



# THE SPARK OF INVENTION

Seventy years after his death, the mystery surrounding electrical engineer Nikola Tesla – particularly his claim to have invented a 'death ray' – is sparking the imagination of movie makers.

By **Crispin Andrews**

THERE'S A CAR company named after him. And an airport, a telecommunications group, a computer graphics processor, a social transformation conference, even a rock band.

Scientist, engineer, inventor, futurist and all round genius; Tesla died 70 years ago. Born in 1856 in Smiljan, Croatia, then part of

the Austro-Hungarian Empire, to Serb parents, he worked in the USA from 1884 onwards. All three countries claim Tesla as their own. So too do the champions of wireless communication, free energy and sustainable living. Those who dream of socialist utopias and complain about

capitalist conspiracies see Tesla as one of theirs, as do capitalist entrepreneurs like Tesla Motors' founder Elon Musk and the company's financial backers, Sergey Brin and Larry Page of Google fame, and former eBay president Jeff Skoll. In Croatia, mobile communications giants Ericsson is called >

**Nikola Tesla's fluorescent-light experiments are claimed to have been squashed by companies with a commercial interest in the light bulb**

< Ericsson Nikola Tesla in a nod to its former countryman.

There are societies, foundations, clubs and centres all over the world dedicated to a man who filed 278 patents in 26 countries, gave the world its system for directing alternating current and inspired the development of radio. Tesla also invented an energy weapon, created lightning, claimed to be able to pluck energy from the air, and apparently had a machine that created earthquakes – making him intriguing enough for novelists, film makers, comicbook writers and TV producers to use as a fictional character.

So, how can one man be so influential in so many, often diametrically opposed, fields?

### Fact from fiction

There are a number of problems for anyone wishing to research Tesla. Firstly, he didn't write all his ideas down, preferring to store them in his head. Secondly, when he died on 7 January 1943, the government raided his rooms at the New Yorker Hotel and took what notes he did make, using wartime legislation relating to enemy property. Tesla, a US citizen, had been born in Croatia, which was at that time (as part of Yugoslavia) under Nazi occupation. Thirdly, Tesla had a talent for self-promotion, and according to some, self-delusion.

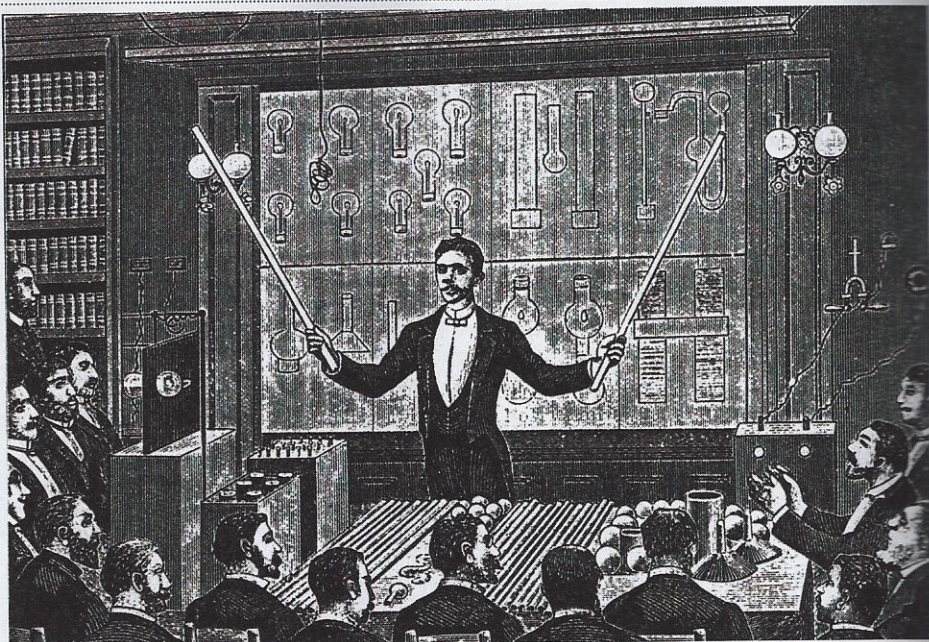
Before the Second World War broke out, Tesla, then in his mid-70s, claimed to have designed a particle beam weapon powerful enough to bring down 10,000 enemy planes 200 miles from a defending nation's borders – the death ray, as the press dubbed it. In the 1930s, governments had overestimated advances in aviation technology. People were petrified that fleets of bombers would lay waste to cities, should another war begin.

Tesla claimed high-voltage electricity would accelerate a narrow stream of small tungsten pellets towards a target. Like those who would later put their faith in nuclear weapons, he believed that a weapon so much more powerful than any other would put a stop to war. And this – as with much of what Tesla either did, claimed or is said to have done – is where the arguments begin.

Apparently, Tesla tried to sell his weapon to the USA, the UK, the Soviet Union – great powers with the capacity, if not the inclination, to put an end to war, at least in the West. He also tried to interest the Yugoslav government. It was hardly a major international player, but it had money like any other, and it was a place where Tesla had connections.

In 1937, Tesla publicly described his weapon, but later claimed that the design blueprint existed only in his mind. Was this war profiteering, a stunt to raise Tesla's profile during his declining years, or had Tesla really devised a super-weapon?

He also claimed his rooms had been raided by spies looking for the designs. Apparently, they found nothing. So were the plans in amongst the papers taken by the US government in 1943? Tesla's belongings were passed on to the Yugoslav government in 1952. By then Yugoslavia was under Soviet control. Had there been such a document, the US would hardly have handed it to the enemy.



According to W Bernard Carlson, Tesla's death-ray design wasn't practical. "It takes an enormous amount of energy just to create a beam of electrons," he says. "How much energy would it have taken to propel much larger objects over such great distances?"

Carlson, whose book 'Tesla: Inventor of the Electrical Age' was published last year, believes Tesla was more interested in technological innovation than whether the science underpinning his inventions was sound. He says that the Tesla-designed Wardencliff wireless transmission tower was never completed because financial backer JP Morgan withdrew funding in 1901, after Tesla's research into wireless communication of power and energy proved faulty. "He thought that if he could imagine something in his mind's eye then it must be possible to create it," Carlson says. "At times this verged on self-delusion."

Marc Seifer, author of 'Wizard: The Life and Times of Nikola Tesla', disagrees. "Tesla created the continuous-wave frequency that is the basis for today's radio," he says, adding that the Internet and mobile phone communication echoes Tesla's concept of a worldwide wireless communication system. Bronimir Jovanovic, curator of the Tesla Museum in Belgrade from 1996-2000 adds: "Alternating current had only just been introduced, and here was someone [talking] about contacting people on the other side of the world without wires. We take this for granted today, but back then, it was beyond what science perceived possible."

### Capitalist cap

In 1898, Tesla patented a model boat that allowed secure communication between transmitter and receiver. Jane Alcorn from the Tesla Science Center says that this invention foreshadowed both the robotics and remote control industries. Bronimir Jovanovic adds a geological survey system and a body massage platform, similar to those found in health clubs today, to the list of Tesla's influential inventions.

Marc Seifer believes capitalist interests squashed some of Tesla's more radical ideas: a steam turbine engine that could have powered cars and ocean liners, by the oil companies; fluorescent lights, by the energy companies. "Tesla had the idea in the 1890s, but companies who owned the rights held on

to it until the 1940s," Seifer says. "They could make more money from traditional light bulbs, which used more energy and need replacing more frequently."

Bernard Carlson sees Tesla sometimes missing out on commercial opportunities because he put design ideals before practical application – a bit like Apple's Steve Jobs, he suggests. Carlson adds that Tesla expected investors and customers to adapt to his beautiful concepts, and often pushed his pet ideas to the point where business partners would back out.

Tesla claimed that he conceived the concept for his ground-breaking polyphase alternating current system in 1882. It wasn't until 1887, however, that he filed the patents necessary to create the entire system, and another year before the Westinghouse Company paid him \$60,000 for a licence, and a further \$2,000 a month to work for them as a consultant.

In 1885, while working for Thomas Edison in New York, Tesla claimed Edison promised him \$50,000 if he could redesign the company's inefficient motor and generators. When Tesla completed the task, Edison offered him a \$10 raise and Tesla left the company in disgust. The following year, Tesla wanted his Tesla Electric Light and Manufacturing Company to focus on those AC motor designs; his investors disagreed, and fired him. For a while, Nikola Tesla, the great inventor, dug ditches for \$2 a day.

Back then, alternating current had to be converted into direct current to enable it to run a motor. Elihu Thomson, one of Edison's competitors, designed an AC transformer in 1886, but something was still missing.

Tesla believed that removing the commutator from a dynamo would allow the dynamo to run on AC rather than DC. He decided to change the magnetic field inside the dynamo's stator, instead of altering the rotor's magnetic poles. Traditionally, the stator in a dynamo provided a constant magnetic field, and the rotor turned within it. Reverse this arrangement, Tesla believed, and the commutator could be removed.

Using two sources of AC out of phase with one another, Tesla created a rotating magnetic field that would run a motor. It was based on multiple alternating currents. Tesla's two-phase version featured a stator with two pairs of magnets, one

pair for each of the AC phases. Working with Westinghouse engineers, he came up with the three-phase 60-cycle current which would eventually become the basis of modern power generation.

"When we see the Earth lit up from space we can say that was down to Tesla," Jane Alcorn says. "There was alternating current before Tesla, but Tesla's system made it possible to send current over long distances without losing power."

It's the same, Alcorn adds, with Westinghouse's hydraulic power station at Niagara Falls. "There had been other stations," she says, "but this was the first powered by alternating current, it became possible to distribute the hydraulically generated electricity over a wider area."

Bernard Carlson says that Tesla approached his work like an entrepreneur, with creativity, intuition, effort and a talent for self-promotion. However, he also believed that technology should be driven by a society's values, wishes and dreams, not just market forces and scientific discovery. "For people who don't want to see the world in exclusively rational terms, Tesla is their man," Carlson says.

Bronimir Jovanovic believes that during his later years, Tesla became more interested in social than technological invention. In how people could develop the Earth in a way that safeguarded it for future generations. "Tesla thought that institutions that came about in the 19th century – governments, schools, universities – were not capable of dealing with 20th-century situations," Jovanovic says. The rich were rich enough, he believed, it was time for the benefits to be spread to everyone.

Tesla needed the rich, though. To invest in his ideas and projects, to develop his patents to buy the products he designed, and even today, fifty years after his death, to maintain his legacy.

Last May, 33,000 donors from 108 countries raised \$1.3m to enable the Tesla Science Center to buy Tesla's old Wardencllyffe lab in Shoreham, New York. It's the last Tesla lab still standing and the organisation estimates

it will cost another \$10m to turn it into a museum and an education centre worthy of Tesla and his legacy. Time, once again, for Tesla fans get their wallets out.

### Tesla movies

It seems that Tesla inspires movie makers as well as scientists, engineers, and comicbook writers. Two films based on his life are due out next year. American producer, Michael Anton's film 'The Mad Scientist' looks at Tesla's life and his relationship with Thomas Edison, the man who according to Anton "screwed Tesla".

Anton wants to share Tesla legacy with people who know little of his influence. He sees Tesla's contributions as matching, even surpassing those of Newton, Einstein and Benjamin Franklin. "Outside Serbia, Tesla remains a mystery, spoken of often only through social media, and mentioned alongside elaborate conspiracy theories," Anton says. "US schools preach the history of Edison and ignore Tesla. Imagine what the next generation could achieve if they believed that anything was possible, as Tesla did."

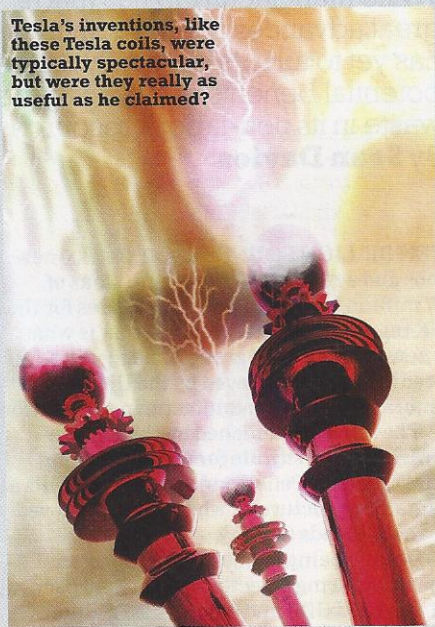
'Fragments from Olympus' focuses on the FBI investigation into Tesla's death ray. It is set after Tesla died, not long after the inventor had splashed news of his super weapon all over the newspapers. This spooked the FBI into confiscating Tesla's private papers. But with the Second World War raging, what did the FBI find? A real weapon that was a threat to the war effort? Or was Tesla simply mad? Veteran Hollywood actor Leo Rossi plays FBI agent Foxworth who leads the investigation.

This latter film is based on the documents the FBI seized back then, recently declassified. Producers, Joseph Sikorski and Michael Calomino hope their film vindicates Tesla, corrects history and encourages further research into alternative power and wireless energy. The film is set for release in October 2014. Finally, last year there was talk of a high-budget Tesla biopic called 'Tesla: Ruler of the World', although this remains, like the death ray, in 'development hell'. \*

### PARTICLE BEAMS

## 'DEATH RAYS' WHICH LED TO THE GULAG

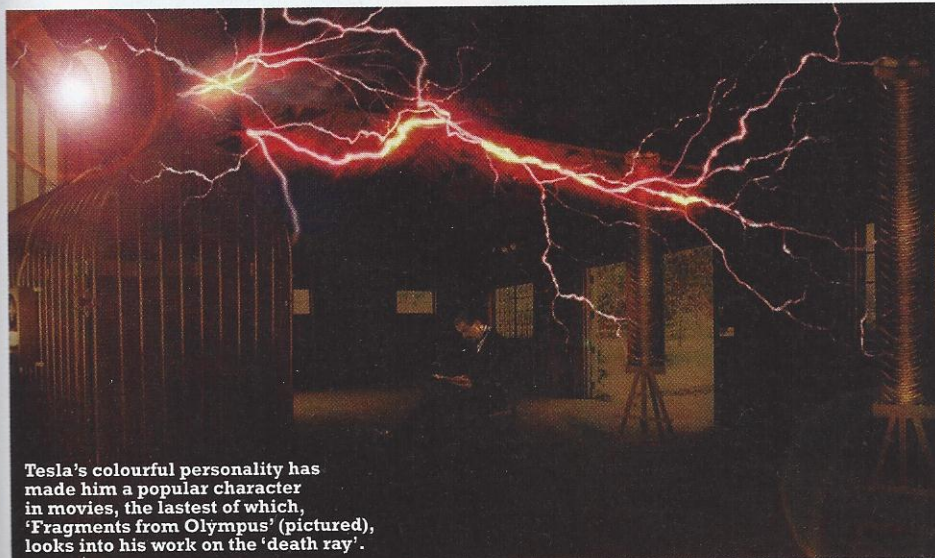
Tesla's inventions, like these Tesla coils, were typically spectacular, but were they really as useful as he claimed?



In an evocative presentation at the recent 24th International Congress of History of Science, Technology and Medicine, Vasily Borisov of the Russian Academy of Sciences threw a new light on the echoes of Nikola Tesla's invention of 'death rays' in the USSR in the 1930s. Tesla himself described his new weapon as 'an apparatus sending concentrated particle beams through the air' and therefore usable against both enemy's aircraft and infantry. The Stalinist USSR was among the countries to which he offered his invention in 1934. The Soviet government assigned the Leningrad Electrophysical Institute to investigate the possibility of making mysterious 'death rays' which, as their inventor had asserted, were capable of taking out up to 10,000 enemy planes and a huge number of personnel from as far as 250 miles away.

Having completed their research in 1937, The institute's scientists came to the conclusion that electromagnetic radiation in the UHF range, as suggested by Tesla, could only damage the engines of old wooden airplanes, but not of more modern aircraft. For that, ten engineers, who took part in the investigation, were arrested and sent to the Gulag for two years. The true reason for their arrest and imprisonment remains unclear. As for the Soviet authorities, they chose to forget about the 'death rays' and focused their efforts on developing their own radar station. The station as completed in 1938, and, although not half as powerful as the one suggested by Tesla, it was still capable of spotting enemy aircraft from the distance of up to 100km.

Vitali Vitaliev



Tesla's colourful personality has made him a popular character in movies, the latest of which, 'Fragments from Olympus' (pictured), looks into his work on the 'death ray'.