THE VACUUM CLEANER

Nobody knew how clean a carpet could be until it came along

BY CURT WOHLEBER

JAMES MURRAY SPANGLER, a department-store janitor in Canton, Ohio, suffered from asthma. Sweeping the rugs every night stirred up dust and dirt, which left him gasping for breath. It was 1907, and agencies like the Occupational Safety and Health Administration did not yet exist, so Spangler was left to his own devices. He fashioned a machine from a tin soapbox, a sateen pillowcase, and a broom handle. Inside the box, an electric motor powered a fan and a rotating brush. The fan blew air out one end of the machine through the pillowcase. At the other end, air and dirt stirred up by the brush rushed in to take its place.

Spangler patented his device, which he called a "suction sweeper," in 1908. He sold a few to friends and relatives but lacked the money to set up a factory. One satisfied customer was Susan Hoover, whose husband, William H. Hoover, owned a leather-goods company. Hoover bought the patent, started a partnership with Spangler, and put some men to work assembling sweepers in a corner of his leather works.

For millennia people had cleaned their rugs by sweeping them, occasionally also hanging them outside and hitting them with a stick to loosen embedded dust and dirt. In the latter half of the 1800s the direct ancestor of the vacuum cleaner appeared. It was the mechanical sweeper, which did the work, more or less, of the age-old broom and dustpan. As the sweeper was pushed along the floor, a rotating brush in the base swept surface debris in the general direction of a built-in dust collector. The most notable carpet sweeper was the Bissel, patented in 1876, which is still being made.

As early as 1869 Ives McGaffey, of Chicago, came up with an early version of the vacuum cleaner called the Whirlwind. This was a mechanical sweeper with a twist: a crank on the handle that turned a fan that sucked dirt into a cloth bag. Turning the hand crank was a chore, though, and McGaffey found few buyers. Later devices used the motion of the wheels as they advanced along the carpet to turn a fan or pump a set of bellows (Daniel Hess of Iowa had patented a bellows-driven version as early as 1860). It was a clever idea, but either the user had to move the sweeper frantically back and forth to generate enough sucking power, or else pushing the machine required superhuman strength.

A successful vacuum cleaner would have to be powered by something more than human muscle. Late in the century John S. Thurman, of St. Louis, designed something that was not the first motorized vacuum cleaner, though many sources credit him with inventing just that. His 1899 patent for a "pneumatic carpet-renovator" describes a machine that dislodged dust from carpets by blasting them with jets of com-

VACUUMS THROUGH THE AGES

From trailer to mini-robot

1905
Puffing Billy
Booth's behemoth was hauled to a customer's home or business.

1908
Model O
Hoover's portable model was the first vacuum cleaner that consumers could buy, store, and operate by themselves.

1993
Dyson
With no bag to get clogged with dirt and dust, it never loses suction.

LEFT TO RIGHT: ESSP0137151 © SSPL/IMAGE WORKS; PHOTOGRAPH COURTESY OF WALSH UNIVERSITY'S HOOVER HISTORICAL CENTER, 1875 EAST MAPLE STREET, NORTH CANTON, OH 44720; PHOTOGRAPH COURTESY OF DYSON, U.K.; COURTESY OF IROBOT

pressed air. The dust was blown into a receptacle rather than being sucked in, as in the machine we know.

Hubert Cecil Booth, an English structural engineer, has the strongest claim to building the first motorized vacuum cleaner for carpets. As he recalled decades later, in 1901 he attended "a demonstration of an American machine by its inventor" at the Empire Music Hall in London. The inventor is not named, but Booth's description of the machine conforms fairly closely to Thurman's design, as modified in later patents. As Booth recalled, "I asked the inventor why he did not *suck* out the dust for he seemed to be going round three sides of a house to get across the front." According to Booth, "the inventor became heated, remarked that sucking out dust was impossible and that it had been tried over and over again without success; then he walked away."

The American inventor was correct: Suction *had* been tried repeatedly without success. More than 30 previous American and British patents using the idea attested to this fact. But the principle was sound, as Booth showed a few days later by sucking on a plush chair in a restaurant.

After "a good deal of experiment," Booth managed to build a massive gasoline-powered and horse-drawn vacuum cleaner. He received patents on February 18 and August 30, 1901, which suggests that he may have actually seen the American machine in a prior year. It was the first commercially successful example of the technology, so Booth called his initial model Puffing Billy, after an early steam locomotive. In the prototype, the vacuum was created with a suction pump; later versions substituted a "multi-stage turbine fan."

The inventor told Booth that "sucking out dust was impossible and that it had been tried over and over again without success."

When a customer's home or business needed cleaning, a Puffing Billy was parked outside and a team of workers lugged hoses in through the doors and windows. During World War I a fleet of Booth vacuum cleaners helped curb an outbreak of spotted fever among naval reservists billeted at London's Crystal Palace exhibition hall by removing a reported 26 tons of dust, much of it from the girders, over several weeks.

Booth's invention was too big and expensive for home use, so the race was on to invent a compact vacuum cleaner. Beginning in 1906, the U.S. Patent Office saw a profusion of patents on such devices. Some used bellows to create a vacuum, and others used bicycle-type pumps, but a fan or turbine was quickly found to be the best solution, and it remains universal to this day.

The first successful portable vacuum cleaner, Hoover's Model O, which was based on Spangler's device, came out in 1908. It weighed 40 pounds and sold for $60. Despite its advantages, it and other early vacuum cleaners were less convenient to use than sweepers. Not only were they heavy and unwieldy, but they required an electrical hookup, which early in the century could be complicated and dangerous. So Hoover representatives sold their products on performance, showing customers that vacuuming rooted out grime from deep in carpets that they didn't even know was there.

The interwar years were the golden age of vacuum-cleaner innovation. During the 1920s Hoover's beater bar, which whacked the carpet to loosen dirt in advance of the roller brush and the suction nozzle, prompted the catchy slogan "It beats as it sweeps as it cleans." Disposable paper bags also replaced cloth sacks. In the 1930s Hoover was among the first manufacturers to use new lightweight materials, such as Bakelite plastic and magnesium alloys. The vacuum cleaner didn't become an essential household appliance until after World War II, when middle-class families migrated to sprawling suburban houses, installed wall-to-wall carpeting, and raised crumb-trailing baby boomers.

Finally, in the 1980s, the British inventor and industrial designer James Dyson set out to solve a problem that had always annoyed him: Conventional vacuum cleaners steadily lose suction as their bags fill up. Dyson developed a bagless vacuum cleaner that relied on cyclonic separation, in which air is forced through a spiral path. Along the way, centrifugal force flings dirt out of the path of the airflow.

In the U.K., where *hoover* had long been used generically for *vacuum*, Dyson dethroned Hoover as the top seller. Dyson also commands a hefty share of the American market. Some rival brands, including Hoover, have adopted similar technology on some of their models, while others, such as Oreck, shun it, insisting that bagless models let too much dust escape.

The latest innovation is the robotic vacuum cleaner. The iRobot Corporation's Roomba Vacuuming Robot steers around obstacles, retreats from stairs, gives extra attention to heavily soiled areas, and plugs itself in for a recharge when the batteries run low. Perhaps more useful, some vacuums are now equipped with HEPA filters to trap very fine dust, which can be irritating to asthmatics—a realization at long last of James Murray Spangler's easy-breathing dream from a century ago. ★

2003
Roomba
It uses sensors to clean the floor on its own.