

1956

## The Bobbin and Beaker Vol. 14 No. 3

Clemson University

Follow this and additional works at: [https://tigerprints.clemson.edu/spec\\_bobbin](https://tigerprints.clemson.edu/spec_bobbin)

Materials in this collection may be protected by copyright law (Title 17, U.S. code). Use of these materials beyond the exceptions provided for in the Fair Use and Educational Use clauses of the U.S. Copyright Law may violate federal law.

For additional rights information, please contact Kirstin O'Keefe (kokeefe [at] clemson [dot] edu)

For additional information about the collections, please contact the Special Collections and Archives by phone at 864.656.3031 or via email at cuscl [at] clemson [dot] edu

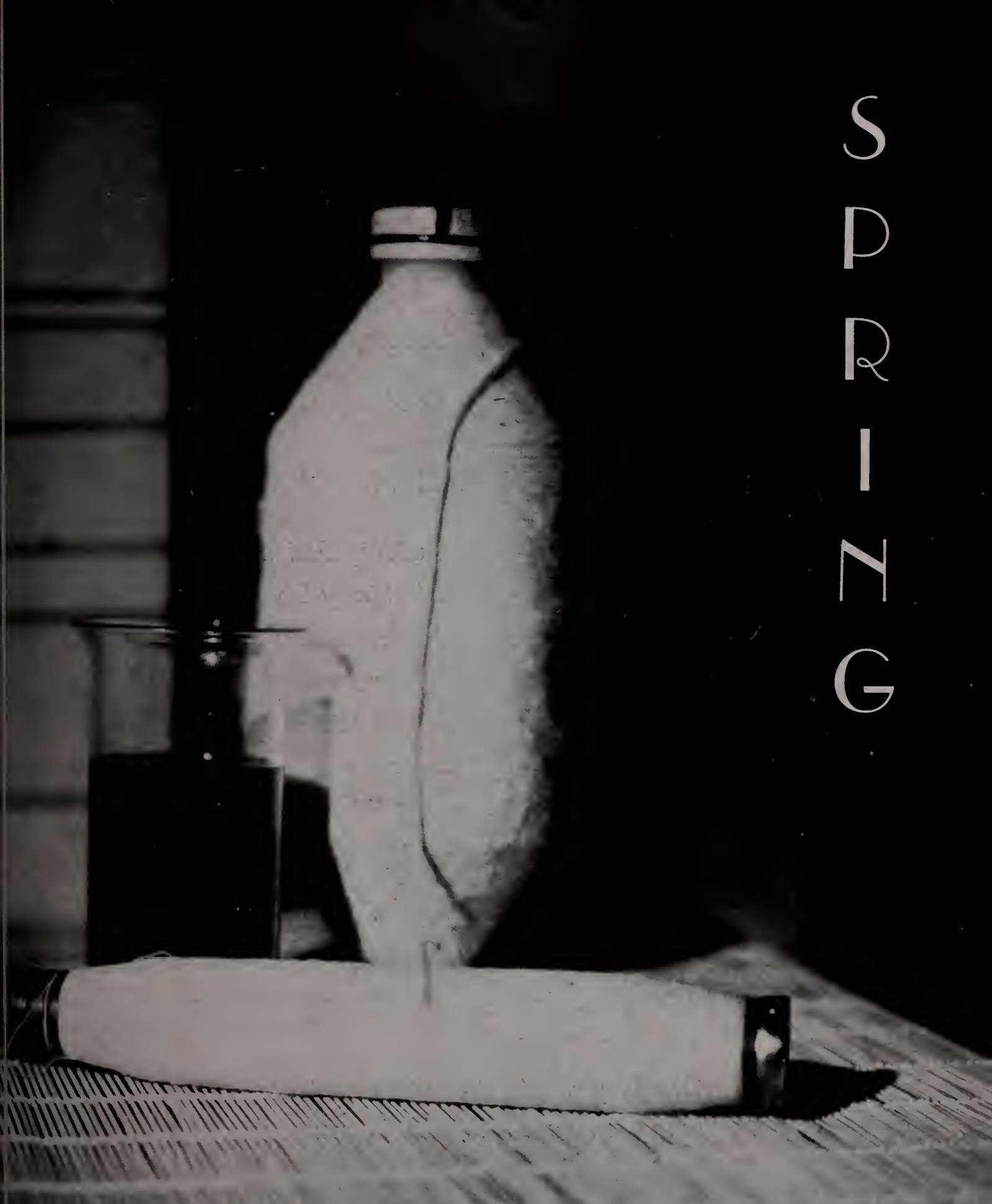
---

### Recommended Citation

University, Clemson, "The Bobbin and Beaker Vol. 14 No. 3" (1956). *Bobbin and Beaker*. 174.  
[https://tigerprints.clemson.edu/spec\\_bobbin/174](https://tigerprints.clemson.edu/spec_bobbin/174)

This Book is brought to you for free and open access by the Engineering, Computing and Applied Sciences, College of at TigerPrints. It has been accepted for inclusion in Bobbin and Beaker by an authorized administrator of TigerPrints. For more information, please contact [kokeefe@clemson.edu](mailto:kokeefe@clemson.edu).

S  
P  
R  
-  
N  
G



**Bobbin and Beaker**

# Textile

## ENGINEERING

*Site Selection*

*Building Design*

*Power Plants*

*Machinery Layouts*

*Water Treatment*

*Modernization Studies*

*Air Conditioning*

*Waste Disposal*

*Appraisals*

*Consultation*

**ROBERT AND COMPANY  
ASSOCIATES**

**Textile Engineering Division  
ATLANTA**

*Over forty years' nationwide experience  
in industrial and textile development*

# THE Bobbin & Beaker

Official Student Publication  
Clemson Textile School

VOL. 14

SPRING ISSUE 1956

NO. 3

## The Staff

EMIL STAHL  
Editor

J. P. CAMPBELL  
Managing Editor

R. P. MOORE  
Business Manager

JOHN McCONNELL  
Assistant Business Manager

CHARLES DAVIS  
Advertising Manager

EDWIN SMITH  
Assistant Advertising Manager

S. J. REEVES  
Circulation Manager

C. E. BROWNE  
Assistant Circulation Manager

R. B. HUEY  
Photographer



## Faculty Advisers

DR. HUGH M. BROWN  
Dean, School of Textiles

C. V. WRAY  
Associate Professor of Textiles

## In This Issue

School Develops a Constant Winding Yarn Tester .....	8
Textile Opportunities in Latin America .....	11
Causes and Detection of Damage in Raw Cotton .....	13
Outstanding Seniors .....	18
Office Notes .....	20

---

### THE COVER:

By ..... TED PAPPAS '57

---

**THE BOBBIN & BEAKER.** Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles. All rights reserved.

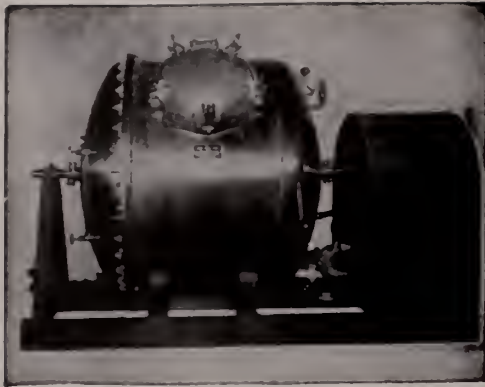
Address: The Bobbin and Beaker, School of Textiles, Clemson College, Clemson, South Carolina.

### POLICY —

The views and opinions expressed in all guest articles are those of the writers themselves, and must not be construed to necessarily represent the views and opinions of the Editors of this magazine or of the Faculty of the Clemson College School of Textiles. No article in **BOBBIN & BEAKER**, or any part thereof shall be reproduced in any form without permission of the editor. Requests may be forwarded to Editor, **THE BOBBIN & BEAKER**, School of Textiles, Clemson, South Carolina.

**THE BOBBIN & BEAKER** is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.

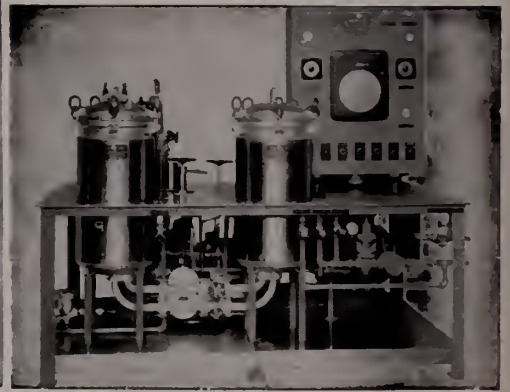




High Pressure Rotary Dyer



Laboratory Dyeing Machine

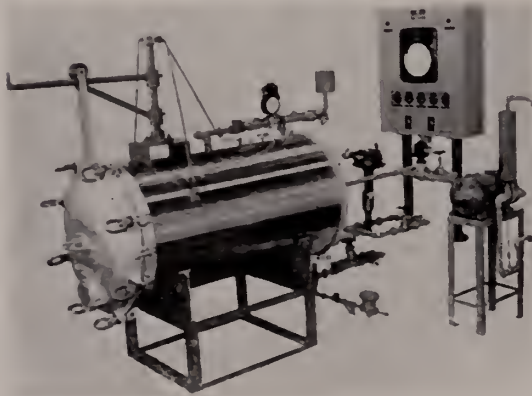


Two-Kier Package Dyeing Machine  
(table model)

**GASTON COUNTY'S COMBINATION  
OF MONEY-SAVING FEATURES**

**PUTS MORE PROFIT  
IN  
YOUR DYEING OPERATION**

New "Hy-Vacuum" Pressure Autoclave  
for Twist Setting



For better, faster, more economical dyeing — Gaston County machines take top rating in any test. No other equipment offers the combination of advantages embodied in Gaston County's rugged construction, complete flexibility, and modern automatic controls. Whether your operation is large or small, simple or complex, Gaston County offers a complete range of standard equipment — or new models can be developed economically to meet your individual requirements. Write for illustrated literature, or call on us for engineering assistance.

## GASTON COUNTY DYEING MACHINE CO.

Pioneers in Automatically Controlled Dyeing Machines

Gaston Co. Dyeing Machine Co.  
Terminal Bldg., 68 Hudson St.  
Hoboken, N. J., G. Lindner, Mgr.

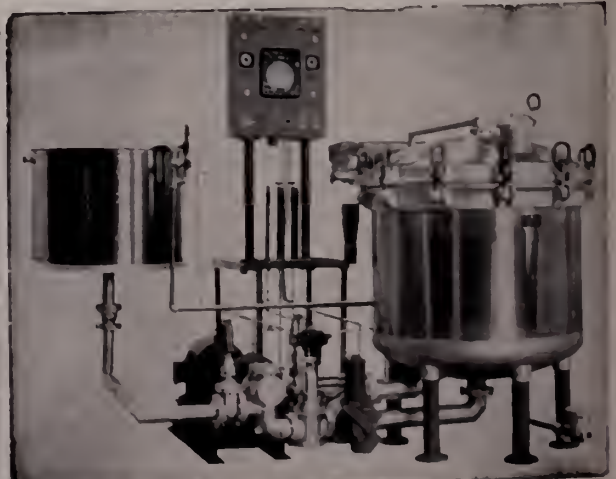
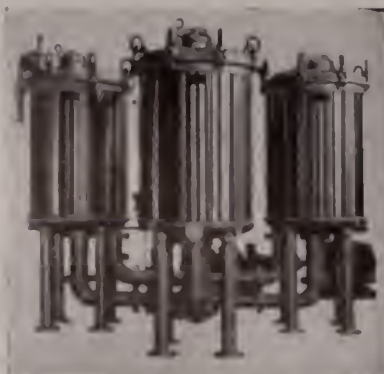
The Rudel Machinery Co. Ltd.  
614 St. James St. W., Montreal  
137 Wellington St. W., Toronto

STANLEY, NORTH CAROLINA

Multiple-Kier Beam and Package  
Dyeing Machine

Combination Extractor-Dryer  
with Movable Package Carrier

Single-Kier Package Dyeing Machine



COMPLIMENTS OF

*Abbott  
Machine  
Company  
Incorporated*

Wilton, New Hampshire

Southern Office: Greenville, S. C.

Manufacturers of Textile Winding Machinery

# School Develops A Constant Winding Yarn Tester

By

Hugh M. Brown, Dean

School of Textiles

In constant winding testing instead of breaking a short specimen of yarn the yarn runs through the machine continuously for sufficient time to test any desired length of yarn. The principle is not new. There is currently offered a machine for continuous yarn testing by Cook and Company of Manchester, England, and one by Goshawk<sup>1</sup> in England. Earlier, in Germany I believe, there was a machine known as the Hahn continuous yarn testing machine and a number of others have been developed.

In some cases, the device is used only to obtain the number of low level breaks in long lengths of yarn with no means provided for measuring the elongation. The problem is more difficult when accurate measurement of elongation is involved. This is usually done by suspending the desired load in a loop of yarn and feeding the yarn into and out of the loop at the right speed to maintain the load at a more or less fixed level. In some cases the force required to give the yarn a fixed elongation is measured as the yarn runs continuously through the machine.

Though continuous testing may have several advantages over break tests, some of the machines for doing it have been somewhat complex mechanically, and some have had impractical features. In case the yarn is fed in and out of a constant tension loop by means of gripping rolls, the rolls become worn and polished and allow slippage of the yarn in spite of high pressure applied to the rolls. If slippage is recorded as elongation the result may be subject to large errors.

It is believed that in the machine developed at Clemson, the problem of slippage is completely solved by means of snubbing drums. At the same time the device is extremely simple, straightforward and

practically free of any type of adjustment. Made of suitable material, it should last indefinitely, requiring no replacement of roll coverings or the like.

In this machine the yarn is fed into the load loop by one pair of steel snubbing drums and taken out of the loop by a second pair and thence to a take-up winder. The input drums run at a constant rate while the speed of the output drums is varied by the amount the load stretches the loop of yarn between the drums. When the yarn in the loop stretches more the weight is lowered which moves a steel spring belt on cone pulleys to drive the output drums at a higher speed. Thus, when the yarn is taken out of the loop at a rate equal to the input plus the elongation the loop will not be further lengthened and the weight will be suspended stationary. If following sections of yarn have more or less elongation the weight will move either higher or lower and adjust the belt on the cone pulleys to properly take up the slack in the loop. The height of the weight is a measure of the percent elongation in the yarn. Instead of having the weight simply hanging in the loop the load is applied by means of a load beam connected to the pulley in the loop so that the force on the yarn can be varied by moving a weight horizontally along the load beam in the manner of a weighing scale.

A pen arm attached to the load beam moves up and down with variation in elongation, thereby recording percent elongation on a moving chart as the yarn moves continuously through the machine.

By employing this snubbing arrangement many turns of yarn can be used on each pair of drums so that both the input and final take-up tensions may be as small as desired and yet feed the yarn into, and take it out of the loop at exactly the speed of the respective drums with no chance of slippage. The yarn structure is not altered as would be the case if the yarn were fed with squeeze rolls.

<sup>1</sup> JTI, Vol. 42, Page P8, 1951.



From the reading of the elongation on the chart and the load setting on the load beam, the average modulus between two given loads can be computed from the following relation:

$$\text{Modulus}_{ab} = \frac{C (F_b - F_a)}{E_b - E_a}$$

where F represents the load, E the elongation and C a constant depending upon the size of the yarn and the units used.

In Table I results taken in this manner for several yarns are shown.

Table I

Yarn	Continuous Winding Tester			Instron	
	Force (gms)	Elongation %	Modulus gm/gx/%	Elongation %	Modulus gm/gx/%
Acetate (166 gx)	25	.86		.20	
	75	2.14	.12	.96	.20
	125	4.72	.095	2.10	.14
	150	9.43	.032	5.4	.045
Cotton (2 ply) (350 gx)	50	1.28		.95	
	150	3.20	.15	2.1	.27
	250	4.50	.22	3.2	.26
	350	5.80	.22	4.3	.26
Cotton (Singles) (175 gx)	50	1.28		0.7	
	150	3.85	.23	2.8	.27
	250	5.85	.29	4.6	.32
Rayon (Filament) (333 gx)	50	.64		.2	
	100	1.14	.30	.45	.60
	200	3.86	.17	1.10	.24
	300	9.43	.054	5.00	.075
Dacron (Filament) (278 gx)	100	.86		0.3	
	200	1.28	.86	0.6	1.2
	400	2.14	.83	1.3	1.0
	600	3.85	.42	2.6	.55
	800	5.14	.56	3.9	.55
	1000	6.43	.56	5.1	.61
Nylon (Filament) (33 gx)	50	5.45		4.0	
	75	7.28	.44	5.3	.58
	100	8.57	.31	6.7	.54
	125	10.28	.44	8.3	.47
	150	14.14	.11	13.	.16
Orlon (Filament) (83 gx)	50	1.50		0.4	
	100	2.80	.46	1.2	.75
	150	6.40	.17	3.9	.22
	200	9.00	.19	7.0	.19

The modulus given by this method of testing yarn is somewhat lower than that obtained from usual stress strain curves. This happens because as each element of yarn enters the loop it is subjected to the

total force for the length of time required to pass through the loop. Applying a given load in this manner will produce greater elongation than when the load is steadily increased from zero upward, where each load value exists only for an instant causing the elongation to be less than would be produced by the same steady load even if applied for only a few seconds. This point was verified on the Instron and Incline machines by quickly placing fixed loads on the yarn and noting the elongation produced after ten second intervals. It is believed that possibly the constant loading applied to the yarn through a considerable time interval as is accomplished by this machine is more like that which yarn will encounter during manufacturing processes and, therefore, the modulus computed from this data is possibly more valuable for some purposes than that computed from conventional stress strain curves.

It is possible with a modified arrangement to have the machine plot a stress strain curve, each part of the curve representing the average percentage elongation. By slowly moving the weight along the load beam from zero load upward, a stress strain curve is drawn. This curve will be somewhat wavy due to variations in the elongation of the yarn. The oscillations of the pen caused by these variations are superimposed on what would be a smooth curve if the yarn were uniform. To eliminate long range variations in the yarn the curve can be traced several times for different portions of the yarn. The several tracings would parallel each other covering an area through which can be drawn an average curve. Of course the machine cannot produce curves extending to the breaking point of the yarn without becoming unthreaded.

It is possible to arrange for the weight and chart to be moved back and forth automatically so that the stress strain characteristics of long lengths of yarn can be displayed without continuous attention of an operator.

If the belt guide is removed, stress strain curves can be taken with the yarn stationary by simply moving the weight along the beam, and in this case the load could be increased sufficiently to obtain the breaking strength. Before curves for static tests are made, yarn must be run through at zero tension before each break. By adding suitable jaws the machine could be used for making standard yarn breaks with definite gage lengths.

Another application of the machine is to detect and record potential weak places in a yarn. This feature can be accomplished by placing an adjustable micro switch so that when the elongation exceeds any desired maximum level an electro magnet will lift the load beam before the yarn is entirely broken. By



means of a delay mechanism the load is restored to the yarn after the weak place has had sufficient time to pass through the loop. An electric counter also actuated by the closing of the micro switch records the number of weak places in any desired length of yarn.

The machine may be altered to measure force at constant elongation instead of elongation at constant force. To do this the belt guide is arranged to set the percentage elongation to any desired value. The loop pulley is mounted on a strain gage bar and the force produced in the yarn is measured by means of a strain gage amplifier and recorder. The pulley may be moved up or down for different gage lengths. This is probably a better way to operate the machine if an amplifier and recorder are available. In this method, since the belt is not moved by the yarn, there is no delay in reading the force as is the case when measuring elongation at constant load. Very rapid variations in force can readily be measured by means of the strain gage set-up. The yarn modulus is computed in the same manner as for the first method of operation.

**Advantages of Continuous Yarn Testing:** Some of the advantages usually claimed for continuous yarn testing over individual break tests are the following:

1. Since yarn breakage in processing occur only at the weakest places in a very long length, testing the yarn in such a manner as to measure these very weak places gives a better indication of yarn performance in the mill than conventional single end testing on 10-inch gage lengths, which gives an average of many strong places and only a very few of the troublesome weak spots.

2. In a given length of time a much larger amount of yarn can be tested, greatly increasing the chance of finding the weakest places. It is a matter of chance of single thread tests ever finding weak breaks.

3. Yarn can be automatically tested at higher speed than with automatic single thread break testers.

4. Possibly the lower modulus obtained by continuous yarn testing correlates better with ends down in processing.

Work is to continue in comparing this test method with the conventional single end test. Comparison is to be made of the degree of correlation of each method with such phases of yarn performance as: coefficient of variation in yarn strength, ends down in spinning, etc.

Appreciation is expressed for the suggestions and help in the development of this machine by members of the research staff, Professor J. S. Graham and Machinist Jack Leard.

## **RALPH E. LOPER CO.**

SINCE 1914

Specialists in

**TEXTILE COST SERVICE**

**INDUSTRIAL ENGINEERS**

Wade Hampton Blvd.

Phone 2-3868

Greenville, S. C.

Buffington Bldg.

Fall River, Mass.

Phone 6-8261

# **REED MAKERS**

**FOR SOUTHERN WEAVERS FOR 31 YEARS**



**GREENSBORO LOOM REED CO., INC.**

# *Textile Opportunities In Latin America*

W. B. Hankinson, Vice-President

United International Corporation

What is my future in the Textile Industry? Where should I locate? Should it be in the United States? Abroad? What branch of the industry should I enter? Production, Research Sales, etc., etc.?

These and many other questions face the graduate of a Textile Engineering School as he finishes his studies and faces the decision as to the type of career he wishes to follow.

The Textile Industry throughout Latin America is expanding rapidly with each country doing its best to become self-sufficient in the production of materials for clothing as well as textiles for industrial use. Such a development offers many job opportunities to the young engineer both in the field of production as well as in sales and merchandising. In past years, in the United States and also abroad, the average graduate has considered his future to be in the realm of production of fabrics. More recently it has become increasingly apparent that there is a great shortage of competent people to take care of the sales and merchandizing of the products manufactured by the mills.

A merchandizer can be defined as a man with "one foot in the sales office and one in the mill." He is the "bridge" between sales and production and is, therefore, a vital link in any textile organization. Merchandizers have often come up from the ranks of sales trainees, salesmen, etc., but it is clearly obvious that a man with a technical background can progress much faster, in the field of merchandizing, if he has a "sales personality".

For this reason there is a growing trend among both domestic mills and overseas organizations to hire textile engineering graduates for training in the field of merchandizing, styling, etc. In this country the need has not been so great due to the fact that merchandizers could be developed from salesmen

over a period of years. However, in Latin America the textile industry is growing at such an accelerated rate that time is of the essence and the more training a man has the more rapidly he can be adapted to a given job.

Most South American organizations, whether totally owned by American Companies, affiliates of American Companies or separate South American organizations, are feeling an increasing need for the constructive thinking, positive action and advanced styling that can be furnished by an alert merchandizer. Competition increases with the opening of each new mill and the only hope of keeping ahead of a competitor is to operate economically and keep abreast of the latest fashions.

The next question that might arise is "How Do I Go About Locating Such a Position?" The answer to this is through your Placement Office, by studying advertisements in leading textile magazines and writing to firms known for their international operations such as United Merchants and Mfrs. Inc., and also by contacting foreign consultants and textile organizations.

A decision to go abroad should not be considered lightly as it is a serious step deserving much consideration. There will most likely be a period of training in the United States in which the graduate would spend from six months to a year going through a regular course for salesmen such as is conducted by most large textile firms in New York City. He would also receive training in production control and mill organization.

After being transferred to the South American plant the "trainees" would spend an additional period of orientation during which he would become acquainted with the company, its policies, clients, manufacturing facilities as well as learn the language and customs of the people of that country.



For more than 50 years  
SONOCO precision paper  
products have meant

# Plus Value

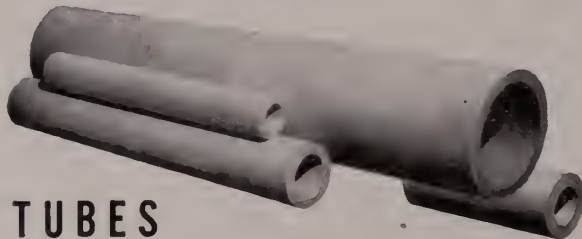


**CONES**

because . . .

SONOCO is constantly striving to improve present products and conducts a continuing program of research and development to meet the needs of an ever-changing textile industry.

SONOCO paper products have become "standard of the world" wherever textiles are made . . . a "plus value" advantage which has resulted in industry-wide benefits.



**TUBES**

SPOOLS  
BOBBINS  
COTS  
SPECIALTIES

**PRECISION  
PAPER PRODUCTS  
SINCE 1899!**



**SONOCO  
PRODUCTS  
COMPANY**

MAIN OFFICE — HARTSVILLE, S. C.

MYSTIC, CONN. • AKRON, IND. • LOWELL, MASS. • PHILLIPSBURG, N. J.  
LONGVIEW, TEXAS • PHILADELPHIA, PA. • LOS ANGELES, CAL.  
GRANBY, QUEBEC • BRANTFORD, ONT. • MEXICO, D. F.

**DEPENDABLE SOURCE OF SUPPLY**

Up to this point he has not been of much value to the company but on the contrary has been an "expense." His future, therefore, begins at the end of his training period and his success will depend entirely on how well he has assimilated his training and whether or not he has the style sense and creative ability to carry out the functions of his job.

With respect to this last quality it is the custom of many companies, before actually hiring a candidate, to subject him to a psychological test (such as the Klein Test) to determine if he has a "sales personality." I strongly suggest that the graduate insist on such a test in order to satisfy himself that his desire to enter the field of sales-merchandizing is based on firm grounds. Desire, education, ambition, etc., will be dissipated in failure unless the person has the invisible qualities of liking people, having a style sense, etc., etc. These psychological (written) tests often require five or six hours to complete but have proven, through the years, to be a valuable aid in the hiring of sales personnel.

None of the foregoing should be interpreted as indicating that there are no longer South American opportunities available in the field of production. On the contrary there are just as many as always and they require preliminary training. It was the idea of the writer to have this article present a new line of thought among textile graduates in order to widen the horizons of their future by suggesting a course of action that has not been explored thoroughly in the past. It is a little unique for a technically trained man to think of such a field but on the other hand competition might not be so great for those who enter first.

Latin America offers great opportunities to the alert textile graduate who is not adverse to spending his future abroad. Do not accept a job in this field in the spirit of a "vacation" or a few years abroad after which you will be transferred back to the United States. As you can see from the foregoing a great deal of time and money must be spent to prepare a man for foreign service so he must be agreeable to planning most of his future career abroad. It is generally customary for a company to return a man and his family to the United States for a three month vacation every three years and, therefore, you do not actually lose all contact with the past. In our organization we have many men who have achieved successful careers in South America, some having spent twenty years of residence abroad.

There is a wonderful opportunity abroad, in the textile industry, for the textile engineering school graduate and with a little foresight a successful career can be achieved.

**THE BOBBIN AND BEAKER**



# Causes and Detection of Damage in Raw Cotton

By Dr. A. N. J. Heyn

Professor of Natural and Synthetic Fibers  
School of Textiles, Clemson College, S. C.



In August of this year, data were collected by the author of this article from thirty mills in South Carolina concerning occurrence and importance of various types of damage of raw cotton under normal conditions in the mill. It was found that in South Carolina, various types of damage occur and that these may cause great difficulty and important financial losses. In the present series of articles, the different types of damage their causes, effects and methods for detection will be discussed.

The causes of damage may affect the raw cotton at different points of time. At the moment of the opening of the boll, infection of the mature fiber by certain microorganisms may cause so-called "tightlock", in which the fluffing of the locks is prevented and the fiber weakened. After the opening of the boll until harvesting, the cotton is exposed to so-called "weathering", damage in which microbial, temperature and photochemical processes play a part. During picking and transportation, tar and oil spots and similar stains may originate. During storage, microbial deterioration of cellulose is one of the main causes of degradation. A certain complex of characteristic changes in fiber properties in this period has been described under the name "cavitoma." In the ginning process, overheating, overdrying, and overbeating are important factors which cause a weaker or shorter fiber and increased waste.

The various types of damage can be roughly classified in the following groups: 1. **Microbial damage**, 2. **Mechanical damage**, 3. **Chemical and photochemical damage**, 4. **Heat damage**. Their occurrences in the thirty South Carolina mills\* was as follows: Twenty-seven mills reported difficulties in the spinning due to one or more of these types of damage; twenty-three reported damage by tar and oil spots; eleven reported damage from weathering; nine, dam-

age caused in storage; twelve reported "cavitoma"; five, damage by yellowing of the cotton and the presence of fluorescent spots; and fourteen reported other types of damage, including gin damage and honeydew. From these reports, the practical importance of the damage problem for the mill may be recognized.

The present article will deal with **microbial damage** and its effect on the fiber properties. Next articles will deal with mechanical, chemical and heat damage. In a final article the detection and identification of damage will be discussed.

## 1. MICROORGANISMS ACTIVE IN DETERIORATION

Damage caused by the activity of microbes, especially molds or fungi has been extensively studied in mildewing of fabrics, but relatively less in raw cotton.

As many as one hundred million bacteria and five hundred fungi have been counted per gram of raw cotton. Many of these organisms are similar to those inhabiting the soil and decaying plant material. They persist during ginning, storage and manufacturing of the cotton and rapidly develop under suitable conditions, especially high humidity. Some, but not all of them, are capable of breaking cellulose down ("Cellulolytic" ability).

**Microbes in tightlock** — The organisms associated with tightlock are not always the same; they are representatives of a different genera of fungi (Dip-

\* The author wishes to express his thanks for the cooperation and interest received from the South Carolina Mills in this survey.

lodia, Colletotrichum, Fusarium, Alternaria). Infection takes place immediately after opening of the boll, upon the mature, but still unexpanded fiber locks. A wet period at that moment favors development. As a result, the locks may remain partly or fully unexpanded and the fiber is largely weakened and deteriorated. (Figure 1) The fibers of moderately tight locks may fluff out and be picked and mixed with normal cotton, lowering its grade.



Figure 1. **TIGHTLOCK.** As a result of the early development of certain fungi on the fiber, the locks do not fluff out.

**Microbes in weathering**—After opening of the boll, microbial damage may affect the normal locks, especially if the cotton is left for an extended period under damp conditions on the field. (Figure 2) This microbial damage is an important component in the **weathering** of field cotton. The fungi commonly

found in weathering cotton belong in large measure to only a few genera (Alternaria, Cladosporium, Diplo-dia); some of these are the same as found in tight-lock. Figure 4 shows some of these fungi.



Figure 2. **WEATHERED COTTON FROM EXPERIMENTAL FIELD IN CLEMSON.** Various fungi developed during weathering; the fungi of Figure 4 were isolated from this sample.

**Microbes in wet storage** — Microbial activity is further considered to be the main or only cause of degradation of cotton in **wet storage**. This type of damage occurs if the cotton has not been sufficiently

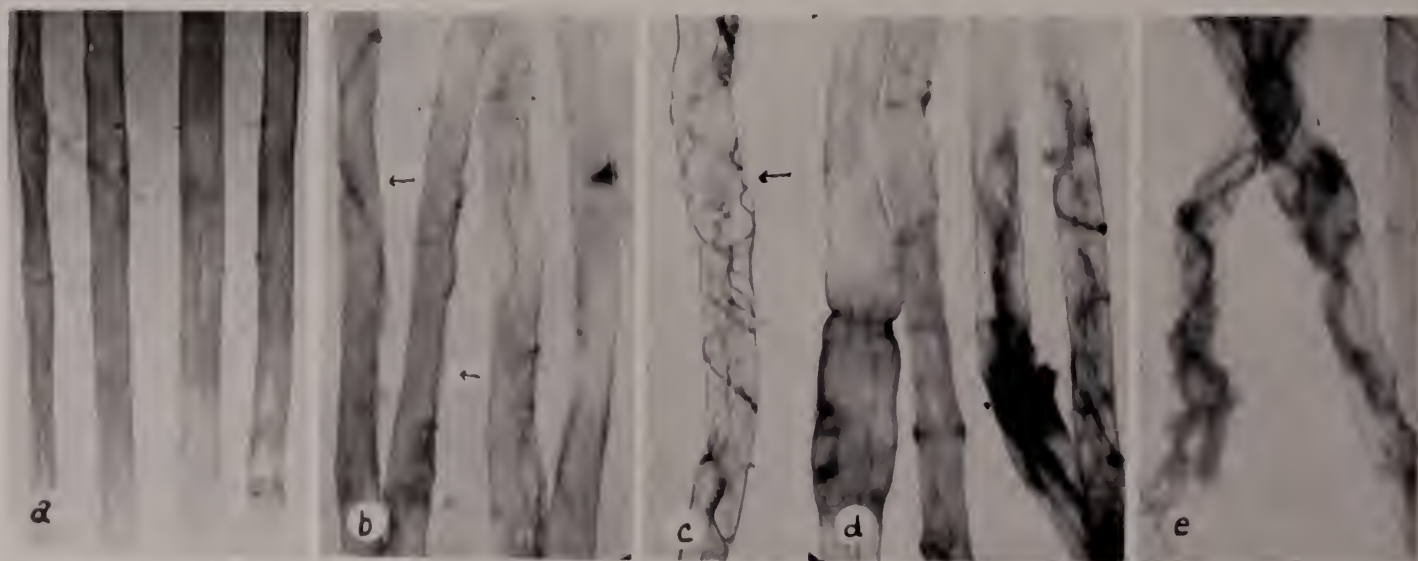


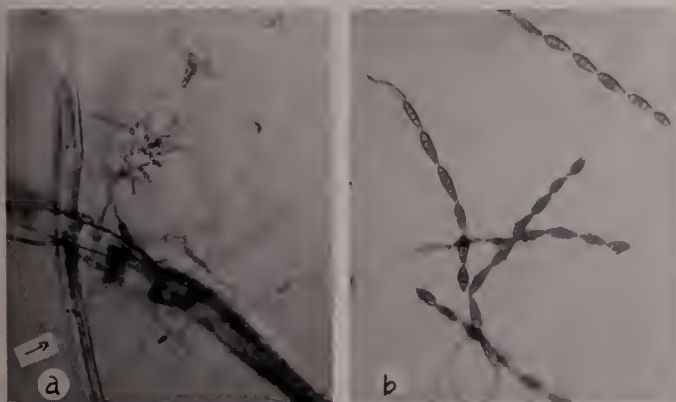
Figure 3. **FUNGI ON MILDEWING COTTON.** All fibers mounted in 18% sodium hydroxide. (a) Normal fiber; (b) Fungal hyphae growing on the outside of the fiber, in spirals (left) or laying on one side of the fiber (center). (c) Same in later stage, not spiraling of hyphae and localized ruptures of fiber. (d) Fibers are highly swollen (left) and severely damaged (right). (e) Final stage of deterioration. (345 X magnification)



dried previously to storage, or if it is stored in the warehouse under humid conditions. A moisture content of nine percent is generally considered the minimum for growth of microbes in cotton, although some authors report fiber damage progressing even at a moisture content of six to seven percent. During storage a great number of other fungi are active in addition to the above ones found in weathering (for instance, representatives of the genera, *Aspergillus*, *Penicillium*, *Mucor*, *Chaetomium* and *Stachybotrys*). These fungi are the same as those which cause the deterioration of cellulose fabrics, "mildewing". Photomicrograph 3 shows the hyphae of these fungi on the degrading fiber. Extensive lists of cellulose decomposing organisms have been published most of which have been compiled in the book by Siu.

**Identification**—The microbes discussed so far and mainly studied in the degradation of raw cotton are fungi or molds.

For the study, an identification of these fungi, small tufts of the cotton are incubated in a moist atmosphere, or suitable substrates are inoculated with a few fibers so that fructifications and spores will develop. Figure 4 are photomicrographs of some of the fungi obtained in this way from cotton weathered for a few days in experimental cotton fields at Clemson. The different types are readily recognized by the different shape and color of the spores and belong to the typical genera mentioned above.



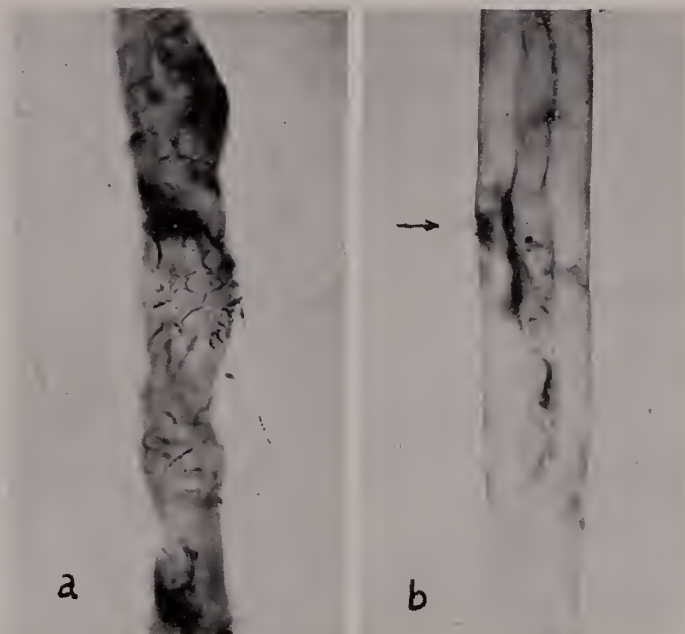
**Figure 4. TYPES OF FUNGI GROWN FROM WEATHERED COTTON.** Fructifications (conidia) of following fungi developed under humid conditions (fiber placed on 2% agar agar in Petri dish)

(a) *Cladosporium* sp., Note two cotton fibers, fungal hyphae and conidia. At arrow, hyphae are attached to fiber.

(b) *Alternaria* sp. Note string of dark colored conidia, each consisting of about four cells.

The type and structure of the conidia allows identification (250 X magnification)

**The role of Bacteria** — Bacteria and Actinomycetes have been often mentioned to play a part in the degradation of cotton but few actual data exists. Figure 5 shows bacteria outside and inside of the highly swollen locally damaged fiber.



**Figure 5. BACTERIA ON DETERIORATING FIBER.**  
(a) On the outside of the locally swollen fiber.  
(b) In the lumen of the fiber, probably after penetrating at damaged spots indicated by arrow.

**Mechanism of Deterioration** — The biochemical mechanism of cellulose deterioration is not yet fully understood. The microbes can attack the fiber from the outside (Figure 3) or invade the lumen and attack the fiber from the inside. The biochemical decomposition takes place under the influence of one or more enzymes secreted by the organism. Various cellulolytic enzyme preparations have been recently obtained. Several hydrolytic enzymes are probably present in these preparations. One of the enzymes has been found to induce increased swelling of the fibers in alkali, (Figure 3d) other enzymes greatly reduce the strength.

## 2. EFFECTS OF MICROBIAL ACTION ON FIBER PROPERTIES

**Effect on strength**—The most important result of the activity of the above fungi is presumably the decomposition of cellulose and an accompanying decrease of fiber strength. The main technique for recognizing this effect consists in determining the reduction in strength of sterile strips of cotton fabric after incubation with pure cultures of the fungus in question. With this technique, the main fungi associated with tightlock, weathering and wet storage



have indeed been found to be able of decomposing cellulose.

In the case of tightlock, serious deterioration of the fiber and complete loss of strength is beyond doubt and can be recognized even without measuring the strength.

In most other types of microbial deterioration, in weathered and cavitomic cotton, a decrease of strength has so far not been easily recognized. The reason of this lies probably in the localized nature of damage and the methods of testing. The Pressley tester, at small gage length which is customarily used for fiber strength determination, tends to mask the weak spots in the fibers. Only recently, a decrease of strength has been found in such cottons by using a 5 mm. gage length instead of the customary small gage length.

**Effect on fiber length distribution**—A decrease of fiber length is always found in cotton damaged by microbes. This decrease can be ascribed to breakage of the mold-weakened fibers during ginning and in the preparation of the sample for the Pressley test. That such breakage actually occurs follows also from direct observation. A comparison of length distribution e.g., in cavitomic cotton as compared to normal cotton of the same origin showed that the percentage of short fibers was much higher in the first cotton. It is this larger percentage of short fibers which probably causes the **lower spinning performance** of weathered and wet stored cotton. A loss of from 10-15% of the cotton in the form of exceptionally short fibers ("fly") may result. This is one of the most serious effects of microbial damage.

**Effect on D. P.**—A so-called "hidden" damage has been described in weathered cotton. Part of the cellulose molecules are broken in this case, as indicated by an increased fluidity (decreased viscosity) of the dissolved cellulose (lower degree of polymerization, D. P.). This damage exhibits itself by weakening of the fabric in later bleaching, finishing, and laundering.

**Effect on color**—A serious effect of weathering is **discoloration** of the fiber. The darkening of weathered cotton has since long been subject of accurate measurements since it seriously influences the grade. It has recently been directly ascribed to the presence of dark pigmented fungi on the fiber and processes have been worked out for bleaching such cotton.

**"Cavitoma"**—Another effect of microbial activity is a complex of mainly secondary characteristic changes in the properties of wet-stored cotton described under the name "cavitoma" (already frequently referred to.) It comprises a shorter staple, an increased pH, a decrease of reducing substances and an increase

swelling of the fiber in 18% caustic (see Figure 3). These changes have been ascribed to microbial activity since the presence of certain fungi is associated with them. Cavitoma was originally considered to be characteristic for a certain type of damage during storage, distinguishing this from other types of microbial damage as in weathering and mildewing. Recently, similar changes have been reported, however, to be also associated with the growth of the fungi commonly found in weathering and mildewing.

**Spots** — During storage under humid conditions, spots of different color may result from the presence of large concentrations of mycelia and/or spores and conidia of colored fungi. Such color spots do not occur in dry-stored cotton, but may be abundant under conditions of excessive humidity. Other spots may result from oil, grease, marking-ink, etc. Fluorescent spots will be discussed under "detection of damage".

**Processing performance**—The behavior in processing has been extensively studied with cavitomic cotton. This cotton produces more processing waste, less even slivers, rovings and yarns, 45% more breakage in spinning and weaker yarns as compared with the same undamaged cottons.

(To be continued in next issue)

Reprinted in modified form with the permission of the publisher, from a more complete article appearing in the April, 1956 issue of TEXTILE INDUSTRIES.



## MODERN MACHINERY

. . . . the nation's largest warehouse stocks of new and rebuilt equipment for HOSIERY, OUTERWEAR and UNDERWEAR MILLS, and DYEING and FINISHING PLANTS.

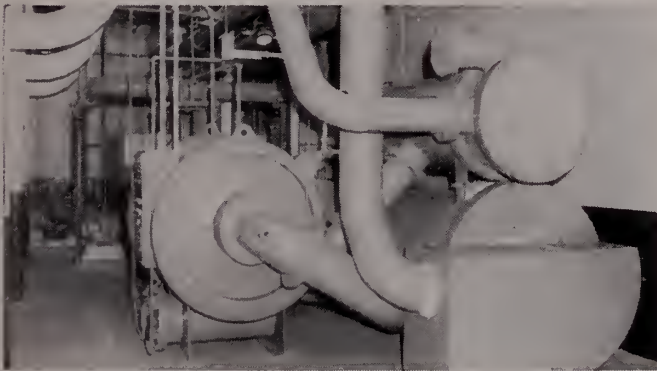
# MORRIS SPEIZMAN

COMPANY, INC.

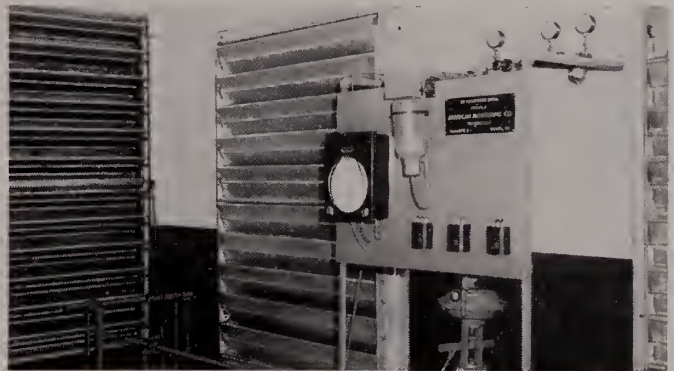
408-514 West Fifth St., Charlotte 1, N. C.



Card room at Highland Park Mfg. Co., Mill No. 1, Charlotte, N. C. Ductwork and zone central atomizers are part of Amco's central station system, designed by J. E. Serrine Company for the entire mill.



Refrigeration is supplied by a 350-ton Trane Centravac unit located in the basement.



The Amco central panel alongside the fresh and recirculated air louvers.

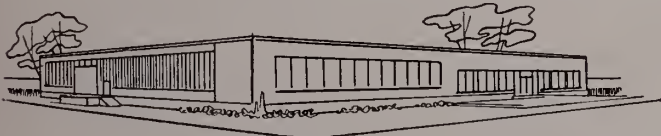
## This **ECONOMICAL** split-system by Amco provides thoroughly conditioned air, with maximum operating efficiency

Whether your need is for one room, or an entire mill, Amco offers air conditioning to meet your requirements. Amco designs and installs all types of systems — humidification alone; or in combination with cooling, such as in the ductless evaporating cooling system; unit dry-duct systems; or central station systems.

The central station system Amco recently completed at Highland Park Mill is a good case in point. In order to effect savings, it was felt advisable not to install the excess

air capacity found in conventional design. Instead, Amco installed a "hand tailored" split system using a smaller central station unit augmented by room atomizers, thus reducing both initial cost and operating cost. This system provides complete control with even greater flexibility of operation. Savings have been substantial.

Amco engineers will be glad to work out a solution to any problem you may have. Next time call on Amco for reliable advice. There is absolutely no obligation.



New Cleveland-Rawan Plant of the American Maisting Company. This modern plant is located at Cleveland, N. C., for the fabrication of duct work and sheet metal products.

# AMCO

AIR CONDITIONING SYSTEMS since 1888



# Outstanding Seniors . . .

**Lynn Arial Hendricks, Jr.**—Lynn is a textile engineering and mechanical engineering student and hails from West Columbia, S. C. Sports, particularly swimming, are favorite pastime activities enjoyed by Lynn.

Lynn made honors for three semesters, elected Who's Who and is a member of Phi Kappa Phi. He is also President of Blue Key, Floor Chairman of the C.D.A., Executive Officer of Scabbard and Blade, and a member of Phi Psi, Phi Eta Sigma, Arnold Air Society, Tiger Brotherhood, Pershing Rifles and Columbia-Clemson Club.

Plans for the future are filled with studies during the Summer and first semester next year in order to get the mechanical engineering degree, and then three years with the Air Force followed by a career in Textiles or in the field of mechanical engineering.



**William R. O'Dell**—Billy is a textile manufacturing student from Newnan, Ga. As hobbies, Billy likes to hunt and watch athletic events. Billy is attending Clemson on an athletic scholarship. He was named on the All-Conference Football Team (U.P.), All-Conference Scholastic Football Team and received honorable mention on the All American Scholastic Team. He also is a member of the Block "C" Club.

During the summers, Billy has worked with the Textile Division of U. S. Rubber Company. Bill's plans for the future are not definite but he will either enter the textile field or go into the coaching field.



**Kenneth Carlisle McAlister, Jr.**—Kenneth is known better by his nickname, "K. C.". He is a textile engineering major and makes his home in Anderson, S. C. His favorite pastime is playing around with art in the form of oils and water color painting.

He is a member of Phi Psi Fraternity, the Senior Platoon, and holds the rank of Lieutenant in the Air Force ROTC.

During the summers, "K. C." has worked at Equinox Mill in Anderson. While at Equinox he has worked in the weave room, twisting room, card room, spinning room and shipping department.





# Proctor & Schwartz Inc.

SPARTANBURG, S.C.

*Greenville Highway 5 miles south  
of Spartanburg  
Stop in and visit us... Phone 6163*

## TEXTILE MACHINERY & DRYING EQUIPMENT

**SERVING ALL BRANCHES OF THE TEXTILE  
INDUSTRY FOR PROCESSING ALL TYPES OF  
FIBERS AND FABRICS**



ASSURES  
QUALITY EQUIPMENT

## MODERN FABRICS . . . MADE IN MODERN PLANTS

**Cords, Seersuckers**, including famous "Reevecord." **Corduroys**, plain, printed and fancy weaves. **Dress Fabrics**—one of the widest ranges in plains and prints on the market, including Reeves famous LONI fabrics for "little or no ironing." **Flannels**, woven fancies, plain suedes. **Industrial Fabrics**, tapes, filter cloths, blanket bindings. **Sateen & Gabardines**, various weights, including famous "Mountain Cloth." **Seat Cover Fabrics**, woven "Reever" of jet-spun yarns, exceptionally durable. **Shirtings**, broadcloths, oxfords, gingham, lenos, madras. **Synthetics**, Dacron, Acrilan, Orlon, Nylon, Acetate and Rayon blends. **Twills**, including famous "Byrd Cloth" and "Reeves Army Twill." **Vivalex Process**, weather preservative for tents and awnings. **Vulcan Products** for many industrial purposes.

Mills Mill No. 1—Greenville, S. C.; Mills Mill No. 2—Woodruff, S. C.; Eagle & Phenix Mills, Columbus, Ga.; Saxon Mills, Spartanburg, S. C.; Chesnee Mills, Chesnee, S. C.; Grace Mill Rutherfordton, N. J.; Csage Mfg. Co., Bessemer City, N. C.; Bishopville Fin. Co., Bishopville, S. C.; Vulcan Rubber Products, Brooklyn, N. Y.; Duroflex, Inc., Buena Vista, Va.; Fairforest Fin. Co.; Clevedale, S. C.; Warrior Duck Mills, Clevedale, S. C.

Reeves Brothers, Inc., is an integrated textile organization, formed in 1920 and today comprises nine wholly owned mills and three finishing plants, employing 7,000 people.

### REEVES BROTHERS, INC.

Southern Headquarters: Clevedale, S. C.  
Executive Offices 54 Worth St., N. Y. C.  
Finished Goods Sales Office, 1071 6 Ave., N. Y. C.

## THE CLEMSON BOOK & SUPPLY STORE

102 COLLEGE AVE.



### THE CLEMSON BOOK STORE Official College Book & Supply Store

**NEW IN APPEARANCE,  
OLD IN FRIENDLINESS!!!  
WE ARE ALWAYS GLAD  
TO WELCOME YOU  
BACK TO THE CAMPUS.**

### L. C. MARTIN DRUG COMPANY Serving Clemson Men Since 1908





## Office Notes


By Emil Stahl, Editor

This being the last issue which the current staff will publish, we would like to thank the members of the faculty and those guest writers who have had their articles published during the past year. Without their help, it would have been impossible to have this publication.

It is my sincere hope that those issues which we have published have been of interest to the students of the Textile School and also those already in the industry. It would be a rather difficult task to attempt to cover all the various phases of the industry in our limited magazine, but we have tried to keep our readers abreast with the current developments in the industry that have proven to be of interest.

I would also like to thank our advertisers, without whose help the free distribution of this magazine would not be possible. Their continued support is sincerely appreciated.


I would wish that the new staff have as much cooperation and that they may continue to uphold the high standards and policies of THE BOBBIN & BEAKER.



Compliments of

# Amerotron Corporation

A  
Textron American  
Company



THE TEXTILE INDUSTRY  
OF THE SOUTH  
LOOKS TO ITS COLLEGES  
FOR ITS  
LEADERS OF TOMORROW



**UNION BLEACHERY**  
GREENVILLE, SOUTH CAROLINA

DYEING AND FINISHING COTTON  
AND SYNTHETIC PIECE GOODS

**LOCKWOOD GREENE  
ENGINEERS, INC.**

ARCHITECTURAL and ENGINEERING  
SERVICES FOR ALL BRANCHES OF  
THE TEXTILE INDUSTRY

PLANT SITE INVESTIGATIONS  
MACHINERY LAYOUTS—DESIGN AND  
SUPERVISION OF CONSTRUCTION  
POWER PLANTS—AIR CONDITIONING  
APPRAISALS

Service on all Types of Industrial, Commercial  
and Institutional Buildings

**Spartanburg, S. C.**  
(Montgomery Building)

BOSTON

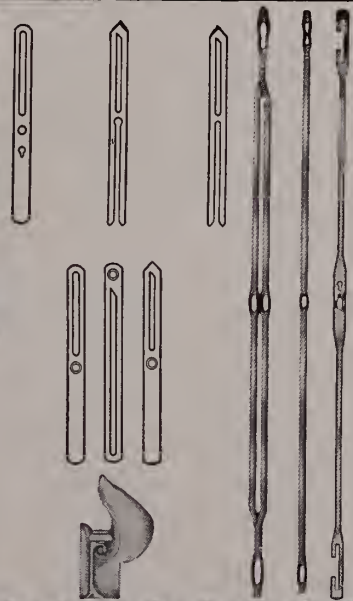
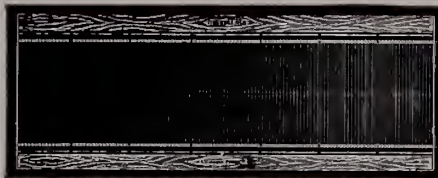
NEW YORK

**Stehedco and Southern**

**ONLY THE FINEST CAN  
PRODUCE THE BEST**

Mills all over the World ex-  
periencing the advantages ob-  
tained in the use of Ste Hed  
Co Quality Loom Harness  
Equipment and Southern (the  
world's finest) Shuttles are  
standardizing on the products  
that "Weave the World's  
Needs!"

Consult our staff of Field En-  
gineers for information on  
your mill problems.



**STEEL HEDDLE MFG. CO.**

2100 W. ALLEGHENY AVENUE • PHILADELPHIA 32, PA.

Other Offices and Plants • Greenville, S. C. • Atlanta, Ga. • Greensboro, N. C. • Providence, R. I.  
**SOUTHERN SHUTTLES** Paris Plant . . . Greenville, S. C. • A Division of STEEL HEDDLE MFG. CO.

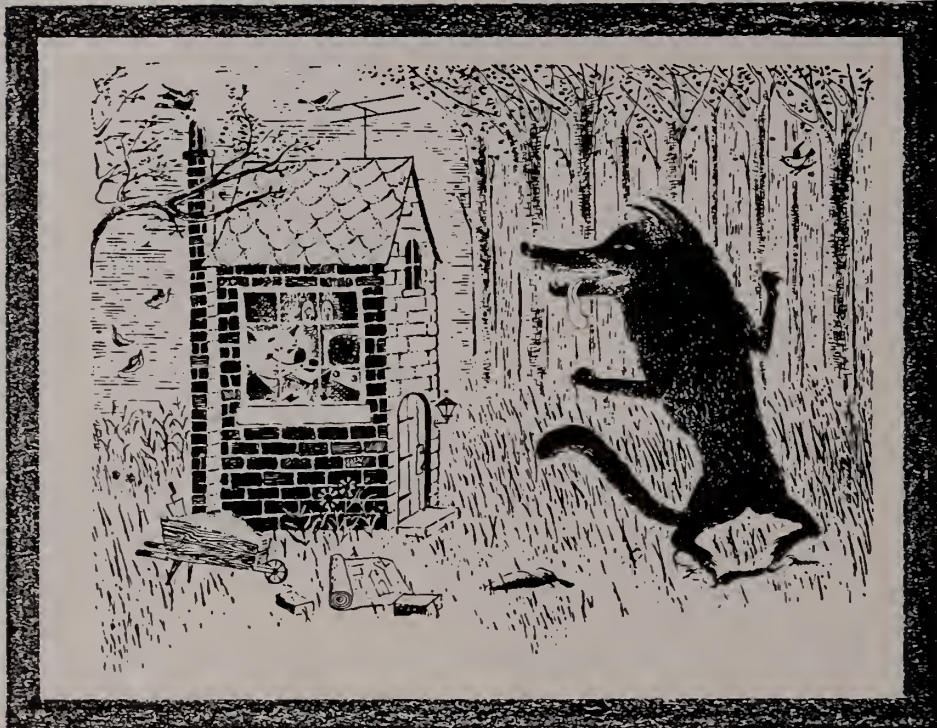
**STEEL HEDDLE COMPANY OF CANADA, LIMITED**

310 St. Hubert Street, Granby, Quebec, Canada



1-L-20A





## YOUR HOUSE AND THE WOLF

The wisest of three famous little pigs could afford a smug expression. His house had been planned with an eye to the course of future events; his meeting of the man with a load of bricks was more than providential.

For sticks and straw he substituted planning and foresight—and bricks—and kept the wolf on the other side of the door.

Engineering protects your building investment. The thoughtful analysis of the physical and economic forces your structure must withstand will best insure your business future. The Professional Engineer helps plan your business program for profitable survival.



*Engineers for 54 Years . . . .* **J. E. SIRRINE COMPANY**  
GREENVILLE • SOUTH CAROLINA

A DEPARTMENTALIZED ENGINEERING ORGANIZATION SERVING BUSINESS, COMMERCE AND INDUSTRY

# Yes, we said "Fine Counts"

## Interoffice Memo:

TO: J. C. Jones, Supt.  
Kasten Mill No. 3

Jim:

Apparently you and I will have to forget what we learned at Tech about not using all-metallic drawing on fine count sliver. Joe's tests at Mill No. 2 show better quality and higher production on his 80's to 100's, on Ideal Drafting, than he ever got on any other system. Recommend you check into Ideal for your combed 60's to 80's right away.

Ed

FROM: E. W. Smith, Gen. Supt.

Feathertouch



Some mills, which were successfully using Ideal Feathertouch Drafting on carded stock, hesitated to use it for fine counts and for combed yarn because of former prejudice against using metallic rolls on fine counts. Those who conducted tests have uniformly made reports like the one above. Today many of the largest and finest mills are running *all* of their finest counts on Ideal Feathertouch Drafting.

Ideal's patented ball bearing spacing sections keep the rolls perfectly aligned at all times. Free-floating fluted top rolls give only a light feathertouch to the stock. They automatically even out thick and thin places in the sliver and impart a permanent crimp. Ideal High Speed Ball Bearing Drawing\* cannot bruise, crush, or cut fibres. Even on the finest counts, Ideal Feathertouch Drafting gives you the highest quality drawing sliver. And Ideal Feathertouch Drafting costs less to buy, less to run, and less to maintain. Write for full information today.

\*Patent Nos. 2,610,363;  
2,490,544; 2,412,357.  
Other patents pending.

# Ideal Industries, Inc.

## Bessemer City, N. C.



COMPARISON PROVES THE

**SAFETY**

OF THE NEW MODERN

**TYPE M**

**ROVING BOBBIN CLEANER**

Note the scratches and nicks on bobbin No. 1. They are the result of obsolete cleaning methods. Compare it with the finish on bobbin No. 2 which is in perfect condition, after repeated cleanings on the New Type M Roving Bobbin Cleaner. This modern machine removes waste with jaws of a new design, so shaped they cannot nick or mar the finish.

**FINISH MARRED AND NICKED**

NO. 1

**FINISH LIKE NEW**

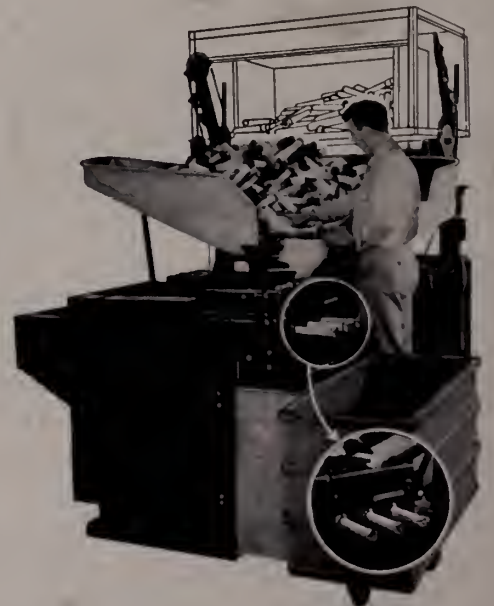
NO. 2

The New Type M Roving Bobbin Cleaning Machine, with the labor-saving Bobbin Box Hoist, is the safest, most efficient, most economical method ever devised for removing waste from roving bobbins.

Works equally well on

- COTTON
- SYNTHETICS
- WOOL

Consult Terrell for additional detailed information, or to survey your bobbin cleaning requirements.



THE **Terrell**

MACHINE COMPANY, INCORPORATED

CHARLOTTE, NORTH CAROLINA