

TECHNICAL BULLETIN



COTTON INCORPORATED

6399 Weston Parkway, Cary, North Carolina, 27513 • Telephone (919) 678-2220

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OPENING KIER BLEACHED COTTON

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	2
METHODOLOGY	2
PROCESSING CONDITIONS AND TEST RESULTS	3
DISCUSSION OF RESULTS	3
CONCLUSIONS	3
TABLE A	4
TABLE B	5

INTRODUCTION

Most of the bleached cotton fiber produced in the United States is done in large kiers designed to handle several hundred pounds of fiber in a load. After bleaching, the wet fiber goes through an extraction operation and the resulting wet cake is deposited on a spiked apron for opening prior to drying. The dried fiber typically passes through some opening equipment in route to the bale press. The effectiveness of fiber opening varies with equipment condition, fiber type, and fiber finish.

Kier bleached cotton finds wide usage as medical and cosmetic swabs as well as in feminine hygiene products. In such products, fiber clumps and stringiness are not a detriment, but in order for cotton to be used in more sophisticated items made from lightweight roll goods, more uniform fiber openness is essential.

This report deals with using a specially clothed cotton card as a fiber opening machine. The fiber used was commonly staple containing a typical soap finish representative of commercial kier bleach production.

METHODOLOGY

Based on earlier investigations, a forty (40) inch cotton card was equipped as described below:

Cardmaster[™] flats (four) – J.D. Hollingsworth #282, 072400668 wire with 14 teeth/inch,
28 rows/inch = 392 teeth/inch².

Lickerin wire – J.D. Hollingsworth 3 point HC40 wire, 6 teeth/inch operating at 1200 rpm.

Main Cylinder wire – J.D. Hollingsworth #07245001, M-1 wire – 7 teeth/inch,
24 rows/inch = 168 teeth/inch².
Speed – 400 rpm.

Doffer wire – J.D. Hollingsworth, 072400502 wire – 6.5 teeth/inch, 24 rows = 156 teeth/inch².

Settings: See Table B

Processing sequence: Bleached fiber from the bale was placed in the hopper. It was then conveyed to a flock feed opener (Kirschner beater, 3 lag, with ten rows of ½ inch long pins and 6 psi for each lag running at 850rpm) and a chute feed prior to carding. The carded web was picked up at the delivery roll with air suction and conveyed to the baler.

PROCESSING CONDITIONS AND TEST RESULTS

Bleached cotton fiber used in the investigations was tested on high volume instruments and the results are shown below:

<u>Mic</u>	<u>Length, inch</u>	<u>Uniformity, %</u>	<u>Strength, g/t</u>	<u>Elongation, %</u>
5.0	0.93	79	21.4	8.2

Production rates may be varied by making adjustments of both the doffer and feed rolls on the card. Various production settings and test results from fiber collected at these conditions are described in Table A.

DISCUSSION OF RESULTS

It is readily apparent that this method of fiber opening is most effective, not only in providing a better-appearing product, but a product with lower nep content. Benefits of this approach start diminishing when approaching the 500 pounds per hour range. At 400 pounds per hour, the results are very similar to the values reported at 377 pounds per hour.

Short fiber content is increased by fiber processing conditions shown here, but for most nonwoven applications, this should not be a problem. Increased amounts of short fiber will cause some lowering of fabric strength, and this is important in durable or semidurable products and can utilize fiber described here. However, most nonwoven products are considered as disposable.

CONCLUSIONS

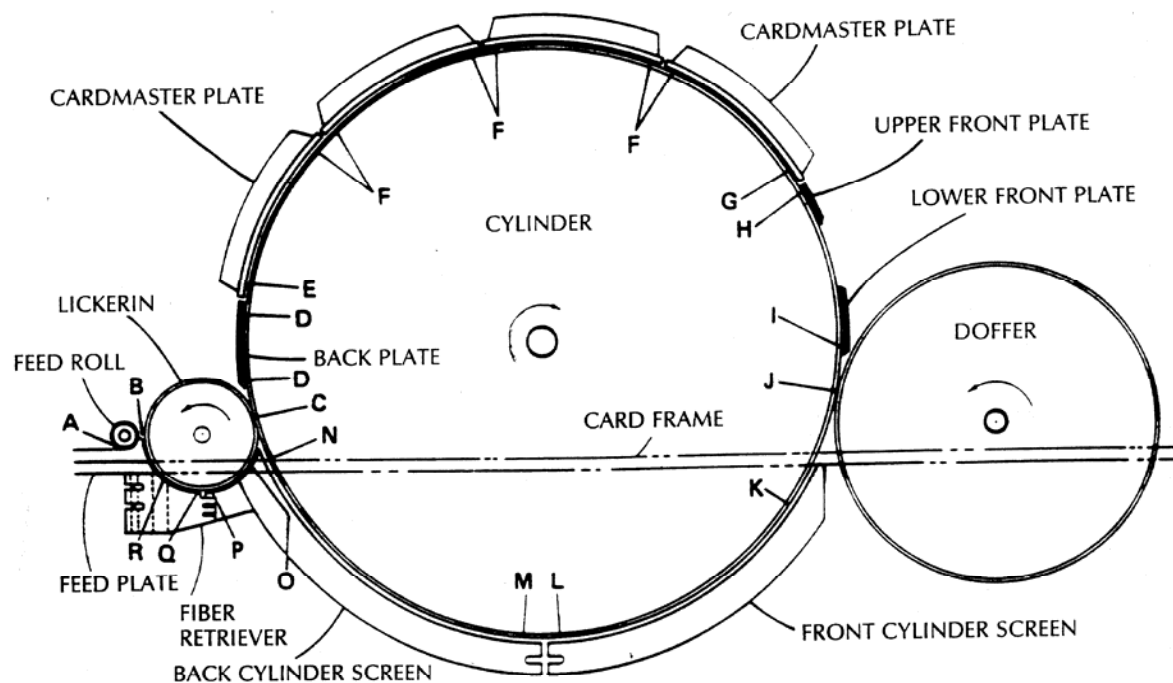
1. Clothing a cotton card with coarse wire as described makes it possible to open kier bleached cotton effectively at high production rates.
2. Equipping such a card with mote knives or fiber retriever will provide cleaning capability for removing bleached plant parts.
3. This type fiber processing can be practiced by the user of kier bleached cotton. If nonwoven web forming is air lay, fiber from the coarse card would feed into a condenser and drop into the hopper section of the webber. If webs are made by carding, opened fiber can be transported directly to chute feeders with start and stop control at the feed roll of the coarse card.
4. This work has shown that coarse carding will reduce nep content and one would expect further reduction in nep content by regular carding at the nonwoven web forming operation.
5. Kier bleached cotton opened in this manner will assure the production of lightweight, nonwoven roll goods of uniform weight, and excellent quality appearance.

TABLE A
PROCESSING CONDITIONS AND FIBER PROPERTIES
ASSOCIATED WITH COARSE WIRE CARDING

Sample Location	Production Rate (lb/hr)	Length Distribution				Nep Content		
		Web Weight (gr/yd ²)	Mean Length (N)	Short Fiber (<0.5)	CV (N)	Total (0.5g)	Diameter (mm)	Card Web Appearance
Bleached Bale	N.A.	N.A.	0.70	21.1	32.5	235	0.79	N.A.
Card Feed Batt	N.A.	N.A.	0.71	23.0	35.0	271	0.80	N.A.
Web Card	159	(197)	0.45	0.67	25.4	34.0	130	0.71
After Card	244	(245)	0.56	0.67	26.1	34.7	161	0.74
After Card	280	(254)	0.58	0.66	26.2	33.6	184	0.72
After Card	377	(249)	0.57	0.66	26.3	33.7	184	0.73
After Card	467	(302)	0.69	0.66	27.6	34.9	219	0.73
After Card	508	(328)	0.75	0.67	27.1	35.3	273	0.75

TABLE B
COARSE CARD SETTINGS

<u>Setting Point</u>	<u>Setting (inch)</u>	<u>Setting (mm)</u>
A	0.005	0.127
B	0.022	0.559
C	0.007	0.178
D	0.022	0.559
E	0.017	0.432
F	0.017	0.432
G	0.017	0.432
H	0.022	0.559
I	0.022	0.559
J	0.007	0.178
K	$\frac{3}{16}$	4.763
L	0.029	0.737
M	0.034	0.864
N	0.034	0.864
O	0.029	0.737
P	0.017	0.432
Q	0.022	0.559
R	0.125	3.175



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Cotton Incorporated is a research and promotion company representing cotton worldwide. Through research and technical services, our company has the capability to develop, evaluate, and then commercialize the latest technology to benefit cotton.

- Agricultural research leads to improved agronomic practices, pest control, and fiber variants with properties required by the most modern textile processes and consumer preferences. Ginning development provides efficient and effective machines for preservation of fiber characteristics. Cottonseed value is enhanced with biotechnology research to improve nutritional qualities and expand the animal food market.
- Research in fiber quality leads to improved fiber testing methodology and seasonal fiber analyses to bring better value both to growers and then mill customers.
- Computerized fiber management techniques result from in-depth fiber processing research.
- Product Development and Implementation operates programs leading to the commercialization of new finishes and improved energy and water conserving dyeing and finishing systems. New cotton fabrics are engineered -- wovens, circular knits, warp knits, and nonwovens -- that meet today's standards for performance.
- Technology Implementation provides comprehensive and customized professional assistance to the cotton industry and its customers -- textile mills and manufacturers.
- A fiber-to-yarn pilot spinning center allows full exploration of alternative methods of producing yarn for various products from cotton with specific fiber profiles
- The Company operates its own dyeing and finishing laboratory, knitting laboratory, and a laboratory for physical testing of yarn, fabric, and fiber properties including High Volume Instrument testing capable of measuring micronaire, staple length, strength, uniformity, color, and trash content.

For further information contact:

COTTON INCORPORATED
WORLD HEADQUARTERS
6399 WESTON PARKWAY
CARY, NC 27513
PHONE: 919-678-2220
FAX: 919-678-2230

COTTON INCORPORATED
CONSUMER MARKETING HEADQUARTERS
488 MADISON AVENUE
NEW YORK, NY 10022-5702
PHONE: 212-413-8300
FAX: 212-413-8377

Other Locations

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