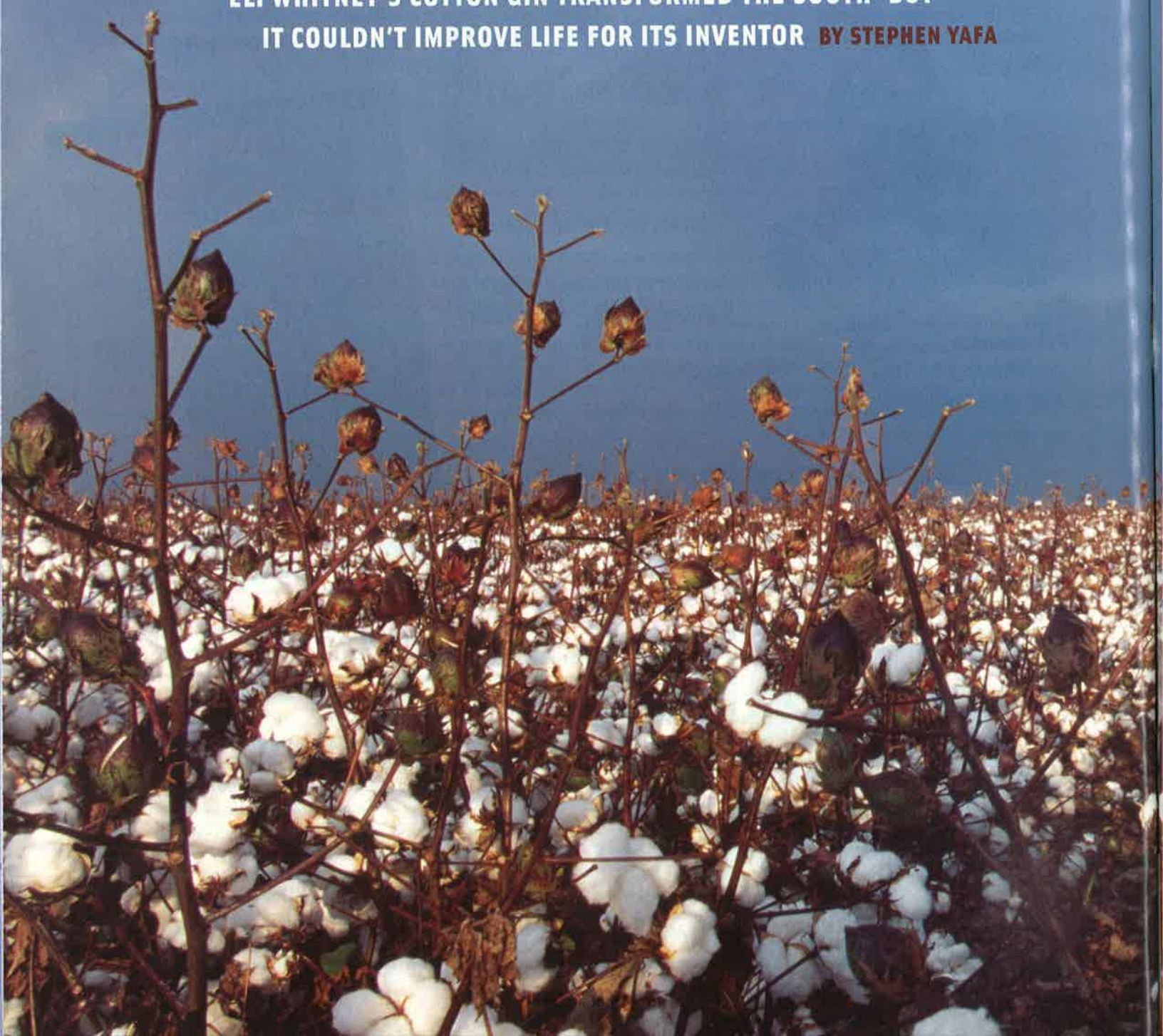


The Man Who Made **COTTON** King

ELI WHITNEY'S COTTON GIN TRANSFORMED THE SOUTH—BUT
IT COULDN'T IMPROVE LIFE FOR ITS INVENTOR **BY STEPHEN YAFA**



ALONE IN HIS ONE-HORSE BUGGY, SLOGGING DOWN A RUTTED road in 1803 to yet another courthouse in the heat of a Georgia summer, Eli Whitney must have felt like a man taunted by the allure of a beautiful woman who was everyone's lover but his. Wherever he looked oceans of upland cotton undulated in all directions, just out of reach. The crop offered unparalleled wealth to thousands of Southern plantation owners and their families but not to Whitney, a cruel taunt indeed, since his mechanical genius was solely responsible for that wealth. "Some inventions are so invaluable," he wrote to his father back in Massachusetts, "as to be worthless to its inventor." He had devoted the past 10 years to trying to enforce the patent he and his business partner had taken out on his gin, a relatively simple device for extricating the fibers of this variety of cotton from the sticky green seeds they were attached to. Before Whitney's gin, a slave could pull free a pound of cotton lint a day by hand. The gin enabled that same slave to separate 50 pounds daily.

Despite the patent that Whitney and his partner, Phineas Miller, had successfully applied for in 1794 and the instantaneous popularity of the gin, they had yet to make a penny. The two men, both transplanted Yankees, had discovered that to Southern cotton farmers a legal patent was a mere nuisance to snake around.

Now, 10 years later, Miller was near death at the young age of 39 and Whitney, two years his junior, was carrying on their fight against patent infringement with little hope of victory and no funds. They had unsuccessfully filed suits 60 different times in Georgia alone. All the while anyone with a few tools and some basic knowledge of carpentry skills could build a crude work-



Eli Whitney, painted by his fellow inventor Samuel F. B. Morse in 1822. Below, cotton ready for harvesting.



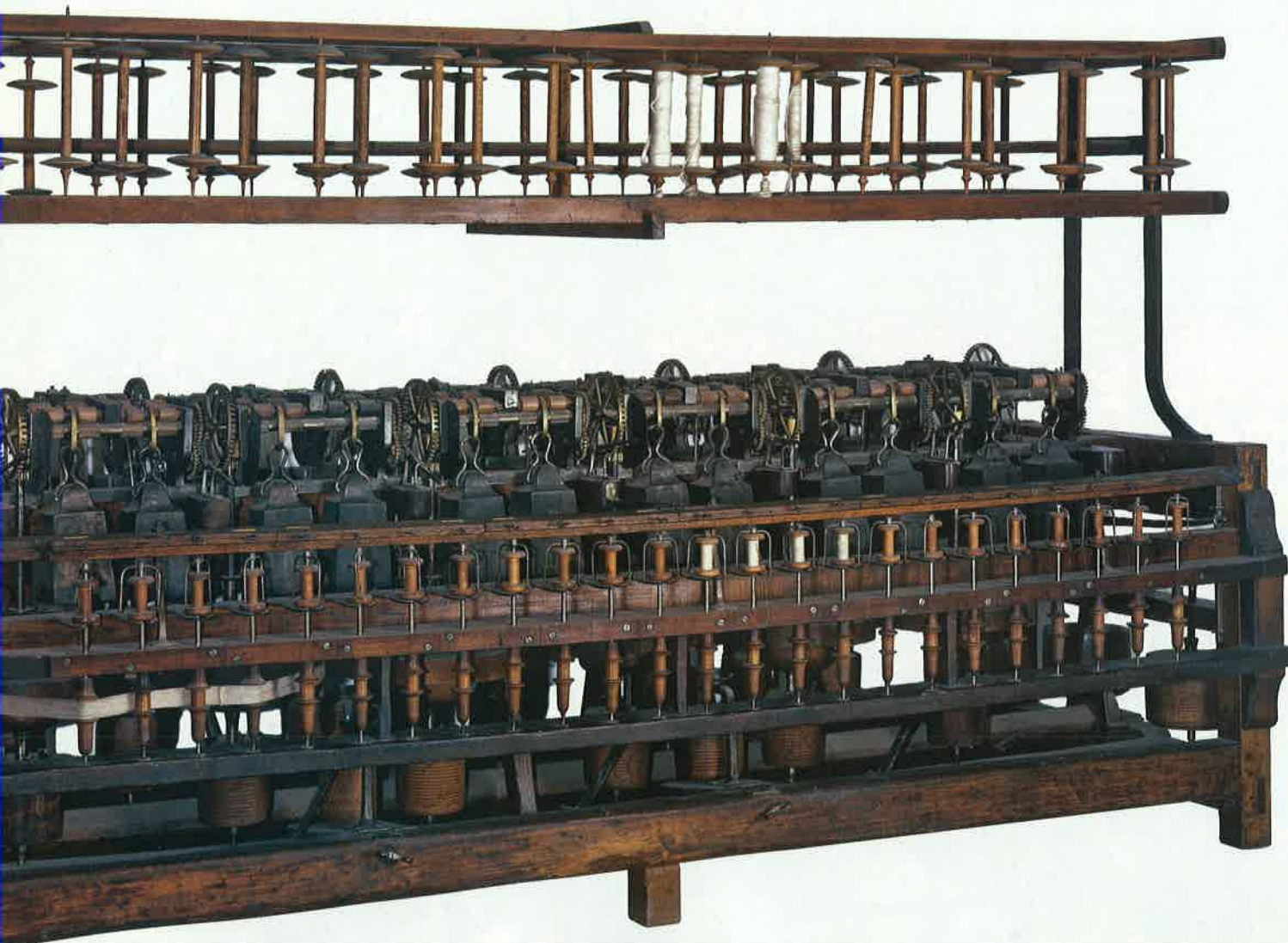
ing version of Whitney's gin. State courts from North Carolina to Georgia during that decade did nothing to stop the flow of pirated gins. At best, judges leveled meager fines; even then Whitney and Miller received no compensation. These court-houses were in the heart of cotton country, their juries stacked with the planters' cronies. "I have a set of the most Depraved villains to combat and I might almost as well go to *Hell* in search of *Happiness* as apply to a Georgia-Court for Justice," Whitney wrote to a friend in 1803. By then he was at wits' end. "It is better not to live than to live as I have for three years past," he wrote Miller. "Toil, anxiety and disappointment have broken me down. My situation makes me perfectly miserable." He was exhausted, penniless, and hopelessly in love with his business partner's wife.

Early on, before Eli Whitney, the eventual leaders of the new Republic realized that to be self-sustaining, its citizens would have to dress themselves in native cloth grown and manufac-

tured without any reliance on foreign powers. To George Washington, Alexander Hamilton, and their colleagues, imported British dry goods were tools of subjugation, reminders of the nation's continuing economic dependence. Initially, flax, spun and woven into linen, was the primary native colonial resource for fabric, along with wool. Cotton, cultivated domestically only on small acreage, might have seemed an appendage at best, but to our first leaders it represented an investment of hope in the country's future.

The plant had established its American roots from the very first settlement, in 1607, at Jamestown, Virginia. There it had been raised the first year, and by 1621 "the plentiful coming up" of seeds sown experimentally had gained attention on both sides of the Atlantic. Two years earlier at Jamestown, in 1619, James Rolfe had brought "twenty

Samuel Slater brought this elaborate spinning frame from England in his head, jump-starting American manufacture.



SLATER HAD CREATED A MONSTER. THERE WASN'T ENOUGH COTTON TO FEED HIS MACHINES, BUT THAT WAS ALL ABOUT TO CHANGE.

Negars,” the first slaves, to the colony. Within decades God-fearing Puritans were importing slaves from Africa and bartering them to West Indian plantation owners for cotton and rum. That made Massachusetts the first slave-trading colony. Its citizens wove their cotton into a variety of blended fabrics. The cotton was mostly the long-staple kind, imported from the Caribbean; the upland cotton that could grow on the North American mainland was too hard to work with. Still, spinning wheels and looms filled homes all over the colonies.

NONE OF THE TEXTILE INNOVATIONS THEN GOING ON in England—James Hargreaves’s spinning jenny among them—made it across the ocean; that left the colonies to rely on hand wheels and looms that produced fabric with painful slowness. Richard Arkwright was busy transforming an artisan craft into a mechanized industry in England, but his government, obsessively protective of Britain’s textile inventions, kept a close watch on exports.

James Madison looked to the future. At a convention held in 1786 to devise means to bolster the industrial output of the country, he told a colleague, “There was not reason to doubt that the United States would one day become a great cotton-producing country.” Alexander Hamilton thought so too. “Several of these Southern colonies,” he wrote, “might some day clothe the whole continent.” But these men knew that excessively laborious processing was needed for the upland cotton that could grow across the South. Nonetheless, cotton produced at home in volume might not only supply domestic needs but bring in large sums as a leading export to help support the new government. In 1788, when John Cabot and his brothers built the nation’s first cotton factory, on the Bass River at Beverly, near Boston, a Virginia weaver—George Washington—soon showed up to take a tour. “In this manufactory, they have the new invented spinning and carding machines,” he wrote in his diary. “. . . In short, the whole seemed perfect, and the cotton stuffs they turn out excellent of their kind.”

In 1789 a former superintendent at one of England’s great cotton mills arrived on this side of the Atlantic disguised as a farmer to avoid detection by the authorities (fearing industrial piracy, the British refused to let anyone who worked in a cotton mill leave the country). Samuel Slater had no models or designs on him, but in his formidable memory he carried the blueprints for re-creating Richard Arkwright’s water frame, and he set out to make his fortune from them. In that same year the Constitution came into effect, and 13 rancorous, feuding colonies somehow managed to find enough interest in common to join forces as the United States of America and elect a textile enthusiast as their first leader.

Within a year Slater built his first cotton-yarn factory, in Pawtucket, Rhode Island. It was also the first to use water frames.

Fashioned entirely from memory, relying on intricate machines forged for the most part on-site, the new nation’s first cotton-warp mill miraculously performed as promised. Slater, said Andrew Jackson, was the “father of American manufactures.” More Slater mills soon opened. Using imported long-staple cotton, they produced yarn for chambrays, sheeting, shirts, and gingham from long-staple varieties. By 1809 there would be scores of cotton mills in operation in New England and New York. Unlike linen and wool, this fabric could be inexpensively brought to market. As a result it soon became America’s—and the world’s—cheap, practical dress wear.

Slater had created a kind of monster. Textile factories are



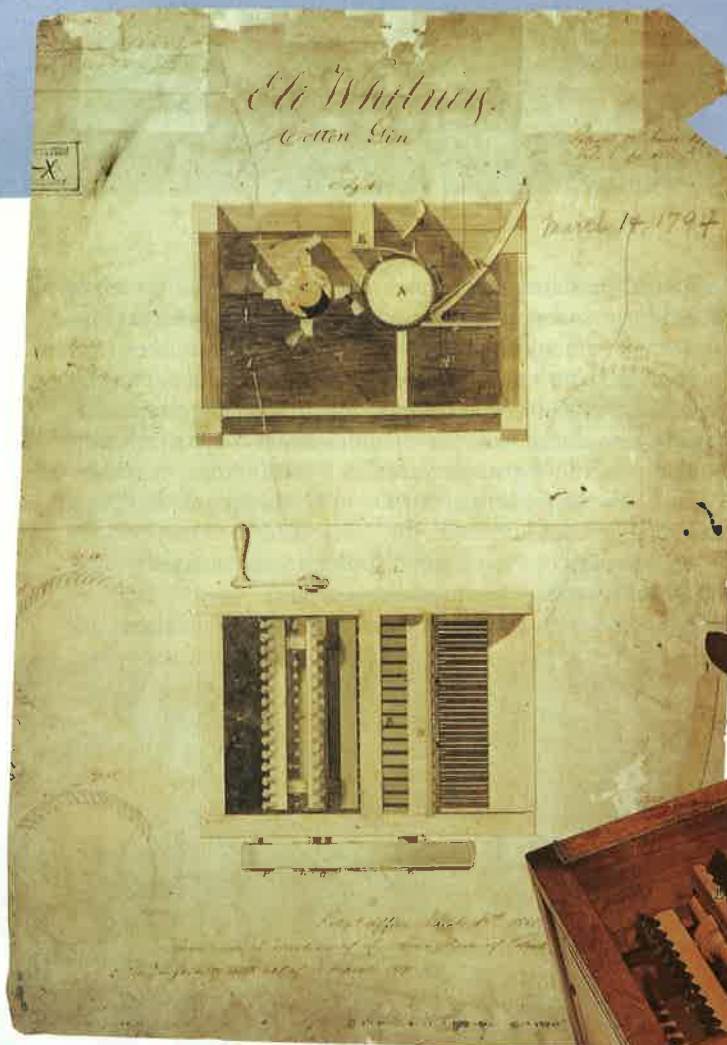
Slater's first cotton mill, in Pawtucket, Rhode Island, depended on raw material imported from abroad.

huge maws that ingest massive quantities of raw material to feed their ravenous machines. Moses Brown, one of Slater’s partners, recognized the problem. There simply wasn’t enough of that raw material. “You must shut down

thy gates,” he wrote Slater two years into operation, “or thee will spin all my [West Indies] farms into cotton yarn.” Brown had refused to use the South’s potentially vast supply of upland cotton; its harvesting was impractical, and the dust that adhered to its fibers resulted in an inferior yarn.

That was all about to change, and with it, the course of industry, society, and politics in the United States. “What Peter the Great did to make Russia dominant, Eli Whitney’s invention of the gin has more than equaled in its relation to the power and progress of the United States,” wrote Thomas Macaulay in the 1850s. Macaulay was right, but by the time cotton exerted its greatest influence on America’s economy, in 1860, it had also brought the country to the brink of disaster.

The great change began with nothing more than a chance



way to becoming a teacher—nothing he cared to do, but the only paying job he could find.

Arriving in South Carolina, he learned that his promised wages were to be cut in half. He refused the position. Caty had invited him to visit her at Mulberry Grove in nearby Savannah, Georgia, the plantation she had been awarded for her late husband's service during the war, and he took her up on the invitation.

Whitney's gin and his 1794 patent drawing for it. Nobody has invented a better one since; they've just improved it.

Phineas Miller, running the plantation, was now also Caty's lover. She was an extraordinarily vivacious, worldly hostess, whose social contacts included George Washington and just about every other famous American of the time. There were children scampering everywhere; there were acres of land to explore. Life progressed with a languorous ease and a sense of adventure

Whitney had never experienced. Aware that Widow Greene and young Mr. Miller were living together out of wedlock, he wrote to a dear friend, Josiah Stebbins, "I find myself in a new natural world and as for the moral world I believe it does not exist so far South." He gave no indication of missing that moral world.

Shortly after his arrival at Mulberry Grove, Caty, following her intuition, got him talking to some of the disconsolate local farmers.

Their common problem, he discovered, was that because they had no way to remove the stubborn green seeds of upland cotton from the fibers except by hand, they planted it only sparingly. The cost of feeding and clothing the slaves who did the excruciatingly slow separation of the cotton cut deeply into profits. The farmers' other crops—tobacco, corn, indigo, and rice—were also problematic and were barely providing a livelihood. There has been an ongoing debate ever since as to whether slavery might have died out altogether in the South without the sudden increase in the demand for field hands and other workers brought about by the explosion of planted cotton. At best, slavery was on a steep decline as a labor source and was fast becoming an economic liability.

Green-seeded cotton grew like a weed in this climate; there was a fortune waiting to be made, and no way to make it. What to do? "Gentlemen, apply to my young friend, Mr. Whitney," Caty told the assembled group. "He can fix anything." Ten days

meeting between a destitute young tutor and the lively widow of a Revolutionary War hero. Graduating from Yale at 27 in 1792, Eli Whitney had accepted a tutoring job in South Carolina to pay back college loans. On the sea voyage from New York, he struck up a friendship with the wife of Gen. Nathanael Greene, Catharine, better known as Caty. Whitney might be lacking money, Greene saw, but he hardly lacked ideas and ambition. She learned from her plantation manager, Phineas Miller—also a Yale graduate—that Whitney had earned a reputation as an especially capable mechanical engineer, even a child prodigy. As a 12-year-old in Westborough, Massachusetts, he had taken apart and successfully reassembled his father's watch. Two years later he had developed the sophisticated molds and tools required to forge nails, and at 14 set up a nail-making business of his own, the profits going to his tightfisted but loving Calvinist father. At 16 he became a manufacturer of hatpins. His mechanical aptitude pegged him as someone adept in the "useful arts," not exactly a socially elevated calling in that era. Still, he insisted on attending Yale, which then turned out mostly clerics and lawyers. Once out of college Whitney was strapped for funds and, like college graduates ever since, pretty much at sea. In this case, literally. When he met Caty on board, he was on his



LEFT: NATIONAL ARCHIVES; INSET: NATIONAL MUSEUM OF AMERICAN HISTORY; SMITHSONIAN INSTITUTION; RIGHT: HULTON ARCHIVE/GETTY IMAGES

IT ALL BEGAN WITH NOTHING MORE THAN A CHANCE MEETING BETWEEN A DESTITUTE YOUNG TUTOR AND THE LIVELY WIDOW OF A WAR HERO.

later Whitney came back with a working model of his cotton gin—crude, but essentially governed by mechanical principles that are still in use today. No engineers since have invented a better gin; they've simply built better versions of Whitney's original.

Legend has it that his inspiration came as he was roaming the plantation grounds pondering how to solve the problem and paused to watch a cat hunt down a chicken. At the last moment the chicken fled and the cat's lunging paw came away with only a few feathers. Why try to separate the seeds of upland cotton from its fibers? Why not instead build a device to separate the fibers from the seeds? Small difference, huge implications. If Whitney's machine could allow the fibers to be pulled away while creating a barrier that held back the seeds, the claws could exert enough force to yank the fibers free.

THAT ELEGANTLY UNCOMPLICATED PREMISE LED WHITNEY to build an apparatus that duplicated the motions of the slaves who cleaned cotton manually. To do the work of the hand holding the seed, he fashioned a mesh sieve, or hopper, with narrow slits in it running lengthwise. On the surface of a drum rotating around the hopper he duplicated fingers pulling off the lint by attaching wire claws that protruded through the slits; these teeth grabbed the lint and wrenched it away from the seeds, which were held in check by the tight mesh. A cylindrical brush swept off the freed lint. This hand-cranked cotton gin (the word *gin* is shortened from *engine*) was, in Whitney's words, "an absurdly simple contrivance." Unfortunately for him, he was all too right; it was extremely easy to copy.

Demonstrating the gin to the local planters and seeing their excitement, he knew he'd come up with a winner. So did Phineas Miller, and the two young men formed a business partnership. Whitney would make the gins, and Miller would put up the money to build them and license them to planters in return for one-third of their harvest. They would split the profits fifty-fifty. Caty Greene was delighted. "Mr. Whitney is a very deserving young man, and to bring him into notice was my object," she told everyone in sight. She was now engaged to Miller, hired to be her children's tutor before he took over management of the planation; they would soon marry. That left Whitney emotionally stranded. From scant but compelling evidence it appears that he deeply loved the woman and valued his business partner's friendship. From the moment his gin became a piece

of valuable farm equipment, however, he had little time for personal angst. "One man and a horse will do more than fifty men with the old machines. It makes the labour fifty times less, without throwing any class of People out of business. . . . 'Tis generally said by those who know anything about it that I shall make a Fortune," he wrote to his father, a proud son boasting to the man he wanted most to impress.

The gin's fortunes and Whitney's went in opposite directions from the start. After 16 months of difficult labor in a workshop in New Haven, Whitney perfected a full-sized bench model of his gin and shipped it off as part of his patent application to the newly formed federal government. His petition came to the attention of Thomas Jefferson, then Secretary of State. "As I [manufacture cotton] myself, and as one of our great embarrassments is the cleaning the cotton of the seed, I feel a considerable interest in the success of your invention, for family use," he wrote to Whitney, asking half a dozen tough, incisive questions about the specifics of its operation. "Favorable answers to these questions would induce me to engage one of them to be forwarded to Richmond for me." Whitney responded in detail, explaining how the first successful small model encouraged him to build larger working versions; in time, with Caty's assistance, the two men would become friends. In March 1794 Whitney obtained a patent.

Delighted, he told his father: "I had the satisfaction to hear it declared by a number of the first men in America that my machine is the most perfect & most valuable invention that has



Slaves load cotton into a gin, little changed from Whitney's patent model, in an engraving made in 1854.



ever appeared in this country. . . . And I shall probably gain some honour as well as profit.”

He had every reason to expect his gin to make him rich, but there was a “new invention” loophole in the patent law first passed by Congress in 1793 just big enough for a competitive gin to squeeze through. Another inventor, Hogden Holmes, had in the interim replaced Whitney’s hooks with saws. While Whitney’s hooks pulverized the plant’s seeds, causing their oil to leak out and clog the gin’s gears with damp lint, saws did a cleaner, more efficient job, and they won Holmes a patent of his own two years later. The more efficient Holmes machines were soon being knocked together on farms across the South. Holmes—a mechanic from Augusta—soon discovered that Georgia courts scoffed at patent-infringement suits. Every one ended in defeat for the inventor, giving growers a license to construct their own versions without concern for any legal consequences. As homemade gins suddenly began to blanket the South, Whitney and Miller laid their plans to monopolize the industry by giving their gins to growers without charge in exchange for one-third of their harvested crops. That in-kind arrangement had been used extensively for wheat delivered to flour mills, but to Southerners the terms seemed exorbitant, and grains a faulty model. Still, Miller and Whitney refused to reduce their terms. It proved their undoing. Possibly a more flexible business proposal might have persuaded some growers to honor their patent.

The crop was in the field, with all the attendant time pressures of cultivation and harvest dictated by the growing season; farmers, now planting upland cotton widely for the first time,

The ginning process today is fully automated and computer controlled. This is a plant in Arkansas.

their own crude versions of Whitney’s gin before harvest. Miller and Whitney might want to control the ginning industry, but they hadn’t adequately done their homework by estimating in advance what their third of the crop would translate to in real dollars. The answer was three million dollars in today’s currency—for one year alone, 1800. Southern state legislators did the math and came to the defense of their native-son growers. The governor of Georgia in 1800 railed against these two transplanted Yankees, “who demand, as I am informed, \$200.00 for the mere liberty of using a ginning machine. . . . Monopolies are odious in all countries, but more particularly in a government like ours. . . .”

Whitney and Miller gave these Southern states all the excuse they needed to wrap the American flag around their resistance, and the two paid dearly for it. By 1797 Whitney had built 28 gins; none was in use. Miller continued to pump his own dwindling funds into the business, \$12,000 in all. By 1800 he and Caty had to auction off Mulberry Grove. As business partners Whitney and Miller might seem to provide a casebook study on how to strangle a golden goose. They alienated their prospective customers, refused to license their design to other manufacturers to meet the urgent demand, laid themselves bare to inevitable bootlegs, and went broke trying to repair the damage.

THE CONFLICT GENERATED BY WHITNEY'S GIN WAS A REHEARSAL FOR THE HOSTILITIES BETWEEN NORTH AND SOUTH THAT FOLLOWED.

Still, the partners' loss was cotton's gain. People now had a reason to propagate it in vast quantities, and they began to do so at once. Supply could finally catch up with demand. In 1793, before Whitney's gin went into operation, the South exported 487,000 pounds of raw upland cotton to England; one short year later that quantity increased threefold to 1.6 million pounds. By 1800 the South was sending 17.8 million pounds to England; by 1805, 40 million; and by 1820, close to 128 million.

Big cotton had arrived to stay. Manchester's mills came to rely on the upland fiber now available only from America. Great Britain in turn exported about 12 million pounds of cotton fabric in 1800 and half a billion pounds by 1860. The South became the sole supplier of America's cotton mills and the primary supplier of Britain's. While Whitney's hand-cranked gin initially produced 50 pounds of lint a day, planters would eventually produce up to 1,000 pounds of cleaned, ginned upland cotton daily, and it was all spoken for.

Once Whitney's gin facilitated mass production, an immensely profitable cash crop quickly attained so much persuasive control that it threw a bolt of energy into the dying institution of slavery, which in turn triggered the escalating political, moral, religious, and economic discord that led to bloodshed. Carried aloft by the winds of potential fortune, the sober minds of bankers, builders, planters, captains of industry, factors, legislators, shippers, and just about anyone on both sides of the Atlantic whose income was linked to the plant in the field or the fabric on the shelf, became muddled by cotton. There was simply too much money to be made. In the end cousins were killing one another in remote Pennsylvania farmlands and on bluffs along the Mississippi Delta in the Civil War.

As for Whitney himself, he died decades before the debacle that his invention precipitated. By all accounts a sensitive man, he almost certainly would have been devastated. His personal tragedy in creating so much sudden wealth for more people than any other man up to that time in American history and not benefiting from it himself was at least partially offset by an eventual resolution to his lawsuits against Southern states.

After more than a decade of crying in the wilderness, he finally caught the sympathetic ear of one judge, William Johnson, in Georgia, who wrote an eloquent decision in his favor. "The machine of which Mr. Whitney claims the invention . . . has suddenly become an object of infinitely greater national importance" than any previous seed-separation machine, he wrote. Hogden Holmes's gin the judge dismissed as a mere adaptation, which it was. "Every characteristic of Mr. Whitney's gin," he added, "is preserved."

States at long last began to pay attention to Whitney's claims. South Carolina agreed to pay \$50,000, but after a \$20,000 down

payment, it reneged on the balance due. Neighboring states made their own deals. Whitney collected close to \$90,000, a handsome payment, it would seem, but in those 10 years he'd run up so many unpaid bills that the money all but vanished; there were creditors to pay for equipment, laborers demanding back wages, sundry bills, and a host of lawyers to settle with. In the end, he pocketed at most a few thousand dollars.

THE SOUTH FARED BETTER. "INDIVIDUALS WHO WERE depressed with poverty and sunk in idleness, have now suddenly risen to wealth and respectability. Our debts have been paid off. Our capitals have increased, and our lands trebled themselves in value. We cannot express the weight of the obligation which the country owes to this invention. The extent of it cannot now be seen," Judge Johnson wrote.

In a sense the conflict generated by Whitney's gin was a rehearsal for the hostilities between North and South that followed. Whitney and Miller behaved like hardheaded Northern industrialists demanding unreasonable terms of sale with no understanding of the vagaries of agriculture, an industry governed by a host of unpredictable circumstances and conditions, from weather to invasive pests. In turn the South's greedy farmers refused to honor the financial and personal debt they owed these men. Magnified a hundred times and greatly complicated by the moral morass of slavery, that self-absorption and conflict of wills, cultures, habits, and values eventually escalated into armed conflict.

Whitney, a successful musket manufacturer at his death in Connecticut in 1825, lived just long enough to glimpse the revolutionary changes in the nation's economy that his gin set in motion. (He also lived long enough to take part in another technological revolution; as a maker of muskets he became a figure in the birth of standardized mass manufacturing of products with interchangeable parts.) In the year he died, America's cotton exports to Britain alone reached 171,000,000 pounds. In Massachusetts two years earlier an enterprising businessman had created the first American city built solely for the purpose of producing textiles from the South's upland cotton. The slave population of the South in the meantime had more than doubled since 1793. The coming conflict between an individual's right to the pursuit of happiness in our democracy, slaves included, and the country's fixation on its cotton economy seemed inevitable to anyone who paused to consider it, and many did. But no one, in the end, was able to prevent it. ★

STEPHEN Yafa is a screenwriter, playwright, and novelist who has written for publications including *Playboy*, *Details*, *Rolling Stone*, and the *San Francisco Chronicle*. This article is excerpted from his book *Big Cotton*, which will be published in January 2005 by Viking.