

The Gin Builder: Examining the Skills Needed for the New Industrial Age

The industrial revolution caused great changes in the lives of many Americans. As mechanical inventions began to appear in numerous industries, workers had to learn new skills and fill new occupations that utilized technology. These inventions often led to increased efficiency and required the development of skill specialization. One such invention was the cotton gin, patented by Eli Whitney in 1793. The use of mechanical cotton gins spread quickly and made the farming of cotton profitable in many areas of the South. The cotton gin simplified the cleaning of short-staple cotton by replacing hand picking with machine combing. The cotton gin separated the sticky cottonseeds from the cotton fibers by passing raw cotton across a series of rollers with wire combs. These combs removed the seeds, which fell to the bottom of the wooden box that held the rollers.

Before the introduction of the mechanical cotton gin, an unskilled worker would clean an average of one pound of cotton a day. In contrast, a worker using a cotton gin could clean fifty pounds of cotton a day, or six hundred pounds a day when using a larger model powered by two horses. With the demand for cotton steadily increasing from the new textile mills in both England and New England, the cotton gin greatly expanded the profits from cotton farming and spurred the rise of the plantation system in the South. Cotton rapidly usurped indigo and tobacco as the major cash crop of the region. As cotton production became more and more lucrative, the southern agricultural economy depended more than ever on slave labor.

Because the cotton gin was crucial to the economy of the South, it was important that the machines be built to rigorous specifications and maintained in proper working order. Highly skilled workers constructed the gins one at a time, often taking several months on each machine; repairs and reconditioning could take a number of

weeks. Though the overwhelming majority of gin makers were white, a few slaves were also trained in gin shops across the South. One such slave was William Ellison. Beginning at the age of twelve, he learned the specialized skills of cotton gin repair and manufacture, and when he was freed by his master at the age of twenty-six, he established his own shop to build and fix cotton gins. Ellison's skills as a cotton gin maker and entrepreneur enabled him to make the transition from slavery to freedom.

Objectives

1. To examine primary documents for evidence about the use of the cotton gin in the antebellum period.
2. To discuss handwritten documents, diagrams, and census information related to the cotton gin and cotton production.
3. To explore the experience of a free black cotton gin mechanic in the antebellum South and consider the types of skills that helped some slaves attain freedom and financial independence.
4. To contrast the skills of a trained mechanic during early industrialization with the skills of an agricultural slave.
5. To discuss the impact of industrialization on the economy and society of the South.

Time Frame

This lesson requires one ninety-minute block or two forty-five-minute classes.

Background

This activity touches two seldom mentioned aspects of pre-Civil War America: 1) the impact of industrialization on agriculture, and 2) the culture and contribution of free blacks in the South. Teachers can use the lesson in an American history

curriculum either while studying the industrial revolution or during a study of slavery before the Civil War.

The genesis of this lesson is a project entitled *Whole Cloth: Discovering Science and Technology Through American Textile History*, a curriculum developed by the Society for the History of Technology, the Lemelson Center for the Study of Invention and Innovation, the National Museum of American History, the Smithsonian Institution, and partially funded by the National Science Foundation. Many materials from this project are available on the Smithsonian web site: <<http://www.si.edu/lemelson/centerpieces>>.

Preparation

Assemble student packets containing the following, each of which is included with this article:

1. the diagram of a saw gin and the ginning process;
2. the biography of William Ellison entitled "The Gin Builder;"
3. the Ellison gin repair bill and accompanying notes; and
4. census figures and cotton production statistics from the pre-Civil War period.

Class Procedure

A. Distribute student handout packets. Examine the diagram of a saw gin and the ginning process.

Suggested Questions for Handout 1:

1. How does it work?
2. What skills were necessary to make it? To repair it? To invent it?
3. Was the invention easy to copy? What did this mean for the inventor? For the users?

B. Read the mini-biography of William Ellison.

Suggested Questions for Handout 2:

1. In what way was Ellison a product of his time?
2. In what way was he unusual?
3. How was he able to succeed in business?
4. What technical and mechanical skills did he possess?

C. Examine Ellison's bill for repairing a cotton gin. Discuss what skills and knowledge Ellison needed to do the repairs. Make a list on the board. You may want to group the skills into mechanical, carpentry, accounting, etc.

Suggested Questions for Handout 3:

1. Were any skills more important than others? Were any more valued?
2. How was Ellison able to acquire these skills? How might his life have been different if he had been barred from learning these skills?
3. How did Ellison's skills as an artisan compare with the skills of a typical plantation field slave?

D. Examine the Statistics Handout.

Suggested Questions for Handout 4:

1. How were the populations of whites and free blacks in Charleston related?
2. According to the data, what were the most common skilled trades for free blacks before the Civil War?
3. Was it common for free blacks to own slaves?

4. How did the introduction of the cotton gin affect cotton production?

5. What was the relationship between cotton production and slave holding?

6. Do you think the lives of slaves improved as a result of this new technology?

Extension Activities

1. Have students compose a one-page resume for William Ellison. You may want to provide an example or a form for them to use.

2. Assign a paper comparing the cotton gin with another invention that required specific skills to build/repair/use, and that helped skillful individuals succeed financially.

3. Work together as a class to create an illustrated timeline poster showing events related to the cotton gin.

4. Ask students to build a working model of a saw gin. Use Whitney's patent diagram and/or the diagram included in the student handouts.

5. Assign the task of interviewing someone who has experienced financial success because of skill in building, repairing, or using a particular machine. □

Bibliography

Hindle, Brooke, and Steven Lubar. *Engines of Change: The American Industrial Revolution, 1790-1860*. Washington, DC: Smithsonian Institution Press, 1986.

Johnson, Michael P., and James L. Roark. *Black Masters: A Free Family of Color in the Old South*. New York: W. W. Norton, 1984.

Merrill, Gilbert R., Alfred R. MacCormac, and Herbert R. Mauersberge. *The American Cotton Handbook: A Practical Text and Reference Book for the Entire Cotton Industry*. 2nd revised edition. New York: American Cotton Handbook Company, 1949.

Whole Cloth: Discovering Science and Technology Through American Textile History: <<http://www.si.edu/lemelson/centerpieces>>.

The Lemelson Center for the Study of Invention and Innovation, National Museum of American History, Smithsonian Institution, 1998.

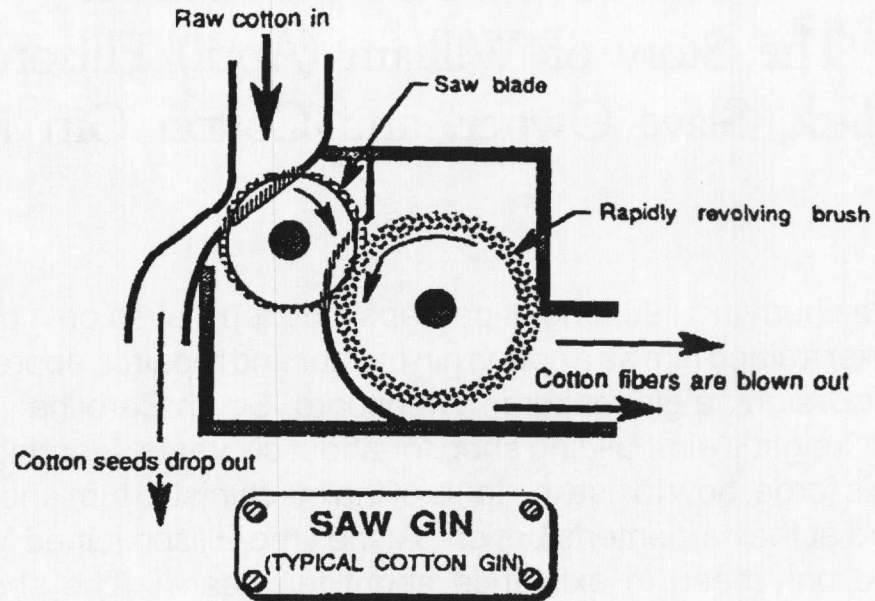
Carlita Kosty teaches American history at Rudder Middle School in San Antonio, Texas, and has worked with the Whole Cloth project since 1991.

Steven Lubar is the chair of the Division of the History of Technology at the National Museum of American History, Smithsonian Institution, and worked with the Whole Cloth project from 1990 to 1993.

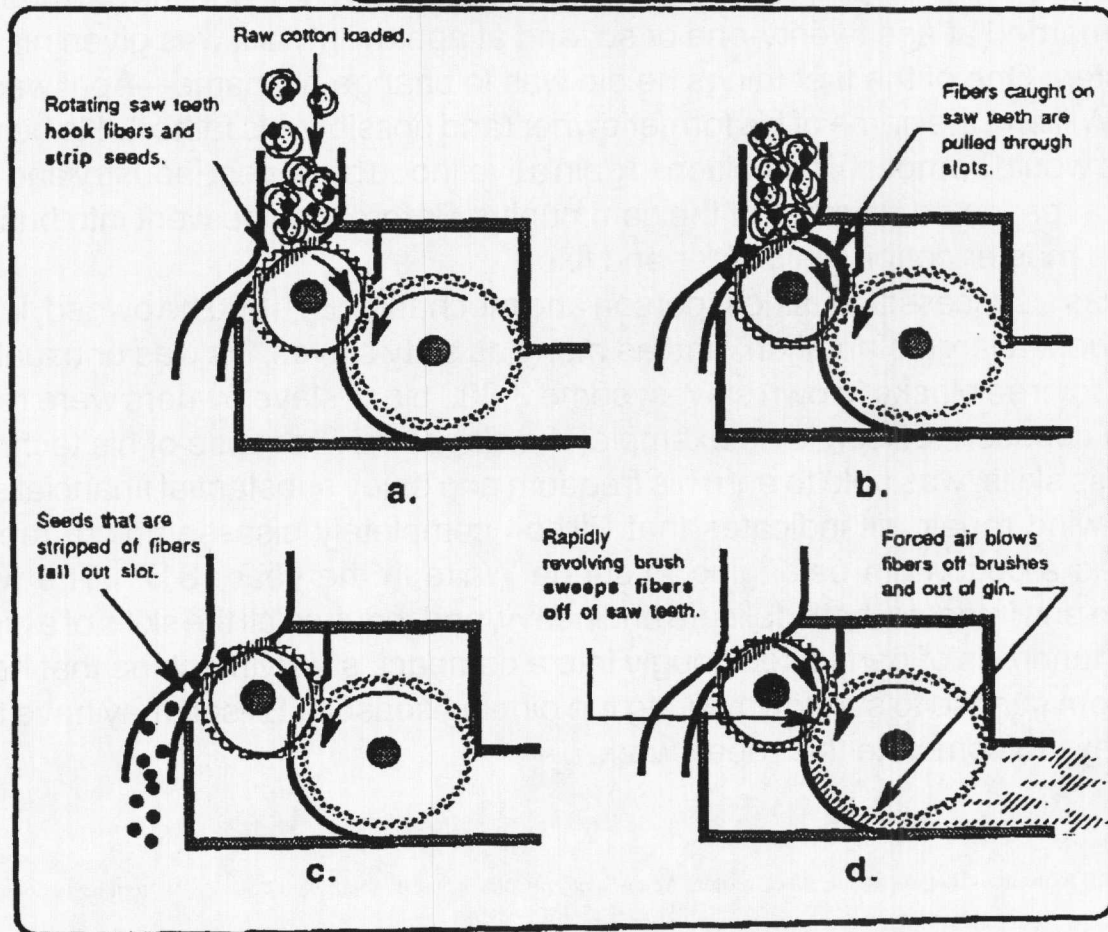
Bill Rhar teaches applied technology at Sammamish High School in Bellevue, Washington, and worked with the Whole Cloth project from 1991 to 1992.

Handout 1

Diagram of a Saw Gin and the Ginning Process



GINNING PROCESS



Drawing by Bill Rhar. (Courtesy of the Lemelson Center for the Study of Invention and Innovation.)

Handout 2: The Gin Builder

The Story of William (April) Ellison: Free Black, Slave Owner, and Cotton Gin Mechanic

April Ellison was born in 1790, one of perhaps a dozen slaves on a plantation in South Carolina. His owner trained him as a cotton gin builder and repairer, apprenticing him at age ten to William McCreight, a gin maker in Winnsboro, South Carolina. He worked as an apprentice in McCreight's gin-building shop for about six years, learning how to work iron at the blacksmith's forge, how to use the tools of the machinist to turn and shape metal, and how to work wood at the carpenter's bench. At the time Ellison joined McCreight, the gin making craft had only been in existence about ten years. The shop served as his schoolhouse for social as well as mechanical skills. He also earned the respect and trust of McCreight, who was white.

Ellison stayed at the shop for approximately another eight years, working as a craftsperson there. He married at age twenty-one or so, and at age twenty-six was given his freedom by his master. One of the first things he did was to change his name—April was a slave name—to William, the name of his former owner (and possibly, his father). He believed his slave name would hamper his ambition to gain a livelihood by honest industry and skill, and to become a respected member of the community. Before long he went into business for himself as a master cotton gin builder and fixer.

Ellison was a successful businessperson and mechanic. By 1860 he owned, in addition to his gin shop, a large plantation, and as many as sixty slaves. (It was unusual, but not impossible for free blacks to own slaves; some 3,800 black slave owners were registered in the 1840 census.) Ellison is an example of a slave who, because of his technological and business skills, was able to earn his freedom and enjoy substantial financial success.

The following repair bill indicates that Ellison completely disassembled, rebuilt, and reassembled a cotton gin belonging to Judge Waite in the year 1817. The work was complicated and intricate, both delicate and heavy, and required all the skills of a gin maker. It involved hundreds of parts fitted snugly into a compact, sturdy machine that had to run smoothly from sunrise to sundown during the ginning season. Ellison may have taken up to twelve days to complete this repair work.

Drawn from Michael P. Johnson and James L. Roark, *Black Masters: A Free Family of Color in the Old South* (New York: W. W. Norton and Company, 1984).

Handout 3: Mr. Ellison's Account Ledger

The following is one page from the account books of William Ellison, an African American gin mechanic. On the left side is a photograph of the original handwritten bill; on the right side is a typed transcription of the same bill. This bill for gin repairs was sent to a local plantation owner.

To cylinder made new and wood tran	\$8 00
To 7 new Saws @ 4/8	7 00
To 37 Saws cut deeper in the teeth @ 25 c.a.p.	25 00
To new brush @ 12 Dollars	12 00
To taking of 41 ribs from making them wider and holifring them @ 20 c.p.	8 20
To mending frame and putting in new ribs	12 50
To new brush nut and stuff and covered with leather	2 50
To new band nut and rollers ribed	1 25
To brush bearer	6 2 1/2
To cylinder beam	5 0
To Englabing Screws	1 00
To 1 bench	1 00
To 4 doz of wood screws @ 1/2	5 0
To 2 hooks for hinges	5 0
To 1 prest hook and Stapel	2 50
To hopper board and hanging	1 50
To facing and Checks	1 00
Charged for carpenter's work	9 00
Credit for hire of Carpent. George for 12 days	9 00
	49.32 1/2

April Ellison gin bill, 1817. Ellison Family Papers. (Courtesy of the South Caroliniana Library, University of South Carolina, Columbia.)

October the 6 1817 Judge Waite's Debt to April Ellison

Cylinder made new and wood tran	\$8.00
7 new saws @ 4/8	7.00
37 Saws cut deeper in the teeth @ 25 c.a.p.	8.25
new brush @ 12 Dollars	12.00
taking off 41 ribs[,] hammering them wider and polishing them @ 20 c.a.p.	8.20
mending frames and putting in new [illegible]	1.25
new brush nut and stuff and covered with leather	2.50
new band nut and Collers rib[b]ed	1.25
brush bearer	.62 1/2
Cylinder bearer	.50
Englabing Screw	1.00
1 Bench	1.00
4 dozen of wood Screws @ 1/2	.50
2 hooks for hinges	.50
1 crest hook and Stapel	.25
hopper board and hanging	4.50
facing and Checks	1.00
	\$58.32 1/2
Credit for hire of Carpenter George for 12 days	—9.
	\$49.32 1/2

Notes

- The **cylinder** is the main piece of the gin that has the saws fastened to it. The saws look like circular saw blades, about forty-five blades on each saw, spaced at intervals of about 3/4" along the cylinder. Saws were typically about 8" in diameter, made of iron, with about 160 teeth spaced evenly around the edge.
- **Saw blades** wore out quickly from the hard work they did tearing apart the cotton. To cut the saws deeper meant filing all 160 points to the same angle, each about 1/4" deep. This was tedious, painstaking, and painful work. ("c.a.p." means "cents a piece", so there is a multiplication mistake here—the total should be \$9.25.)
- The **brush** was a hollow, leather-sheathed cylinder covered by rows of pig-bristle brushes. It rotated in the opposite direction of the saws, and pulled the ginned cotton off of the saw blades. As might be expected, the brush wore out very quickly.
- The **ribs** were the wooden supports between the brushes. As the gin was used, the ribs became rough, and the cotton would catch and choke or clog the gin. The "20 cp" is probably "20 cents per," that is, for each of the 41 ribs. These are more repairs for the brush.
- A **bearer** is what we would call a "bearing," the metal piece on which the brush turns.
- The **hopper board** fits on top of the gin, above the saws; this is where the seed cotton was dropped.

Handout 4: Statistics

Table 1
Population of the City of Charleston,
South Carolina, 1790-1860

	Whites	Slaves	Free Negroes
1790	8,089	7,684	586
1800	9,630	9,819	1,024
1810	11,568	11,671	1,472
1820	10,653	12,652	1,575
1830	12,828	15,354	2,107
1840	13,030	14,673	1,558
1850*	20,012	19,532	3,441
1860	23,376	13,909	3,237

*The boundaries of the city were extended in 1848 to include population in Charleston Neck.

Table 2
Occupations of Free and Negro Men
in Charleston, 1850 and 1860

	1850	1860	Change
Carpenter	101	139	+38
Tailor	84	55	-29
Carter, Drayman	53	41	-12
Laborer	49	45	-4
Shoemaker/Bootmaker	39	19	-20
Barber/ Hairdresser	24	22	-2
Fisherman	22	16	-6
Butcher	13	22	+9
Wheelwright	14	11	-3
Bricklayer	14	19	+5
Porter	13	27	+14
Millwright	12	13	+1
Painter	12	24	+12
Blacksmith	10	16	+6
Baker	1	12	+11
Upholsterer	2	10	+8
Other	81	118	+37
Total	544	609	+65

Farmer, Shopkeeper, Merchant	19 (3%)	33 (5%)	+14
Skilled Trades	370 (68%)	420 (69%)	+50
Carter, Drayman	53 (10%)	41 (7%)	-12
Common Labor	102 (19%)	115 (19%)	+13

Table 3
Free Negro Slave Owners
in Charleston, South Carolina, 1860

Number of Slaves	Slaveholders			Percentage of Slaveholders (N=122)	Percentage of Free Negroes (N=721)
	Male	Female	Total		
1	20	29	49	40	7
2	13	13	26	21	4
3	9	8	17	14	2
4	4	5	9	7	1
5	4	5	9	7	1
6	2	1	3	2	0.4
7	3	0	3	2	0.4
8-9	0	0	0	0	0.0
9-11	1	1	2	2	0.2
12-14	2	2	4	4	0.6
Total	58	64	122		

Table 4
U.S. Cotton Production
and Slave Population, 1790-1860

Year	Cotton Production (1,000 bales)	Slave Population*
1790	3	697,681
1800	73	893,602
1810	178	1,191,362
1820	335	1,538,022
1830	732	2,009,043
1840	1,348	2,487,355
1850	2,136	3,204,313
1860	3,841	3,953,760

*Not all slaves were involved in cotton production. Sugar, rice, and tobacco were also major plantation crops.

Source: Michael P. Johnson and James L. Roark, *Black Masters: A Free Family of Color in the Old South* (New York: W. W. Norton, 1984), 340-43.