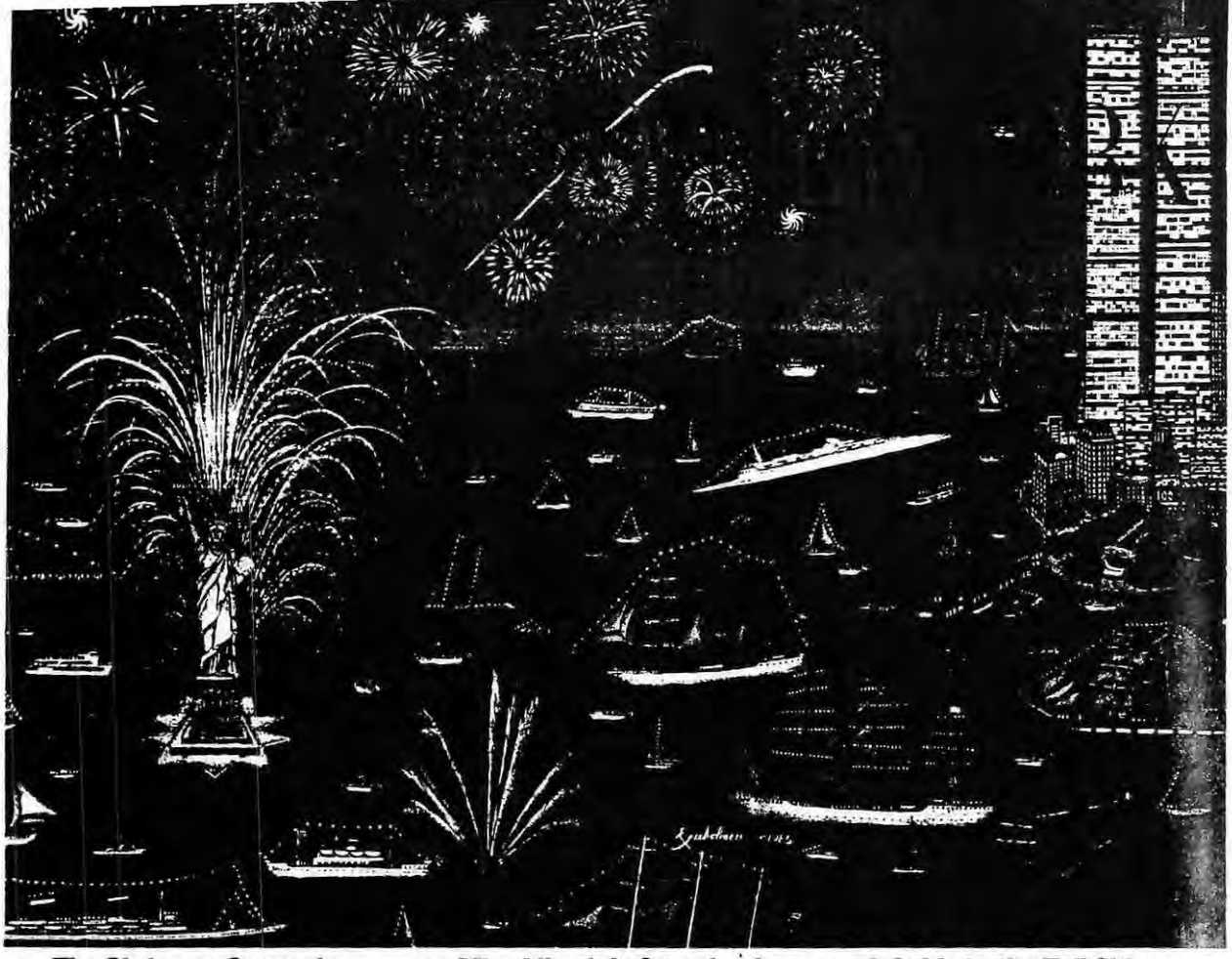

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MARVIN SIEGEL *Editor*

JUDITH ANDERSON *Deputy Editor*

ELLEN BURNIE *Art Director*

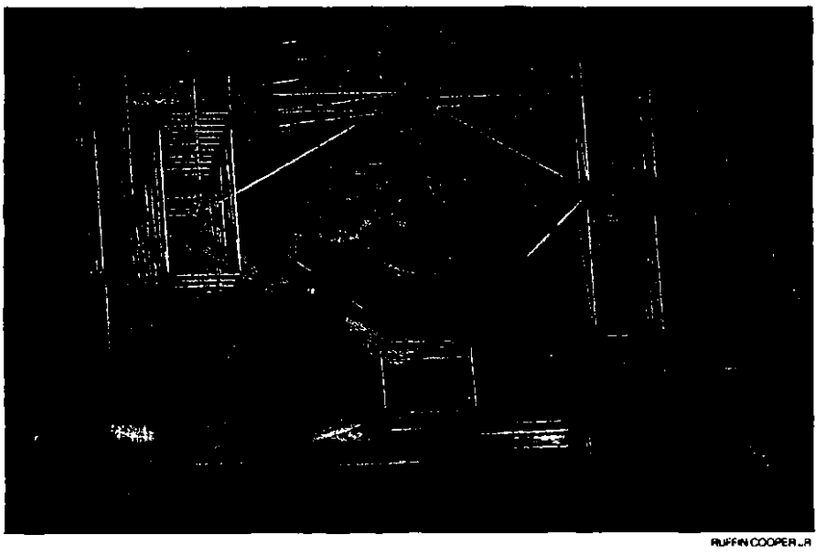
HILLARY RASKIN *Picture Editor*

COVER: This centennial portrait of the Statue of Liberty was specially painted for The World of New York by Alex Katz.

ABOVE: Detail from Kathy Jakobsen's painting "The Statue of Liberty." (Private collection, courtesy Jay Johnson Gallery.)

Better than New

By Samuel G. Freedman



RUFFIN COOPER JR.

ENCASED IN SCAFFOLDING FOR TWO YEARS, LIBERTY WAS FREED LAST MARCH.

The statue's restoration blends high technology with Old World craftsmanship.

The construction site looks like any other. There are cranes and bulldozers and trailers with Playboy centerfolds on the wall and one of those quilted aluminum trucks that sell corn muffins sealed, as if for eternity, in slightly inflated cellophane bags. The men on the job, and the few women too, wear bandannas and down vests and work boots, and they stick their thick gloves in the back pockets of their jeans. Today is Thursday, and so Angelo Bommarito, the foreman for the laborers, zigzags across the site, finding his men and passing out checks. "Yo, Giacomo," hollers at a man driving a forklift. The m cannot hear above the engine's noise. "Y Payday!" The man hits the brakes.

Giacomo gets his check, but he cannot cash until he takes the boat back to Manhattan. F this job, even though it is surrounded by all trappings of any other, is singular. Out here New York Harbor, some 300 workers are pairing and restoring the Statue of Liberty her July 4 centennial celebration. Banking boat is the least of the challenges and a p check is far from the greatest of the rewar "We got the job of the century," says A Anello, the safety superintendent on project. "Restoring America's symbol of f dom for America."

To be around the Statue of Liberty is to n amid personal history, family lore, nati mythology. It is an appropriate setting f construction worker, because construction always been the kind of brawling, dirty-h job that accommodates, indeed welco anyone with a broad back and broken En Generations pass and the names of yester laborers today adorn the sides of the large chines and the billboards listing the su tractors on Liberty Island — Grossman and Aluminum, A. Ottavino Stone Setters bek Trailer Sales and Rental.

Memory is as much individual as colle Angelo Bommarito looks back to 1956 an himself, a 17-year-old from Sicily, sailin the statue and into a new land. Now, set Queens with a wife and three children, h ahead to July 3, when he intends to ta oath of citizenship. Robert Kearney Sr runs the construction elevator on the sc ing, talks of his grandparents, who cam County Cork in the early 1900's, knowin Gaelic when their boat arrived. Tom the general foreman for the structur workers, speaks of his parents and of hi

"Growing up, the Statue of Liberty ways a big deal," Mr. McCue recalls both my parents came from Newfoun '22. When I was a kid my mother still tag from Ellis Island and the letter f parish priest in Canada saying she wa

Samuel G. Freedman is a reporter on the culture staff of The New York Times.

INSIDE THE STATUE

THE OLD TORCH, BADLY CORRODED, WAS REPLACED WITH A NEW COPPER TORCH AND GILDED COPPER FLAME BASED ON THE ORIGINAL DESIGN BY FREDERIC AUGUSTE BARTHOLDI. THE FRAME SUPPORTING THE RIGHT SHOULDER WAS REINFORCED.

THE MOST EXTENSIVE REPAIR WORK INVOLVED REPLACING ALL THE IRON ARMATURE BARS WITH ONES MADE OF STAINLESS STEEL AND SEPARATING THEM FROM THE COPPER SKIN WITH TEFLON TAPE.

THE 25 WINDOWS IN THE CROWN WERE REPLACED AND ALL SEVEN SPIKES REFURBISHED. SPOTS OF CORRODED COPPER SKIN ON THE NOSE, RIGHT EYE AND HAIR WERE ALSO REPLACED.

PYLON

WIDER REST PLATFORMS ALONG SPIRAL STAIRCASE

NEW EMERGENCY AND MAINTENANCE ELEVATOR

The inner structure of the Statue of Liberty is a tribute to the genius of Gustave Eiffel, who in 1879 designed a support system for the statue that would adjust to the expansions and contractions brought on by heat, cold and changing wind directions. A central pylon made up of four iron columns joined by horizontal struts and diagonal cross bracing supported the weight of the statue. A secondary frame of lighter trusswork, extending to within a foot of the statue's copper skin, was bolted to the central pylon and connected by hundreds of flat bars to the armature supporting the skin. The armature was made up of 1,799 thin iron bars that were attached to the skin through U-shaped copper saddles.

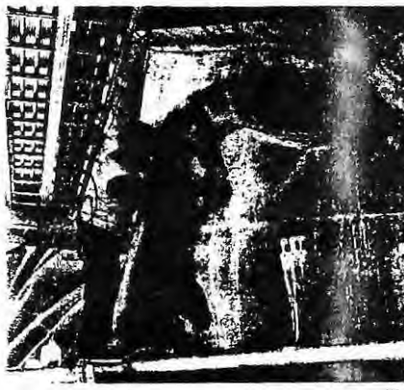
person. I remember in a textbook in grammar school we had a picture of the Statue of Liberty, and it looked like it was made of stone. I used to think, 'How'd them French get all that stone over here?' When we were learning about the statue in school, while I never got much help on my homework from my Mom, she told me all about that — the throngs of people on the boat and at Ellis Island, how she liked the Italian people there even though she couldn't understand a word they said."

These tender words are uttered in a brutish place. Mr. McCue and his men are working in the base of the statue, where the American Museum of Immigration is being expanded. On this day, with the dull noise and the dim light, with men in hard hats laying girders between walls of brown stone, the scene suggests some bizarre mixture of a Budweiser commercial and "Raiders of the Lost Ark."

Mr. McCue pauses to let the sound subside, so he can speak softly. By way of autobiography, he is pointing out one of those American ironies: the way the children of immigrants, in their hunger to fit in, often ignore or escape the past, the past embodied by the statue in which he stands. "It's a funny thing," he says. "Here I grew up in Manhattan, I've been an ironworker for 30 years, but I never made it out here till this job. It took me 48 years to get here. And I am pretty overwhelmed by it." There is no such delay for the next generation of McCues. On Christmas Eve, Tom McCue brought his 10-year-old son, Patrick, over to visit the Statue of Liberty.

Dimly, vaguely, the rest of New York has been aware that something has been going on at Liberty Island, but not quite sure what it was. For two years, the statue has been surrounded by scaffolding, the most public of monuments wrapped in a kind of private fog, the most obvious of symbols the object of some mystery.

The actual process of restoring the statue required the uncommon skills and common sense of architects, engineers, construction workers, even 12 French artisans, and it involved historical research, high technology and experimentation with materials ranging from liquid nitrogen to baking soda. Lehrer/McGovern, a construction management firm, oversaw the project, and more than 30 subcontractors lent their abilities to it. The cost has so far amounted to almost $31 million, drawn from the more than $233 million raised for the restoration of Liberty and Ellis islands. Th cost of the original statue was $250,000.



DA

CONSTANCE BASSETT, A PATINIST, STAINS PATCHES NEW COPPER TO MATCH THE REST OF LIBERTY'S FAC

At her birth, the Statue of Liberty repre sented perhaps the greatest fusion of enginee ing and art of her time. The statue was co structed over a nine-year period; her designe Frédéric Auguste Bartholdi, drew largely an earlier, unrealized scheme to place a colo suslike guard at the entrance to the Suez Can The building of Liberty presented unparallel challenges, chief among them the construct

DAN CORNISH/ESTO

ONE OF THE 12 ARTISANS FROM RHEIMS WHO ARRIVED HERE LAST YEAR TO HELP RESTORE LIBERTY WORKS IN THE REPAIR SHOP SET UP AT THE STATUE'S BASE.

of a hollow frame and thin copper surface that could withstand the Atlantic winds and storms. Bartholdi turned to Eugène Emmanuel Viollet-le-Duc, an expert in medieval architecture who is perhaps best remembered for his restoration work on the Cathedral of Nôtre-Dame de Paris. Viollet-le-Duc designed the head and the torch-bearing arm but he died in 1879 without leaving a workable plan for the statue's skeleton. To replace him Bartholdi chose the foremost engineer of the age, Gustave Eiffel, a chemist turned bridge builder whose most famous structure, the tower in Paris that bears his name, was still a decade away.

Eiffel struck upon a revolutionary idea for the interior skeleton of the statue, including a reconstruction of the right arm designed by Viollet-le-Duc. Eiffel's intricate support system anticipated the modern curtain-wall construction now used for the outside walls of many skyscrapers, allowing the statue to "breathe" independently of the main support framework. Involved were calculations of the utmost accuracy, right down to the smallest rivet.

Now, after nearly 100 years of standing up to whatever nature and pollution could hurl at her, the Statue of Liberty confirms the extraordinary skills of Bartholdi and Eiffel. Less than 1 percent of her copper skin has had to be replaced, and only in the case of her right shoulder did the original skeleton need to be buttressed. "The statue has held up," says Lawrence Bellante, project manager for the Statue of Liberty-Ellis Island Foundation. "What was wrong were some engineering concerns — corrosion, the wearing of paint, the elevator, the lighting."

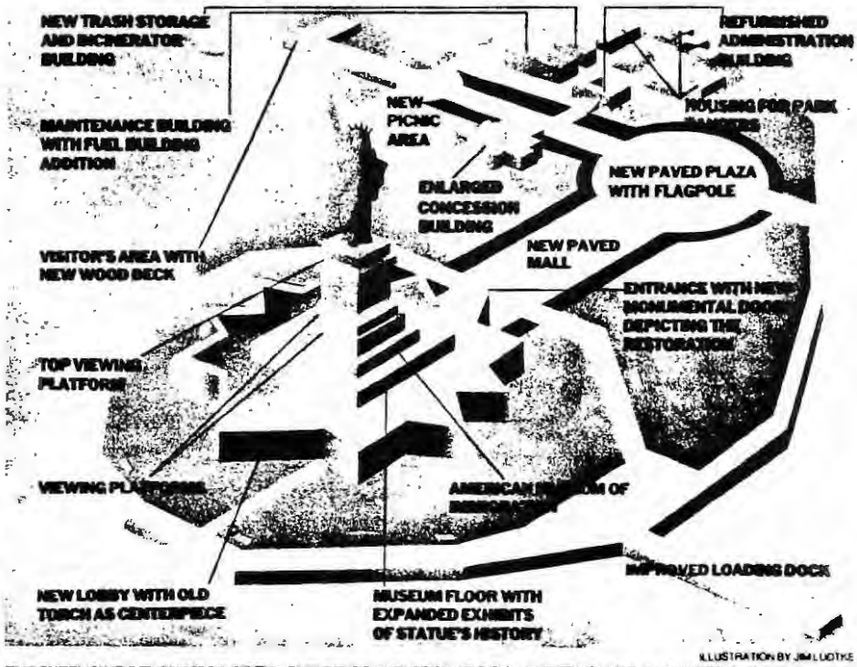
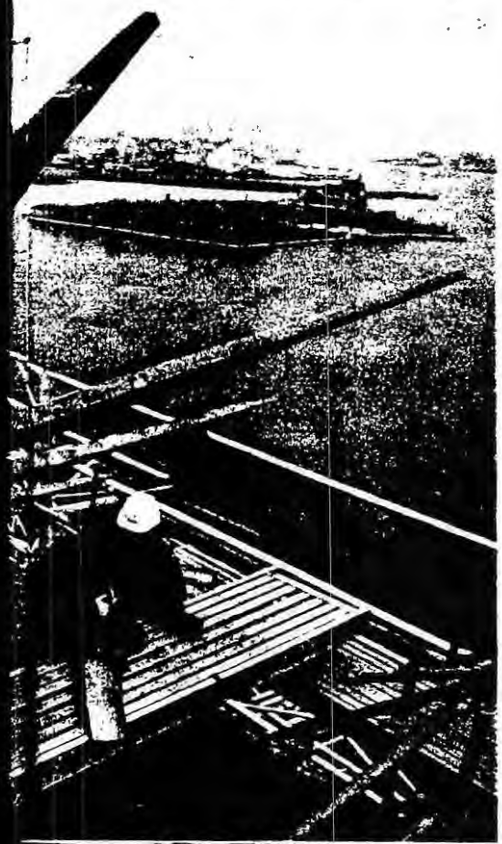


ILLUSTRATION BY JIM LUDTKE

THE EXTENSIVE RENOVATION OF THE BUILDINGS AND GROUNDS OF LIBERTY ISLAND, INCLUDING THE AMERICAN MUSEUM OF IMMIGRATION, IS DESIGNED TO ACCOMMODATE 2 MILLION VISITORS ANNUALLY.

DAN CORNISH / ESTO

LIBERTY'S NEW 15-FOOT, 2-TON TORCH, WITH GILDED COPPER FLAME, IS LOWERED ONTO ITS REINFORCED BASE.



FRENCH AND AMERICAN WORKMEN ON LIBERTY ISLAND JOIN TOGETHER TO REPLACE ONE OF THE SEVEN REFURBISHED SPIKES OF THE STATUE'S CROWN.

JONATHAN ATKIN

But in no way does the statue's stability mean her restoration has been a simple job. The tides governed the ability of barges to deliver or remove materials from Liberty Island. The tight confines inside the statue meant that it took one hour to move a single plate of steel from the pedestal to the shoulders; on most modern construction sites 10 pieces of steel can be moved that far in a matter of moments. Removing paint and tar from the interior of the statue presented the constant risk of explosion — much like the blasts that occur in silos from grain dust. On the outside of the statue, work could not proceed when the wind exceeded 20 miles an hour, and on the inside, the midsummer heat turned Miss Liberty into a 110-degree steambath.

In the early 1980's, the architects Richard

(Continued on Page 72)

ing this cen- in the cities oth countries, bration in the -Cyr-sur-Mer. estivities, the ial to the ng water will he edge of the

square to its center. It is hard not to read its shift in position as a metaphor of the centrality of the idea of liberty to both nations. There is still no plaque on the monument, but perhaps that, too, can serve as a reminder that the values represented by either Mlle. Liberté or Miss Liberty can never be taken for granted. ■

I ANNIVERSAIRE

e honor of vill take out the er. In e New brary's y: The can ition (June g. 30). can ex- s and par- ed. What he high- chedules it is a double- e appropri-

COURTESY OF LINCOLN CENTER

GARDE REPUBLICAINE

ance Salutes New York

ebration, sponsored by the Florence J. Gould e French Government and French and Amer- ns, is being organized under the aegis of the for the Performing Arts. In addition to perform- rs and concen halls, there will be such free out- concerts by the Garde Républicaine Marching 8 A.M., 1 P.M. and 5:30 P.M.), Philippe Petit on a 10) and a performance by the Urban Sax jazz information, call 212-877-2011.

ant dates:

Schwarz will open both the salute and the 20th Mozart Festival with a program called "Mozart sting of works the composer wrote during his Mr. Schwarz, the musical director of the festival, arol Wincenc will be flute soloist. Tickets: $8 to er Hall (212-874-2424).

s Opera Ballet, under the direction of Rudolf Nu- forces with American Ballet Theater, directed yshnikov, in a gala performance, Mr. Nureyev nikov will dance together for the first time since am will also include a new work by Mr. Baryshecial adaptation by Twyla Tharp of her ballet o Shove." The companies will appear together s "American in Paris" ballet, adapted by Mi- nd in the third act of "Raymonda." Tickets: $35 politan Opera House (212-362-6000).

hamber Music Society of Lincoln Center will per- such French composers as Debussy, Poulenc, el. Tickets: $15. Alice Tully Hall (212-362-1911).

nova," Alexander Volkoff's 1927 film, will be pre- iginal form, as restored by the Cinémathèque orges Delerue will conduct a 15-piece orchestra s own accompanying score. Ticket prices to be lice Tully Hall (212-362-1911).

ew York City Opera will present Bizet's "Pearl e final offering of the salute. Tickets: $7 to $40. e Theater (212-870-5570).

Bastille Day

here will be an all-day, free outdoor Bastille Day with hot air balloons and a 19th-century carou- nd boule games. The celebration will end with a New York Philharmonic (Debussy, Ravel and es Conlon conducting) and a fireworks display.

RESTORATION

Continued from Page 31

Hayden and Thierry Despont and an engineer, Edward Cohen of Ammann & Whitney, joined up with a team of four French engineers to analyze virtually every inch of the 151-foot 1-inch statue, from her 21-foot-high torch to her 8-foot-high index finger, from her 4½-foot-long nose to her 2-foot-thick tablet. Information gathered from monitoring both the stress on the statue's internal armature and the wind speed at the top of the torch was fed into a computer system that relayed the data to computers in the Paris offices of the project, operative until December 1983, and in the Boston headquarters of the National Park Service's architects.

THE TESTS DETERmined a new torch was needed; the structural skeleton in the right shoulder had to be reinforced; a face lift was required to spruce up the statue's exterior; the entire iron armature system had to be replaced with one made of a modern alloy, and the more than 30,000 rivets that connected the copper skin to the metal saddles of the armature system had to be replaced. The final verdict: a tribute to Eiffel but a big job nonetheless.

With these and other repairs came decisions to make the statue more accessible and comfortable for an expected two million visitors a year. The viewing area in the crown was refurbished, the stairway and rest platforms were widened and the wire mesh screens that once enclosed the stairs were eliminated to provide clearer views of the interior. Lighting and ventilation were improved, and an air-conditioned, double-decker glass elevator to carry visitors to the top of the pedestal was installed, offering unobstructed views of the interior of the base and pedestal.

Engineering considerations and limited space weighed against the installation of an elevator that would take visitors to the crown. A small maintenance elevator was constructed, but the famous 171-step ascent up the spiral stairway leading to the crown remains. Improvements, however, were made for handicapped visitors, including the installation of closed-circuit monitors in a new colonnade area at the top of the pedestal to provide vistas of the harbor and views of the statue.

But high technology could go only so far. The restoration project required not only computer chips but 300 tons of aluminum scaffolding, 5,000 cubic yards of concrete and 30 tons of stainless steel. When it came time to replace the iron armature bars with ones made of stainless steel, there was no shortcut. Each one of the 1,799 bars had to be individually removed and measured, then a new one shaped to size and installed. A woman named Constance Bassett, known in the trade as a patinist, was hired to stain chemically the new copper of a few of Miss Liberty's curls to match the rest of her coiffure. No henna here; only copper sulfate and ammonium sulfide for this lady.

No problem proved more nettlesome than removing seven layers of paint and two coatings of tar from the inner skin of the statue. Using solvents on the paint was impossible because, in a confined space, they would invite explosion. Sandblasting was difficult for the same reason. Finally, Frances Gale, an architectural conservator working for the National Park Service, and John Robbins, project architect for the Park Service, came up with the idea of shooting liquid nitrogen at 325 to 350 degrees below zero onto the paint. Sure enough, all seven layers of paint shriveled up and fell off.

The tar, though, was another matter. Almost any chemical that would remove the tar would discolor the copper skin. And since that skin was only about one-tenth of an inch thick, most industrial abrasives would rip right through it. As weeks passed, the attempted solutions grew more preposterous. Sand did not work. Ground walnut shells failed. Corncobs, no go. Somebody, Lawrence Bellante cannot remember who, suggested baking soda. Or maybe it was the last choice outside of coconut husks and Brillo. And so by bombarding the tar with 40 tons of baking soda the interior of the statue was finally cleaned. Workers then repainted it with a special water-based zinc primer invented by the National Aeronautics and Space Administration.

If the tar problem was the most difficult, the construction of a new torch and flame may have been the most effective combination of detective work, scientific sophistication and precarious human chemistry in the entire project.

Unlike the rest of the Statue of Liberty, the torch and flame had suffered not from the ravages of nature but from the bad taste of man. Although the statue had been designed to function as a lighthouse, she always looked better by day than by night; Bartholdi died in 1904 still not satisfied with the statue's lighting system. In 1916, however, Ralph Pulitzer, the son of Joseph, whose fund-raising efforts in The World enabled the statue to be installed in the first place, started a fund-raising campaign of his own in The World for a new lighting system. The $30,000 project involved the redesign of the torch, and the job was given to a sculptor, Gutzon Borglum, who would later go out to the Black Hills of South Dakota and blast the likenesses of four Presidents into the side of Mount Rushmore.

Borglum produced a seven-foot-high latticework of copper and glass, illuminated from within and colored to resemble fire. So many hundreds of pieces of copper were cut away from Bartholdi's original flame to accommodate the lights and glass plates that the torch "assumed the look of an outsized Tiffany lamp," as Frederic Golden put it last year in Engineering magazine. Moreover, the joints between the copper and the glass were not properly sealed; the resulting leakage from rainwater eventually damaged the torch beyond repair. The copper ears of corn that adorned the railing of the small balcony below the flame as symbols of America's fertility also began to corrode, and in the 1970's the National Park Service removed the few that had not yet fallen off.

BUILDING A NEW torch began with a search for the original design. Blaine Cliver and Carole Perrault, architectural conservators for the National Park Service, found photographs of Bartholdi's flame in the Library of Congress, the New York Public Library, the National Park Service Office on Liberty Island and the Colmar collection in the Bartholdi Museum in France. The existing flame, meanwhile, was measured along 8,000 points of

reference. Artisans used all the information to fashion half-scale and full-scale models of the flame from wood and plaster.

The ears of corn, though, seemed to have vanished forever — until Carole Perrault accidentally found a two-inch fragment of one of the ears in the National Archives while rooting through files of the Quartermaster General from the early 1900's, when the War Department had maintained the statue. From that shard, designers could extrapolate the entire eight-inch ear.

Enter the French.

SEARCHING FOR experts in the metal embossing process known as repoussé, the Statue of Liberty-Ellis Island Foundation engaged the French company Les Métalliers Champenois of Rheims. The French artisans had spent years learning their specialty, working on projects as intricate as the balustrade of the Château de Versailles.

But when the 12 French specialists arrived on Liberty Island last year they learned that, unlike the statue they had come to restore, they were not considered a gift by the American workers. On their first day of work, Iron Workers Local 455 picketed the construction site in a protest against the hiring of foreigners to work on the Statue of Liberty. Life went no better off the job. When the Frenchmen tried to make friends near their Brooklyn quarters by rapping on their neighbors' windows with bottles of wine, they inspired fear, not fellowship. "And the subway!" says Jean Wiart, who usually lives in a 150-year-old cottage in a town of 30,000. "It was a surprise, yes."

"When the French first came, people felt animosity," concedes A. J. Anello, the safety director on the restoration project. "They felt they were taking away American jobs, that Americans could do whatever the French could do. And it didn't help that the French got so much of the media attention."

Mr. Wiart also remembers the testy beginning. "The American workers never expected a foreign company on this job," he says. "And a lot of the Americans did not know the statue was a gift from France. I can understand how they feel. What would the French think if the Americans came to work on the Eiffel Tower? So at the start there was not a lot of friendship. It was observation time. They wanted to see if we could really do a good job."

In time some of the Americans began poking around the shed on Liberty Island where the Frenchmen were working. There they saw tradition and precision in action, for the repoussé method is an ancient one, practiced by early Greek bronze workers. The Frenchmen began by making a steel mold of the wood-and-plaster model of the flame. They used the steel to make a copper negative and the negative to make a positive. Finally, they riveted the sheets of shaped copper into a single, gleaming flame.

"As time went on," Mr. Anello says, "you saw what the French did, and how they did it, and you realized we couldn't do it. And the animosity changed into admiration. As the Frenchmen's work on the torch progressed, the Americans would look at it and make comments — 'That's really nice' or 'Did you see how he did that?' That's how things turned around."

FOR THE FRENCHmen, who came over from a relatively homogeneous country, the Americans offered a lesson in the melting pot. "This was the first time we had to live, to work, with black people, Jewish people, Indian people," Mr. Wiart says. "It's a good human experience. You have to accept the difference, the difference of opinion. And I remember some of the Russian workers and Italian workers who had trained in Europe coming to us and saying, 'We are proud to work with you.' "

When they had finished, the artisans of Les Métalliers Champenois had created a 15-foot, 2-ton torch that duplicated Bartholdi's original design, including the ornate balcony railing with its acanthus leaves and ears of corn, the platform it sets upon and the drum that holds the flame base — all chemically treated to give them the same aged green patina of the rest of the statue. The solid copper flame was covered in pounds of gold leaf by Robert Gohard and his son, Fabrice, owners of a Paris company specializing in monument restoration, to reflect floodlights at night and sunlight by day. The Borglum torch was taken down on July 4, 1984, and visitors will soon be able to see it on display in

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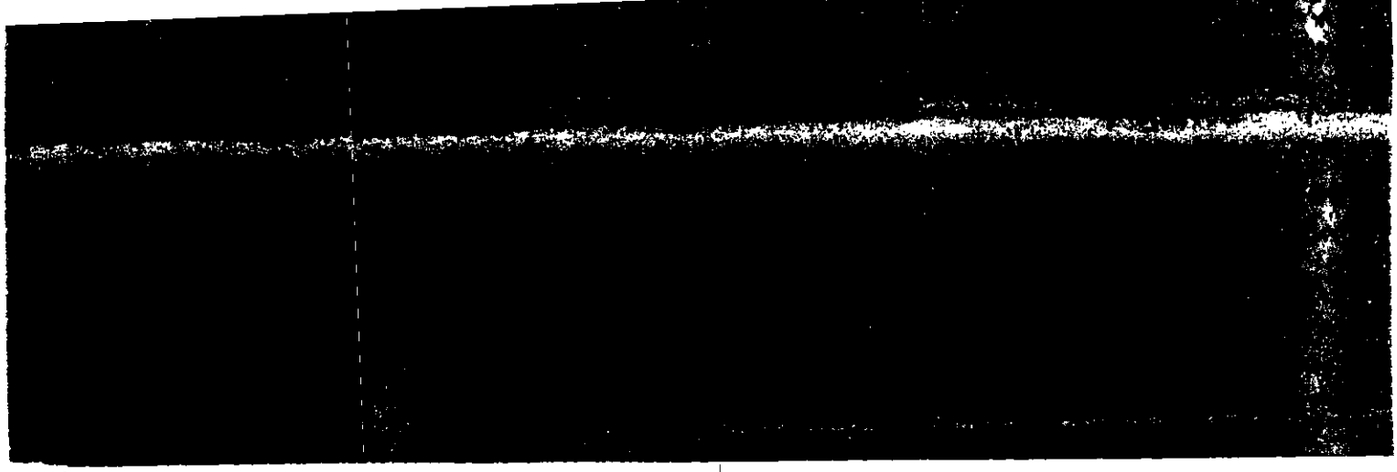


Continued from Page 73

the museum at the statue's base. The new torch was raised on Nov. 25, 1985, and will be officially lighted by President Reagan on July 3.

No single event ever formalized the mutual respect between the Americans and the French — no picnic, no ceremony, no night of tankards and toasts. The French did find American friends and they did discover New York, especially the Lone Star Cafe in Greenwich Village for their beloved American blues. They even made plans to set up an American branch of their company in Paterson, N.J. Still, they rarely socialized with the men alongside whom they worked on the statue.

BUT THERE WAS A telling moment, more so for its informality, on Dec. 5. This was the day when the last of the seven rays in Miss Liberty's diadem, representing the seven seas and the seven continents, was to be reattached. From the platform near the crown, Miss Liberty's fingers resembled giant green logs, while the sights in the distance — the George Washington Bridge, Coney Island, the Watchung Hills — assumed the tiny and almost unreal quality of some scene fixed in the lens of a toy telescope. It felt windy and lonely and vulnerable.

The middle ray was the last to be installed. It took several men to lift the 9-foot, 155-pound spike from the platform onto the diadem. A couple of the American workers grabbed one side of the spike, two Frenchmen the other. The Americans wore overalls and fatigue jackets and hard hats with a logo of the statue set against the American flag; the Frenchmen had on blue uniforms, knit caps and — chic in high places — plaid scarves. Together, the four men heaved the spike up onto their shoulders and then planted its wide base inside the crown. For a very brief second, as the spike grew steady, this tableau high above New York Harbor looked strangely reminiscent of Joe Rosenthal's photograph of the American servicemen raising the flag on Iwo Jima. It was too surreal, perhaps too sentimental, an image to last, and it ended almost as quickly as it had begun. Soon the sound of hammer striking metal echoed from within the crown. The spike stood in place and the French and American workers on the outside, colleagues briefly, went their separate ways.

ROBERT KEARney has had one of the least active, but most fulfilling, jobs of the restoration. He suffered a heart attack back in January 1984, and that May his doctor permitted him to return to work. Rather than the heavy construction he once did, his new job was to operate the elevator on the side of the scaffolding, running workers up and down the statue. In the process, Mr. Kearney made himself into something of a celebrity. He met Lee Iacocca and Gregory Peck and played a bit part in the movie "Remo Williams," a rather forgettable action film that had some location shots on Liberty Island.

Mr. Kearney became most famous, at least on the construction site, for buying, out of his own pocket, about 15,000 commemorative lapel pins at 75 cents apiece from the Statue of Liberty-Ellis Island Foundation and handing them out to visitors to the island. Every state, many private companies and even some foreign countries had contributed the pins to the foundation to help raise money for the restoration.

"See this," Mr. Kearney says, opening up a gym bag and holding a pin. "Connecticut." He rummaged some more. "Germany." He pulled out another. "British. My grandfather better not see me with this. He was in the I.R.A."

Isn't there something a bit extravagant about spending more than $10,000 on pins? "Look," Mr. Kearney says. "I got one wife. I got one home. I get my three meals a day. I spread the rest around. I'm 54 now. Life's too short to get greedy."

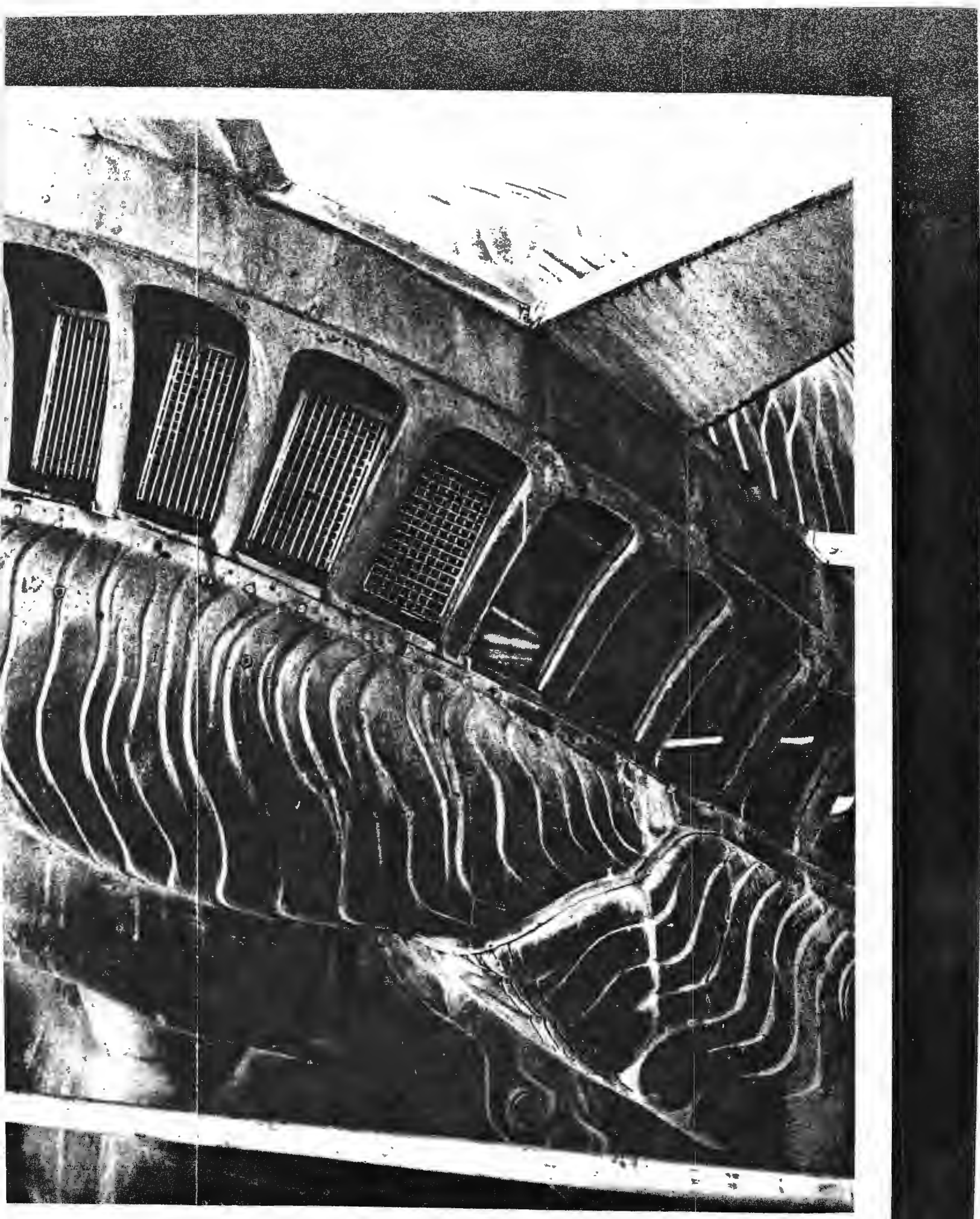
Besides, he counts the other benefits. "I remember the day I called the union hall from the Veterans Administration Hospital in East Orange, N.J., and they said, 'All right, on Monday you go to work at the Statue of Liberty,' " he recalls. "And that was fantastic. I was so shocked. I had this friend, Blackie, on my last job before the heart attack. I was working a hoist on a senior citizens' center in Hoboken. And Blackie, every time he had to get to the top of the building, as we were going up, he'd look out over the water and salute the statue. And he'd say, 'That's my gal.' " ■

Liberty Lifts Her Lamp Once More

By ALICE J. HALL ASSISTANT EDITOR

At once the world's largest metal statue, a tangible pledge of French-American friendship, and a beacon to immigrants, the great lady rising from New York Harbor is much more. In one stunning image recognized around the world, the Statue of Liberty says America. And in this country that so often places its celebrities on a pedestal, citizens have over the years taken Liberty from her lofty perch and into their hearts. That feeling of familial affection was evident among the workers putting up the scaffolding for much needed restoration in anticipation of the statue's 100th anniversary. Tony Soraci (**right**) summed up their accord, "It's a historic job, something to tell my grandchildren."

Likewise, the improbable tale of the statue's birth is something to remember and pass on. She was conceived by French intellectuals during after-dinner conversation near Paris in 1865. Chafing under the despotic rule of Napoleon III, host Édouard René Lefebvre de Laboulaye proposed a monument to American independence that French men and arms had helped achieve. It would be a gift of the French people for America's Centennial in 1876 and would reinforce ideals of equality and liberty still held by many Frenchmen. One guest, 31-year-old sculptor Frédéric-Auguste Bartholdi, began to plan a design. In 1871 he traveled the United States from coast to coast and spotted Bedloe's Island in New York Harbor: "Here . . . my statue must rise; here where people get their first view of the New World." He would spend the next 15 years turning idea into reality.



KONI NORDMANN, CONTACT PRESS IMAGES

"Liberty Enlightening the World"

So Bartholdi named his copper-skinned goddess, lifting a torch and stepping out of broken shackles. Her tablet, a meaningful symbol to his fellow Freemasons, represents the rule of law and is inscribed in Roman numerals July 4, 1776. To hold this 151-foot statue against Atlantic gales, he called on the brilliant bridge engineer Alexandre Gustave Eiffel for the tallest iron support structure of its day. A tribute to 19th-century technology, the monument has undergone an equally pioneering restoration, described in this color-coded computer rendition.

THE TORCH: Even before the statue was unveiled, Americans had cut portholes in the flame so that electric light could shine out, under the erroneous assumption that the statue would serve as a lighthouse. After more windows were added over the years, the torch deteriorated so much that it was replaced during restoration by this copy of Bartholdi's original. The old torch and flame will be displayed in the statue's museum.

COPPER SKIN: Chosen for longevity, flexibility, and relatively light weight, 32 tons of copper, mined in Norway, was formed into 300 sheets. Each was hammered into a distinctive shape, then spliced or lapped and riveted together. The skin hangs on an armature of iron ribs. Today the copper, about the thickness of a half-dollar, remains in excellent condition. Popped rivet holes and other damage have been repaired and the exterior thoroughly washed. The green patina, the soft aging of 100 years, remains intact.

THE OFFSET PROBLEM: The framework in the head and right arm has always been out of alignment. Constructed first, the two parts were displayed for years as part of fund-raising activity. Photographs of the period support the theory that when

IRON SKELETON: Like a great railroad trestle, the central pylon, made up of four cross-braced columns (gray), transfers the weight of the copper skin to the pedestal and the ground. A secondary framework

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THE OFFSET PROBLEM: The framework in the head and right arm has always been out of alignment. Constructed first, the two parts were displayed for years as part of fund-raising activity. Photographs of the period support the theory that when the statue was assembled in Paris, the head had to be set two feet left of center to join properly with the torso. To compensate, the frame for the right arm was reconstructed with an offset of 18 inches. Restorers debated whether to replace the shoulder bracing or repair it and decided to preserve the historical anomaly with repairs.

STAIRCASE: The spiral staircase (brown) to the observation platform in the crown has been eagerly climbed by visitors since its installation in 1888. Stainless-steel treads of its 171 steps, an improved railing, and landings for observing the statue's interior were added during restoration. The central column (white) supporting the stairs carries a new heating and ventilating system.

PEDESTAL: Designed by New York

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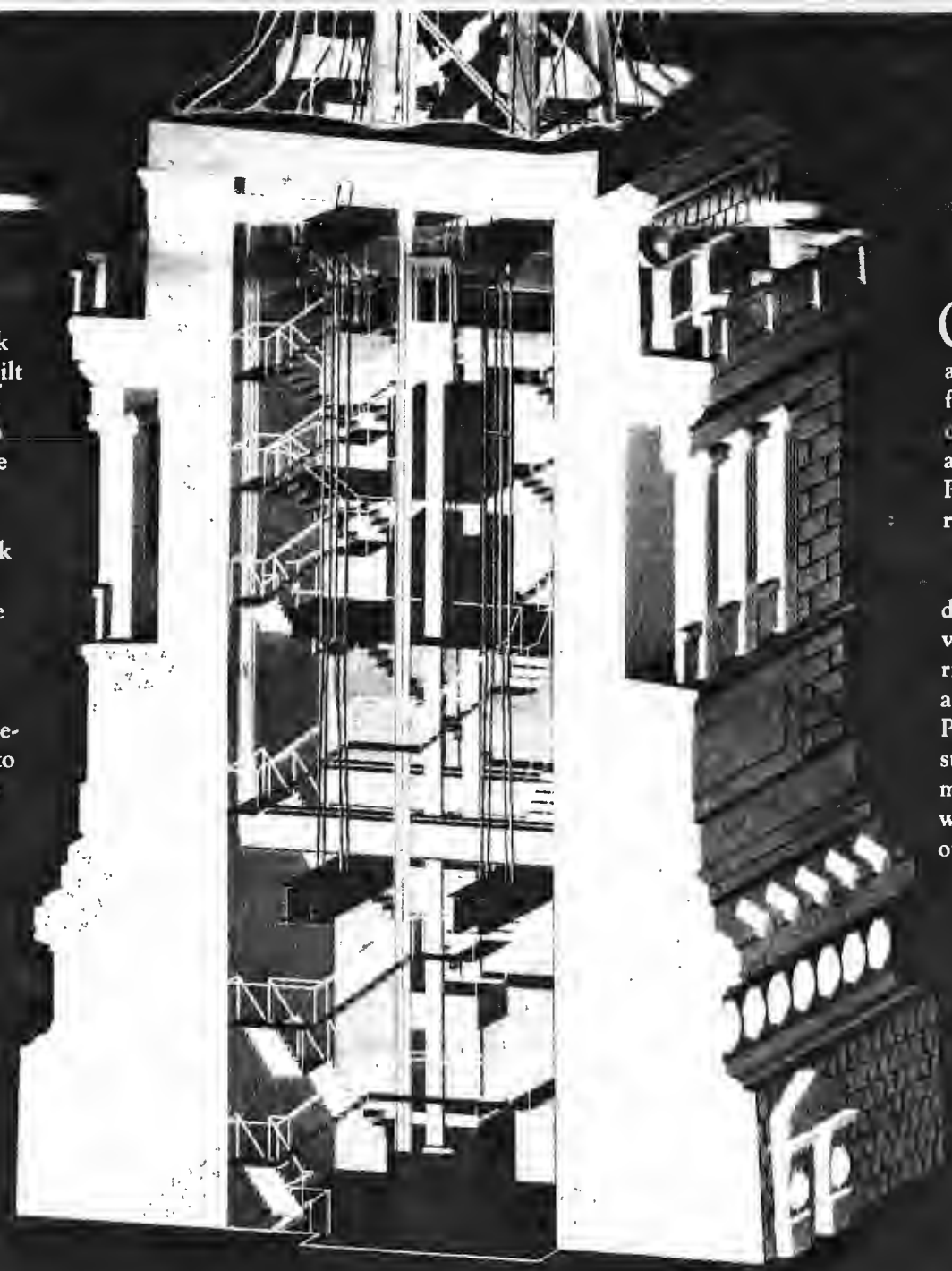
IRON SKELETON: Like a great railroad trestle, the central pylon, made up of four cross-braced columns (gray), transfers the weight of the copper skin to the pedestal and the ground. A secondary framework (light blue) is connected by flat bars to the ribs on the skin, permitting the copper to flex as it responds to wind, heat, and cold. Thus the statue seems to float. The concept resembles the non-load-bearing curtain wall of today's skyscrapers. Modern testing of the statue's puddled iron, a type of wrought iron, revealed no internal cracks; it can withstand winds up to 125 miles an hour and has a fatigue life, if properly maintained, of more than 500 years.

COMPUTER MODEL: From

the statue's interior were added during restoration. The central column (white) supporting the stairs carries a new heating and ventilating system.



PEDESTAL: Designed by New York architect Richard Morris Hunt, built and paid for by Americans, the 87-foot-high pedestal relies on mass to withstand nature's forces. Only the facing is Connecticut granite; the interior is less costly concrete. Massive steel girders (light and dark blue), connected by tie-rods to one another and to the statue, reinforce it against an overturn.

Renovation has opened the pedestal's interior to easy viewing from a new open stairway. A double-deck glass elevator carries visitors to the colonnade level. Closed-circuit television provides views of the statue's interior for those visitors not wishing to climb to the crown, highest point open to the public. A two-person emergency elevator rides a vertical track (cream) to the shoulder.

The pedestal stands on a 53-foot-high concrete foundation—the largest pour of its time at some 23,500 tons—built on the site of an old fort. The museum within is maintained by the National Park Service, as is the statue itself.

COMPUTER MODEL: Few architectural drawings exist from Bartholdi's day, so all parts of the statue had to be measured and analyzed before the National Park Service could begin renovation.

Structural drawings were later [illegible]d into a computer-aided design system that permits viewing of all details, down to rivets and gusset plates, at any angle at a one-to-one scale. Printouts can be obtained for study and to aid repair. At the museum a computer terminal will allow visitors to view some of these drawings.

COMPUTER DEPICTION BY BURNS AND ROE, INC., FROM DATA FURNISHED BY SWANKE HAYDEN CONNELL ARCHITECTS, AMMANN & WHITNEY, AND GEOD, WITH SUPPORT FROM THE RESTORATION RECORD PROGRAM OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

ANDY LEVIN, BLACK STAR

JIMMY RUDNICK

"Mom, they've got Liberty in a cage," a youngster cried out at the disconcerting sight on television of the statue imprisoned by scaffolding. Last November 25, as a Coast Guard helicopter hovered (**right**), a crane hoisted the new torch into place, an event marking one of the last chapters in the three-and-a-half-year, 31-million-dollar renovation. It began with an inch-by-inch inspection of the interior.

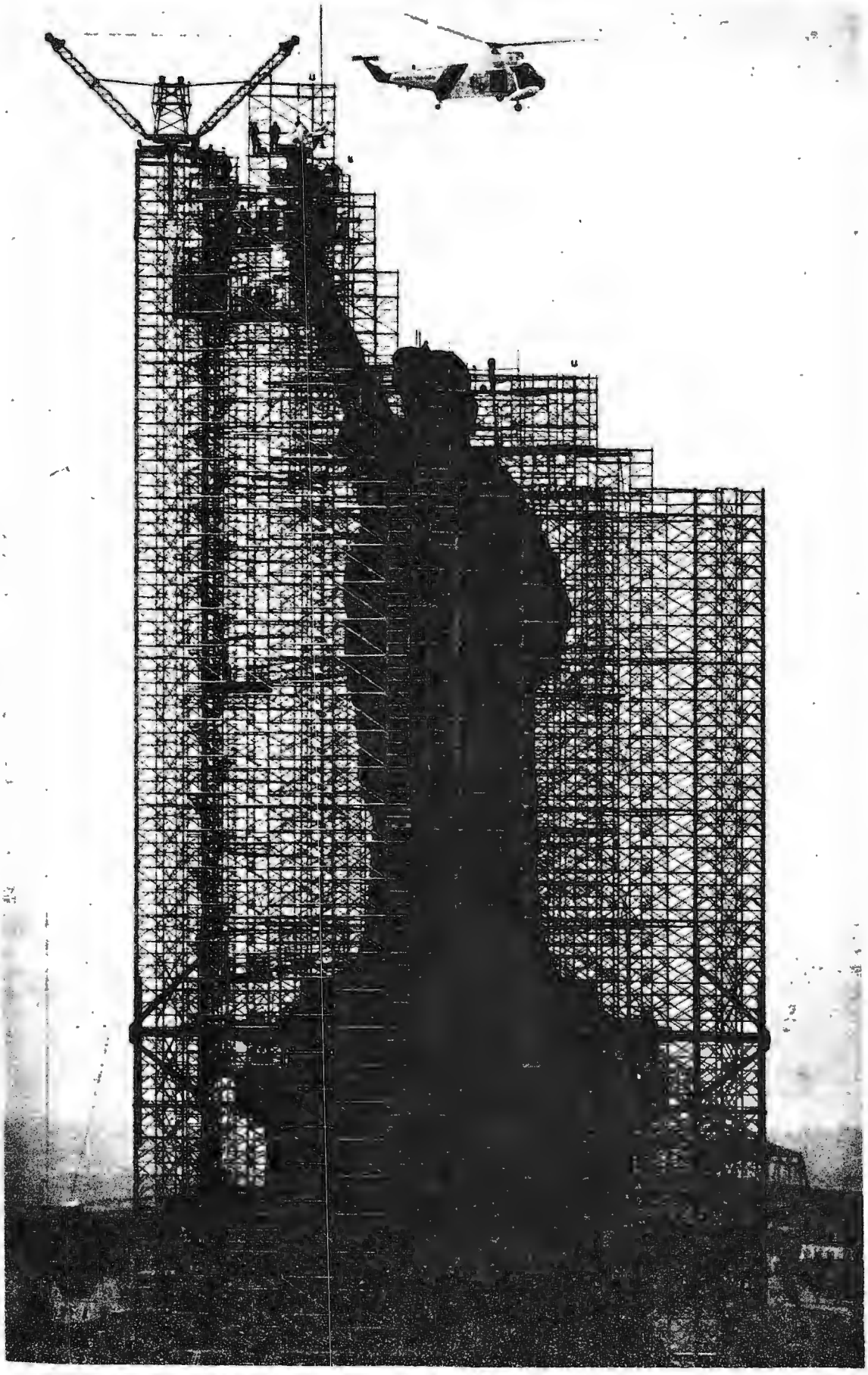
The worst problems were rust and corrosion. The statue had always leaked, and corrosion due to galvanic action occurred wherever iron ribs were held against the copper skin by copper fastenings, despite an insulating asbestos backing. Where the saddlelike fastenings had fallen off, rivet holes (**below**) exposed the interior to more moisture.

Squeezed inside the two-foot-wide tablet, metalworker Mark Scola (**left**) removes one of the 1,800 corroded, paint-covered ribs. Each was replicated in a malleable rust-and-corrosion-resistant stainless steel known as 316L. Scola and Richard Sardina (**lower left**) used the old rib as a template for the new one, which they here back with Teflon-coated tape to prevent its binding on the skin side and to add insulation between the two metals.

During its earlier life the statue's interior was "improved" with tar,

DAN CORNISH, ESTO PHOTOGRAPHICS INC.

probably in an effort to keep out water, and painted at least seven times. Liquid nitrogen was applied to freeze and crack the paint; the tar came off with blasts of gritty sodium bicarbonate, whose residue is seen above during the cleaning process. Stripped bare, the brown copper revealed the hammer marks of its creators.

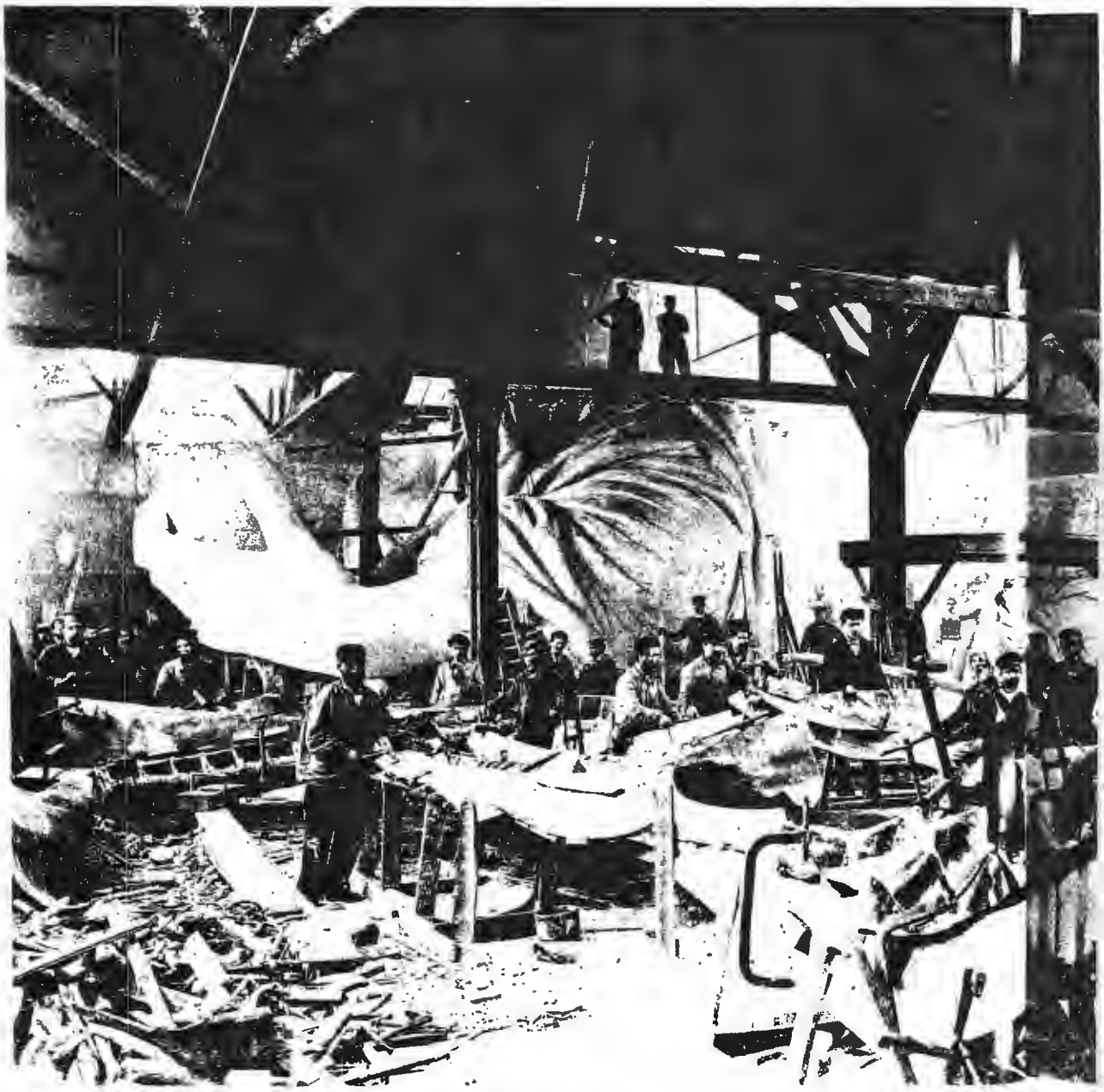


JOHN P. FILO

"I will try especially to glorify the Republic and Liberty over there," young Bartholdi **(right)** wrote of the U. S., "hoping that I will one day find them back here." His consuming passion became the creation of a "work of profound moral worth," and he drew inspiration from stone monuments of Egypt, the Colossus of Rhodes, and a 76-foot copper statue of St. Charles Borromeo in Arona, Italy.

Supporting himself with commissions, such as a statue of Lafayette for New York City, he worked tirelessly, but he willingly interrupted his efforts to answer any call from his

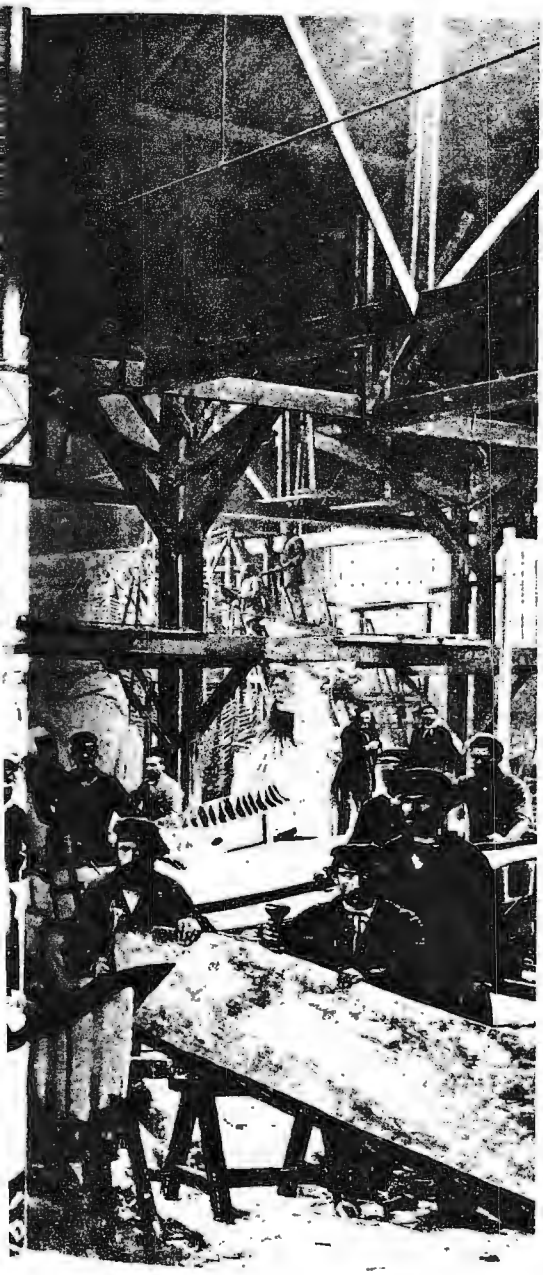
MUSÉE BARTHOLDI, COLMAR, FRANCE



possessive widowed mother. Later an acquaintance saw in her features Liberty's face, an observation Bartholdi neither denied nor explained. But his terra cotta bust of his mother (**right**) resembles an early model of Liberty.

Wags said that Bartholdi's ladylove, Jeanne-Émilie Baheux de Puysieux, posed for the body, an unlikely rumor since he met and married her during his second trip to America, in 1876. By then the statue was under way.

To build the titan, Bartholdi cut his final 36-foot-high plaster model into sections and enlarged each on the basis of thousands of precise measurements.



LIBRARY OF CONGRESS (LEFT); KEVIN FLEMING, COURTESY MUSÉE BARTHOLDI

Each full-size section, such as the arm (**left**), was modeled in plaster in the Paris workshop of Gaget and Gauthier. Carpenters carved wood molds to match the plaster shape; metalworkers then hammered copper sheets into the molds until they duplicated the plaster arm. Iron armature ribs were attached with copper saddles and rivets.

Work was sporadic because of lack of funds, but 600,000 francs—$1.3 million in today's dollars—had been raised by 1880, and by 1884 the last of the copper sheets was assembled over the frame in the workshop yard. The statue was seen at last when it was presented to the U. S. minister on July 4. For months Liberty stared over the Paris rooftops. Then it was taken apart, crated in some 200 boxes, and shipped to New York, arriving June 17, 1885.

LIBRARY OF CONGRESS (ABOVE AND BELOW)

The torch had already traveled once to America. To fire enthusiasm for the unimaginable colossus, Bartholdi displayed the statue in parts. Only the torch was completed in time to appear at the Centennial of 1876 in Philadelphia. For a fee visitors could climb to the balcony (**upper left**). When the *New York Times* expounded against spending any money on a "bronze female," Bartholdi proposed placing it in Philadelphia. New Yorkers responded by forming a committee to

National Geographic, July 1986

BOB SACHA

raise funds for the pedestal. Whenever their efforts flagged, other communities —Boston, San Francisco, Milwaukee, and Glover, Vermont—volunteered to give Liberty a home.

In Paris the head **(left)** aroused great interest at the Universal Exposition of 1878. Fine workmanship showed up especially in the coiffure, a 19th-century style.

Continuing the tradition of artistic metalwork, a team of French craftsmen came to New York in 1984 to replicate Bartholdi's original torch and flame in copper repoussé. They were followed by master gilders from Paris, Robert and Fabrice Gohard, who applied nearly a pound of gold leaf **(above)** to brighten the flame. The coating will last at least 20 years and will be easy to touch up when necessary. Lights shining from the torch's balcony will illuminate the flame at night.

The French metalworkers also fabricated actual-size reproductions of the left foot and the face for the statue's museum. These copies will show how the copper was hammered and spliced.

The selling of the statue has occurred continually from the monument's inception, as official committees have raised money for its construction and restoration, while some companies have exploited its image for personal profit. Bartholdi arranged for the Avoiron foundry in France to cast and sell models for 10 percent of the proceeds. Three of these now rare models stand on the dresser of New York collectors Anne Griffiths and William M. Gaines (**above**). The small model, center, has a sculptured flame, while larger flanking models were sold with fittings for gas or electric lights.

In the United States, Bartholdi copyrighted his design and granted licenses for model making with proceeds to go to the American committee, but manufacturers were soon turning out unofficial imitations.

No legal barrier stands in the way of reproducing the image, and ingenuity seems the only limit. Souvenir spoons (**right**) from Miss Griffiths' collection have long sold as collector's items.

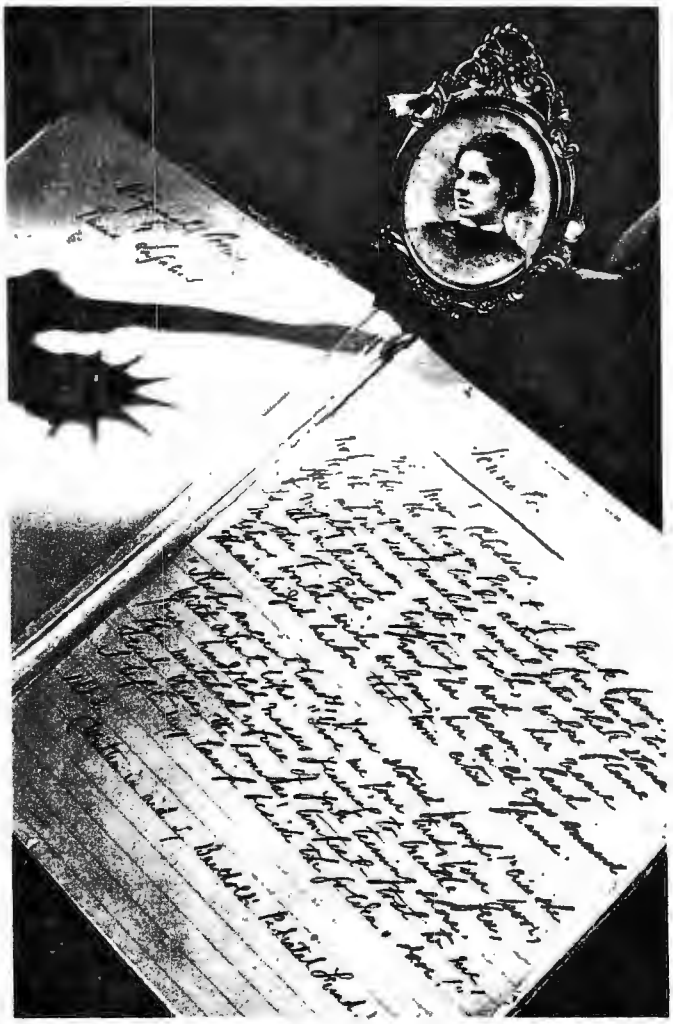
BOB SACHA (ABOVE AND RIGHT)

KONI NORDMANN

These rest on a print of an Edward Moran painting of 1876. Foam diadems were hawked recently on 42nd Street (**above right**).

For the restoration of the statue and the historic immigration depot nearby, the official fund-raiser—the Statue of Liberty-Ellis Island Foundation, Inc.—accepted contributions from individuals and corporate sponsors and also granted licenses to select manufacturers in exchange for a percent of the profits, permitting such donors the right to use the foundation's logo.

Liberty Lifts Her Lamp Once More



BOB SACHA, COURTESY THE AMERICAN JEWISH HISTORICAL SOCIETY AND THE NEW-YORK HISTORICAL SOCIETY

The sonnet that is synonymous with the statue was penned by an American literary figure to help raise funds for the pedestal. "Give me your tired, your poor, your huddled masses yearning to breathe free," wrote Emma Lazarus (**above**), identifying the statue not as a classical goddess but as "Mother of Exiles." Her poem was included with works by Walt Whitman, Mark Twain, and Bret Harte in a portfolio auctioned for $1,500 at an art exhibit in December 1883.

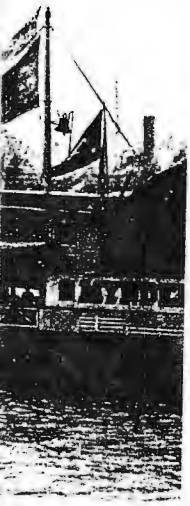
Daughter of a wealthy New York merchant and member of an elite Sephardic Jewish community, Lazarus had been exposed to the effects of persecution when she met Jewish refugees fleeing the pogroms that swept Russia after the assassination of Tsar Alexander II in 1881. Thereafter she took up the cause of "the oppression of men and women by men and women" everywhere. But her poem slipped into obscurity despite James Russell Lowell's compliment: "I liked your sonnet . . . better than I like the Statue itself. . . . [It] gives its subject a raison d'être."

Still the pedestal fund languished, until a prominent publisher turned his newspaper into a fund-raiser. Joseph Pulitzer, who had himself come to America as a penniless Hungarian immigrant, put the statue's image in the logo of his New York *World* and used the paper's pages to shame New Yorkers for accepting "this splendid gift without our having provided even so much as a landing place for it." Appealing to "the people," he wrote, "let us not wait for the millionaires." By publishing the name of every donor in 1885, regardless of the size of the contribution, he raised $100,000 toward the $250,000 cost in five months, and pedestal construction moved forward.

In the years that followed, hundreds of immigrant ships entered New York Harbor, usually landing first- and second-class passengers in Manhattan and carrying third-class arrivals (**right**) to an immigration station at Ellis Island. For many, their first glimpse of America was the statue. "She was beautiful with the early morning light," one noted. "Everybody was crying. The whole boat bent toward her because everybody went out." Another recalled a "feeling among many of us that isn't it strange that here we are coming to a country where there is complete equality, but not quite so for the newly arrived immigrants. So third-class passengers had to come to Ellis Island."

In 1903 Emma Lazarus's poem was placed on a plaque inside the pedestal by a friend as a memorial to her, but not until the late 1930s did the sonnet move into the mainstream of American consciousness. By then the statue was increasingly associated with the earlier wave of immigration.

Today the plaque bearing Emma Lazarus's poem holds a place of honor in the statue's museum. The main building at Ellis Island that processed more than 12 million arrivals between 1892 and 1954 is being renovated as a museum honoring the immigrants.



LIBRARY OF CONGRESS

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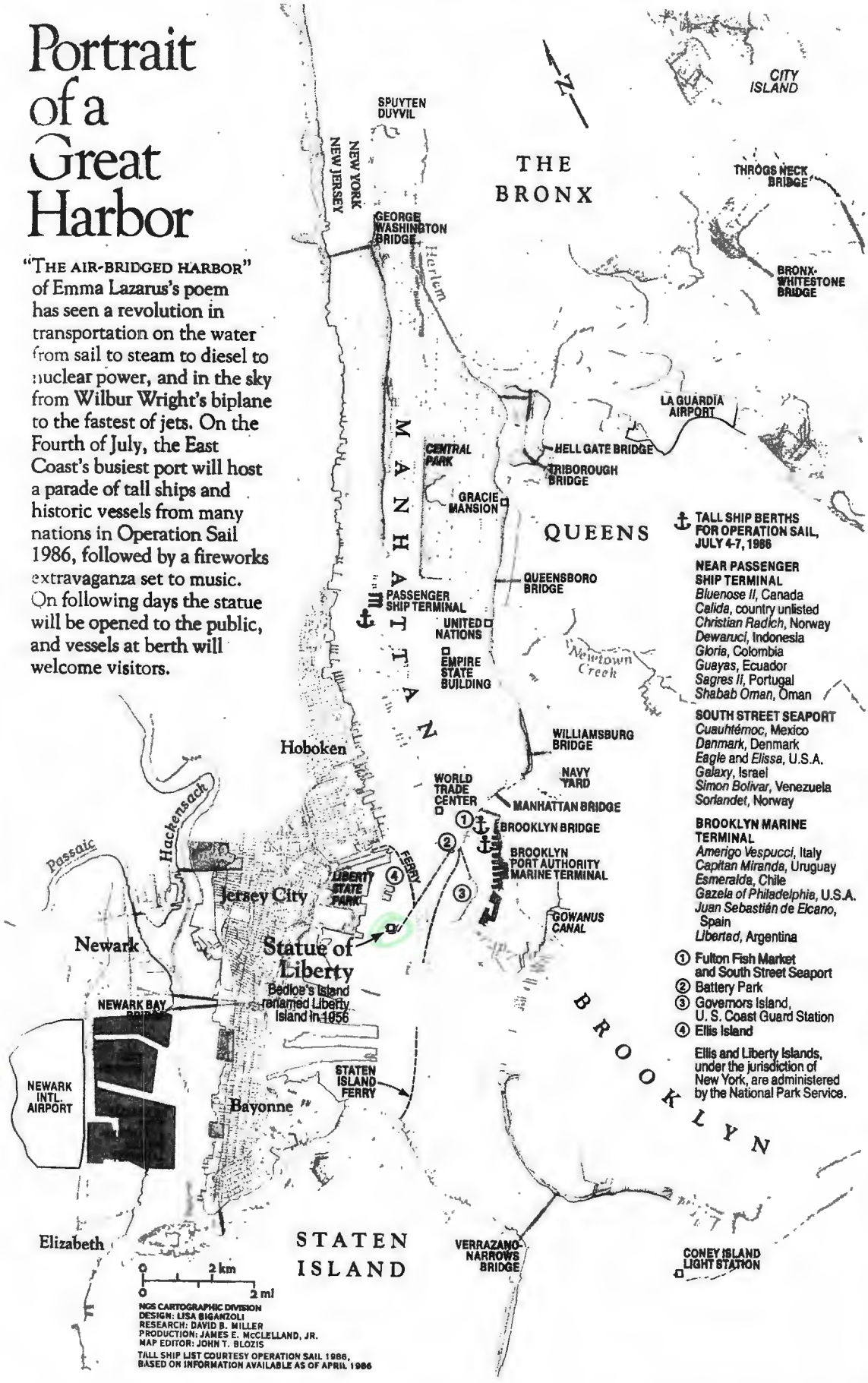
Portrait of a Great Harbor

"THE AIR-BRIDGED HARBOR" of Emma Lazarus's poem has seen a revolution in transportation on the water from sail to steam to diesel to nuclear power, and in the sky from Wilbur Wright's biplane to the fastest of jets. On the Fourth of July, the East Coast's busiest port will host a parade of tall ships and historic vessels from many nations in Operation Sail 1986, followed by a fireworks extravaganza set to music. On following days the statue will be opened to the public, and vessels at berth will welcome visitors.



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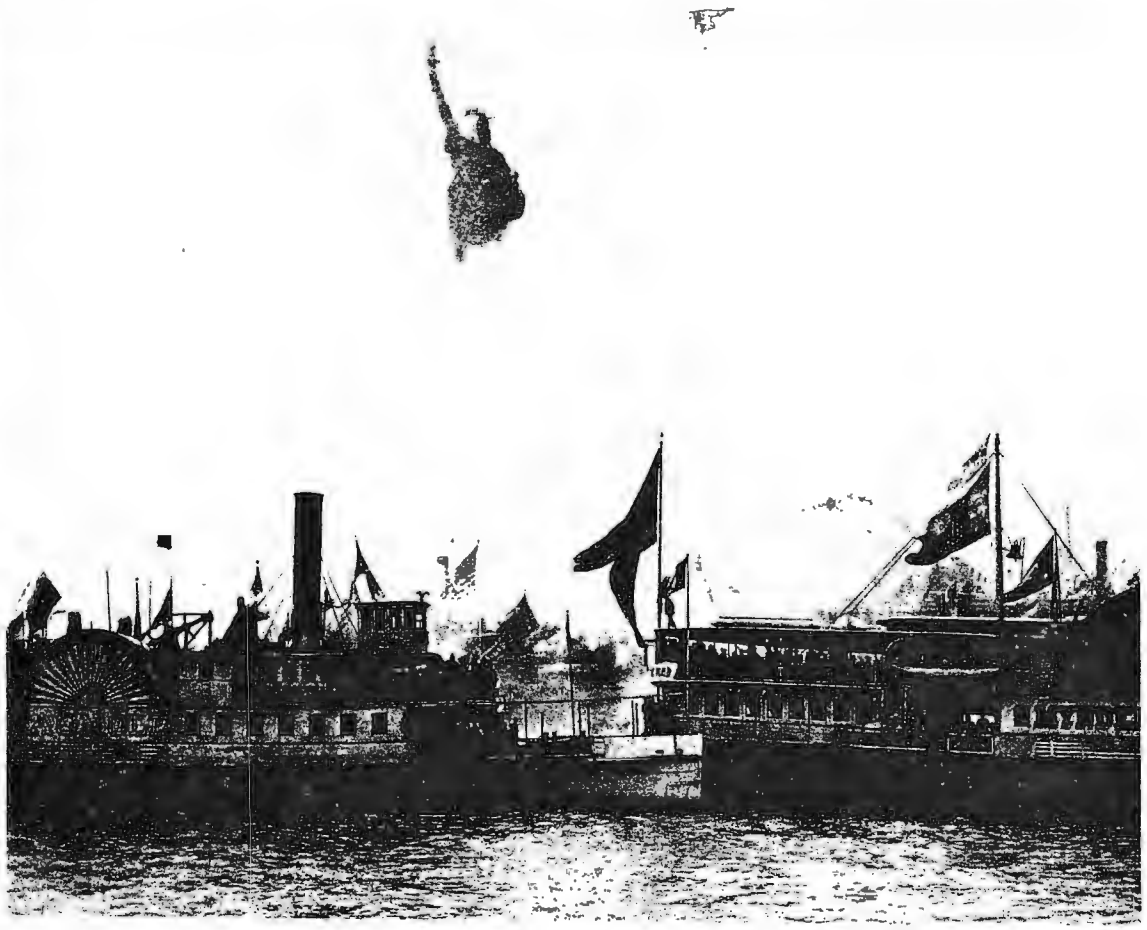

LIBRARY OF CONGRESS

Opening-day hoopla saw "everything that floats in New York, Brooklyn or Jersey City—steamers, ferry boats, yachts" and these paddle wheelers crowded around Bedloe's Island for the dedication on October 28, 1886. A boatload of suffragettes pointed up the irony of the portrayal of Liberty as a woman when American women did not have the vote. It was a drizzly, foggy day, and so much smoke rose from firing cannon that the statue was almost obscured. As President Grover Cleveland stepped onto the island, cannon boomed and steam whistles screamed, joining sirens on shore in wild cacophony; few in the audience heard the speeches. Canal builder Ferdinand de Lesseps made an official presentation, concluding "au revoir until we meet at Panama." In the middle of the next speech, Bartholdi, who was standing in the crown, responded to an inadvertently early signal from the ground and dropped the French tricolor that veiled Liberty's face. Again an incredible din arose.

New York City had declared a public holiday and sponsored a grandiose three-hour parade that included veterans, student groups, Freemasons, culinary societies, National Guardsmen, and volunteer regiments that called themselves the Sons of Lafayette and Rochambeau. Congress had approved $56,400 for island improvements and entertainment, despite the opposition of congressmen from the West decrying public funding of a "good time for the citizens of New York." Madame Bartholdi wrote to her mother-in-law, "Our dear Auguste was celebrated like a king."

This July 3, President Ronald Reagan plans to relight the refurbished statue, setting off a weekend of celebration in the harbor. □