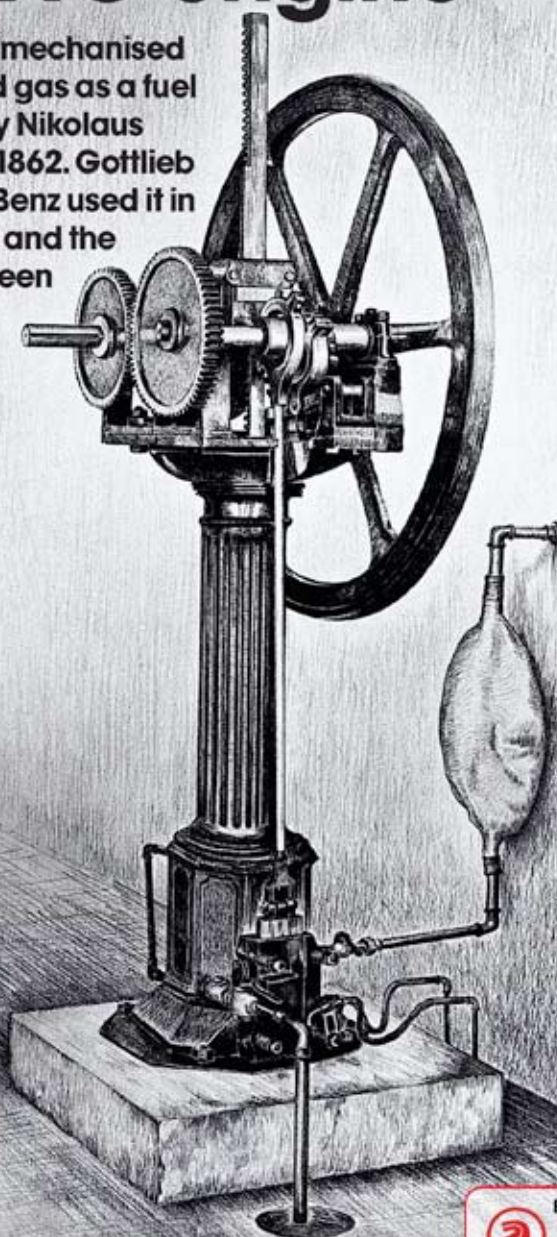


unstoppable

The OTTO engine

The first means of mechanised power using liquid gas as a fuel was this engine by Nikolaus August Otto from 1862. Gottlieb Daimler and Karl Benz used it in their automobiles and the world has never been the same since.




Edition 17 of a special series by
APOLLO TYRES

WHAT WE HAVE HERE IN this 17th edition of the Unstoppable is the very heart of the automobile, essentially the very first internal combustion engine ever. Made by Nikolaus August Otto, a German engineer in 1862, this stationary powerplant was the very first to run reliably and efficiently on the set of principles we all know as the Otto cycle.

The very first studies for an internal combustion engine all centred around steam but in 1678 the inventor Christian Huygens had written a theoretical piece of what could have been the first IC engine. Huygen's invention consisted of a sliding piston in a cylinder, at one end of which there was a charge of gunpowder which was subsequently lit enabling a controlled explosion to take place which in turn caused the displacement of the piston.

Such an engine was actually built almost at the fag end of the 18th century by the Swiss De Rivaz but not much was heard about it. Robert Street, an Englishman was another who was experimenting with controlling the energy explosions of inflammable gas in cylinders while the French engineer Le Bon was the first to try to use electric sparks as a means to ignite fuel in a cylinder. In the early 19th century an American engineer Peter Cooper came close to making an IC engine which worked only for him to suffer an unfortunate explosion on the test bed which blinded him. In fact, Cooper's memoirs show that he had already envisaged that people would fly using his engine as the means of propulsion! While all this was going on, the discovery on another front opened up yet another vista for the inventors. In 1825, the great Michael Faraday discovered benzene in tar was derived from coal. It became the very first liquid fuel capable of usage in IC engines, making the lot of the inventors that much easier.

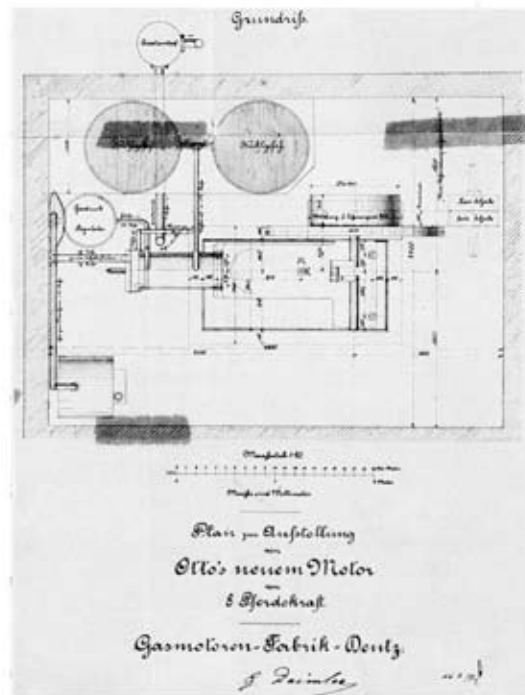
The period between 1850 and 1870 remains one of frenzied activity among the techies seeking a breakthrough. The Italians Eugenio Barsanti (a scientist and doctor of physics) and his colleague Felice Matteucci in the College of San Giovannino began experimenting on the means to extract mechanical power from the burning of an explosive mixture. The first engine from the duo came out in 1856, based on patents taken out earlier by them in Italy and England. This



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Patent certificate for Otto's four-cycle IC engine

engine worked on a three-stroke cycle (sans compression) with explosions in two-cylinders from a mix of air and inflammable gas. Benzene was always factored in as the fuel of choice (easy to handle and deliver) and this prototype engine was followed by another in 1858 and two years later a third engine was made by the Swiss firm of Escher and Wyss and shown to the public at the Florence Expo in 1861.

Tragedy befell the duo though because their pioneering work, never received the due recognition, from barring Italy, anyone else in an increasingly jingoistic Europe. Barsanti died suddenly from typhoid in 1864 in Liege where he was

overseeing a small production run of his engines. Matteucci was already very ill at that time and in a couple of years the duo were all but forgotten.

The honour or recognition of a gas charged controlled explosion IC engine fell to the French engineer Erienne Lenoir who patented his work in 1859, much later than Barsanti and Matteucci and built his first engine a year later. Lenoir's motor employed the same three-stroke cycle as the Italians with the fuel being in an uncompressed form.

The efficacy of the Italian or the French motor was always in doubt but Lenoir's engine helped in the mechanisation of machine tools and in the course of such activity one was

also installed in a wheeled vehicle in 1862 or 1863. What flummoxes auto historians is the abject lack of any press reports as to this vehicle and we only know about it thanks to Lenoir's own notes. From them we learn that the engine seemed to have sparking plugs (much like we have them in our cars) and even an embryonic distributor! The vehicle so powered made a number of journeys between Paris and Joinville-le-Pont, set 12 miles apart.

Keeping Lenoir's engine and vehicle apart, that very period is of utmost significance to all us motoring enthusiasts and historians because it was in this period that the genuine internal combustion engine, "our" engine was conceived.

Enter young German Nikolaus August Otto who was working in Cologne when he came to know about Lenoir's engine in 1860. He drew up a working system of his own take on such an engine along with his brother Wilhelm but their patent was rejected by the Prussian government as they couldn't see any difference between their engine and Lenoir's.

Undeterred Otto kept on doggedly to the task and in 1862 he had an engine ready. It trembled, it coughed but ran using gas. And then it blew up massively. Otto didn't give up even then, making a visit to England to check up on a running version of Barsanti and Matteucci's engine. On his return he built a new engine but again his patent was rejected.

A stroke of luck came his way thanks to a chance meeting with the technocrat Eugen Langen. Langen had good connections with the Prussian patents commission but by then - 1876 - Otto had developed his famous four-cycle principle to the hilt encompassing four piston strokes, two upwards and two downward. Otto had succeeded in perfecting an explosion to occur with every other revolution of the crankshaft. The four strokes - intake, compression, power and exhaust - are the bedrock of all IC engines to this very day and the entire process is known as the Otto cycle. The famous Deutz factory began building versions of it for sale but it fell to Gottlieb Daimler and his engineer Wilhelm Maybach on one end with Karl Benz working separately in another enterprise to put the Otto engine in a car. The rest as we all know is history.

Adil Jal Darukhanawala