Phi Psi banquet for the current school year has been planned for October 30 at the Clemson House. Dr. L. H. Hance will be the speaker. The conferring of Honorary Degrees will be held immediately after the banquet in order that the candidates may be guests of the chapter at the banquet. All alumni members who wish to attend the banquet should contact the Iota Chapter Secretary, Box 864, Clemson, South Carolina.

As it has already been mentioned, the awarding of Honorary Degrees in the Phi Psi Fraternity will be held October 30 following the banquet. These degrees will be awarded to men associated with textiles, who the chapter feels should be deservedly recognized for outstanding contributions to the textile industry and to the education of textile students.

Recent Clemson graduates included 18 Phi Psi men, who we of the chapter were glad to see obtain this measure of success but regretfully notice their absence from the ranks of active members. Those graduated in Textile Chemistry were W. P. Creighton and F. L. Wickham. Graduating in Textile Engineering were M. R. Bridgeman, R. M. Cook, C. R. Mabry, M. C. Robinson, and T. E. Wessinger, Jr. And those graduating in Textile Manufacturing were W. R. Bridges, W. C. Compton, J. C. Crumpton, R. R. Fowler, R. L. Garrison, E. J. Gilliland, A. B. Hair, J. R. Kaiser, J. J. Poupalos, and R. V. Smith.

Since the last issue of the Bobbin and Beaker it has been requested that this column explain a few facts about the Clemson Phi Psi Chapter and how its men are chosen. Actually the Phi Psi is a national organization of nine active chapters located at institutions teaching textiles, with Clemson being the seventh or Iota Chapter. The Grand Council Executive Secretary is also located here at Clemson. The Fraternity is bonded together in brotherhood for the purpose of promoting good fellowship and higher standards among textile students while encouraging them onward to a successful career in textiles. In keeping with the objective of maintaining high standards and scholarship through the fraternity, it has been and is now Clemson's policy to pledge the sophomore with the highest scholastic average for each regular semester, and to pledge juniors and seniors with a grade point ratio of at least 2.6 and 2.3, respectively. This is based upon a "4" grade point system in which an "A" counts "4", a "B" counts "3", etc., and these are averaged out to give the students grade point ratio. We feel that this policy encourages scholarship among Clemson textile students and insures a good, all-round reputation for Iota Chapter and the Clemson School of Textiles.

N.T.M.S. TAKES IN NEW MEMBERS


Leon A. Cooper of Columbia, S. C., was elected as Sergeant-at-Arms from the new members. Other officers for the '54 session are: Vice President, Ben K. Chreitzberg of Williamson, S. C.; Secretary, J. Frank Byrd of Graniteville, S. C.; Treasurer, Robert T. Mitchell of Greenville, S. C.; Corresponding Secretary, Robert S. Calabro from New Jersey, and Publicity Secretary, George R. Morgan, Jr., of Greenville, S. C.

Professor Hubbard was selected to assist Professor Campbell as advisor for the organization this year and will assume full advisorship in September of 1954.

One of the chief aims of this chapter for the year is to start new chapters of N.T.M.S. in other textile schools of the country.
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PRINCIPAL PROPERTIES WHICH NEW FIBERS IMPART TO FABRICS

(Continued from page six)

Dresses and sport shirts for fall and winter and spring.
Blends with wool will be seen, as Orlon will add crease retention, durable pleats that are washable, wrinkle recovery, and warmth with lower weight.

Acrilan is an acrylic fiber and is made in staple only. It is made by the Chemstrand Corporation which is a company set up by the American Viscose Corporation and Monsanto Chemical Company.

Acrilan is very similar to Orlon in most characteristics such as warmth, crease retention, wrinkle recovery and dimensional stability. It will be used in the same type of fabrics in competition with Orlon.

Dacron is duPont’s polyester fiber. It is made in both filament and staple. Du Pont is the only manufacturer; however, it is being made in England under the name of Terrylene.

Filament Dacron is nearer to nylon in hand and behavior than Orlon, but is different from nylon in that it is:

- Stiffer, more rigid and more resilient.
- Doesn’t stretch as easily or have as much elasticity as nylon.
- Easier to sew without puckering.
- Offers ready washability and won’t shrink.
- Quick drying.
- Can be dyed wash fast.

Filament Dacron does, however, pill like rayon.

Its place is in fabrics for the following:
- Washable blouses, dresses and shirts, washable cord suiting, curtains, and industrial fabrics.
- Filament Dacron is not good for hosiery as it is not sufficiently elastic.

The outstanding characteristics of Dacron staple are as follows:

- Resiliency, wrinkle resistance, wrinkle recovery, and crease retention. Its wrinkle resistance is as good when wet as when dry. It is superior to wool and all other synthetics in this respect. Its abrasion resistance is high, almost equal to nylon, but it also pills like nylon.
- It develops static from wear and changeable weather conditions.
- It is dimensionally stable and readily adaptable to washable garments.

There are good drape and tailoring qualities in Dacron. It is excellent for summer weight suiting and slacks as well as spring and fall garments.

Washable slacks may be laundered without shrinkage or loss of crease and with very little need, if any, of pressing.

In blends with viscose, these properties of wrinkle resistance are imparted to the blend, although resin is necessary for the best results when Dacron is below 75% of the blend. It blends well with wool to improve wool.

Dynel is manufactured by Carbide and Carbon Chemicals Corporation in staple form only. It has a warm, soft hand and other properties of Orlon and Acrilan, but

- It has a low softening temperature.
- In 100% Dynel fabrics, it fuses, glazes and gets stiff at the rayon setting on an iron unless a press cloth is used between iron and Dynel fabric.

Dynel has outstanding resistance to burning and to chemicals, and will be used in fabrics where such resistance is important.

It should be good for half hose, knit goods, sweaters, etc., which don’t require ironing or pressing, also for chemical work clothing.

Vicara is manufactured by the Virginia Carolina Chemical Corporation. It is staple and has been in production some time.

Vicara has the most cashmere-like touch of any synthetic. It is best used for blending with other fibers such as nylon, to improve the hand, with wool to soften, and with rayon, to make a woolier touch.

It is also readily dyable.

In using these new fibers, there will be:
- Fabrics made of 100% new fibers.
- Fabrics of blends and combinations with rayon, acetate, nylon, wool, silk, and cotton to combine the good features of each to get cross dyes and styling, and to get lower cost.

The volume will be in the blends which offer lower cost.

In summary then, the outstanding characteristics in general which these new acrylic and polyester fibers possess over rayon, acetate, wool and cotton are:

- Hand and drape
- Wrinkle resistance without special finishes.
- Quick drying with little need of pressing and ironing
- Durability—to wear or abrasion
- Crease retention
- Warmth—in case of acrylics
- Washability — then some dyeing problems have been overcome
- Styling through combinations
- Price stability
- Insect proof

All of these add up to garments with lower maintenance costs, and clothing that is easier to care for and less costly to keep clean and fresh.

EIGHTEEN

THE BOBBIN AND BEAKER
RAMIE

By Max Gainor ’54

Ramie is defined as an Asian perennial plant with strong, lustrous, bast fibers capable of being spun into various coarse light-weight fabrics resembling linen.

The history of ramie dates back several thousand years. Ramie originated in China and the Maylayan countries and is better known to the trade as China grass. Its biological name is Bochmeria Niver — Niver meaning snow white which is the color of the finished fibers. The Egyptians used ramie fibers for wrapping mummies, and this plant was mentioned in the Chinese Treatise in 2200 B.C.

To date, the production of ramie fiber on anything resembling a commercial scale has been limited to Oriental countries having cheap labor. Mass production has been limited by lack of efficient methods for mechanical decortication. Decortication is the process of removing the bark and pith surrounding the ramie fibers without damaging the fibers themselves. In China, decortication is done by hand, the workmen scraping the ramie fiber from the green stems with crude implements. In this way only a few pounds of fibers can be separated each day. In our country any kind of hand process for an operation of this nature would be too expensive. Another trouble has been the cost of harvesting the ramie crop. When growing naturally, some ramie plants mature before others, even though all of them were planted at the same time. In the past, this difference in the state of maturity has made hand harvesting a necessity, and has practically ruled out mechanical harvesting. Recently, however, careful cultivation and fertilization and overall good management have smoothed out this uneven growth. Today, ramie plants cultivated in the United States have an even, steady growth that makes mechanical harvesting practical.

With the harvesting problem simplified, there still remained the need of an efficient mechanical decorticating and degumming process. The lack of such a process has been the holdback to production and use of ramie in this country. Without such a process, no American industry could compete with Oriental coolie labor.

Machines designed for scraping away the back and pithing core of the ramie plant from the valuable fibers have been of two general types. There is the larger, centrally located type of decorticator that is capable of separating the fibers from the stems of plants grown on thousands of acres. The other is a smaller, portable machine that can be set up in the fields where needed.

One of the companies that has been going in for ramie research in a large way has recently announced the perfection of a decorticator with a daily capacity of 20,000 pounds as compared to the few pounds per day by coolie labor.

Just a few of ramie’s possibilities include corduroy that is better than the standard cotton corduroy, inexpensive suits that cannot be distinguished from wool. Since ramie absorbs a lot of water and has a tendency to swell, it is used in submarines as packing around the propellers. Because it is stronger when wet, ramie also makes superior cordage, fishing nets and sails. In fact, it is a matter of record that ramie fiber is adapted to the widest range of uses among known textiles. Ramie can be used alone or in combination with cotton, rayon and wool.

The fiber is only a small part of the entire plant. Since the leaves and stalk tops are rich in vitamin A and protein, they make fine food for cattle. Its yield per acre is said to be higher than any other protein-producing vegetable. Ramie sauce for cooking is claimed to have a salty meat-like taste. This could prove to be a boon to people on a salt free diet. Ramie waste has been found to yield such valuable chemicals as chlorophyll and industrial proteins—all potentially valuable in chemical processes. Pectin, from the ramie gums, is widely used in the food and cosmetic industries.

Ramie has been defined as a perennial plant and it is usually grown from root stocks although it can be grown from seed. This plant prefers a warm climate and is grown successfully in California and Florida. When stocking a new field, sections of the root about 4” long are set at two to three foot intervals in rows, four feet apart and covered with a thin layer of soil. Usually the roots will burst into life within two weeks. During the first year in a new field, the weeds have to be controlled, but after that, the plant becomes so well established that it crowds out all other growths so that weeds are no longer a head-

(continued on page twenty-four)
NEW FRONTIERS
(Continued from page seven)

year some members of the South Carolina Legislature advocated measures similar to those which had doomed most of the textile industry in New England.

Amazing progress began in South Carolina. Thousands upon thousands of good new jobs were created, nearly every type of business flourished as a result, great increases occurred in government revenues, affording the rapid advancement we have enjoyed in educational facilities and other public services of value.

All of this was the answer of industry to a state which had proved itself sound after having so barely escaped an industrial development quarantine.

How may South Carolina continue to progress?

It seems very clear that much of the answer lies in the hands of you young men who will be the future leaders in this state. It cannot be emphasized too strongly, however, that with the opportunities you have come also the large responsibilities of advancing not only the industry itself, but of helping to maintain the healthy atmosphere which the people of the textile communities and elsewhere in this state are now experiencing.

As we enumerated earlier the mistakes of New England, let us now list what the young men of South Carolina can do to prevent what could happen here as it did up there:

1—In addition to doing your job every day, be alert, active and informed citizens; read up and broaden yourself on subjects other than just your job; know what is going on in your community, state and nation; learn from the mistakes of the past; do something about it by constant participation in good government; recognize and fight radical ideas; never surrender the proven principles of sound competitive industry, and draw a sharp dividing line between private business and government interference.

2—Help those who work with you to understand that wages must be compensated for by a fair return of productive work.

3—Continue day by day to remind yourself, your community and your state of the absolute necessity of sound and balanced attitudes in all phases of human well being.
WORK AT U. S. D. A. COTTON LABORATORY

(Continued from page twelve)

quality of a product made from cotton. The Standards have been a great help in measuring cotton quality.

In order to obtain additional test data on small quantities of cotton, a small sample slasher was designed and constructed so that as little as 2 pounds of yarn can now be prepared and woven into fabric for strength testing and dyeing.

COTTON TESTING SERVICE AVAILABLE TO BREEDERS AND OTHERS

To make the testing experience of USDA laboratories available to cotton breeders and others, an Act of Congress, passed in April 1941, provides for the making of fiber and spinning tests on a fee basis. The special equipment needed for much of the testing work and the high degree of skill required for accurate and dependable results have made it necessary to provide a certain degree of specialization at the various laboratories. The cotton testing services available at the various laboratories are as follows:

1. All laboratories:
   Fiber length by the fibrograph, fiber strength by the Pressley tester, fiber fineness by the Micronaire, fiber maturity by the Micro-projector method, and moisture content by the drying oven method.

2. Clemson, S. C., laboratory:
   Carded and combed yarn spinning tests, plied yarn and cord tests, Shirley Analyzer test, fabric weaving and testing, fiber length, fiber fineness and maturity by the array method, in addition to fiber tests which are performed at all laboratories.

3. College Station, Tex., laboratory:
   Carded yarn spinning tests, plied yarn and cord tests, Shirley Analyzer test, fabric tests, fiber length, fineness and maturity by the array method, in addition to fiber tests which are performed at all laboratories.

4. Mesilla Park, N. Mex., laboratory:
   Ginning of test samples, determination of foreign matter content of unginned cotton samples by the fractionation method, and Shirley Analyzer tests, in addition to the fiber tests which are performed in common at all laboratories.

5. Stoneville, Miss., laboratory:
   Ginning of test samples, determination of foreign matter content of unginned cotton samples by the fractionation method, and Shirley Analyzer tests, in addition to the fiber tests which are performed in common at all laboratories.

6. Washington, D. C., laboratory:
   All fiber cross-section, grade and staple classification, causticaire tests for fiber fineness and maturity, fiber length, fineness and maturity by the array method, in addition to the fiber tests which are performed in common at all laboratories.

Cotton breeders have been quick to use these services in evaluating the qualities of their selections, progenies, and new strains as a means of ascertaining promising selections. This has accelerated the progress made by American cotton breeders in developing cottons characterized by improved spinning quality. Many mills are taking advantage of the laboratory services to guide them in some of their purchases of cotton and to test their manufacturing levels to ascertain whether changes should be made.

A program of testing cottons of representative varieties grown by selected cotton improvement groups across the Cotton Belt was initiated in 1946. Samples representative of the predominating grade and staple length for early, midseason, and late-season lots, embracing a considerable number of bale samples composited for fiber and spinning tests, are carefully selected each year. The results are published periodically during the season concurrently with the crop movement.

THE TEXTILE SCHOOL TAKES TO THE AIR

The faculty of the School of Textiles of Clemson College, through the courtesy of the Clemson Journal and in coordination with J. B. (Bob) Mattison, moderator of this program, “takes to the air waves” each Wednesday on the 12:45-1:00 program for the next 52 weeks over WIS, broadcasting “state wide” at 560 on your dial. These are general programs and should be of interest to the public as a whole. A committee of four faculty members was appointed for the purpose of arranging these programs, Professors J. L. Thompson, R. J. Breazeale, and R. G. Carson with J. C. Hubbard, Jr., as Chairman.

Prof. Gaston Gage, outstanding member of the faculty known to all the graduates of the Textile School, gave an excellent start to the first program, taking the cotton from the grower to the mill. He covered the handling of cotton by the ginner, through the local buyer, to those who classify the cotton as to staple and class, and to those who resell to a mill which desires a specific type of cotton. The second program by Prof. J. C. Hubbard, Jr., covered the progress of the textile industry in the South, South Carolina in particular, for the past century. The third talk in the current series was given by Dr. R. G. Carson. The job location and placement of students was discussed rather extensively endeavoring to give some idea as to types of jobs available in the textile industry.
Here’s the outstanding combination extractor-dryer — with speed and efficiency proved by many years of satisfactory mill use.

Mills using this equipment report the extracting and drying of package-dyed yarn in periods of one and one-half to two hours. Drying time varies with the temperature used, density of packages, count of yarn and types of color.

Dye houses of any capacity benefit from the quick-drying, space and labor-saving features of the Gaston County combination extractor-dryer. For small production, one machine does the entire job — for larger production it may be used for extracting only, in combination with open port dryers. Let us show you how this machine can save money for you, as it has for other leading dyers.

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THE TEXTILE SCHOOL TAKES TO THE AIR
(continued from page twenty-one)

industry as well as the possibility and future of these jobs, and requirements necessary for the student to fulfill the job.

Future programs are planned to cover the use of soaps and detergents in launderings as well as the use and launderability of synthetic fibers in present day garment manufacture. Others will cover "Textiles as a Career," "Sewing Thread Production" and additional topics of interest to the farmer, housewife, textile executive, and prospective student alike.

At present this is a live program not only from the viewpoint that the program originates here on the Clemson College campus and goes directly on the air from the studio located here at the Clemson House, but also the topics are of today, for today. Plans are now being made to send these programs by tape under the name, "The Voice of Clemson" to stations at Greenwood, Orangeburg, Charleston, Sumter, Florence and WMIT at Mount Mitchell. Other programs will be transcribed and sent to thirty additional stations throughout South Carolina.

The idea behind these programs is to bring to the attention of the people of South Carolina some of the activities carried on here at the Textile School.

RAMIE
(continued from page nineteen)

ache. During the first year's growth, the plant reaches a height of about one foot. During the second year, the plant must be cut twice, and after two years, it must be cut three times a year. It has been said that you can cut the plant at night and by morning it will be several inches high. One of the main advantages of ramie is the fact that it does grow fast. To grow it must have food, therefore, it uses the food from the soil very fast and this must be replaced in the form of fertilizer. If the roots are not controlled, they will be too thick to grow after eight years. In fact, the ground will be a solid mass of roots and fertilizer will not help any more.

From an economical viewpoint, it is quite possible that the ancient plant may provide a new crop of major importance and a source of additional wealth for our states with a warm climate.
22 Ideal Drawing Deliveries
Replace 57 Old Style Deliveries
... and produce Better Yarn

Long Shoals Cotton Mills at Lincolnton, N. C., ordered 42 Ideal High Speed Ball Bearing Drawing Deliveries to replace their 57 old style units. After the first 22 had been installed they cancelled the balance of the order.

"Our 22 Ideal deliveries are producing as much drawing as we formerly got from 57 old style units," says Mr. Columbus Johnson, Cardroom Overseer, "and are giving us 4% to 6% greater breaking strength and almost perfect evenness. Our Ideal Drawing Equipment has not only made single process drawing possible and better than our former 2 process drawing but has solved a pressing floor space problem and saved one man's time on each shift."

The Long Shoals Cotton Mills spin 20's to 50's cotton yarns, but Ideal High Speed Drawing Equipment is equally efficient on any count cottons and on synthetics. Let us show you how you can save on equipment, labor, and floor space with Ideal High Speed Ball Bearing Drawing Equipment.

Ideal Industries, Inc.
Bessemer City, N. C.

*Patented
For: Dyeing, Printing, Reducing, Stripping

REDUCING AGENT FOR VAT DYEING:
A pure, full strength Sodium Hydrosulfite (Na₂S₂O₅).
A reducing agent for dyeing vat colors on cotton, rayon and other fabrics. Also HYDROSULFITE OF SODA Q.D. for immediate solubility in continuous vat dyeing machines.

APPLICATION & DISCHARGE PRINTING:
The highest strength of Sodium Formaldehyde Sulphoxylate. (NaHSO₅.CH₂.O₂H₂O). For application printing of vat colors and for discharge printing on all textiles. Also used for stripping.

DISCHARGE PRINTING OF ACETATE:
A clear-dissolving, soluble Zinc Formaldehyde Sulphoxylate. (Zn(HSO₅.CH₂O)₂). For discharge printing on acetate dyed grounds. Also for stripping certain colors on wool, acetate and nylon.

STRIPPING WOOL STOCK:
This is a Basic Zinc Formaldehyde Sulphoxylate (Zn(OH)HSO₅.H.CH₂O) used for stripping wool stock, Shoddy and rags.

DISCHARGE FOR INDIGO:
Mixture of Leucotrope W and Hydrosulfite AWC in the proper proportions to give a white discharge on Indigo-dyed grounds.

DISCHARGE FOR INDIGO:
Sulphonated quaternary base. For pure white discharges on Indigo-dyed grounds when mixed with Hydrosulfite AWC.

The Jacques Wolf Family of Hydrosulfites

Write today for complete information as to how a Jacques Wolf Hydrosulfite can help you do your job better. Samples for testing sent without obligation.