

August 6, 1945 started as just another day in the lives of lakhs of people of Hiroshima. Their nation was at war with the United States of America and American planes were regularly bombing them. Little did the people of Hiroshima realise that the most powerful explosive known to humankind would soon be tested on them. A B-29 bomber of the US Air Force dropped the first atomic bomb on Hiroshima. The explosive power of the bomb was about 15,000 tons of TNT. The explosion was unlike anything seen before. A huge mushroom cloud accompanied by a deafening sound. Buildings, vehicles and human beings completely vaporised in the immediate area. The fireball from the explosion caused the death of some 100,000 people and a similar number were seriously wounded. Three days later another atomic bomb was dropped on Nagasaki, completely destroying the city and killing hundreds of thousands of people.

The journey from gunpowder to the atomic bomb had been short: it was only about 700 years ago that a young man of 20, called Marco Polo saw a fireworks display in Shantung, the summer capital of the emperor Kublai Khan. In the year 1275, Marco, together with his father and uncle had traveled from Italy to China. Battling disease, bandits, sandstorms and blizzards, the journey had taken them 4 years. The spectacular fire-cracker display was on the occasion of the emperor's birthday. Young Marco was totally spellbound by the spectacle of light and sound in the night sky. This was probably the first encounter of a European to the power of the mysterious black powder as gun powder was known then.

A mixture of saltpetre (potassium nitrate), sulfur and charcoal, black powder had been known to the Chinese since the tenth century, but it was used almost exclusively in fireworks and signals. It was only around the year 1300 that the Arabs developed the first gun, a rather primitive device of a bamboo tube strengthened with iron and used the black powder to fire an arrow. From the Arabs, the technology passed on to various European nations, who for the next 500 years used their firepower to enslave the whole world. By the mid nineteenth century, European colonies had been established from Bolivia to Borneo. It is remarkable that though the Chinese had rugged ships, the magnetic compass and gun powder a long time before the Europeans, they never established a worldwide empire.

It was not until the 17 century that gun powder was used for industrial purposes. But its use in mining and in blowing up mountain sides for tunnels was somewhat restricted because of safety reasons. A variety of fuses, from woolen yarn to goose quills were tried but all of them were unpredictable and dangerous. The real breakthrough came with the invention of the safety fuse in 1831 by an English leather merchant, William Bickford. The fuse was simply some gun powder tightly wrapped in a variety of textiles, the most important of which was jute from India! This safety fuse provided a safe, dependable and accurate way of bringing the flame in contact with the explosive. The basic principle of the safety fuse remains the same today though the materials used are different.

The next great advance came in 1846 with the discovery of nitroglycerin by an Italian chemist. Though a very powerful explosive, it was extremely hazardous to produce. The tremendous commercial potential of this explosive was soon realized by Immanuel Nobel and his son Alfred. They built the first factory to produce nitroglycerin which unfortunately blew up in 1864 killing Alfred's younger brother. Not to be disheartened, Alfred continued his studies of the wonder chemical even going to the extent of constructing a factory on a floating barge in the middle of a lake!

What really allowed the widespread use of nitroglycerin was the invention of the blasting cap by Nobel in 1865. This provided a safe way of detonating nitroglycerin and other explosives. Consisting of a copper capsule filled with a compound of mercury, this technol-

ogy proved crucial for the general use of nitroglycerin. But even with this detonator, nitroglycerin was too dangerous a substance to handle leading to many accidents in its manufacture and use. What was needed was a substance which was safer and easier to manufacture but with all the power of nitroglycerin.

This was achieved by Nobel in 1867 with the invention of dynamite. One day, while working on nitroglycerin in his laboratory, Nobel accidentally dropped some of the dangerous chemical on the floor which was made of kieselguhr, a kind of porous soil. He discovered that kieselguhr would absorb large quantities of nitroglycerin, giving a product that was much safer to handle and easier to use than nitroglycerin alone. This led to the invention of dynamite, a mixture of 75% nitroglycerin and 25% of kieselguhr named after the Greek word dynamis. Here was finally an explosive which was safe to handle, could be transported without hazard and was more powerful than anything known to human beings. It was, and continues to be used to blast tunnels on in mountains, for building dams and probably most importantly for blasting oil wells to increase the flow of oil.

Nobel invented many other kinds of explosives which found use in both industry and military. He died an enormously rich man in 1896. Interestingly, the man most responsible for inventing modern explosives firmly believed that the tremendous destructive power unleashed by his inventions would bring about the end of warfare as people would be too horrified to use them. How wrong he was! Not only were his inventions used to unleash destruction, they also led to the development of "better" explosives.

Alfred Nobel was also a great philanthropist. He left his vast fortune to a trust with instructions to establish the Nobel Prizes in Physics, Chemistry, Literature, Medicine and Peace. The Nobel Peace Prize for 1997 was awarded to the International Campaign to Ban Landmines. Isn't it ironic that the money made from inventing dynamite is used to fund the most prestigious prize in the world for Peace which is awarded to an organization working for banning the use of landmines!