

TOYO TIRE TALK



Report No.	08 - 004
TTT No.	TTT - 198
Report Date	March 21, 2008

Issued by Technical Service Department of TOYO Japan.

Subject : History of The Tyre - Part 1

The "history of the tyre" from its origin to the most recent developments will be covered in two separate issues of Toyo Tire Talk. In this first issue, the history of the tyre from its origin to the invention of the pneumatic tyre will be covered.

The Oldest form of Land Transportation

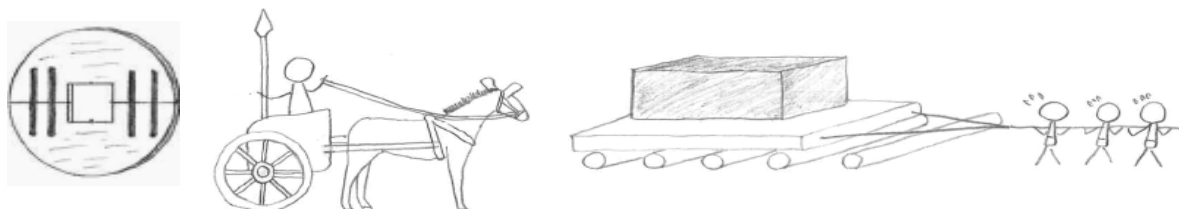
The sleigh is said to have been the oldest means of the land transportation. Before this, human beings simply carried loads or used domestic animals (e.g. oxen, horses). Although the invention of the sleigh enabled human beings to move more load, the load the carrying capacity was limited in terms of weight (due to high friction?).



Change from Slide to Roll

The Sumerians were a people who lived at the mouth of the Tigris-Euphrates river (present day Iraq) around 3000 B.C. The Sumerians were known to have made the first wheel of wooden disks, the centre of which was attached to an axle. Transport capacity was dramatically increased with this epoch-making invention. Furthermore, animal skin attached by nails, covered the outer circumference of the wheel to achieve a primitive form of tread. This was surely the origin of the tyre. Various improved versions of this primitive tyre have been used for over 3000 years.

Although the Egyptians had used logs to transport stone blocks during construction of the Pyramids, the history of the log in transport is not well known.



The Birth of the Iron Tyre.

The iron tyre was born with the innovative technology invented by the Celts, who lived in the Rhine River valley at the time of the Roman Empire, about 2000 years ago. The Celts fitted a burnt iron ring onto the circumference of a wooden wheel. The durability and strength of the wheel was increased, and transport capacity was further improved. This iron-ringed tyre has been used for more than 1900 years since its origin.

The Birth of the Rubber Tyre

It was about 130 years ago when rubber was first used in the construction of a tyre. This first attempt simply wound raw, unvulcanised rubber around a primitive wheel. The rubber quickly aged, deteriorated, and performance was poor.

The major breakthrough, that enhanced the utility and durability of rubber, was discovered by the American Charles Goodyear in 1839. This discovery of vulcanization was the result of an accident that mixed sulphur with raw rubber, achieving 'cross-linking' of the rubber molecules, resulting in a very durable, elastic product.

From that period onward, bicycle tyres, then the first automotive tyres, benefited from the miracle of vulcanization with enhanced endurance and improved ability to transmit tractive force to the ground - a major requirement of the tyre even today.

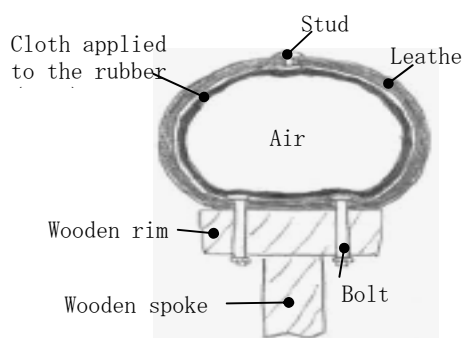
Although vulcanized rubber was used for improved traction, compared to the iron wheel, its application as a solid tyre wrapped around the wheel's circumference limited its speed to around 30 km/h (19 m.p.h.), and the heat sensitive rubber tended to burn and smoke after running a long period of time.

The Dawn of the Pneumatic Tyre

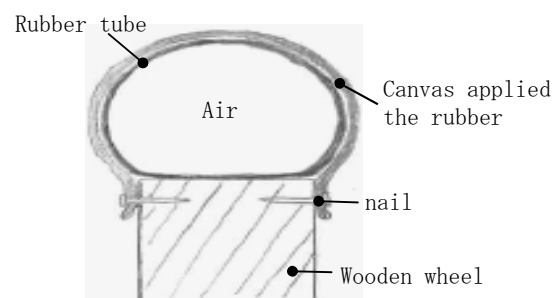
Although the idea of the pneumatic tyre was devised and patented first in Scotland in 1845 by R.W. Thompson, it had been forgotten without practical use. J.B. Dunlop, a Scottish veterinarian, used it on the bicycle of his son in 1888. This was the beginning of the practical use of the pneumatic tyre.

The Michelin brothers, Andre and Edouard, envisioned that the key point of their success was to develop a pneumatic tyre that could easily detach from the wheel. All existing versions had the tyre glued or permanently attached to the wheel. The Michelins invented a detachable tyre/wheel, and entered it into Paris to Bordeaux race of 1895. Although they had to retire from the race due to many punctures, the race participants were astonished at the performance of the pneumatic tyre, and the ease of replacement and repair. In the following year, almost all of the participants used pneumatic tyres for the race. Michelin utilized the lessons learned from racing for their mass produced tyres.

Cross Section of a Pneumatic Tyre



Thompson's concept



Dunlop's concept

How the pneumatic tyre has evolved into the present state of technology will be covered in next issue of Toyo Tire Talk.