By Rice Odell

Patent models recall creativity of early America

Required by law, thousands of gadgets supported inventors' hopes for everything from an elevator brake to a clothespin

For 80 years after the beginning of the Republic, America's prolific inventors were required to submit small models of the brainstorms they wished to patent. Altogether, it is estimated that 300,000—and perhaps many more—such models arrived at the U.S. Patent Office. But there have been three fires, a series of auctions and other attrition.

Possibly 150,000 of these models—from corsets to locomotives—still exist in various parts of the country. Some might say they comprise an enormous collection of toys. But, more accurately, they represent an astonishing record of man's inventive wizardry. "They are important historically as a record of American and foreign technological accomplishment," says Robert M. Vogel, curator of the Smithsonian Institution's Division of Mechanical and Civil Engineering.

The government now retains only about 3,000 of the models. A small number are lodged in the Patent Office, including an Edison light bulb in the Commissioner's chambers. The rest are at the Smithsonian —some on display in its various museums and in the Associates' dining hall, but most secluded in its reference collections. The Smithsonian hopes—and believes —that it has most of the choice models that still exist. But it is possible that the whereabouts of many important miniatures is unknown.

The models not only represent a great historical legacy of ideas. "There's an incredible range in craftsmanship," says Vogel, "from the utterly crude model whittled by the inventor himself with a penknife, to the highly professional." A truss bridge, for example, was put together informally with scraps of tin and sticks. But a cannon on a swivel includes exquisite brass gears and other moving parts.

Over the years various rules have governed construction of the kind of models that could be submitted. In general, a model was to "exhibit advantageously" the attributes of an invention. By 1873 the Patent Office's rules had evolved to require that a model be "neatly and substantially made of durable material, metal being deemed preferable; and should not in any case be more than one foot in length, width or height.... Glue must not be used."

A working model was generally preferred. In some cases, the "model" consisted of the invention itself, if it was small enough. A model did not have to demonstrate the whole machine, only that feature involved in the claim. But most models included all working parts, or at least a full mock-up of the machine.

Certainly, many of the more expert models were made by the inventors themselves. But those not at home with hardware could seek out the many skilled artisans available a century ago and so much more difficult to find today—machinists, cabinetmakers, blacksmiths, founders, watchmakers and the like.

Skilled modelers available

Alternatively, the inventor could turn to a special breed, the "model maker." He could walk in with nothing more than a rough sketch, and generally count on the model maker's fine machinists to transform it into an operating reality. In the words of one advertisement in 1858, "We are prepared to manufacture every description of working models, of all kinds of material."

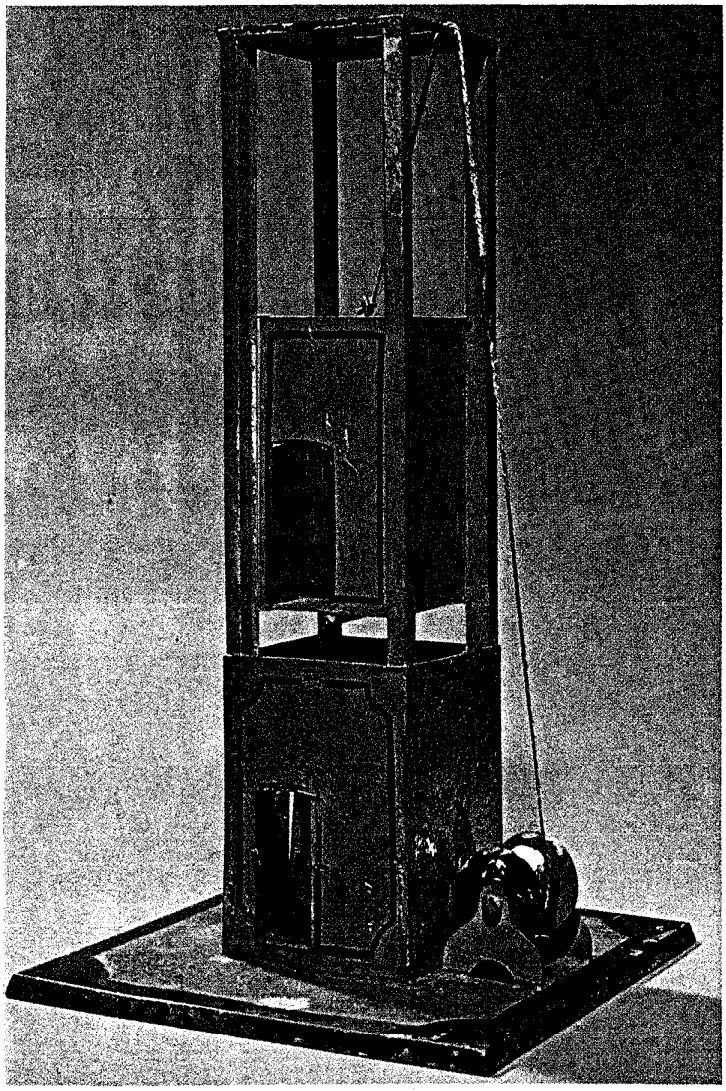
Model makers began sprouting up near the Patent Office in Washington, D. C., for example, and by the 1870s there were about a dozen of them in the city. Then. when models were required only if the Patent Office thought it necessary, these multiskilled entrepreneurs began to disappear. By 1929, according to a city directory of Washington, only one remained: D. Ballauf Mfg. Co.

The firm was started by Daniel Ballauf in 1855, and

Don't dodge the threatening cowcatcher—it's a toy locomotive modified to include a new refinement—a sanding device, not visible in the picture.

Rice Odell has written articles for SMITHSONIAN *on the controversies over a new dam (September 1971) and new freeways (April 1972).*

Old-time patent models



Built of tin, this crude model of a variation of the famed Otis elevator was made to display its Safety Air Cushion at the bottom of the shaft, an improvement for which a patent was sought.

it is situated today at the same location in the heart of Washington's Chinatown. As the model-making business shrank, D. Ballauf turned to its own specialized machine-tool work. But, up to several years ago, it still accepted almost any challenge brought in from the street. Even without the Patent Office requirement, inventors frequently had models made for court evidence in a patent dispute, or to help them sell their invention to a financial backer.

With so much riding on their patent applications, it is not surprising that most inventors struggled over their drawings and models, insisting on a high degree of professionalism. "Some of them would almost live in here while their models were being made," said Thomas E. Hayes, president of D. Ballauf.

Golden hope on every model

If the craftsmanship of the models was usually impressive, so must have been the anxiety and hope they embodied. One can only imagine the hard work, the time and money, and the aspirations that went into the development of a rifle, a fire engine, a windmill, a venetian blind, a candle mold, an ice-cream freezer, a machine for cutting cork, for making barrels, for cleaning tobacco leaves and for draining marshes.

How many hopes were dashed, or just melted forlornly into the years? Many models were forwarded to the Patent Office without names, to be lost or mislaid. Even when properly labeled, many disappeared into oblivion, having been put helter-skelter into boxes or onto shelves as patent examiners frantically tried to keep pace with a growing deluge of models.

In addition, patents were issued promiscuously for years, with no regard to other inventions in the field. This led to competing claims. Inventors also had the benefit of studying the models of others—for they were on display, and were viewed with awe by the public and by foreign visitors. At one time an estimated 200,000 models were clogging every corner of the Patent Office. In 1936, it was reported to a Senate committee that "it is not uncommon for persons to copy patented machines in the model room; and, having made some slight, immaterial alterations, they apply in the next room for patents." With no real examination system yet in effect, patents were routinely issued and inventors sallied forth to market them. Whether original or stolen, of course, an invention seldom reached fruition as a commercial product. Many a scoundrel, however, was able to brandish his patent papers and induce eager investors to part with their money. And patent lawyers, too, sometimes gouged their inventive clients.

The various American colonies had procedures for granting patents as early as the 17th century. Then, at

the instigation of James Madison and Charles Pinckney in 1787, the U. S. Constitution gave Congress the power "to Promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." The period of exclusivity was 14 years, later extended to 17.

A patent law was passed by the first Congress in 1790. It created a three-man patent board headed by Secretary of State Thomas Jefferson, an accomplished inventor himself. The law also required the submission of a model with a patent application, if feasible. Obviously, models could facilitate evaluation of an invention. It was often easier for an inventor to build a model than to draw and describe his device.

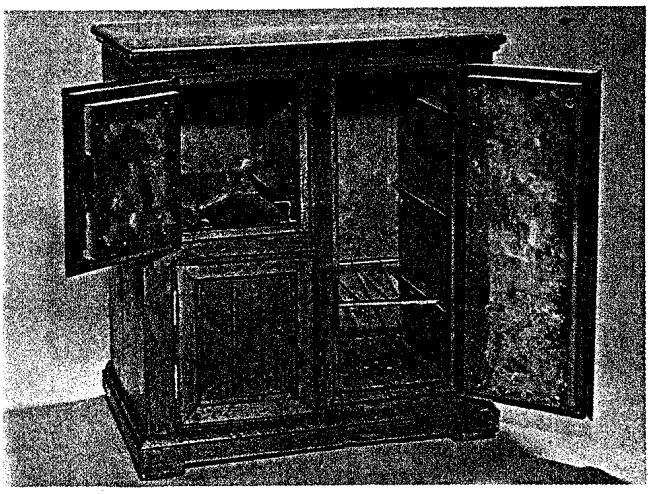
In 1790 only three patents were issued. But over the years applications and models proliferated, more than once causing the Patent Office to bulge at the seams and retreat to a larger building. In 1810 it moved from an office in the State Department to Blodgett's Hotel, where hundreds of the miniatures were displayed. In the summer of 1814, after British forces had burned every other federal building in Washington, they prepared to put the torch to Blodgett's as well. Dr. William Thornton, the dynamic chief of the Patent Office at the time, rushed into the city from his Georgetown home and pleaded with the British colonel not to destroy a collection so valuable to mankind (see SMITHSONIAN, April 1971). The British spared it.

Fire destroys a collection

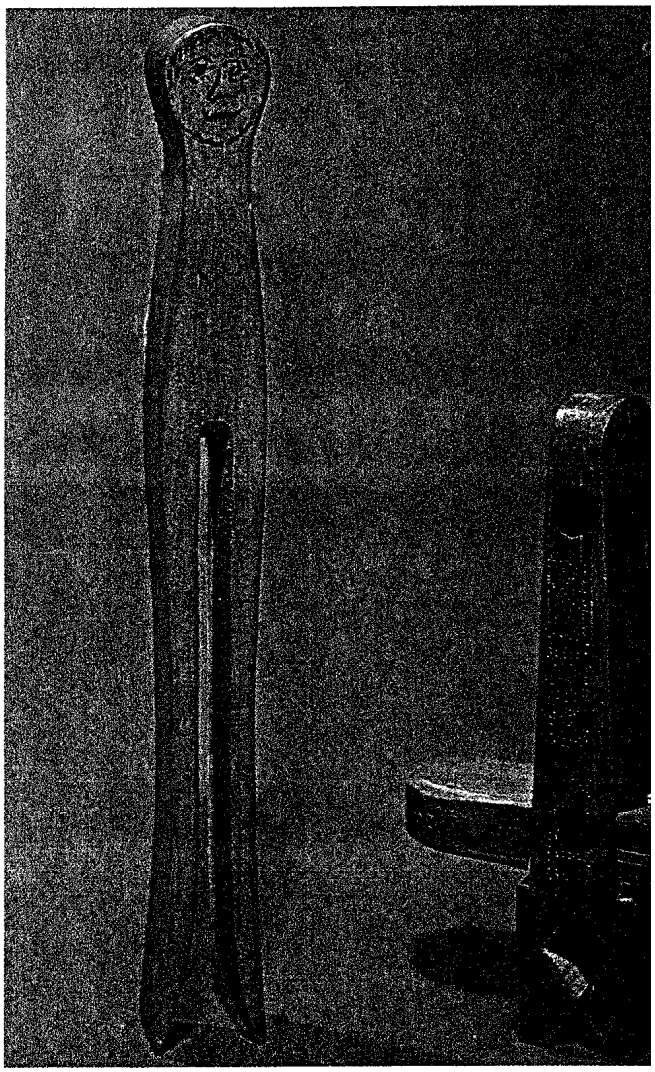
But fire was soon to strike with a vengeance in any case. By 1836, the number of models had grown to 7,000, and some had to be relegated to the hotel's attic. That year Congress passed a law to provide a new building, and ground was broken. But on December 15, flames destroyed Blodgett's and the model collection was wiped out. (Among the countless valuable items lost were Robert Fulton's original drawings of his steam engine.) Congress appropriated funds to restore the most significant models, but the task proved difficult and was only partially completed.

Models kept pouring in, however, and it wasn't long before they were filling up display rooms in the new Patent Office building (which now houses the Smithsonian's National Portrait Gallery and National Collection of Fine Arts). Patent Commissioner Henry L. Ellsworth was rather annoyed at the logistical problems. But he was also impressed, and in 1844 he issued what must rank as one of the great overstatements of all time: "The advancement of the arts . . . taxes our credulity and seems to presage the arrival of that period when human improvement must end."

It was, in fact, only the dawn of a golden age of in-



One of thousands of iceboxes, this features a new system of cooling ducts and chambers.



Two fanciful clothespins date from the mid-19th century; one bears an etched face, the other a sliding lock. The inventor of the latter, one T. L. Goble, carved his name on one of the movable arms.

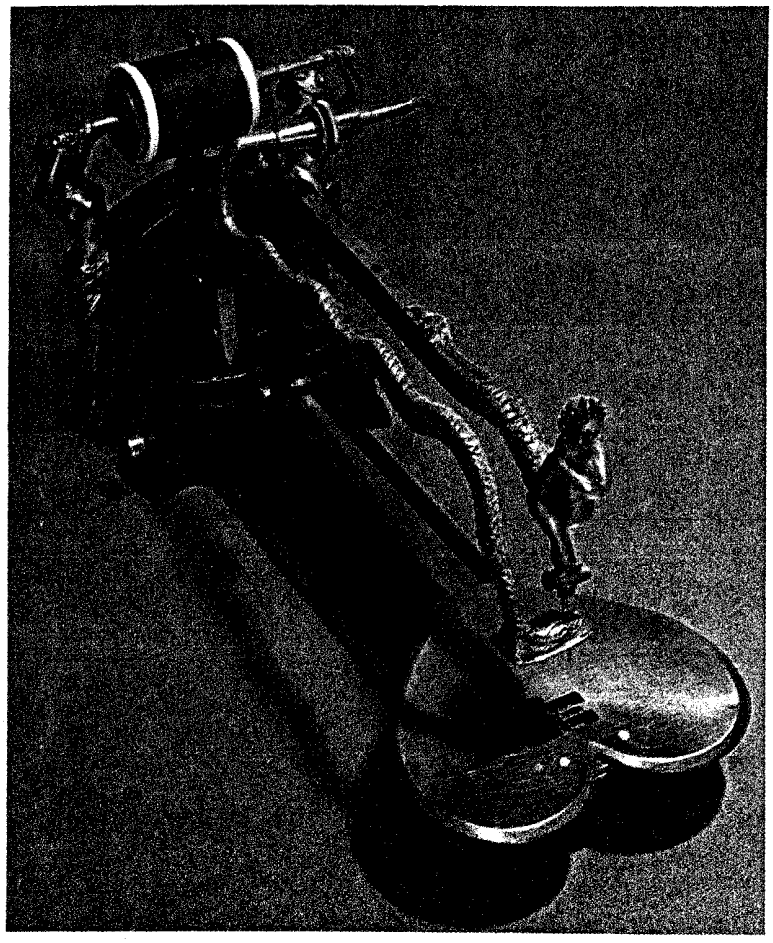
venting. Spurred by the challenges of the Civil War and the needs of a pioneering, postwar people, the nation's inventors seem to have applied themselves with more gusto than ever. The roster of brilliant conceptions to emerge in the last half of the 19th century and the first few years of the 20th would seem to be unparalleled: revolver, machine gun, air brake, barbed wire, telephone, phonograph, incandescent lamp, railroad car couplings, electric welding, electric motor, refining of aluminum, linotype machine, zipper, trolley car, cash register and airplane, to name a few.

By 1877, some 175,000 or more models were crowded into the exhibition rooms of the Patent Office, where they were accumulating at the rate of more than 13,000 a year. Unfortunately, it was once again a fire which alleviated the glut. On September 24, 1877, two wings of the Patent Office were burned out—and posterity lost an estimated 76,000 of the models.

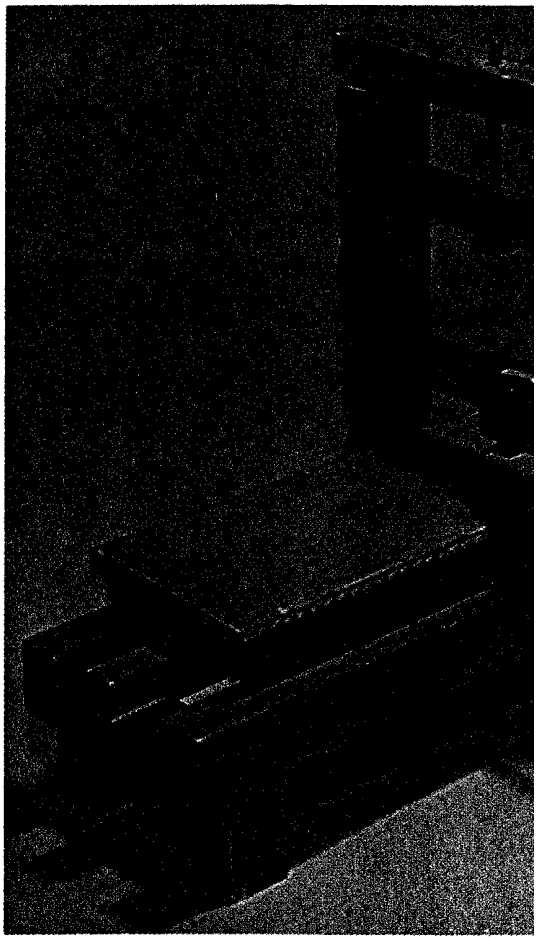
By this time, in any case, the flow of models was being stemmed. With laws passed in 1870 and 1880, Congress resolved that enough was enough, and that the submission of models could be costly and wasn't crucial to most patent applications anyway. In 1870 it eliminated the requirement, except in cases where deemed necessary, and in 1880 models were forbidden unless specifically called for.

Under current law, a model can still be required. But in an age of such complexity—nuclear physics, computers, lasers, and so on—models seem anachronistic. Who, for example, would wish to model this patented color television process: "The stimulation to emissivity of red, blue and green-emitting phospors in rotation responsive to picture signals . . . etc."?

Current Patent Office policy does insist, however, that a working model accompany any application for a perpetual motion machine. There was a time when inventions which defied the laws of nature were taken most seriously by quite a few inventors. Indeed, the Patent Office itself actually granted patents to more than one such brain child. In 1909, Isaac Smyth of Chicago submitted elaborate drawings and descriptions (records do not show if a model was included)



The patentable feature of this sewing machine is its design—semidraped females holding the spool, mermaid guiding needle through serpent-shaped foot.



Wood-planer model, patented in 1861, rests on its traveling bed. Black wooden wheel represents cast iron in the production machine.

of an automobile using weights and pulleys to propel itself by the force of gravity. About the same time, someone patented a ship to be driven solely by the force of the water against its bow.

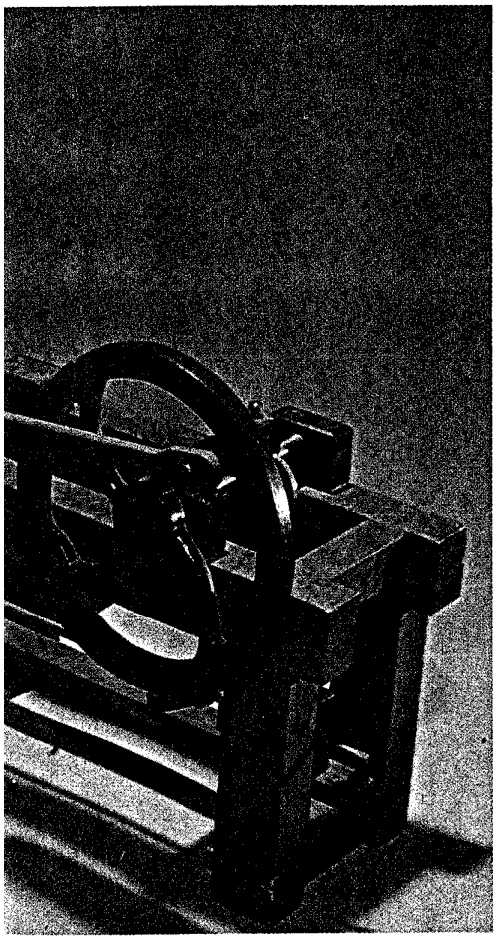
Whatever the reason, patents were granted between 1870 and 1915 for a device to create dimples; for a cuspidor that flushes; for a fly-catching pistol (with a metal jaw to spring out at the end of a long spring and snap shut on the fly) ; for an antisnoring mouthpiece (with valves to control the volume of air from the lungs) ; a hat which could tip automatically (for the man passing a lady while his arms are filled with packages); a coffin with a periscope (so friends and relatives could peer in at the face of the deceased) ; a coffin with a string to an alarm bell above ground (in case of premature burial) ; a burglar alarm to release a shower of water over the pillow on a bed (for those with defective hearing) ; a rocking chair hooked up to a butter churn; and a covered bathtub on rockers (thus combining two favorite pastimes of the day) .

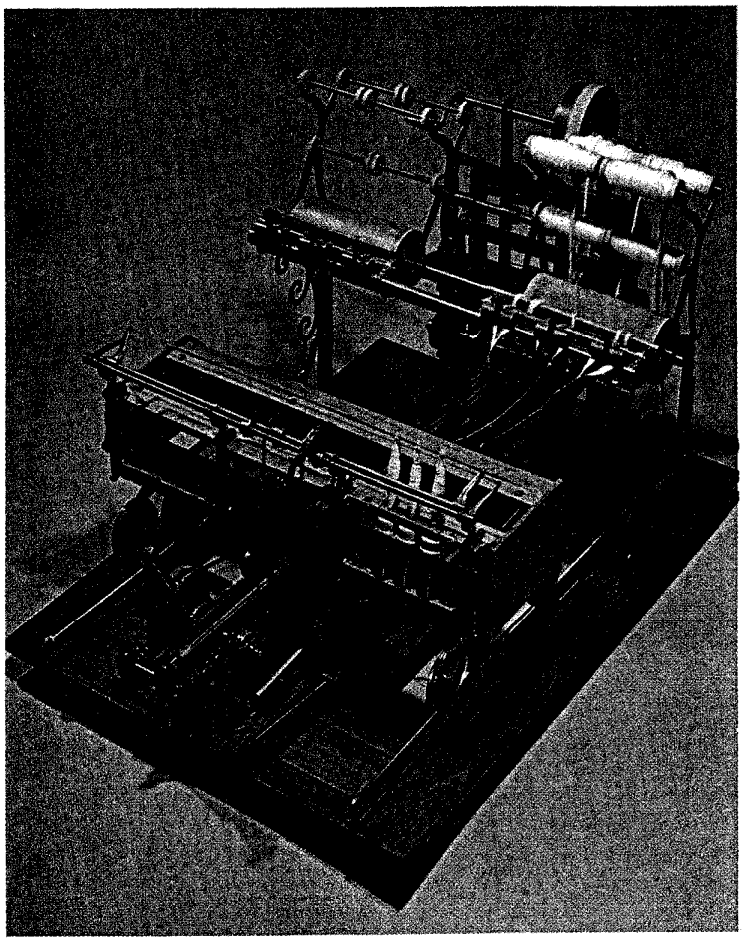
In 1904, when Henry Ford's motor cars were coming into their own, Henry Hayes of Detroit applied for and received a patent on a wooden horse attached to wheels, to be mounted on the front of a car to prevent it from scaring real horses as it sputtered along.

In 1915, Louis Schramm jr. of Armiger, Maryland, alarmed by the activity of German submarines, produced plans for a ship that would carry large magnets in its hold and thereby "draw submarines out of their course and toward the sides of the ship." Then the submarine and its crew would be shocked by a jolt of electricity sent from the ship. Imagine the potential cost overruns! But Schramm received a patent.

And so it went. Meanwhile, models continued to accumulate. In 1893, the Patent Office was authorized to rent another nearby building so that it could display them. But the exhibit never materialized, and in 1908 Congress abruptly decided to sell off all the models.

First, the Smithsonian was given a crack at them. It selected only 1,061. About 3,000 more were sold at public auction. But more than 150,000 remained unsold. These were hauled around in trucks and stored





Intricate model of a self-acting spinning mule introduced a number of improvements. This patent was granted to Nathan W. Bancroft in 1874.

in various buildings in the capital for 17 years. In 1925, Congress again ordered a sale.

The models were laid out on tables, and representatives of the Smithsonian and some other museums combed through them in a search for those of special interest. The Smithsonian staff selected several thousand. "They picked generously," says Vogel, but he adds that there was considerable urgency, and that the staff members naturally emphasized their personal fields of interest or expertise to the exclusion of other technologies. There also probably was a stress on the significant rather than the impractical and amusing.

The Smithsonian screened its hoard, sending some models to other museums and educational institutions. (Years later Vogel made a point of retrieving half a dozen of special importance.) Some models of lesser import were returned to the inventors or their families, when they could be found, and one wonders how many of these, and others returned by the Patent Office over the years, remain in attics.

On December 3, 1925, an additional 50,000 models were sold at auction—for $1,550. The buyer was not identified, but it may have been the wealthy industrialist Sir Henry Wellcome, because a few months later Wellcome bought another 125,000 or so.

Sir Henry died before he could display the models in a museum he had planned. The trustees of his estate reportedly sold them for $50,000. The buyer was the Broadway producer and collector Crosby Gaige. With a flair for public relations, Gaige managed to successfully promote the models and market many of them. He then sold out to a group of businessmen.

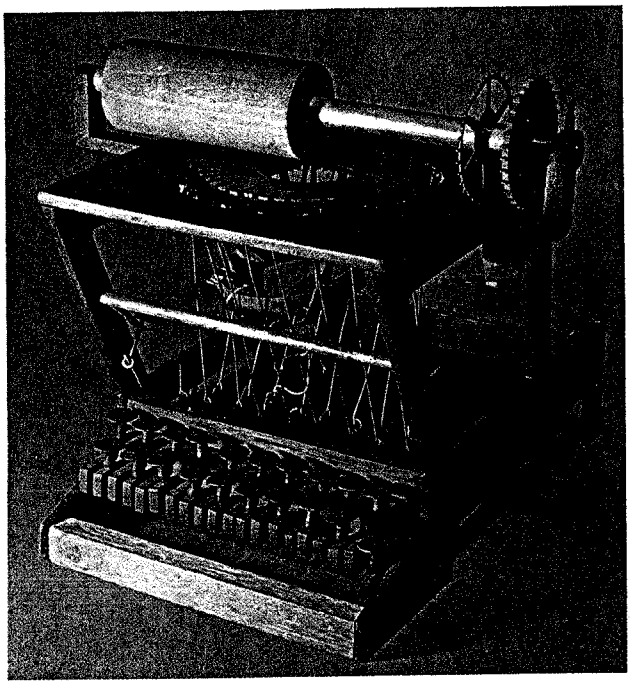
Their efforts, which included a cross-country cavalcade, generally fizzled out. As storage costs climbed, many of the models were offered in desperation for as little as $1 each. Then, in 1942, came a bankruptcy sale of those remaining, and they may have numbered more than 150,000. They were acquired by O. Rundle Gilbert, an auctioneer from Garrison, N.Y., and his wife.

"The bankruptcy sale was in Foley Square in New York," Gilbert recalls. "We purchased them because they were going to be bought and used for scrap metal. A group of junk dealers were weighing the boxes. And this was one of the finest collections of Americana."

The models were shipped in dozens of trucks to Garrison and crammed into Gilbert's barns. In 1945, one of the barns was consumed by fire, destroying approximately 20,000 of the models—already catalogued.

Over the years Gilbert and his wife and son Robert have held a number of auctions and other sales, most recently last December when 500 models were sold. But success generally has been limited, though two men from Texas once bought 1,000 says Gilbert, and thousands of others have been sold to individuals and to the Farmer's Museum, the National Baseball Museum and other exhibitors.

The Gilberts also have displayed models at several small museums they set up themselves. Many of them are still on view at their Patent Model Building adjacent to the Garrison Inn. Gilbert estimates that they still have 80,000 models—most not yet unpacked.



George Yost's typewriter required several models for various patentable features, this one applied for in 1885. The machine was manufactured in the 1900s.

NOTE: This article was originally reprinted in a binder of mechanical bank patent papers that were distributed at the 1998 Mechanical Bank Collectors of America Convention by Bill Jones.

Toy Money-Boxes Patented in U.S.A.