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## TURN OF THE WHEEL

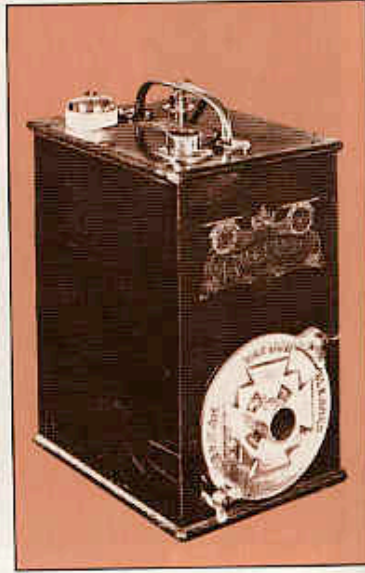
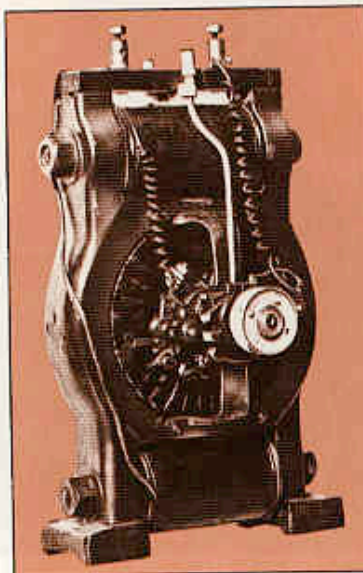
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*Previous page:*  
"A maid of all work" was the advertising description of this 1914 vacuum cleaner.

One of the first suction devices for cleaning was operated by bellows attached to the housemaid's feet.

The development of smaller electric motors - this one 1880 - made possible many home appliances like the portable vacuum made by BVC in 1904 (right).





### The story of the electric motor

In a power station generator, mechanical energy derived from steam, internal combustion engines or water power is used to rotate an electro-magnet inside coils of wire held in a stationary frame. As the magnet revolves, pulses of electric current are generated in the coils. This makes use of the principle discovered by Michael Faraday in 1831 that led to the use of electricity to provide power and light.

An electric motor uses the same kind of equipment to convert electrical energy into mechanical energy. By applying a current to the coil winding in a motor two magnetic fields are produced, one in the stationary frame and the other in the moving part. It is the interaction between these two magnetic fields that makes the moving part rotate very rapidly.

The electric motor is one of the most efficient of all energy converters – capable of transforming into work over 90 per cent of the energy that reaches it. The steam engine is only between 16 to 30 per cent efficient and the petrol engine in the car about 15 per cent.

Another Englishman, James Clerk Maxwell, studied Faraday's discoveries and he, in 1864, worked out in mathematical terms the fundamental theories of electricity and magnetism. These calculations enabled other scientists to design electric motors of all sizes and types, including those used in home appliances.

#### Electric fan

The first small, practical electric motor was designed by an American immigrant, Nicola Tesla in 1889 and its first home use was for a small table fan that sold so well that, in 1891, he produced a fan motor that could have its speed regulated.

#### Vacuum cleaner

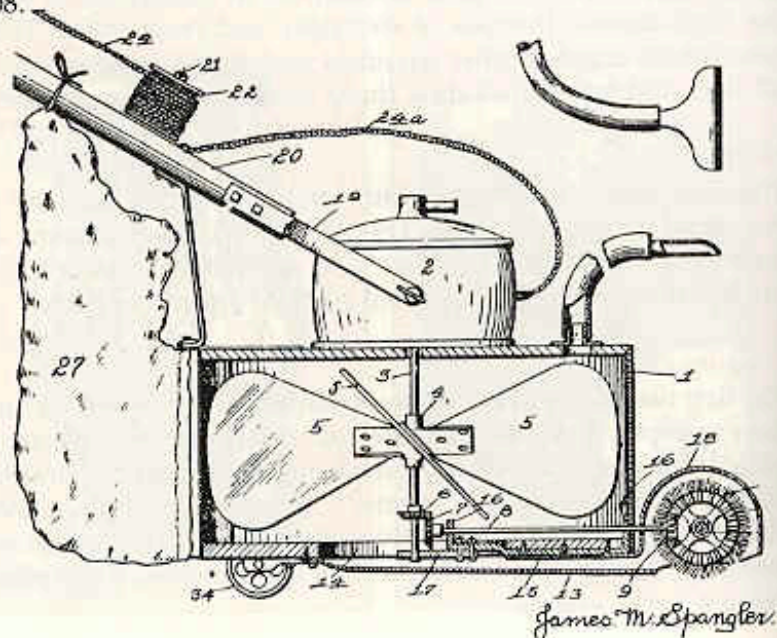
The first use of an electric motor to simplify housework was in a floor sweeper. A cleaner that lifted dirt out of carpets, upholstery and curtains by suction had been invented by Cecil Booth in 1901. He called it "the vacuum cleaner". If you wanted your home cleaned a horse-drawn cart arrived at the door and the dust was extracted through pipes laid through the windows – the power being a petrol engine.

It was a cumbersome arrangement and, in the early days, the police summoned Booth for causing an obstruction. What was needed was something that could be used by the maidservants and numerous ingenious inventions appeared, using portable bellows. In one of these the bellows were strapped to the feet of the maid who, clutching a hose in her hands, walked about the room hopefully drawing in the dust and dirt.

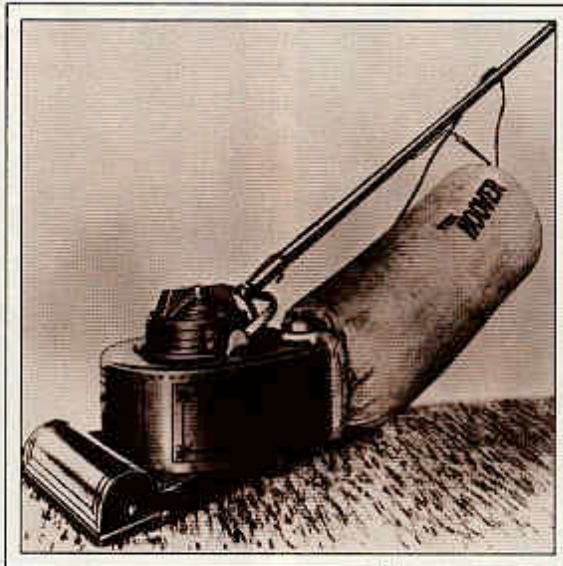
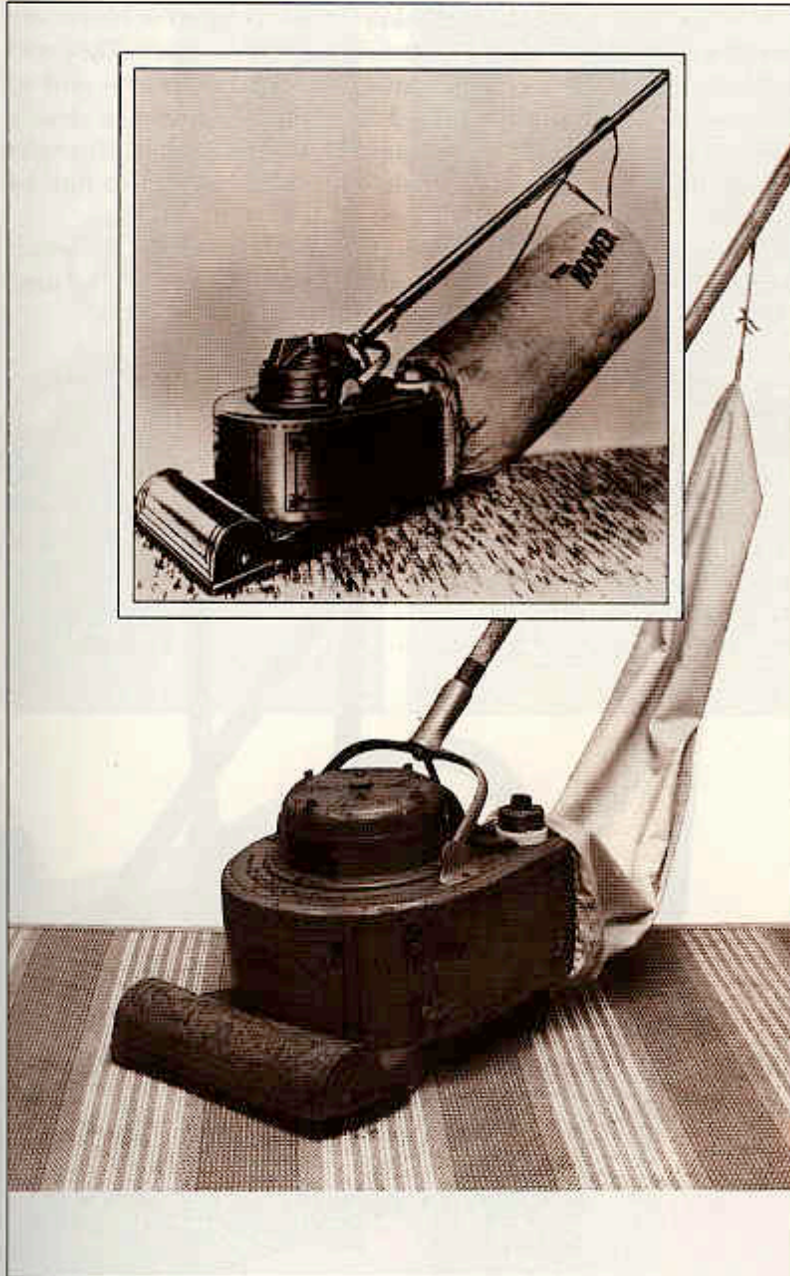
These bellows cleaners were largely ineffective, except in redistributing the dust. What was required was more suction power and so in 1904 Booth produced a portable cleaner using an electric motor mounted on a trolley. It plugged into a light socket, but it was bulky and heavy although effective at collecting dust.

An American caretaker, J. Murray Spangler, heard of Booth's invention and, although he had not seen an illustration, he set about designing one for himself using his wife's broom handle and one of their pillowcases for a dust bag. Spangler, who was employed by the Hoover family, suffered badly from asthma and his objective was to find something to do his cleaning work for him so the dust would not aggravate his condition. Hoover was impressed with his solution and persuaded him to patent it in 1908.

Spangler's US Patent 889 823 dated 2 June, 1908 led to the development of the popular 'bag and stick' cleaners. These are two early Hoover versions of 1909 and 1912.







Hoover, who was a saddle maker, converted part of his factory to make a few models of the "vacuum carpet sweeper". They sold so quickly that he devoted himself to the business – and so successfully that today the word "hoover", meaning to clean a carpet mechanically, is to be found in the dictionary. Spangler retired and lived comfortably on the royalties paid to him by Hoover.

The first Hoover arrived in Britain in 1912 and it cost £25 which was more than the annual wages of most of the maids who used

This 1906 vacuum cleaner, nicknamed 'the pram', competed with the hand operated models and the 'electric box' vacuum cleaner.







it. Booth and his British Vacuum Cleaner Co. Ltd. had not been idle and he had improved on the first designs to produce a model which was cheaper.

*Opposite page:*  
Vacuum cleaner of  
1930 with its 1988  
upright and  
cylinder successors.

*Below:* Goblin  
advertisement

By 1915 there were more than a dozen firms making "vacuum cleaners". Almost half a million homes had now been wired for electricity, all of them where servants were normally employed to do the housework, but with the recruiting for the armed forces or for the munitions factories a "mechanical servant" to do the dusting, and selling for about £7 became very popular.

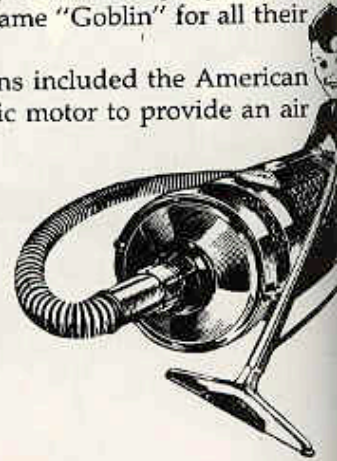
There were also benefits to health. When a serious outbreak of Spotted Fever broke out amongst soldiers at Crystal Palace, vacuum cleaners were used to remove 23 tonnes of dust. The British Vacuum Cleaner Company reported "the health of the men improved immediately, when all conventional attempts to control the epidemic had failed".

In 1918 a Swedish firm called Lux (later named Electrolux) further improved on Booth's ideas and enclosed the motor and the fan in a metal cylinder. At one end was an outlet to which a long hose could be attached and to this was fitted a variety of shaped tools to suck in dust – not just from the floor, but furnishings, upholstery and curtains.

Hoover continued to develop the stick type of cleaner and by 1926 he had added a beater bar with brushes. This was driven by the motor to lift dust from the carpet so it could be sucked into the cleaner.

An upright cleaner was produced by Booth's company in 1921 and in 1926 they adopted the trade name "Goblin" for all their cleaners.

A variety of other ingenious designs included the American "Airway" which also used the electric motor to provide an air flow for a hair dryer. There was also a system that had outlets in every room leading to a large motor, fan and dust bag installed in a cupboard or in the cellar. By 1939 the popular selling cleaner was either the type where you pushed the motor ahead of you – the upright – or pulled it behind you –



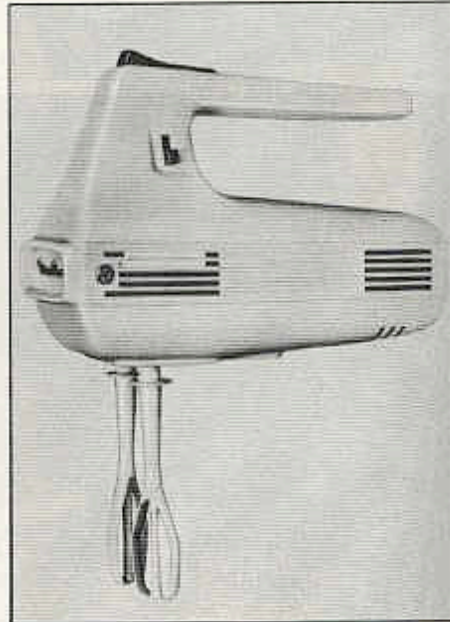






UNIVERSAL  
FOOD MIXER AND BEATER  
MADE U.S.A.

1913





the cylinder.

In the post war period there were many improvements. Smaller, more powerful motors gave better suction power and one model, made spherical in shape, used the same principle as the hovercraft to aid movement along the floor.

Now to be found in more than 90 per cent of homes in Britain, the modern suction cleaner comes with a range of cleaning attachments for various purposes – essential for the cylinder model, but now supplied as an extra for the upright. Other features include power driven nozzles for the cylinder cleaners, flex winders, disposable dust bags and some models come with the motor mounted on the handle so they can serve as either cylinder or upright cleaners.

#### Food mixers

Another popular application of the electric motor was in mixing and grinding foods but it was not until the development of compact, reliable electric motors in the 1930s that a variety of kitchen equipment came into use for mixing.

The first practical food mixer came from America in 1918. Its beaters extended into the bowl and mixed from above – a design that was unchanged until 1952 when a mixer was invented that had its motor in the base with the blades fitted into the bowl.

In the 1920s and 30s the electric motor was applied to all sorts of culinary tasks like mincing and shredding which later became attachments for some of the more powerful food mixers. Blender/liquidisers and can openers appeared in the mid 1930s in the U.S. and the electric slicing knife in 1939 where two serrated blades slid side by side, driven by a motor. This was an improvement on the circular slicer where the food being sliced was moved against the revolving blade.

Hand-operated bacon slicers were to be seen in every grocer's shop from the turn of the century and many of these were converted to electric motor power; a small domestic circular slicer appeared in Germany (for slicing sausages) in 1937.

J.W. Powers of the General Electric Company in America is credited with the invention of the food waste disposer that fitted into the sink outlet in 1929, although it did not go on sale until 1935. In Britain in the 1960s a version was developed that could

*Opposite page:* With its modern counterpart in the background, the 1918 food mixer shows an unchanged principle of motor driven beaters. *Below:* a 1944 design with a juice extractor attachment, and a lightweight hand held model of 1962.

also be used as a clothes washer, a vegetable and shoe cleaner and a food mixer, simply by connecting attachments to the motor.

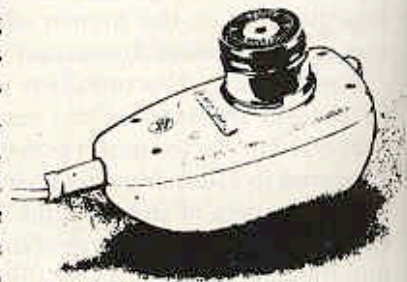
### Curiosities

Among the more curious motor powered ideas for the home that appeared in the 1930s was the automatic, motor driven "waker" which stripped the clothes off the bed when the electric alarm clock rang!

More sensible was the automatic bedside teemaker. This was invented in a practical form in 1904 by a Birmingham gunsmith, although his design was not electrical. An arm linked to an alarm clock struck a match which lighted a spirit stove which heated a kettle. When the kettle boiled it tilted and poured the water into the teapot and extinguished the flame. Mr. L.G. Hawkins of Drury Lane adapted the idea in 1920 and linked an electric clock with an electric kettle in a simple machine but the first popular machine to supply the now famous bedside "cuppa" was patented by Brenner Thornton in 1936 and sold by "Goblin" for £5.15s.6d.

Electric mousetraps, cockroach catchers and an astonishing collection of health, beauty and slimming aids appeared, albeit briefly, between 1910 and 1940. To read the publicity of the period, you would be led to believe that electricity was capable of curing most of the common ailments – from acne to lumbago. Many of the electrical gadgets were endorsed by eminent physicians – some were even invented by them. "A daily dose of electricity", wrote one enthusiast in 1922, recommending mild electric shocks, "is better than £100 of pills and potions".

One of the most successful and practical survivors among the motor powered appliances is the electric shaver. The first was designed by a retired American Army Officer, Lieut. Colonel Jacob Schick in 1928. This used the principle of a cutting surface sliding back and forth behind a shearing head. In Germany in 1933 a smaller version appeared



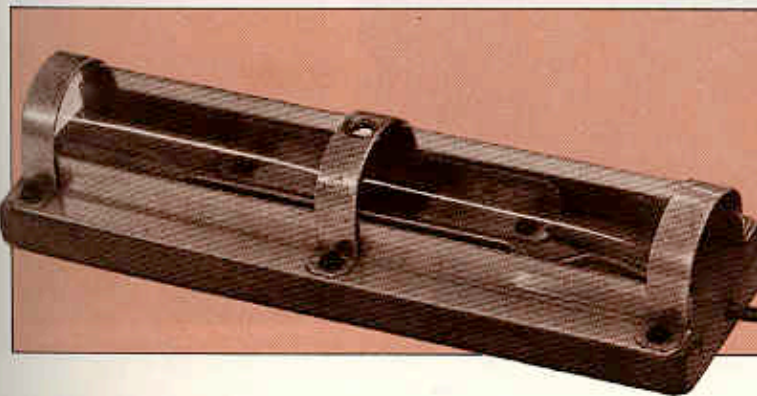
Philips Shaver 1947.



COOL IT



Electric shaving mug (1926), and a device for electrocuting mice (1926). These and many other electrical 'curiosities' are on display in The Milne Museum Tonbridge, Kent.



that closely resembled the hand razor and used standard razor blades that had to be honed after each shave. A completely different approach was taken by Professor Horowitz of Philips in Holland in 1937. He designed a circular cutting head – the Philishave.

Along with the shaver came a very popular appliance – the electric shaving mug that heated its own water.

Power drills, power saws, sanders and the range of garden aids such as mowers, hedge trimmers and lawn rakers, all gradually emerged in the late 60s and early 70s as popular home appliances because of the better design of the alternating current motors – some of which were now able to run at different speeds and adjust themselves to cope with heavier loads.

Now we depend on motor power to run many of our central heating systems; even the mains drainage system and gas supply for the modern home is dependent on electricity. In industry, electricity is the life blood, and motor power its arms and legs.



A motor driven fan distributes thermostatically controlled warmth from this modern room heater.