# TOP 10 INVENTIONS THAT CHANGED THE WORLD

HUMANS ARE AN INGENIOUS SPECIES. THOUGH WE'VE BEEN ON THE PLANET FOR A RELATIVELY SHORT AMOUNT OF TIME (EARTH IS 4.5 BILLION YEARS OLD), MODERN HOMO SAPIENS HAVE DREAMED UP AND CREATED SOME AMAZING, SOMETIMES FAR-OUT, THINGS. FROM THE MOMENT SOMEONE BASHED A ROCK ON THE GROUND TO MAKE THE FIRST SHARP-EDGED TOOL, TO THE DEBUT OF THE WHEEL TO THE DEVELOPMENT OF MARS ROVERS AND THE INTERNET, SEVERAL KEY ADVANCEMENTS STAND OUT AS PARTICULARLY REVOLUTIONARY. HERE ARE OUR TOP PICKS FOR THE MOST IMPORTANT INVENTIONS OF ALL TIME, ALONG WITH THE SCIENCE BEHIND THE INVENTION AND HOW THEY CAME ABOUT.

# THE WHEEL

Before the invention of the wheel in 3500 B.C., humans were severely limited in how much stuff we could transport over land, and how far. Apparently the wheel itself wasn't the most difficult part of "inventing the wheel." When it came time to connect a non-moving platform to that rolling cylinder, things got tricky, according to David Anthony, a professor of anthropology at Hartwick College.

The hard work paid off, big time. Wheeled carts facilitated agriculture and commerce by enabling the transportation of goods to and from markets, as well as easing the burdens of people traveling great distances. Now, wheels are vital to our way of life, found in everything from clocks to vehicles to turbines.

# THE NAIL

- Without nails, civilization would surely crumble. This key invention dates back more than 2,000 years to the Ancient Roman period, and became possible only after humans developed the ability to cast and shape metal. Previously, wood structures had to be built by interlocking adjacent boards geometrically a much more arduous construction process.
- Until the 1790s and early 1800s, hand-wrought nails were the norm, with a blacksmith heating a square iron rod and then hammering it on four sides to create a poin. Nail-making machines came online between the 1790s and the early 1800s. Technology for crafting nails continued to advance;
- After Henry Bessemer developed a process to mass-produce steel from iron, the iron nails of yesteryear slowly waned and by 1886, 10 percent of U.S. nails were created from soft steel wire, according to the University of Vermont. By 1913, 90 percent of nails produced in the U.S. were steel wire.

# THE COMPASS

Ancient mariners navigated by the stars, but that method didn't work during the day or on cloudy nights, and so it was unsafe to voyage far from land. The Chinese invented the first compass sometime between the 9th and 11th century; it was made of lodestone, a naturally-magnetized iron ore, the attractive properties of which they had been studying for centuries.

Soon after, the technology passed to Europeans and Arabs through nautical contact. The compass enabled mariners to navigate safely far from land, increasing sea trade and contributing to the Age of Discovery.

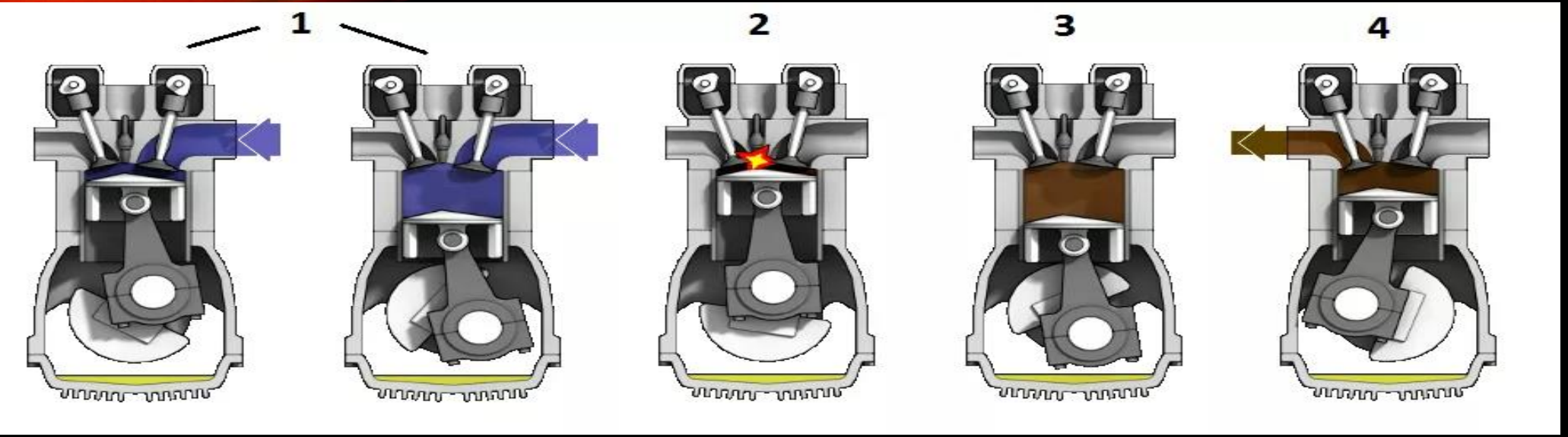
# THE PRINTING PRESS

The German Johannes Gutenberg invented the printing press around 1440. Key to its development was the hand mold, a new molding technique that enabled the rapid creation of large quantities of metal movable type. Though others before him — including inventors in China and Korea — had developed movable type made from metal, Gutenberg was the first to create a mechanized process that transferred the ink (which he made from linseed oil and soot) from the movable type to paper.

With this movable type process, printing presses exponentially increased the speed with which book copies could be made, and thus they led to the rapid and widespread dissemination of knowledge for the first time in history. Twenty million volumes had been printed in Western Europe by 1500.

Among other things, the printing press permitted wider access to the Bible, which in turn led to alternative interpretations, including that of Martin Luther, whose "95 Theses" a document printed by the hundred-thousand sparked the Protestant Reformation.

# THE INTERNAL COMBUSTION ENGINE




In these engines, the combustion of a fuel releases a high-temperature gas, which, as it expands, applies a force to a piston, moving it. Thus, combustion engines convert chemical energy into mechanical work. Decades of engineering by many scientists went in to designing the internal combustion engine, which took its (essentially) modern form in the latter half of the 19th century.

The engine ushered in the Industrial Age, as well as enabling the invention of a huge variety of machines, including modern cars and aircraft.

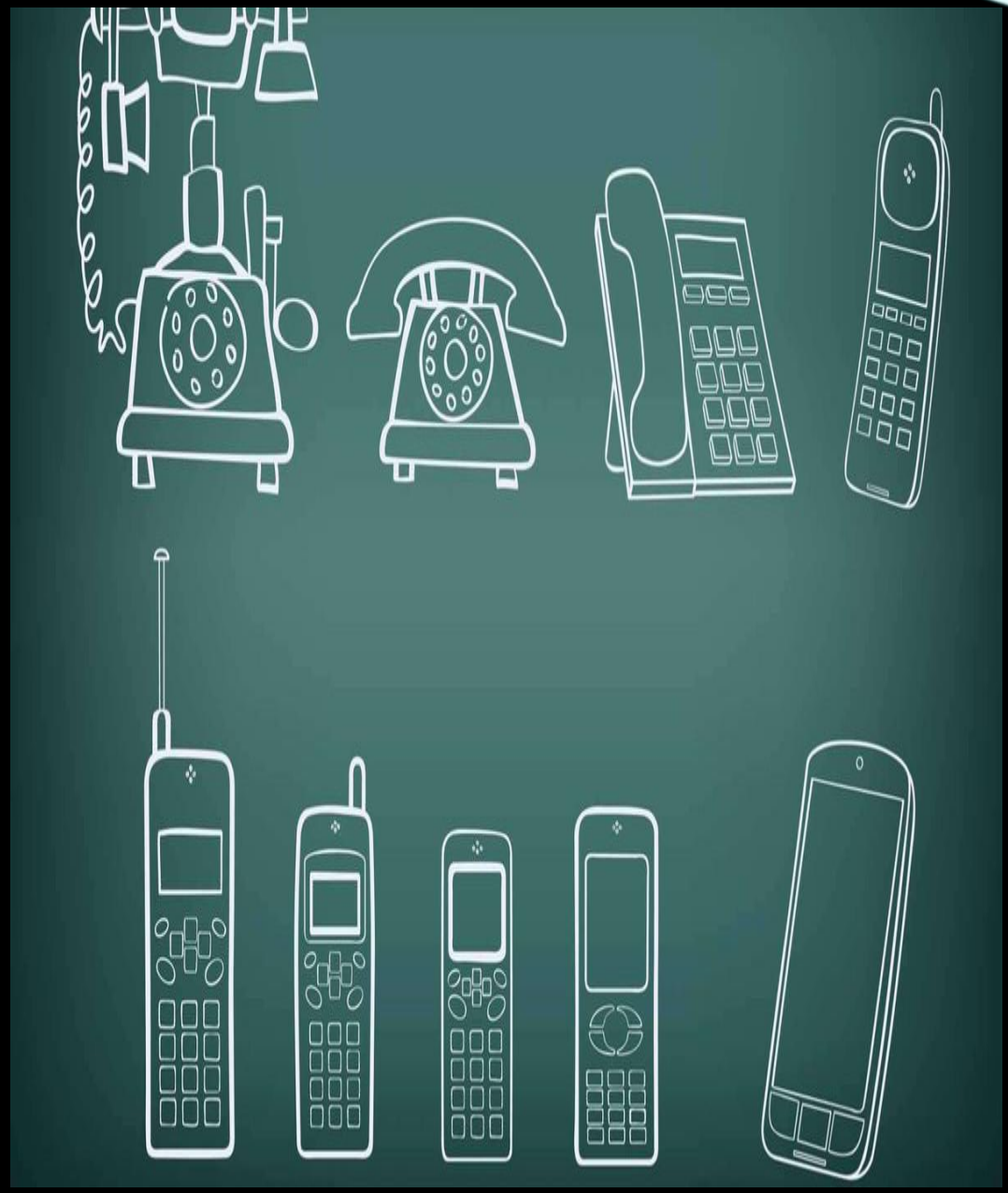
Pictured are the operating steps of a four-stroke internal combustion engine. The strokes are as follows: 1) Intake stroke - air and vaporised fuel are drawn in. 2) Compression stroke - fuel vapor and air are compressed and ignited. 3) Power stroke - fuel combusts and piston is pushed downwards, powering the machine. 4) Exhaust stroke - exhaust is driven out.

# THE TELEPHONE

Though several inventors did pioneering work on electronic voice transmission, Alexander Graham Bell was the first to be awarded a patent for the electric telephone in 1876. (His patent drawing is pictured above.) He drew his inspiration from teaching the deaf and also visits to his hearing-impaired mom, according to PBS.

He called the first telephone an "electrical speech machine," according to PBS.

The invention quickly took off, and revolutionized global business and communication. When Bell died on Aug. 2, 1922, according to PBS, U.S. telephone service stopped for a minute to honor him.



# THE LIGHT BULB

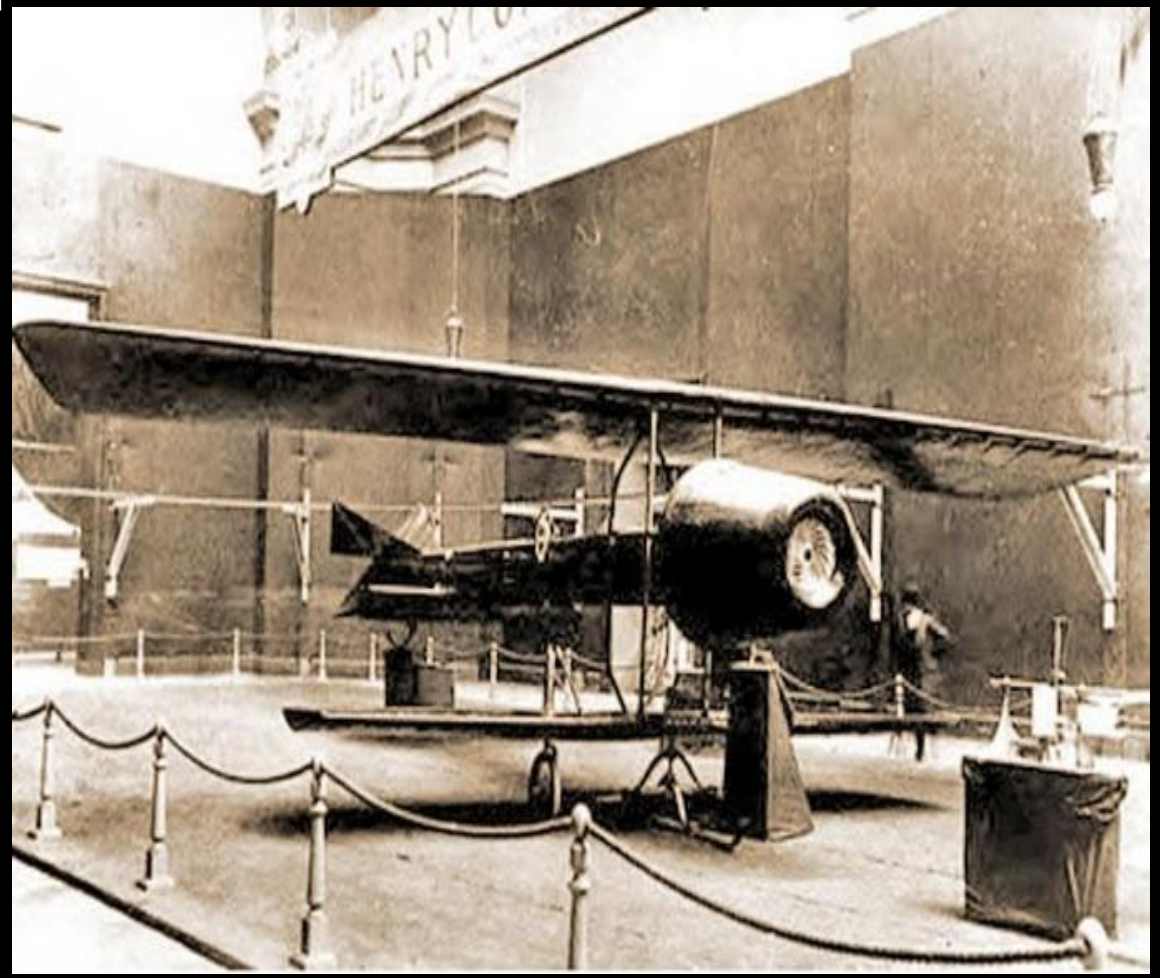
When all you have is natural light, productivity is limited to daylight hours. Light bulbs changed the world by allowing us to be active at night. According to historians, two dozen people were instrumental in inventing incandescent lamps throughout the 1800s; Thomas Edison is credited as the primary inventor because he created a completely functional lighting system, including a generator and wiring as well as a carbon-filament bulb like the one above, in 1879.

As well as initiating the introduction of electricity in homes throughout the Western world, this invention also had a rather unexpected consequence of changing people's sleep patterns. Instead of going to bed at nightfall (having nothing else to do) and sleeping in segments throughout the night separated by periods of wakefulness, we now stay up except for the 7 to 8 hours allotted for sleep, and, ideally, we sleep all in one go.

# THE AIRPLANE

Henri Marie Coandă was a Romanian inventor, aerodynamics pioneer, and builder of an experimental aircraft, the Coandă-1910 described by Coandă in the mid-1950s as the world's first jet. He invented a great number of devices, designed a "flying saucer" and discovered the Coandă effect of fluid dynamics.

Coanda spent World War II in occupied France where he worked for the Nazis to help their war effort by developing the turbopropulseur (turbopropeller) drive system from his 1910 biplane into a propulsion system for snow sleds. The German contract concluded after one year, yielding no plans for production.



# PENICILLIN

It's one of the most famous discovery stories in history. In 1928, the Scottish scientist Alexander Fleming noticed a bacteria-filled Petri dish in his laboratory with its lid accidentally ajar. T

he sample had become contaminated with a mold, and everywhere the mold was, the bacteria was dead. That antibiotic mold turned out to be the fungus Penicillium, and over the next two decades, chemists purified it and developed the drug Penicillin, which fights a huge number of bacterial infections in humans without harming the humans themselves.

Penicillin was being mass produced and advertised by 1944. This poster attached to a curbside mailbox advised World War II servicemen to take the drug to rid themselves of venereal disease.

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# THE INTERNET

It really needs no introduction: The global system of interconnected computer networks known as the Internet is used by billions of people worldwide. Countless people helped develop it, but the person most often credited with its invention is the computer scientist Lawrence Roberts.

In the 1960s, a team of computer scientists working for the U.S. Defense Department's ARPA (Advanced Research Projects Agency) built a communications network to connect the computers in the agency, called ARPANET.

It used a method of data transmission called "packet switching" which Roberts, a member of the team, developed based on prior work of other computer scientists. ARPANET was the predecessor of the Internet.