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Ancient Chinese Bamboo Drilling

The earliest evidence of wells in China, in Zhejiang Province comes from the era when humans were first turning to agriculture in this region, some 7,000 years ago. About 5,000 years ago, the Chinese boiled sea water to produce salt and as the need for salt increased with increase in population, they needed to go underground and started digging for brine, to meet up with the demand of salt. The first recorded salt well in China was dug in Sichuan Province around 2,250 years ago.

Around 2,000 years ago, there was a noticeable change from the use of hand and shovels dug wells to percussively drilled ones. The drilling technique used is still seen today in China in the rural areas. Basically, the drill bit is made of iron and the pipe, bamboo. The rig is constructed from bamboo; one or more men stand on a wooden plank lever, like a child's seesaw, and this lifts up the drill stem about 1m. The pipe is allowed to drop down with one man holding it and ensuring that it goes straight in the direction needed. As it crashes into the rock, it pulverizes it and slowly, the drilling progresses. This might take months in most cases.

Another noticeable change happened around 1050 AD. Solid bamboo pipe was replaced by thin, light, flexible bamboo. This allowed for deeper wells to be drilled as well as it lowered the weight that needed to be lifted from the surface. By the 1700s, wells as deep as 300 – 400m deep were drilled and in 1835, the Shanghai well was the first in the world to exceed 1000m in depth. About that time in the US, the deepest wells were around 500m in depth. This drilling method on its own is impressive, especially when compared to what the rest of the world had to offer about that time.

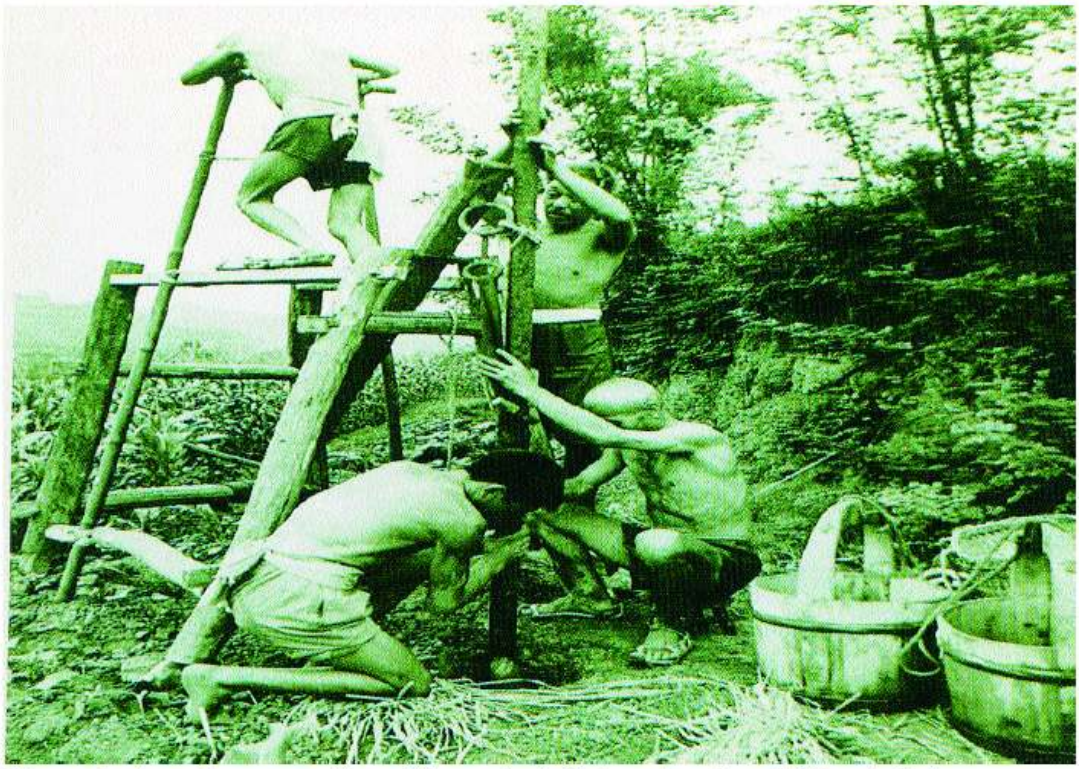


Figure 1: A modern recreation of the ancient Chinese bamboo drilling technique.

Cable Tool Drilling Technique

The basic principle employed in cable-tool-drilling operating has remained virtually unchanged since its inception in China during the early days of the Christian era. (Kurts et al., 1940) Drilling is done by repeatedly lifting and dropping a heavy string of drilling tool into the bore hole, with the drill bit crushing consolidated rocks into small fragments. However, vast improvements have been made to the basic ancient Chinese bamboo drilling technique. Kurts, DeGolyer, MacNaughton and McGhee; Eugene, University of Kansas (1940) highlighted some improvements in rig mechanisms and labour-saving devices. For example, the old spring pole originally operated by the weight and brawn of three or four men being re-placed with the modern all-steel rig powered with an internal-combustion engine, electric motor, or steam engine.

During this period of mechanical advancement, man power is highly needed one way or another in the drilling practice. Although each driller

has his own peculiar technique in operating the cable-tool, the good driller is distinguished from the poor one by the footage he makes in a given period of time.