

Topic "History of structures and storages for oil products. Comparison of Storages"

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History of oil.

How it all began

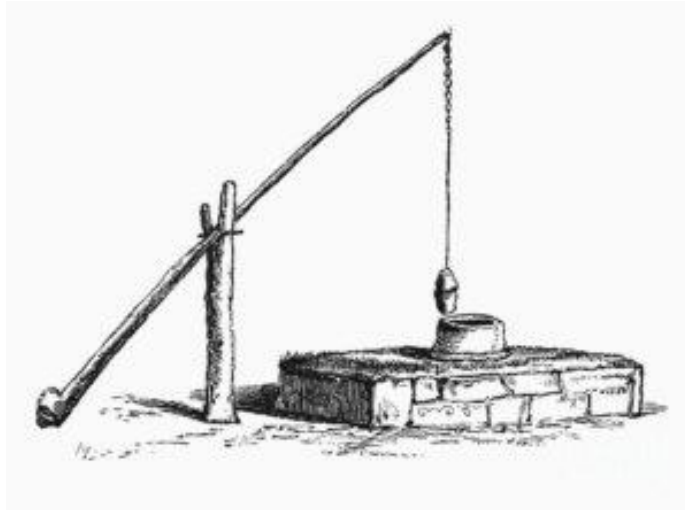
When we talk about the history of oil, we usually touch upon the issues of the world's first wells and its production on an industrial scale. In fact, man was familiar with oil even before our era. The world history of oil touches the times more than 5 thousand years ago, when ancient civilizations not only attributed magical properties and divine origin to oil, because they did not understand its origin, but also used oil, bitumen and asphalt in everyday life.

The first methods of extraction

"If a source of oil is found in a country, its king will be made omnipotent"
- Omen of the Babylonians

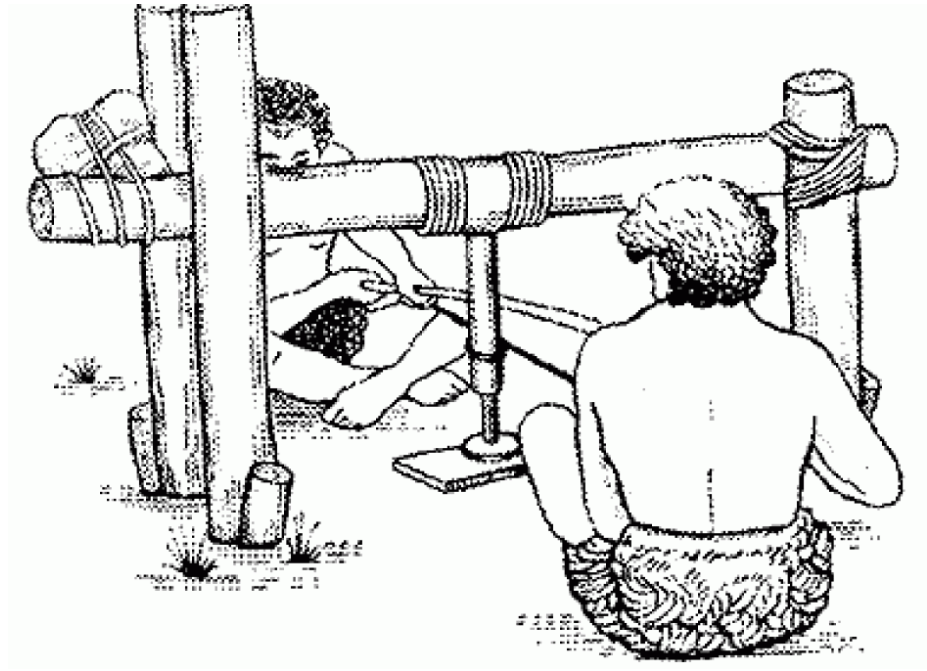
Until the end of the Middle Ages, people collected oil and asphalt only in places where they naturally come to the surface - from rocks and water sources. Later came a more advanced method of extraction - well extraction.

According to Herodotus' description, on the Greek island of Zante (now Zakynthos) in the Ionian Sea, people extracted oil with long poles with myrtle branches at the end. The oil was poured from the branches into a shallow pit, and as it filled, it was poured into vessels.



While in other parts of the world oil was being squeezed from rags and drawn from wells, China had already mastered drilling. In 250 BC, civil engineer Li Bin invented the percussion-rock method of drilling wells. And, although bamboo poles with copper devices were used, and one well could be drilled for years, it was possible to penetrate to a depth of 1000 meters.

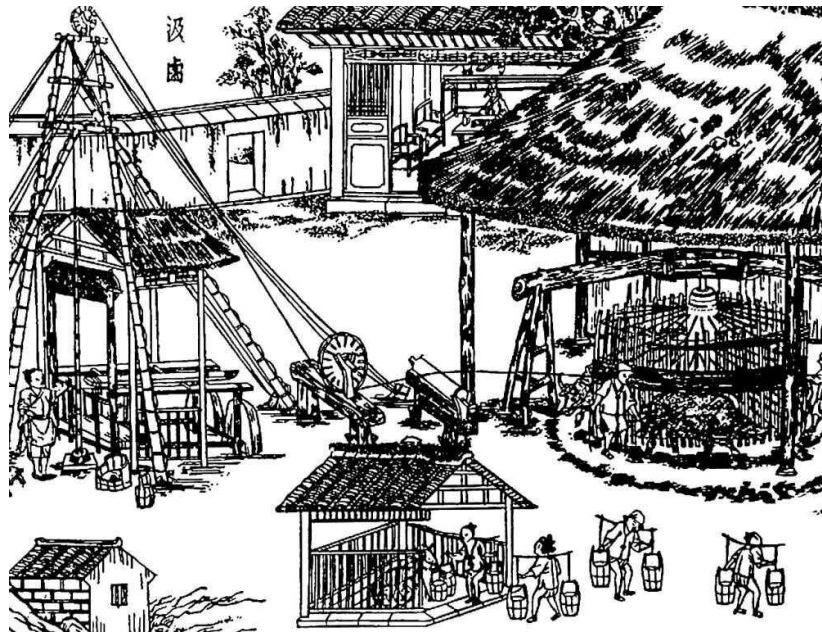
For comparison - the depth of the first oil well of E. Drake is only 21 meters. In addition, China was the first to learn how to transport gas by means of a pipeline made of bamboo. After the Manchurian conquest in the XVIII century, the Chinese lost their knowledge, and oil and gas production practically stopped. It was not until the 19th century that drilling technology was brought back to China from Europe.



"Well drilling methods for salt extraction applied later to oil drilling". Salt extraction in ancient China by borehole drilling.

The first documentary evidence that shovels in ancient China were replaced by a drill dates back to the 3rd century B.C. It was a construction made of bamboo with a narrow metal tip. At that time, instead of wells with walls reinforced with wooden shields, they began to dig narrow boreholes extending several hundred meters into the earth's strata.

The ancient drilling technique is still used in remote Chinese villages. A rope was tied to a pole with a drill and thrown over a block. The free end of the rope was held by several men, which allowed the drill to be raised and lowered, thereby crushing the ore. A hollow bamboo shaft with a valve at the lower end was used to extract the remaining crushed rock. Water was poured into the face to wash out the slurry and fill the shaft.



The Zigong Salt Museum houses a prototype of an ancient derrick that was used to extract raw materials.

The first oil derrick

Edwin L. Drake, a man of exuberant energy, unprecedented tenacity in pursuit of a goal, and an even greater desire to make a fortune. He was acquainted with banker and Pennsylvania Rock Oil Company shareholder James Townsend, who actually engaged him in the work. In December 1857 Drake set off on a grueling journey to Pennsylvania, where near the logging

village of Titusville he found a tract of land with oil coming to the surface, registered it with the company, and in the spring of 1859, together with local locksmith William A. Smith and his two sons, built a drilling rig with the necessary equipment.

The hard work progressed slowly. The shareholders had already lost patience and the will to incur further expense on what they thought was a hopeless case and ordered Drake to curtail the work. But on August 27, 1859 at a depth of more than 25 meters the drill slipped several meters at once and it was decided to stop the work to avoid its breakage. The next day oil appeared in the well, and on the 29th of August it filled all the tanks collected from all over the area! Drake had adapted a pump to pump the oil out of the well! The news instantly travelled across Pennsylvania and the village was flooded with people wanting to buy oil-bearing land! There was an acute shortage of whiskey barrels, and overnight their price was double the price of the oil they were filled with! Incidentally, it was a standard 156 liters' whisky cask that would later become the standard volume of a barrel of oil.



A. Drake (in a tall cylinder) against the background of the first oil well built by him in 1895 near the village of Titusville, Pennsylvania.



Old oil derrick



Modern oil derrick

So where were petroleum products stored?

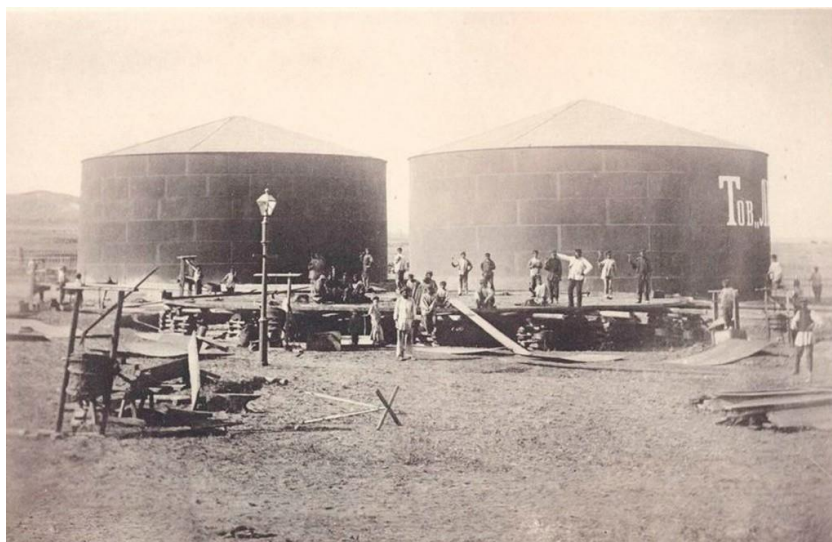
Fuel tanks: from wood to metal

Open pits in the ground were used as oil tanks for petroleum at this time. This method of storage was inconvenient and fire hazardous, the contents were heavily contaminated, reloading was difficult, and manual labour was used.

Purposeful production of mobile (transportable) tanks began in the XVII century, and they looked like wooden barrels - so-called barrels with the volume of 159 liters.



The first metal cylindrical tank for storage of oil and oil products appeared in 1878 in Russia, and the technology of its manufacture in the form of joining metal sheets with rivets was actively used up to the 30-50s of the XX century, until the engineers got at their disposal welding. The first welded construction with a capacity of 1000 cubic meters was also created by Russian specialists, and it appeared in 1935.



The cylindrical steel tank proved to be a very successful design. In total, the "Technical Office of Engineer A.V. Bari" manufactured more than 3200

steel tanks for oil and other products, as well as a large number of projects in other industries. Cylindrical tanks allowed to significantly reduce the metal intensity of the construction and improve the quality of the stored product.



Currently, the main oil tanks are still vertical steel RHS tanks, which store the largest amount of crude oil and petroleum products produced in the world. For storage of small volumes of oil and petroleum products, horizontal steel RGS tanks are most often used. Oil tanks can be aboveground, underground and semi-subterranean, semi-buried.

Soft tanks for oil and oil products storage.

A real revolution in the production of tanks for petroleum products was made by the developers of soft rubber-fiber tanks. And even though the first prototypes of such containers appeared in the 30s, its active use began to be practiced only at the turn of the century.

The reason - such containers for storage of petrol, fuel oil and diesel fuel could not tolerate low ambient temperatures very well, which made their use in northern regions impossible. The problem was solved by creating a new generation of tanks for diesel fuel - polymer oil tanks. This is a real know-how, which is superior to rubber-fabric tanks in all parameters.

Today oil tanks are actively adopted not only by oil product producers, but also by all major consumers, including army units in various countries of the world.

Elastic oil tanks turned out to be much lighter than their rubber predecessors (5-6 times lighter), which greatly facilitated the installation of tanks even of the largest volume.

The material of tank manufacturing is not afraid of critically low temperatures and retains its original elasticity and strength in any weather conditions. The addition of polymer in the composition of the material of manufacture of such containers also made it possible to increase the wear resistance of the walls of the tank and remove any restrictions on the choice of location of the tank.

Finally, only with polymer oil tanks it was possible to achieve the highest safety indicators: such storage of petroleum products completely excludes harm to humans and the environment.



Modern storages – polymer

Comparison table of wooden, steel and polymer storages.

Material	Durability	Service life	Cost	Corrosion resistance	Environmental friendliness	Maintenance
Wood	Stronger and more resilient	Less longer lifespan	Generally more affordable	More affordable	More environmentally friendly	Maintenance and upkeep
Steel	More stronger and more resilient	More longer lifespan	Generally more affordable	Affordable	Less environmentally friendly	Less maintenance and upkeep
Polymer	Less stronger and more resilient	Longer lifespan	Generally more affordable	Less affordable	More environmentally friendly	More less maintenance and upkeep

Conclusion

In the end, I would like to add that time is flying forward and development affects everything, including the storage and extraction of minerals such as oil, from the beginning to our days, we can observe an amazing process of improving technologies and materials in the future there will be a more simplified and safe production and oil storage.