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THE

Bobbin and Beaker

Official Student Publication
Clemson Textile School

VOL 12 SPRING 1954 NO. 3

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Clemson Pre-twister for Roving Frames

DR. HUGH M. BROWN
Dean of Textiles

It is not usual that improvements in processing (or in anything else for that matter) can be had at no extra cost, but such seems to be true with a new development at Clemson.

When making roving normally, the strand between the top of the flyer and the front drafting rolls has very low twist. This is due not only to the fact that the final twist in roving is low but that the full twist does not get out of the top of the flyer and travel up the strand to the front rolls. Usually for some distance from the front roll there is practically no twist. Due to the strand passing out through the hole in one side of the top of the flyer it is vibrated back and forth which keeps it whipped slack by stretching it at its weakest places. This effect is especially bad for heavier roving for which the twist is lower and the mass being whipped is higher.
If there were some way of increasing the twist between the top of the flyer and the rolls it would prevent such stretching of the weak places and make better roving. Extra twist in this region would have to be "false twist" and not add any to the final desired twist in the roving.

It happens Clemson has developed a method of adding false twist to yarns to reduce ends down in spinning. The same principle, twisting by rolling the strands, can be used on roving frames. For spinning frames the yarns pass over the edge of rubber rollers mounted in the thread guides and driven by a belt along the side of the frame. (An article on the method is being published in Textile Industries magazine.) Instead of rollers the patents also covered the use of rotating rubber eyes to be built in each thread guide. Now for the roving frame, the method is simplicity itself, since each flyer top is already a rotating eye. Instead of keeping those eyes nicely polished they need only be covered with rubber which by rolling the roving can add as much as several hundred percent extra twist between the flyer and the front rolls. This extra twist is all false and does not follow the strand beyond the top of the flyer. The rubber may be applied in any of the following ways:

1. Place a rubber sleeve around the flyer top with the edge of the sleeve slightly above the metal. This can be nicely done by cementing half-inch pieces of gum rubber tubing around the top of the flyers.

2. The hole in the flyer top may be reamed out and rubber sleeve placed inside projecting slightly above the metal.

3. The top of the flyer may be coated by painting, spraying or dipping with rubber paint. The action is better if the hole is first reamed out to approximately one-half inch in diameter.

4. Rubber coated metal sleeves may be placed over or inserted in the flyer top.

Plans are under way to have special sleeves made by one of the rubber manufacturers.

The operation of the frame is not changed in any particular way. Only the results are different which it seems can be summed up as follows:

1. Much fewer ends down — Fewer splices to affect the yarn.

2. More compact roving and harder bobbins so that more stock can be carried by each bobbin.

3. Possibility of running with less twist hence more production and better spinning.

4. More even roving — Unevenness reduced 20 to 25 percent for heavy roving.

5. Possibility of a practical stop motion due to having firm strands between flyer and rolls.

6. Roving unwinds better at spinning frame and gives more even yarn.

All the above advantages can be had for nothing but the cost of a rubber band or a dab of paint for each spindle.

The method is not as effective on fine roving from high draft frames because it is already given higher twists and being so light the weak places are not stretched by whipping so badly as heavier roving. It is believed there should be some gain, however, and should make stop motions more practical.

A nice way to demonstrate the twist is to run colored roving along with the sliver in a normal end and one with the rubber band. The one with the rubber top will often show more than three times the twist. It was found both at Clemson and in a textile mill that the higher the false twist the greater the improvement in evenness.

Clemson School of Textiles is offering this device to the industry as a service of Clemson and will welcome anyone interested in seeing this simple improvement in operation.

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**FIBER MICROSCOPY**

A Textbook and Laboratory Manual

By A. N. J. HEYN, Professor of Natural and Synthetic Fibers, Clemson Agricultural College, Clemson, South Carolina.

1953. 396 pages. 377 illus. 6 tables. $5.50

**INTERSCIENCE PUBLISHERS, INC.**

250 FIFTH AVENUE, NEW YORK 1, N. Y.

The material is presented in the form of a standard course, based on the author's experience with textile classes at Clemson. It familiarizes the user with the microscopic appearance of all natural and synthetic fibers commonly used in the United States and with the techniques for their identification and investigation. Microscopy and microchemistry of fibers are developed in a gradual and pedagogical way. Added are a great number of photomicrographs, especially of synthetic fibers, hitherto unpublished.

The user of the manual will be able to analyze and identify any commercial fabric, qualitatively, for its fiber constituents.
Measuring and Reducing Industrial Fatigue

The following is a condensation of an article on measuring and reducing industrial fatigue by Lucien Brouha, M. D., D. Sc., of the Du Pont Company's Haskell Laboratory for Toxicology and Industrial Medicine. It was published in the January issue of *Advance Management* and is presented here with the permission of the editors of that publication.

Years of research have established the fact that increases in an individual's pulse rate and temperature following muscular exertion and the time it takes these reactions to start back toward normal levels can be relied upon to measure the amount of physical stress caused by work and the fatigue it is apt to induce.

While muscular activity is known to result in physiological changes other than increases in pulse rate and body temperature, many of these cannot be used on the job evaluation of fatigue in industry for a variety of reasons, some of them related to the impracticality of making the required measurements outside the laboratory.

But measuring pulse rate and body temperature is technically simple and the equipment required — stopwatches and accurate medical thermometers — is inexpensive and easy to handle and the duration of a single observation may, at the most, be only four minutes.

The procedure which not only serves to measure fatigue inherent in a given set of working conditions, but to evaluate the relationship to fatigue of such factors as age and sex of workers, is essentially as follows:

Immediately following a given work period, the plant physician, whose studies usually are correlated with engineering work-method investigations, records the pulse rate of workers at rest three times, at one-minute intervals. Thus he determines pulse increases caused by exertion and the rates at which the pulse returns toward "resting levels." Body temperatures also are recorded during the same four-minute rest period.

The procedure is repeated through the working shift. If the average rise in pulse and temperature is found to be progressive or if the recovery to the "resting level" too slow at any time during the shift, the physician may be certain that something about the job activity or working conditions is causing employees to draw too heavily upon physical reserves.

Each worker can be considered as owning a "physiological capital" which enables him to have a certain "physiological credit." As he works, he contracts a "physiological debt" which varies with the nature of the job. After the work is over, the greater the debt the longer it will take to pay it back and to recover fully to the physiological resting level. Therefore, any change in the job or in the environment that will reduce the physiological stress will also reduce the debt and the time necessary to recover. Consequently, for the same amount of work, fatigue will decrease.

The reduction in physiological stress can be evaluated by the extent to which heart rates and body temperatures have been found to have been lowered and by the disappearance of high reactions toward the end of the day. The aim is to organize the work so that at the end of the shift the reactions are the same or only slightly higher than they were at the beginning of the day's work.

Examples of reducing the stress and of evaluating the physiological benefit of the change are given in the following:

1. Reducing the Work Load

   Any body motion is the consequence of the construction of at least two groups of muscles: some which produce the action and the others which control it by antagonist contraction. The final results can be expressed as "mechanical work" in terms of foot pounds. It should be realized, however, that so far, no relation has been established between the mechanical work done and the energy spent by the body to maintain its balance and to accomplish the various motions necessary to produce the mechanical work. In terms of the human machine, what counts is not the mechanical work but the "physiological work" which is necessary to perform a certain movement and which sooner or later will produce fatigue. Nature, speed and rhythm of motion influence the physiological cost according to the number of muscles, which has no direct relation to the mechanical work, is nevertheless costly from the physiological point of view. A simple example of this fact is given by the much more severe fatigue experienced while painting a ceiling with numerous muscles statically contracted than while painting a floor when little static contraction is needed.

   Many industrial operations can be made easier if the position of the body (static contraction), the nature of motion (dynamic contraction) and the speed of motion (rate of contraction) are so arranged that the work load is decreased and the physiological cost of the job is reduced to a minimum level. This can be achieved by combining time, motion and physiological studies.

   For any job in which the physiological expenditure is great enough to produce significant changes in heart rate, the heart rate recovery curves will determine the physiological cost of the job and will permit evaluation of any modification that is made in...
An Address . .

By Dr. Ellison S. McKissick, Vice-President
South Carolina Textile Manufacturers Association

We are gathered here today to pay homage to, and present awards to, the champion cotton growers in South Carolina in the year just past. These are the men who have been able to coax the highest yields from a selected five acres, or the winners of the annual South Carolina Five-Acre Cotton Improvement Contest. Somehow it is hard for me to refrain from referring to them as South Carolina’s Kings of Cotton for the year. It is, I well realize, somewhat hackneyed and trite always to refer to our staple agricultural commodity here in this part of the country as King Cotton. Here in the cotton belt we have hotels, motels, streets and everything imaginable named King Cotton.

However, it serves the purpose in emphasizing the point I wish to make when I refer to the personification of Dixie’s great staple crop as King Cotton—and that is the great cotton heritage we have here in South Carolina. Today, it is estimated, cotton is a way of life for some 14,000,000 Americans — that is, people who are one way or another dependent on cotton for a livelihood. But when you come to think of it, there is no other area in the world where cotton — its culture and its manufacture — plays so important a part in the lives of so many people, in proportion to our size and population at least, than in South Carolina.

Cotton is actually older than recorded history. Man has made use of the plant, which has grown either in tree or shrub form, for thousands of years. In Peru not long ago cotton cloth was found on a mummy estimated to be over five thousand years old. The cloth was a fine fabric of unusual length and still showing good tensile strength. We can well assume that cotton is as old as plant life on this globe, but our cotton heritage here in South Carolina goes back to relatively early Colonial times when the prized and fabulous Sea Island cotton grown on our coast went into fine fabrics for the royalty of Europe and sometimes brought as much as $2.50 a pound.

Our so-called American upland cotton was brought in from Mexico and the same types have been introduced over much of the world after breeding to make them adaptable to the prevailing soil and climate. Of course the boll weevil came and stayed with us by way of Mexico also, and that is why Sea Island can no longer be profitably grown on our coast or elsewhere in the cotton belt. But I am getting a little off the track. I want to remind you that we have always had cotton in our blood here in South Carolina to such an extent that it is small wonder that a South Carolinian, Senator James H. Hammond, on the floor of the United States Senate in 1856, first coined the expression, “Cotton is King.”

Cotton, a commodity subject not only to the vagaries of nature but the tide of world trade, is essential to us in normal times and of immense strategic value in time of war. Actually, one can think of no other raw agricultural commodity which has had a greater influence in determining the course of our national existence, our way of life — economically, sociologically, or politically — than this fiber, the most versatile fiber of all, and the southern part of our country has nearly always, even as now, accounted for about half the world’s production.

Yet, in an economic sense, cotton didn’t become so important to us until Eli Whitney invented his marvelous cotton gin in 1793. And it is interesting to note, by way of coincidence, that our cotton manufacturing industry in America is considered to have been born in the same year when Samuel Slater built at Pawtucket, R. I., the first cotton mill in the New World using the Arkwright water-powered system of cotton processing which he duplicated from memory, having served as a machinist in the first English mill to be completely equipped with this system.

The cotton manufacturing industry sparked the industrial revolution and mass production in the infant nation that was destined to become the mightiest on the face of the globe, and one whose high living standard is the envy of the world. There certainly would not be time here even to begin to show you the many ways in which cotton has so profoundly influenced the course of modern civilization. I’ll cite merely one. And I’ll start by asking: To what do our womenfolk owe their great freedom today, their greater education, their political rights, their leisure, their attainment in so many worthwhile fields of endeavor?

What has removed them from 18th Century servitude? The great suffrage movement of a few decades ago, you suggest? To an extent, yes; but Eli Whitney’s cotton gin did more to raise the status of our better halves than all the suffrage agitation in the (continued on page 21)
Where Are They Now?

By
Fred H. Hope, TM '55

Springs Cotton Mills: Francis L. Bell, '38, office manager; Ernest S. Armstrong, '32, cost accounting; Thomas B. Poole, '50, quality control technician; G. Cleveland Miller, '48, textile engineer.


Springs-Gayle Plant: V. A. Ballard, '38, superintendent; C. C. Brigman, Jr., '38, overseer; Emory J. Hollis, '49, assistant overseer.


Springs-Springsteen Plant: Harry M. Miller, '49, assistant overseer of spinning; Joe H. Sanders, '26, superintendent of Springsteen Plant.

Springs-Kershaw Plant: Theron Carter Hegler, '41, assistant to superintendent; Olin Mitchell Clark, '51, supervisor of testing.

Springs-Grace Bleachery: R. S. Stribling, '24, plant manager; James M. Sharp, '25, superintendent of finishing department; Robert M. Hughes, '36, chief chemist; Claude S. Hughey, '43, overseer of dyeing; Richard O. Belue, '44, assistant plant engineer; D. A. Watson, '47, chemist in charge of laboratory; John M. Bridges, Jr., '47, Hooker operator—packing department; Ira E. Estridge, '49, calendar operator—finishing department.

Springs-Research and Quality Control Department: Furman H. Martin, Jr., '33, director of research and quality control; James R. Hunter, '46, laboratory foreman; John H. Blackwell, Jr., '51, laboratory assistant; William L. Grist, '51, laboratory assistant.

Springs-Standards Department: Oren E. Sullivan, '40, key man — Fort Mill; Archie L. Todd, '46, key man — Chester.

Springs-Cotton Department: James B. Elliott, '33, cotton buyer.

Monarch Mills: Thomas D. Truluck, manager, cotton purchasing; William E. Broadwell, assistant to director quality control; Marvin D. Lindsay, manager, waste department; Horace L. Pratt, Jr., superintendent; Ben R. Black, Jr., second hand, weaving department; Harold E. Hulon, trainee, carding department; Woodrow E. Dunn, superintendent; William D. McBee, overseer, spinning department; Laurens E. McAlpine, head of accounting department; Robert L. Whitaker, second hand, weaving department. (Non-graduates): Frank S. Sistare, head cotton classifier; Joe F. Shinta, time study engineer; Calvin S. Dobson, time study engineer; John David Hagan, trainee, laboratory.


(continued on page 16)
HIGH PRESSURE, high temperature dyeing of today's new synthetic yarns is a precision process. To maintain top level performance, all Gaston County package dyeing machines are equipped with the new Electronic DYNAMASTER controls. For the first time, the accuracy of your dyeing is not affected by ambient temperature changes, shock, vibration, line voltage fluctuations, and other normal outside interference. Gaston County's positive control and unequalled ruggedness of construction assure greater economy of operation and upkeep. Combine these with many other advantages fully described in our new literature and it's easy to see why Gaston County installations range from the world's largest to the smallest. In the interest of higher quality, lower cost dyeing . . . .

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STANLEY, NORTH CAROLINA
What Textile Preparatory Machinery Needs Variable Speed Drives and Why

By
Mr. Joseph L. Delaney,
General Superintendent, Joanna Mills

My topic of discussion gives me a great latitude in past, present, and future applications of variable speed drives. I have tried to use some restraint in not venturing into impractical or improbable adaptations of this type drive. In general, my remarks will be confined to the field of textiles in which I am most familiar and which offers a real challenge for variable speed drives.

PICKERS
This machine receives the partially opened stock from the Opener Room. It continues to open it and also to clean it of the heavier impurities, then forms the stock into a thick uniform sheet which is wound into a continuous roll called a ‘Lap’. We are concerned only with the forming of the “allegedly” uniform sheet of stock. One yard of lap contains enough cotton to spin from ten to twenty miles of yarn, depending on count. It is axiomatic that to make quality yarn you must start with a lap of high uniformity. The picker evener motion is supposed to regulate this important feature but due to mechanical difficulties requires a terrific amount of maintenance in order to function properly. This motion is as old as a Model T. It is subject to every conceivable ailment of decrepitude. It has too many joints, links, couplings, slides, loose fitted bearings and tie rods. It easily becomes fouled with the lint contained in the air of the average picker room. Its cone section, which increases or decreases the speed of the feed rolls, has a narrow driving belt which has a high slippage factor due to glazing over from dust and lint. This same belt stretches, curls on the sides, and narrows in width, giving slower response to the actuating mechanism and all in all is a complete arrangement for bedeviling the Quality Control Department.

Now here is where a modern variable speed unit controlled electronically and operating in a dust tight casing would really do a job. Such a drive would actually do the work our present eveners are so inadequately performing. This drive would require a minimum of maintenance and give positive control of the feed roll speed. It would have no mechanical linkage to foul, no bearings to stick, no rods to bind, neither slippage, stretching, nor narrowing of its belt. The drive would be powerful enough to handle the load with a high margin of safety. Is there such a drive now available for a picker? No! Is there need of it? Positively!

CARDS
Some time or other all of us have heard about the brand new card evener motion just due to be put on the market. This device would deliver sliver superlatively even, from which smooth, even, strong yarns could be spun. Up to now this is still wishful thinking; but nobody questions the desirability of such a gadget.

Now the card is a rather fine piece of machinery. It does its job well and at a very low cost. Essentially it is pretty much the same today as it was almost a hundred years ago. It takes the picker lap composed of larger tufts of stock, opens these up to the individual fiber, cleans out trash, leaf, etc., drafts the cotton out to a soft untwisted sliver which has two highly contradictory features. Yard for yard it is very uneven; but inch for inch it has a high uniformity. Over a period of time means have been found to make better picker laps which make better sliver. Better settings, speeds, or components have also improved card sliver uniformity. Up to now nothing has been added to the card which by itself alone corrects a poor lap into a good sliver. If a thick or thin place occurs in the lap it will be made into thick or thin card sliver from which thick or thin yarn will be spun.

It may be that I am somewhat quality conscious, but it is true that quality sliver pays off eventually in lower costs in both spinning and weaving. Such a device as described for use on the picker might be adapted to the card feed roll. Ordinarily, card sliver runs from 10 to 15 percent on the Saco-Lowell Sliver Tester. If this figure could be reduced to 5 or 7 percent, then doublings, except for the very fine work, could be eliminated almost, and large size roving would become practically universal. This would pay off handsomely in higher productions and lower costs.

DRAWING
A generation ago serious attempts were made to make more even drawing sliver by inserting a small pair of cones into each delivery of drawing. By (continued on page 18)
The Textile School Takes to the Air

By
C. H. Ferguson, T.M. '55

The faculty of the School of Textiles of Clemson College, through the courtesy of the Clemson Journal and in coordination with J. R. (Bob) Mattison, moderator of this program, "takes to the air waves" (dial 560) each Wednesday on the 12:45-1:00 program to bring you the latest news of interest in the textile world. These programs are taped for transcription and used by twenty-nine radio stations throughout the state. Also a four minute "Voice of Clemson," a condensation of these programs, is sent to and used by Greenwood, Orangeburg, Florence, Easley, two stations in Charleston, Sumter and WMIT, and Mount Mitchell FM which covers seven states.

Professor T. D. Efland, Head of the Knitting Department, on December twenty-third, discussed the meanings of different terms used in the knitting industry plus the quality of nylon hose. It is interesting to notice the nylon is not worn out in the sense that we normally think of wear. Professor Efland stated that ninety-nine per cent (99%) of the nylon meet with an accident, such as a sharp fingernail, a splinter on a chair or some other sharp article. "Why don't we make stockings with a larger yarn?" was the next question asked. Professor Efland stated that anyone knows that you must give the customer what she wants and not what she thinks she should have. Hosiery is a fashion accessory to the ladies' costume and is generally purchased as such, and not as a utility item. Nearly all hosiery departments stock heavier denier hosiery which will give greater wear, but they represent a very small percentage of sales.

On January sixth, Professor H. L. Loveless, of the Warp Development Department, discussed the importance of textiles to the American people. According to the statistics of the Bureau of Agricultural Economics, each person in the United States consumes a little over 43 pounds of textile fibers each year based on the average amount of fibers used from 1943 to 1953. This includes all fibers: cotton, rayon, wool, acetate, nylon, etc. Professor Loveless stated that cotton leads all other fibers by making up 32 pounds of the 43 pounds which includes all fibers. In recent years, cotton has increased in per capita consumption but not in proportion to the total. Professor Loveless also pointed out that the United States, while having only 7% of the world population, consumes more than 1/3 of all fibers. It is interesting to note that the year of highest fiber consumption in the United States was in 1942 when war and industry uses played a large role. The per capita consumption for the year was over 50 pounds per person.

Professor J. C. Hubbard, reported some of the general problems faced by the housewife in caring for textile products. First, Professor Hubbard told the best way to wash chenille bedspreads, housecoats, beach coats, etc., by removing soil or dirt was to place the article in lukewarm water and use a synthetic detergent. While the spread was still wet it was placed into the machine and washed for three or four minutes. It was then rinsed once, keeping the tumble or spin dry at lowest possible speed. The action was watched closely and the fabric removed as soon as the fluffy pile would stand up. It was hung without folding to complete the drying, shaking the spread occasionally. Next, Professor Hubbard talked on Dacron, especially emphasizing its outstanding ability to resist wrinkles and stains, and to retain its shape and crease. After that he pointed out that Orlon-wool, and acetate-Orlon-rayon are the most popular blended fabric on the market at the present time, but as time goes on and fiber production of the man-made increases, it is likely that there may be some changes. Professor Hubbard is an authority on textile fabrics and knows a great deal concerning the care of a fabric.

Professor J. L. Thompson told us the history of cotton and the three groups of cotton on a commercial basis in the world today—(1) Long Staple, which is 1 1/8 inch and longer. Long Staple includes such varieties as Karnak, Sakel, and Pima. These cottons are of a fine character and are used in the finest weaves. (2) American Upland, about 85% of all cotton used is American Upland. (3) Short Staple Cotton, this cotton is of a very inferior quality; consequently only a limited amount is used in this country. The small amount which is used is for mops, stuffing, etc.

Professor W. Bratton Williams emphasized the importance of safety. He pointed out that all accidents fall under three causes: (1) Unsafe conditions; (2) acts of persons; and (3) Acts of GOD. The first two are man-made and make up 98% of all accidents while acts of GOD are responsible for about 2% of our accidents, such as lightning, floods, tornadoes, and over these we have no control. "You have heard (continued on page 13)
Reasons for the Large Textile Growth in South Carolina

By
J. L. Richardson, Textile Management Department

As one rides through the state of South Carolina, we see new textile mills by the hundreds and the question asked by some is: “Why are so many mills coming to this state?” The whole thing resolves down to the fact that the textile industry on a whole is a very competitive industry, and as such the mills are forced to locate where the overall cost of manufacturing is lowest.

What, then, are the contributing factors to this low cost of manufacturing in our state? Perhaps the most significant reason may be found in the nature and character of the people of South Carolina. Many textile managers have attributed their success to this factor above all others. The people of South Carolina are over 90% native born. They are individual thinkers and do not require someone else to do their thinking for them, they are free from the false ideologies or “isms” which plague so many groups in America today. The people welcome new industry, because they realize that the more industrial jobs we have means more wages and a better standard of living. In exchange they feel they should give a good day’s work for a good day’s pay. As a result their high productivity has caused many a new plant to succeed from the start. This is verified by the Dunn and Bradstreet Magazine’s tabulation of business failures in the United States for the year 1950. Business failures in the United States run 34.3 per 10,000 businesses, and in South Carolina it was 4.7 per 10,000; this was the lowest in the nation for that year. Machines run just as well in other states as they do in our state, it’s the people operating these machines that makes the difference. Our people are reasonable and are not out on strike on every disagreement with management. The total man-hours lost due to disputes with management during the fiscal year ending June 30, 1952 was only three ten-thousandth of one percent of the total man hours worked. This is another factor that encourages new mills.

The supply of labor has also been more than adequate at almost any location in the state. About 798,000 people make up the labor force of our state. This plentiful supply of labor is partly due to the mechanization of farms causing thousands of people to seek positions in industry. It is estimated that for every farm job available, 14 persons from farm backgrounds must seek other employment. Coming as they do from small towns and rural areas, the people of South Carolina who seek places in industry are sound thinking, conservative, honest and free from foreign ideologies which have brought turmoil else-

where. You will notice that many of these textile plants are located in rural districts and draw on the local labor supply. Very seldom do you see a mill village around a plant that has been built in the last ten years. These farm people know the value of hard work, and are eager to give a fair day’s work for a fair day’s pay. The people are friendly and cooperative with management, because of their high sense of loyalty that is ingrained in their character. As a result, they are highly productive and quick to learn new skills. Almost every plant manager faced with placing a new plant in production has been astounded by the speed with which South Carolinians acquire the skill and technical know-how which make for profitable production. In many instances plants have been brought to full production months ahead of schedule.

South Carolina has also been blessed with many natural resources. The raw cotton that is used in many of our textile plants is grown right here in our state, and as a result much is saved on freight in shipping to the mill. Technical men advise that the use of synthetic fibers are being integrated and blended with cotton and wool. It follows that South Carolina’s large forest reserves, and its intelligent renewal program, will be of permanent interest to industry. Some rayon yarns are made from wood, therefore, the raw materials are once more, close to the processing plants. Another natural resource that is extremely important to large plants is the water potential for producing power to run the plants. South Carolina has, through its 36 generating stations, the power necessary to take care of its expanding textile industry. Plans are in the making to take still further advantage of the power potential of our lakes and streams.

Our state government has provided the state with an excellent system of roads. There are 23,138 miles of roads in the state system of which 8,888 miles are in well-marked primary system. Hard surfaced roads in both primary and secondary systems total 14,842 miles. These well-maintained roads are very necessary, for trucking the raw materials to the plant and for transporting finished products to the markets. There are over 250 motor carriers doing business in the state, and a large network of rail lines blanket the state. Also, being a coastal state, we may ship readily by sea.

Another part of our state government plays, is the genuine interest it has shown by cooperating with
the textile companies that show interest in locating in South Carolina. Our tax laws are administered by a commission of five members appointed by the Governor, approved by the senate, with staggered terms, so as to avoid sudden changes of personnel and more important, insuring a consistent and conservative administration. Stability of tax policies is a very important advantage to textile executives who are looking far into the future. As an example, general property taxes in one state are 300% more than in the state of South Carolina. This is a substantial difference and shows how interested our state government is in encouraging textile business in our state. South Carolina led the nation in industrial development from 1948-51, and the textile industry accounts for a large percentage of this industrial expansion.

Another thing our state government has done to assist the new mills coming to our state is to set up a Research, Planning and Development Board whose function it is to give assistance to existing industry and assistance to industry seeking a new location. This board provides information on such items as labor supply, transportation, power, water, sites, building and buildings costs and many other such items. This board also cooperates with the county planning and development boards throughout the state.

THE TEXTILE SCHOOL TAKES TO THE AIR
(continued from page 11)

of the three "E's" of safety: Engineering, Enforcement, and Education. You cannot create safety by mechanical guarding or by enforcing rules. You must educate for safety. You must create interest and enthusiasm for safety." This was stated by Professor Williams in his speech.

On February 10, Professor W. T. Rainey spoke of the "handling of textile materials." This "handling" refers to washing, bleaching, and other home processes. To decide whether to use a soap or a detergent you must first consider the use of the product. For instance, there are several sudsless detergents which are better for dishwashers than soap. Then, consider the user, for many people are allergic to some soaps. Soap is insoluble in hard water while detergents are not always affected. They operate efficiently in hard water without waste or formation of curdy material. Bleaching is not a cleansing agent so it does no good where washing shirts with dirty cuffs for example. Cotton may be oxidized if excessive bleaching is used and this cuts down on the wear of the material. It is interesting to note that most grocery store bleaches call for using about five times as much bleach as a power laundry would use for the same amount of clothing.

SPRING 1954
organizing

attempts to reduce stress and fatigue. For example, in a job where men had to skim impurities from the surface of a liquid with a long and heavy ladle, the tanks were situated at such height above the floor that the operation had to be performed at shoulder level. Average reactions were high, reaching 160 beats per minute for the first pulse recorded one minute after skimming one tank. Special platforms were built so that the men could operate slightly above waist level. The average heart rate recorded one minute after the operation dropped to 112 beats per minute indicating a drastic reduction in the physiological work necessary to perform the job.

A very fatiguing operation can be transformed into a comparatively easy one by total or partial mechanization of the work as well as by improvements in motion and timing. For example, changes in heart rate recovery curves were observed in the same environmental temperature on men doing a job entirely by hand or partially mechanized. In this case the mechanical device eliminated lifting and using a comparatively heavy hammer above shoulder level. Before this improvement a high physiological stress was put upon the workers as indicated by an average recovery pulse of 148 beats per minute measured one minute after the end of a work period. With the new method the average value fell to 110 beats per minute demonstrating that the partial mechanization had resulted in a marked diminution of the stress.

2. Reducing the Heart Load

Considering the effect of increasing environmental temperature on the physiological reactions, it is obvious that reducing the temperature at which the work is done will proportionately lower the reactions. This can be achieved by an adequate ventilation system, by properly insulating the sources of heat, by protecting the workers with screens or special clothing and by developing tools and methods which will enable the man to work as far as possible from the source of the heat.

When humidity enters the picture, adequate ventilation and sufficient air movement will considerably improve the situation. When temperature and humidity were reduced and air movement increased, more favorable heart rate recovery curves were recorded throughout a working shift. At the same time the average body temperature was reduced from 99.0° F. to 98.6° F. Therefore, maintaining temperature and humidity as low as ventilation cost permits, reduces considerably the physiological stress upon the cardiovascular system and the thermo regulating mechanisms of the workers. The final result is less fatigue and greater efficiency.

3. Organizing Adequate Rest Periods

In many instances, particularly in “hot industries,” even when mechanization is advanced and temperature has been reasonably controlled, high reactions are still observed among the workers. In such cases adequately organized rest periods provide a reduction of the physiological stress. When the job is scheduled in such a way that the workers take, at set intervals, a rest period which is of long enough duration to insure a complete or nearly complete recovery, they will be able to avoid excessive fatigue and to remain in good physical condition throughout the shift.

Establishing adequate rest periods is not an easy task. It has been done patiently, by the method of trial and error and with the close collaboration of the physiologist and the industrial engineer so that changes in rate of work and in production can be evaluated together with changes in physiological reactions. The problem can be illustrated by results of studies made at two average temperature levels with the same group of workers. At an average temperature of about 40° F. with short rest periods between successive operations in the morning and with longer rest periods during the afternoon, the workers were able to perform eleven full cycles of work without showing abnormally high reactions. When the groups were studied in an area where the average environmental temperature was around 82° F., the number of operations was reduced from eleven to eight giving the men longer rest periods. Nevertheless, very high physiological reactions were observed during the second part of the shift indicating a progressive accumulation of fatigue. This shows clearly that at low temperatures the sequence “work-rest periods” was adequately determined to insure high efficiency with a low fatigue level.

At higher temperatures this system did not work. In spite of a considerable reduction in the total work load and in spite of a considerable increase in the rest allowances, physiological reactions were at a high level. The stress became greater as the shift progressed and the men reached a state of extreme fatigue at the end of the day. In this case, in order to maintain both the physiological reactions and efficiency at an acceptable level, another solution had to be found which was to increase substantially air movement in that particular area. Here again the combination of time study and physiological study lead to a satisfactory organization of the day’s work.

Duration of rest periods as the shift progresses and as the environmental temperature changes as well as the time intervals between successive rest periods must be accurately determined if a maximum of beneficial results is to be achieved. When an adequate solution is found the reduction of the physiological
stress is evident as shown by the lowering of the heart rate and of the body temperature throughout the shift. In relation to this problem it must be remembered that complete recovery is impossible for men who rest in hot surroundings. In certain instances it has been found necessary to air condition the rest rooms in order to insure environmental conditions favorable to a complete and fast recovery of the workers. Such rest rooms have been installed and used for several years in various plants of the Aluminum Company of Canada. The results have been very favorable as illustrated by the comparison of the heart rate recovery curves obtained during the summer on two groups of men doing the same job in the same environmental conditions. One group who took their rest periods in the plant or outside in the shade showed definitely higher reactions both at rest and after work than the men who could rest in air conditioned rooms and could recover to approximately their normal resting level. The temperature maintained in these rest rooms varied with the plant temperature but the humidity was kept at a constantly low level so that the clothing of the men, wet with sweat, dried quickly and made the workers more comfortable, insuring at the same time a good evaporative cooling and a complete return of body temperature to normal levels.

4. Organizing Adequate Teams of Workers

In certain operations where several men are involved, it is sometimes found that, in spite of various improvements, the physiological stress remains too high when the working team comprises the smallest number of men compatible with the job. Under these conditions the only way to bring down the reactions of the workers is to add men to the team. This decreases the individual physical exertion and increases the resting time. Average heart rate recovery curves were obtained for crews of three and four men on the same job. In addition to having a much higher pulse rate, the three man crew also had a higher average body temperature of 99.6°F, as compared to 99.0°F, for the four man crew. The addition of an extra man reduced the physiological stress on the cardiovascular system as well as on the thermoregulating mechanisms. Comparisons of reactions recorded on a comparatively cooler day with the environmental temperature averaging 88°F, with those obtained on a warmer day averaging 115°F, demonstrated that the greater the physiological stress produced by the job and the environment, the greater the improvement achieved by the addition of an extra worker.

5. Influence of Adequate Water and Salt Supply

The importance of an adequate water supply for workers involved in manual labor in hot surroundings has been emphasized repeatedly. In heavy jobs twelve quarts of water or more can be lost through sweating during eight hours of work. In order to avoid excessive fatigue this loss of water must be compensated for as the shift progresses. Drinking must be frequent and sufficient in order to maintain the water metabolism at a normal level on an hourly basis. If the water intake is insufficient, efficiency is reduced and exhaustion soon appears. In practice, drinking will be adequate if an abundant supply of cool, clean and palatable water is available. Frequency distribution curves of body temperatures were recorded for the same job in the same environmental conditions with and without a good water supply. When the supply was inadequate, the water temperature was around 70°F, and the drinking was insufficient to replace the water loss as proved by marked weight reduction in the workers at the end of the shift. High heart rates and body temperatures of 100°F, and above were frequent. With an adequate supply of water maintained at a temperature of 42°F, to 45°F, the drinking became more abundant, water metabolism was more efficiently maintained and body temperatures of 100°F, and more disappeared. At the same time the heart rate recovery curves stabilized at a definitely lower level indicating that the total physiological stress had been appreciably reduced.

Keeping a balance between fluid intake and fluid loss is a matter of training because most people who are sweating profusely will drink about two-thirds of what they eliminate on an hourly basis. If the water balance is to be maintained throughout an eight hour shift one has to drink more than necessary to merely quench his thirst. We have had good results by giving the workers paper cups and explaining to them that in order to replace the amount of sweat lost they should drink an average of so many cups at the end of each work period. The number of cups was experimentally determined by studying the average weight loss of the worker involved in various jobs. The men learned rapidly how to force their water intake in order to compensate more accurately for their sweat loss and a definite improvement in physiological reactions was observed.

In these experiments salt tablets were not used and the salt loss was compensated for by adding enough salt to the food at every meal. It has been shown that the concentration of sodium chloride eliminated in the sweat increases as work is prolonged and as the rate of sweating becomes greater. When a progressive depletion of salt occurs fatigue soon appears and in extreme cases, total exhaustion and heat cramps are observed. Nevertheless, laboratory experiments have shown that the sodium chloride level in blood serum remains remarkably constant in prolonged work in heat provided the overall daily intake of salt with the meals is adequate. Our
experience with industrial workers eating a good diet confirms these findings. The men were instructed to salt their food abundantly and no extra source of salt in the form of salt tablets or salted drinks was provided. This practice eliminated completely the gastro-intestinal uneasiness, the stomach cramps and the vomiting which were frequently observed when salt tablets were used. Under the usual circumstances of exposure to industrial labor and heat, it is advantageous to replace the sweat loss on an hourly basis and to replace the sodium chloride simply by salting adequately the daily meals. As proved in many instances, the final results of adequate water and salt intake is to maintain the efficiency and the well being of the workers in spite of very abundant sweating, thus decreasing physiological stress and fatigue.

6. Selection of Workers

The capacity to perform muscular work depends on the natural physical fitness of an individual and on his degree of training for the specific activity in which he is involved. Even when studying men who appear to be thoroughly adapted to their work and to the environmental conditions in which the job is done, wide differences are found among individuals.

The frequency distribution curves of pulse rate and body temperature demonstrate that in order to accomplish the same task some workers experience a much greater physiological stress than others. The upper values of the distribution curves indicate that these men are comparatively “paying too much” for the job and they should be given an easier kind of work. When the “physically unfit” for a given job are eliminated, the remaining group will have a higher efficiency at a lower physiological cost. In many instances the elimination of the poorly fit will have a beneficial effect on the morale of the group because one must remember that a man who is fatigued by his job blames the job rather than himself and influences the attitude of his co-workers. From all points of view it is important to transfer these workers and to use, for comparatively hard jobs, men who can handle them easily.

So far it is only by studying the physiological reactions produced by the job that the qualifications of an individual can be determined. For example, selection of heat resistant workers and a system of gradual adaptation has been used successfully at the City Deep Mine in South Africa. In an experimental chamber equipped with rocks and shovels the new workers are given probationary tests in atmospheres comparable to those encountered in underground work. “Heat intolerant” individuals are detected by excessive increase in pulse rate and body temperature and given no employment in hot jobs. “Heat tolerant” subjects are gradually adapted to their future task in periods of four to fourteen days according to individual tolerance.

Such methods take time and have to be handled with great care in order to avoid antagonizing the workers. Nevertheless, considering the cost of frequent turnover and of continually training new men, and considering the ill effects of chronic fatigue and dis-satisfaction among the workers, the experience is well worth trying in industries where physical exertion and exposure to heat are combined to give a predominant importance to the physiological capacities of the workers.

From the general point of view of labor utilization the lower the physiological stress required by a given task the more people will have the capacities to qualify for it. Therefore, the recruitment of new personnel will be simplified and the employees will be able to continue working at a satisfactory level of efficiency in spite of advancing age. It is obvious that it is in the interest of both management and the workers to see that, by the combined efforts of the industrial engineer and the physiologist, the stress and fatigue produced by the day’s work be reduced to a reasonable level.

It has been our experience over the last eight years that when the average value of the first recovery pulse is maintained at about 110 beats per minute or below, no abnormal fatigue is observed as the day progresses. It appears that this level of work can be maintained throughout the shift in a “physiological steady state” provided work and rest periods are adequately organized. The recovery is complete and the physiological measurements taken at rest at the end of the day are within normal limits.

While certain unmeasurable factors are known to cause stress and fatigue in industry, such as emotional stimuli, boredom, social adjustment, etc., certain physical factors leading to fatigue have been measured and their importance evaluated. As a result, we know that industrial fatigue can be reduced with the collaboration of the physiologist, the engineer, management and labor.

WHERE ARE THEY NOW
(continued from page 8)

SIXTEEN

THE BOBBIN AND BEAKER
Three Ideal units will outproduce five of the best types previously known . . . and produce better yarn as well.

A survey among operators of many hundreds of Ideal units shows an average reduction of 26.9% in variation of drawing sliver, 20.5% in yarn numbers, and a 7.4% improvement in breaking strength. In many cases Ideal units were credited with more than doubling the production per frame. These carefully kept records also showed a reduction of 7.5% in ends down in roving and 27.5% in spinning.

This survey showed such an improvement in performance, efficiency, and yarn quality that old standards can no longer be used. Ideal Drawing Rolls save on original cost, labor, floor space, and maintenance. Don't replace your present drawing rolls until you have investigated the great advantages of Ideal High Speed Drawing Rolls. Write or wire for full information.
WHAT TEXTILE PREPARATORY MACHINERY NEEDS VARIABLE SPEED DRIVES AND WHY
(continued from page 10)
means of counter balanced feelers, regulation of the amount of stock fed, in relation to the amount delivered, could be maintained. Because of full mechanical operation this application proved impractical and was dropped.

If this old idea could be taken up, given a shot of electronic stimulation, and applied with present day know-how, it might work. Then instead of getting sliver full of variable wave cycles, one would get stock far better than is now considered "normal". One could look forward to seeing cloth free from such defects as wavy filling, thick and thin ends side by side making poor contrast, and poor cover because of yarn unevenness.

ROVING
A roving frame, be it large or small, delivers a thin strand of lightly twisted stock from the steel rolls to the flyer, which winds it on the bobbin. Some method must be used to stabilize the tension on the delivered roving to avoid stretching if too tight, or tangling if too slack. This job is done by a combination of differential motion and top and bottom cones which at all times allows the surface speed of the bobbin to equal the delivery speed of the front roll, by slowing down the bobbin without slowing down any other part of the frame.

This tension, builder, differential compound and cone combination is a fearsome and marvelous get up. It has done a fairly good job over several generations and even in our own day continues to produce a pretty uniform hank of roving. Since I find myself cast as the "man of tomorrow" I'd like to be able to look forward to a device based on the principles of the variable speed drive which would do away with cones and slipping belts, planetary gear compounds, tension racks and gearing, plus all their truck which clutters up the present day roving frame.

It would be "sho-nuff" fine to be able to wind a bobbin of roving as even as the drafting equipment of today is able to produce. Why shouldn't the frame of tomorrow be able to wind a hard, full bobbin of roving made with substantially less twist than conventional and with a correspondingly greater amount of roving on the package. It can be done. I have seen roving made with at least three less teeth of twist than normal and with a gain of at least 20 percent in yardage on the package. From this roving yarn was spun of better than average uniformity and strength. It, also, ran better having less ends down in spinning. It was my understanding that problems in tension were encountered which had not yet been overcome.

SPINNING
For years engineers have known that the operating speed of a spinning frame is a compromise between mechanical conditions at the start of the doff on the empty bobbin as against increased diameter of the bobbin at full doff.

Due to the excessive angle of traveler pull on the empty bobbin, particularly on modern large size rings, end breakage is considerably higher on this part of the doff. As the bobbin size increases the traveler angle of pull becomes more favorable, the twist per inch increases slightly, and generally better running work ensues. For these reasons industry "butters-up" the first part of the doff with a lower speed, at the expense of the full doff which can stand higher speeds.

There have been many attempts at the principle of speed adjustment on spinning frames. Some have used a two speed motor, some a variable speed drive with built-in devices to permit speed increase during the doff, either manually or automatically. There may, also, be direct current drives which offer substantial speed ranges.

All of these drives fall into the same category. They increase the overall speed of the frame. To do this they must be heavily built, rugged, and able to supply the full horse power rating of the main drive.

The switch gear must, also, have a large factor of safety. All this is very costly, space consuming, difficult to maintain, prodigal of burning out electric devices, with attendant production losses.

These applications of speed variation may not be the answer for which we are looking. Perhaps we need a device which will change the twist per inch in the yarn during the doff cycle. The early part of the doff would then receive more twist, which it needs, rather than a slower overall speed, the benefit of which is debatable.

What I have in mind is a very light low cost variable speed drive built into the gear train between the twist gear and the front roll. This could then be set to run plus 5 percent normal twist on the first part of the doff cycle and minus 10 percent or more on the latter part of the cycle. For example, let us assume a warp spinning frame running a ten hour doff has an average front roll speed of 100 r.p.m. With the variable speed device working, the front roll would start the doff at 95 r.p.m. During the first hour the speed would slowly increase until 100 r.p.m. was reached. After this the speed would gradually increase to the point of best operating and be held there. Assuming that this point would be 110 r.p.m. front roll and would be reached at the half way point in the doff we would then have an average front roll speed of 106.75 r.p.m. during the entire doff cycle.

EIGHTEEN

THE BOBBIN AND BEAKER
This amounts then to a 6.75 percent increase in production, and in a 50,000 spindle warp room is equal to the production of over thirteen frames of 250 spindles each. Assuming a new spinning cost of $35.00 per spindle, this thirteen frame savings would amount to $113,750.00 of capital expense. The labor saved here would amount to better than $10,000 annually. There might, also, be an added gain in increased spindle assignments from the decrease in ends down. To this could be added the savings in floor space, lighting, air conditioning, and maintenance. One would have something really special to offer the cotton industry if such a unit could be developed at a price which would allow repayment in a reasonable length of time.

SLASHER

A slasher coats the warp with boiling hot size, dries it, splits it back to the individual ends, and winds the many ends onto a loom beam in such a way as to insure their unwinding smoothly and evenly at the loom.

The machine may run from full stop to 100 yards per minute. It must be able to slow back to full stop in a minimum of time and with no lag in any of its sections. It must not overstretch the yarn at any point. It must wind the delivered sheet of warp ends onto a beam which starts off empty and at a relatively high r.p.m. to the same beam which when full has a relatively low r.p.m. The yarn speed is constant and the beam speed must be adjusted to handle it.

Different constructions require different speeds, hence the main drive must be capable of speed adjustment.

For a considerable time variable speed units have produced excellent results on slashers. The usual arrangement is to install a 5 to 10 hp unit in the main drive section. This mechanically gives a slow or fast speed in accordance with either manual, electrical, or electronic moisture control. The basic control is regulation of speed in accordance with the desired amount of moisture left in the delivered yarn. Such a drive is simple, easy to maintain, not too expensive, and offers very few operating problems. It can be used on slashers running at speeds of up to 100 yards per minute.

Another point where a light weight variable speed unit is used on a slasher is between the size box and delivery rolls. On older type slashers yarn tension was maintained by building up the diameter of the breast-roll, or delivery roll, by wrapping cloth of sheeting around it. This might be all right for one construction but not for another, and required frequent changing. Some stretch must be ap-

(continued on page 22)
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AN ADDRESS BY DR. ELLISON S. MCKISSICK
(continued from page 7)

world, for a woman chained to a spinning wheel had little time for feminist movements or anything else. The invention of the gin so reduced the cost of cotton that the market for it expanded with the unbelievable rapidity and for more than 40 years, from the beginning of the 19th Century, King Cotton held absolute sway throughout the South, moulding the course of its economy, its thinking and way of life, and the shape of many things to come.

It is indeed rather interesting to note, however, that this sudden revolution and the flourishing era for the South which followed did not last forever and considerably before the outbreak of the War Between the States, we had become very worried about cotton and its problems — and the problems then were remarkably similar to those we have today. For instance, a report adopted by the Agriculture Committee of the South Carolina House of Representatives in 1842 expressed concern over the great expansion of cotton in the West (the West in those days consisting of the Gulf States and Texas) and sought to make the case that the Western area was sufficient to supply the demands of the world in all time to come. The idea, of course, was that farmers in South Carolina needed to look for some other crop as a source of income.

Now in 1842 the United States produced only a little over a million bales of cotton, which was more than one half of the entire world production. South Carolina accounted for about one-thirteenth of U. S. production then; it doesn’t do quite that now, as both its agriculture and its manufacturing industry (which scarcely existed then, incidentally) have become more diversified. But the interesting fact is that world cotton production in 1952-53 was around 29,000,000 bales, the United States accounting for roughly half of it. What would our people who were so worried back in 1842 think of that?

The fact remains, however, that the production of cotton had, a little over a quarter century ago, sunk to a pretty sorry level, compared to what we know today. South Carolina, in 1926, was the first state to start a Five-Acre Cotton Contest and the cotton improvement program of which it is a part and a symbol has demonstrated beyond any doubt that cotton can continue to be the most important cash crop in our state if farmers produce the largest possible yields of good quality at the lowest cost and thereby meet the competition from foreign cottons and the competing synthetic fibers.

The extension service of Clemson College organized the Five-Acre Cotton Contest and the State Publishing Company of Columbia donated the prizes for the first year. Since 1927 the South Carolina Textile Manufacturers Association has donated the state and district prizes and the South Carolina Cottonseed Crushers Association since 1945 has donated the county prizes.

The dramatic increase in quality and yields of cotton in South Carolina over the last quarter century is one of the great epics in the story of cotton. For one thing yield increased from an average of 100.8 pounds of lint per acre in 1921-25 to 314.7 pounds in 1943-52, or an increase of 75 percent. In 1929, only 36.7 percent of South Carolina cotton staple 15/16” or longer, while now around 99 percent of the cotton crop in South Carolina is one inch or longer.

Another thing — South Carolina has become the undisputed one-variety state of the rain-grown cotton belt, although North Carolina has reached pretty much the same status with the same variety. Actually, California is the only one variety state, where one variety is compelled by law, but here in South Carolina we have done virtually the same thing, not through any law, but by the educational process of “seeing is believing.” Today about 99 percent of the crop in South Carolina is planted to a single variety, Coker 100 Wilt. There is no state in the rain-grown belt which equals, either, South Carolina’s record as to uniformity of staple length.

There are many who have had a part in this change. It can certainly be called an agricultural revolution, and perhaps that even minimizes the performance. Agriculture in the South, and particularly here in South Carolina, is eternally grateful to the late David R. Coker, who at Hartsville, in our state, pioneered scientific seed breeding, and whose work in this field is carried on today by the organization he founded. And we certainly could never have accomplished, or even begun to accomplish, what we have except for the extension service at Clemson College and the county agents.

I read a speech that was made in Columbia last year by a distinguished scientist, Dr. Robert White-Stevens of Lederle Laboratories, and he paid one of the finest tributes to the work of the county agents I have ever read or heard. I use his phraseology when I refer to our county agents and extension workers as the true pastors of the soil. They are the men who must plant the seed of new practices in fertile ground before any returns from the work of the research laboratory can be harvested. The magnificent system of land grant colleges, state agricultural research and regional training carried to its fulfillment in the county agent has played a role in agriculture that reminds us of the country doctor in medicine and the circuit-rider in our spiritual heritage.

Today in America, thanks to seed breeders, our “pastors of the soil,” our technologists and our researchers, and to men like you award winners to

(continued on page 24)
With the beginning of a new semester, the staff is striving to bring to you a better, more colorful, and interesting magazine. We hope that you, the reader, have enjoyed this issue and we will welcome any comments.

The most noticeable change in this issue is the cover, which was designed by L. D. Tankersley, an architecture student. To quote Mr. Tankersley's explanation of the cover, "You see an undulating composition of the basic weave which suggests boldly, textiles in its most recognized form. The purpose is to bring this conclusion to you in a pleasing and unconscious way through the medium of color and composition. That is because color affects what you see. Sometimes the color that flashes pictures to your mind and memory is a muted tone, it is noticed because of its relation to the hues and composition around it, thus the color has attracted your interest to an area and so to the composition thereon; your interest now is on the composition and it suggests what the content of this publication contains, textile matter. I would now say that if that is the case, the experimentive effort involved has been justified."

In answer to a good deal of comment on the lack of student articles in the last issue; due to the fact that students can write only on general terms or on compiled reading material, it is left up to the men of the industry and members of the faculty to form the back-bone of the magazine. It is from these resources that the reader can expect to find articles which are both informative and up to date. The fact that THE BOBBIN & BEAKER is a student publication does not necessarily mean that it must be written by the students. The true meaning of this statement is that the staff members, who are students, compile the articles, solicit the advertising, and run the magazine as a whole, with the hope of depicting the independence of the textile school and the industry; thereby keeping its readers informed of the latest in the field of textiles.

Dr. A. N. J. Heyn, member of the faculty of the School of Textiles, has written a book entitled "Fiber Microscopy." This book is being used as the textbook for Microscopy courses here and in other schools and contains some very useful information concerning fibers and their properties. Other information concerning Dr. Heyn's publication may be found in this issue.

WHAT TEXTILE PREPARATORY MACHINERY NEED VARIABLE SPEED DRIVES AND WHY
(continued from page 19)

plied in order to split the warp sheet at the exit split rods. However, excessive stretch definitely reduces warp performance in the weave room and should be avoided. For this reason, the use of the light variable speed unit very effectively give close regulation of yarn stretch and makes it easier on the operator to accurately control this important feature.

Still another variable speed unit is made for use on a slasher to take the place of the old style friction clutch used to control the relationship between the delivery speed of the yarn which is more or less constant, and the r.p.m. of the loom beam which is fast on the empty beam and slow on the full beam. On more modern higher speed slashers this represents quite a problem which very definitely rules out the old style slip clutch. There are variable speed units available which handle this control very efficiently, give only minor maintenance problems and run at high speeds on stiff operating schedules. The range of counts and ends such a unit can handle falls well within the pattern of the average mill and this offers no great problem in upkeep of highly specialized equipment. One tangible gain from this drive is the increased yardage wound on the loom beam due to uniformity of tension. This may amount to from 10 to 15 percent increased yardage — above that of a regular drive.
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AN ADDRESS BY DR. ELLISON S. McKISSICK
(continued from page 21)
whom I referred earlier as the real “kings of cotton,” our cotton fiber generally has qualities that make it most desirable throughout the world. Yet it costs more to produce cotton here than in less fortunate parts of the world which do not have our enviable standards or economic system or our dynamic free enterprise. However, in many backward countries of the world, improved cotton varieties and production methods are today making much headway.

The American textile mills, which consume the great bulk of domestic cotton, basically face the same situation. Economists tell us that American textile prices relative to costs — and this involves our high standards of living in America — are the lowest in the world, and any lowering of them further to meet an influx of cotton goods from low-cost foreign countries could mean only substantial unemployment or wage reductions, and consequently, a substantial reduction in the domestic consumption of U. S. cotton.

Relative to production, our cotton goods exports are traditionally the smallest of any important cotton manufacturing country. In 1953, the figures for the first nine months indicate we will run far behind Japan, the United Kingdom and India in export of cotton goods. Not only our exports, but the total volume of world trade in cotton goods, has steadily shrunk and the process has been aided by a multiplicity of import restrictions applied against the United States. Certainly world trade cannot be revived by programs, so common outside of North America, of trade restrictions and nationalisms which tend to decrease per capita consumption of cotton.

The economists have figured that if per capita consumption of cotton can be raised to one-half of the United States level, all the spindles and looms now in existence in the world would be inadequate to meet the demand. That is why in our industry we feel that the only way out of the dilemma must be a vigorous new foreign trade policy which recognizes the true causes behind the worsening picture and which will help more of the world’s people to expand their consumption of cotton and of cotton textiles. Here in South Carolina, where cotton is the basis of our agricultural economy and cotton manufacturing is our greatest manufacturing industry, we have a large and very real interest in the untangling of the jungle of foreign restrictions which prevent a normal and healthy pattern of international commerce.

It can be done if we discard the smokescreen and recognize the actual causes of trade distortion — the same way we here in South Carolina more than a quarter century ago recognized the true causes behind the situation into which our cotton production had sunk, and begun a corrective program whose

magnificent fulfillment is impressed upon us so unforgottably today as you “kings of cotton” receive your awards for your attainments which — to use one of today's common expressions — would have seemed “out of this world” a scant generation ago.

Gentlemen, I think I can speak for all South Carolina in saying to you that your state shares with pride in the accomplishments for which you so richly deserve recognition.

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Help us to keep our files up to date. Our sincere THANKS to all of you who answered our appeal in the last issue. If you haven’t answered, please fill in the form below and mail to:

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