

My South Seeking Chariot

by William Irwin

Gerald Hart's article on the Yellow Emperor's Chariot in the August 2008 NZFMM magazine inspired me to dust off my model of the south seeking (or south pointing) chariot which I had built in 1980 shortly after my re-discovery of Meccano. As this model is built in red and green from my original boyhood Meccano parts and is now 28 years old, I will probably never dismantle it! It has been on many exhibitions both in South Africa and in New Zealand and it still works flawlessly. It is fairly accurate provided the wheels don't slip.

It is of course based on the Lanchester design as mentioned by Gerald Hart. The original Lanchester model was displayed in The Science museum in London and described by F W Cousins in a Meccano Magazine article (ref. 1). There are many other South Pointing Chariot designs which can be examined on the South Pointing Chariots website at <http://www.odts.de/southptr/>. Further Meccano references are given below (ref. 2, 3 and 4).

The construction should be fairly straightforward from the photographs provided. I had originally based my model on a design described by "Spanner" in a Meccano Magazine (ref 2). Please note that this design DOES NOT WORK as described! It is stated that the wheels must be spaced a distance apart equal to the wheel diameter. This is correct if the vertical Contrate Gears attached to the wheels have the same number of teeth as the horizontal Gear Wheels of the differential. However, in this model, the vertical Contrate Gear has 50 teeth and the horizontal Gear Wheel has 57 teeth, so in order for my chariot to work properly the wheels had to be spaced further apart by about 1.15 times the diameter of the wheels to compensate. This is done on my model by the use of an adaptor for Screwed Rod (173a). The wheel runs freely on the shaft of the adaptor, which has a 1" Screwed Rod screwed up tight in the threaded bore. The Contrate Gear runs

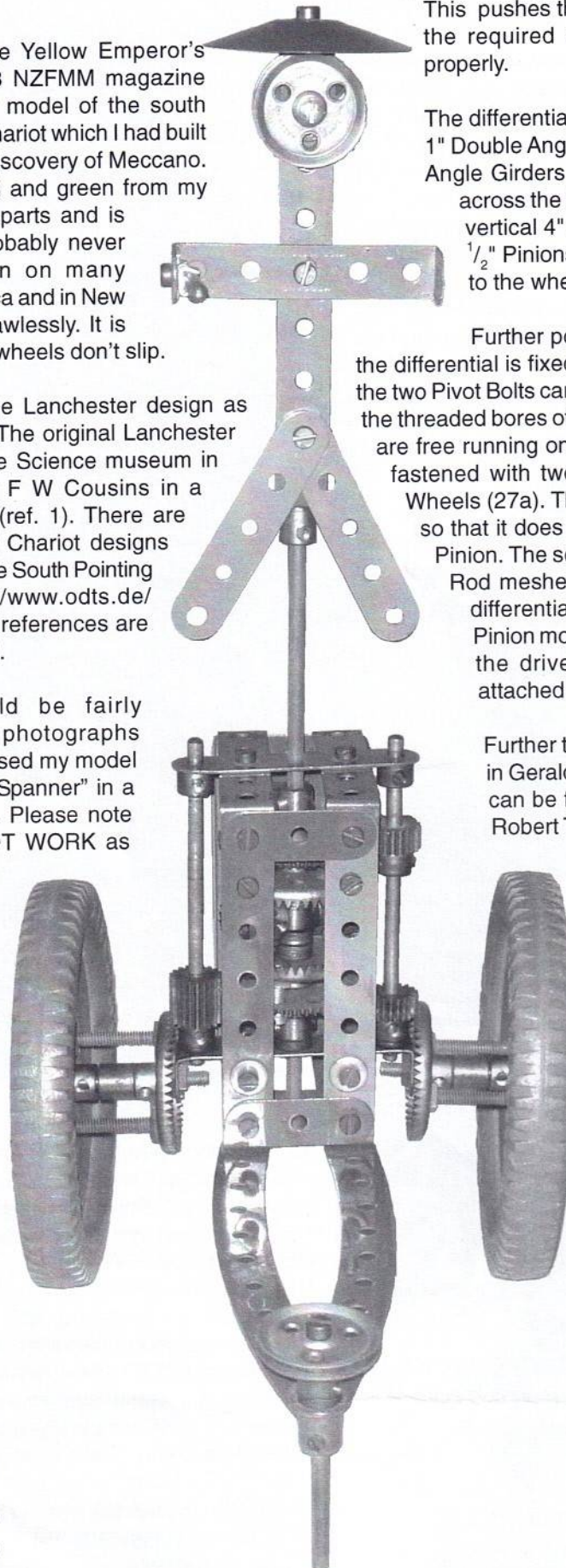
freely on the Screwed Rod and is attached to the Pulley by two $1\frac{1}{8}$ " Bolts. The assembly is then lock-nutted to the $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip forming part of the chassis. This pushes the spacing between wheels out to the required ratio for the chariot to function properly.

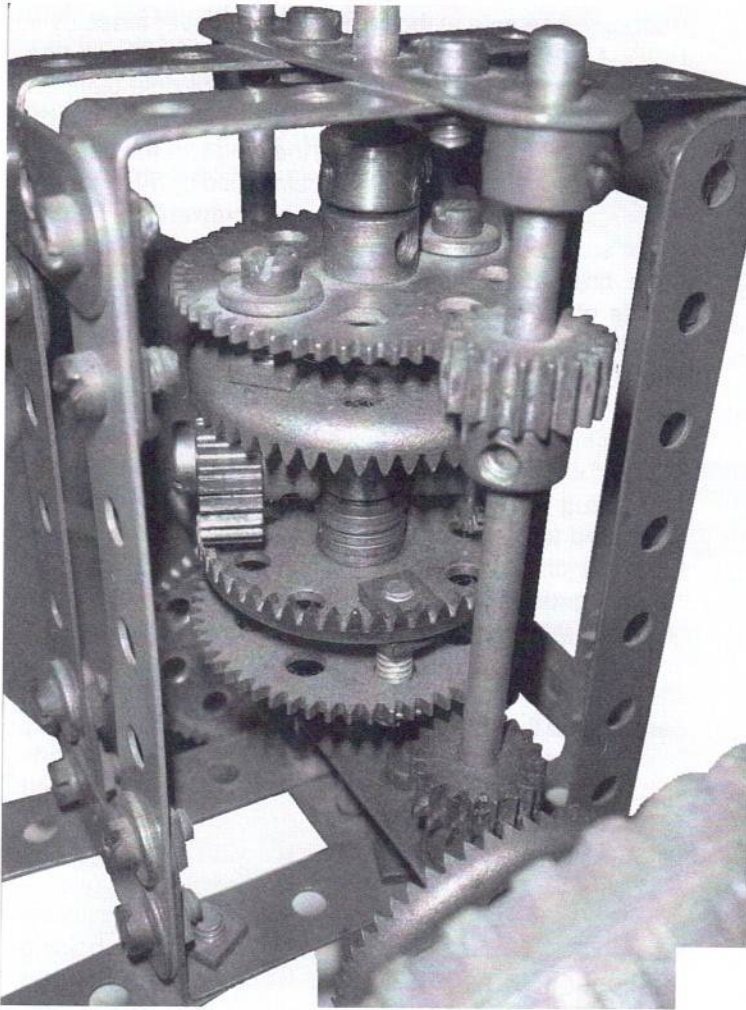
The differential cage is made up from four $2\frac{1}{2}$ " x 1" Double Angle Strips, two $3\frac{1}{2}$ " Strips, two $3\frac{1}{2}$ " Angle Girders and four $1\frac{1}{2}$ " Strips. A $2\frac{1}{2}$ " Strip across the top supports the top end of the two vertical 4" Axle Rods. These each carry two $\frac{1}{2}$ " Pinions. Adjust the Contrate Gears fixed to the wheels so that they mesh nicely.

Further points to note are that the spider of the differential is fixed firmly to the vertical $6\frac{1}{2}$ " Rod by the two Pivot Bolts carrying the idler Pinions (25) through the threaded bores of a Collar. The horizontal Contrates are free running on the central vertical Rod, and are fastened with two $\frac{1}{2}$ " Bolts to free running Gear Wheels (27a). The lower Gear Wheel is spaced up so that it does not engage the left side lower $\frac{1}{2}$ " Pinion. The second $\frac{1}{2}$ " Pinion on the left vertical Rod meshes with the top Gear Wheel of the differential. On the right side the $\frac{1}{2}$ " x $\frac{1}{2}$ " Pinion mounted on the vertical Rod transmits the drive direct to the vertical Contrate attached to the wheel.

Further to the comprehensive history given in Gerald's article, an interesting discussion can be found in "The Genius of China" by Robert Temple (ref 5). In a chapter headed "The First Cybernetic Machine" it appears that the earliest definitive date for the invention of the south pointing carriage is the middle of the third century AD with the famous engineer Ma Chun as the builder. According to the eminent Chinese historian Dr. Joseph Needham all earlier references are legends, including its use by the Duke of Chou in the beginning of the first millennium BC. Undoubtedly such devices were in use up to 1200 years earlier, but it is still debatable whether they were mechanical or whether magnetic lodestones were used. Lodestone compasses were in use in China as far back as the third century BC. Only much later between 850 and 1050 AD were they used at sea, when iron or steel magnetic needles were used.

Needham has also called the south pointing carriage "the first

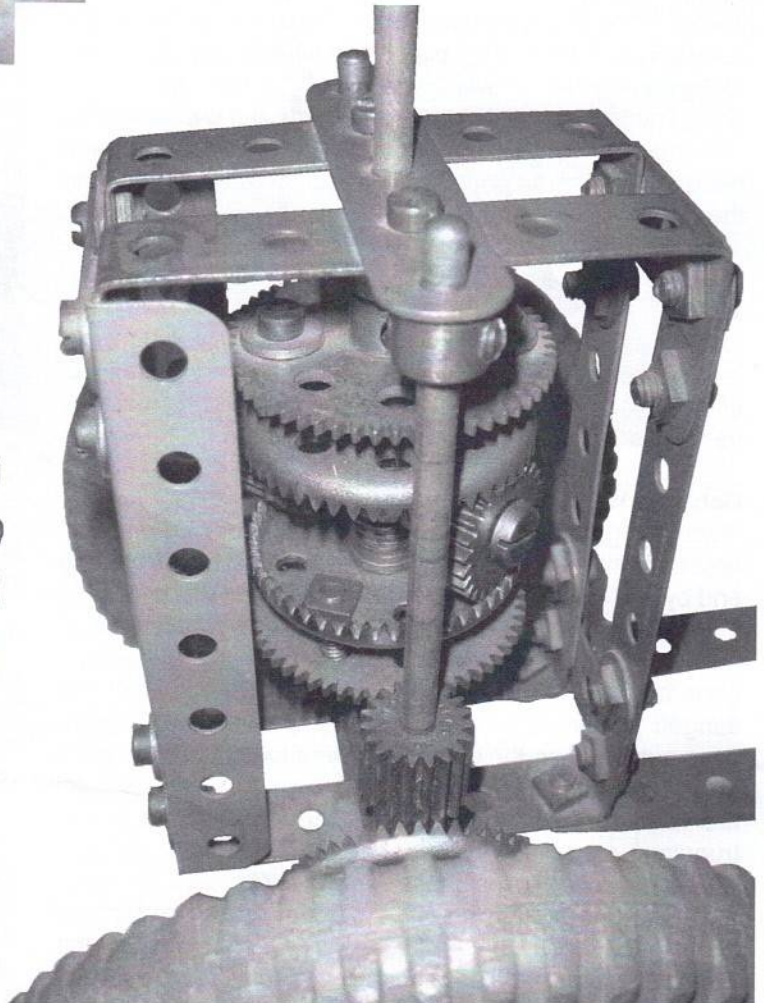




The Left side Chariot mechanism.



The Chariot wheel attachment



The Right side Chariot mechanism.

homeostatic machine in human history, involving full negative feedback. Of course the driver had to be included in the loop. But an attractive carrot held by the pointing figure might have replaced the human driver and closed the loop more automatically."

References:

- 1)
A Mystery of Ancient China, by F W Cousins, *Meccano Magazine*, September 1955.
- 2)
A Meccano South-seeking Chariot, by "Spanner", *Meccano Magazine*, January 1957.
- 3)
South Seeking Chariot, by Terry Morris, *Meccano Magazine*, January 1977.
- 4)
Chinese South Seeking Chariots, by Noel C Ta'Bois, *Meccano Magazine*, October 1979.
- 5)
The Genius of China, 3000 years of Science, Discovery and Invention, by Robert Temple, Andre Deutsch, 1986.

Turn to page 24 for another photo of this model.