

THE PHARAONIC MYSTERIOUS TURBINE

by

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Summary

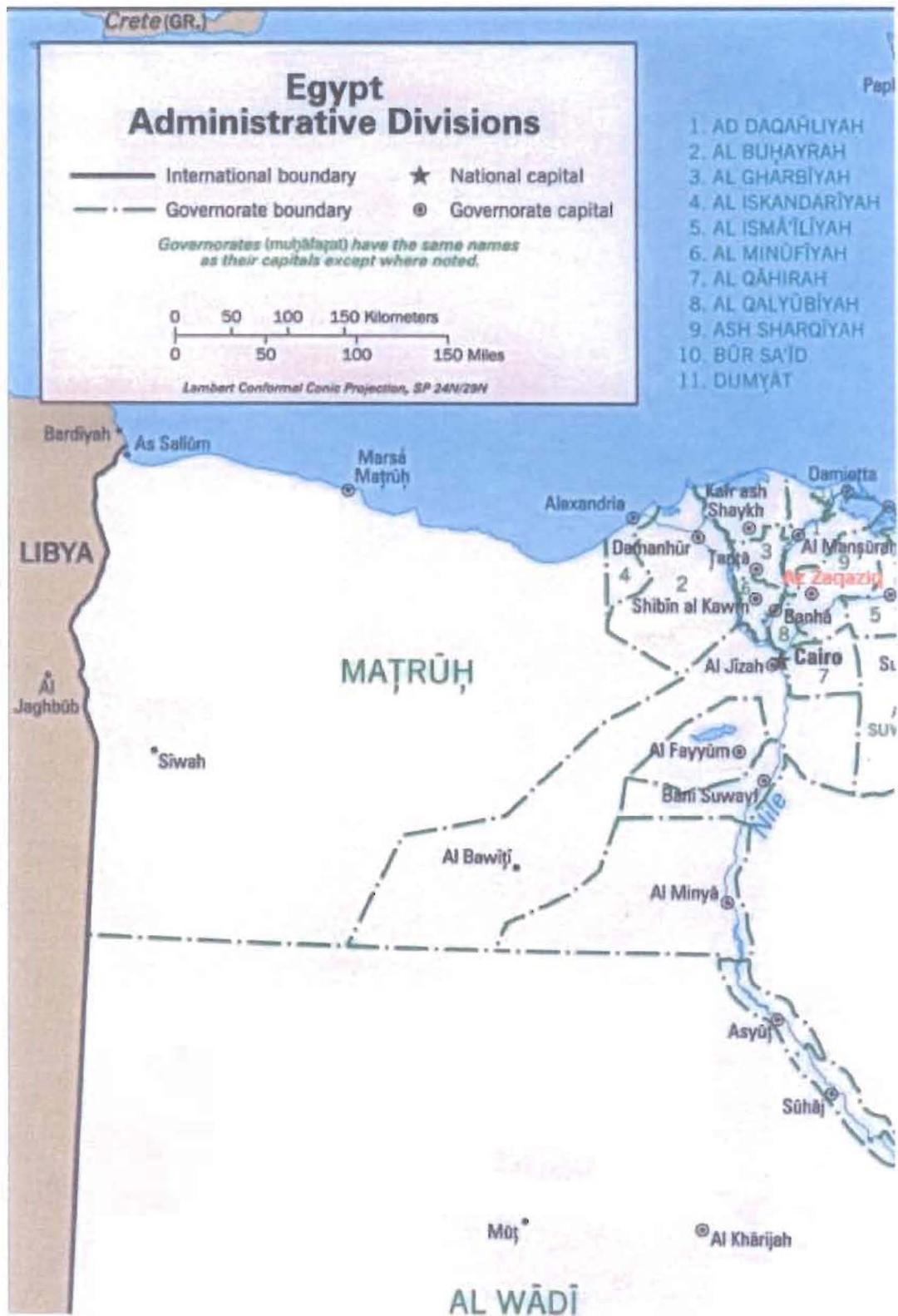
An piece of alabaster or gypsum was excavated in Zagazig desert (eastern Delta) on the year 1917 by Mr. Perdrizet, now reserved in Cairo Egyptian museum in room 34 piece No. 46101 among ropes from the 11th Dynasty. Its length is 12 cm, 8.5 cm width, history doubtful, function unknown. The author of the article proposes that this piece was a part of a turbine or machine. The proposal based on the shape and dimensions of the object, its four wings and its spiral axle couldn't be made as an amulet or makeup container or decorative item. It should be part of a machine. Most probably it is a cast for a bronze or copper object because the gypsum or alabaster are soft to be suitable material for a machine or turbine. Ancient Egyptians used to cast copper and bronze statues and by the use of gypsum and wax casts. The area where this object found was always occupied with many activities through the Pharaonic era especially temples of Bastet (the ancient Egyptian goddess represented as a cat). The object could be a turbine or part of a machine used to push liquids inside a deity statue in the temple. A statue base of Ptolemaic period excavated in the area found provided with secret tunnel running from its base to the inside of the statue gives support to the author proposal. The turbine could be used to push liquids inside a statue with similar secret tunnel to give impression of miracles to the visitors of the temple. Most probably the turbine related to the Ptolemaic period or at least the last three centuries B.C. which regarded as the ancient technological inventions era.

THIS VERY mysterious piece was excavated in Zagazig desert on the year 1917 by Mr. Perdrizet, now reserved in Cairo Egyptian museum in room 34 piece No. 46101 among ropes from the 11th Dynasty found in "Al-Deyr Al Bahari" near Luxor 400 miles south of Cairo. It is made of gypsum or alabaster. Its length is 12 cm, 8.5 cm width, history doubtful, function unknown.

Analysis of the history of the site where it found and its shape and material may help us to discover its function.

History of the site:

Zagazig (eastern Delta) in Pharaonic period was known as AMU-KHENT, the 18th Nome of Lower Egypt. Its Greek name was Bubastus or Tell – Bastah. Its Goddess in late time was the Cat-headed Goddess Bast, or Ubast. The Nome usually included a large town and the estates, vineyards, plantations & c., which forms its suburbs. Bastet represents the useful warmth and heat of the sun. (Budge, W.: p. 106) Tell Basta was mentioned in the Holy Bible in Ezekiel,



30.17. *"The young men of Aven and of Pi-beseth shall fall by the sword: and these cities shall go into captivity"*.

Important activities in Tell Basta through Pharaonic history:

1-The remains of a great temple of Ramsis II, where archaeologists found names of kings Khufu & Khafren inscribed on some stone blocks. Another small temple was built 500 meters far from the great temple. (Hassan, S.: Vol.6, p.407). The foundation of the building went back to the time of the pyramid builders and there were inscriptions of the Kings Cheops, Chefren and Pepi I about 2500-2400 B.C. (Baikie, J.: p.19).

2-Important heads in grey granite were found and believed to be portrait of the Pharaoh Amenemhat III (1841 B.C.).

3-The Libyan Pharaohs of the XXII Dynasty about 950 B.C. built annual festival of the Cat Headed Goddess attracted according to Herodotus writings more than 700,000 pilgrims. The site of the festival was excavated in 1887-9 by Dr. Edward Naville for the Egyptian exploration Fund. It has visited and described by Napoleon's savants in 1798 and Sir Gardiner Wilkinson in 1840. The remains of the temple showed that it has been used as a regular quarry. Bubastis in this period became the name city of the Dynasty. (Baikie, J.: pp.19-20).

4-Neqtaneb II (reigned 360-343 B.C.) have a great activities in Tell-Basta.

5-Kings Oserkon II and Neqtanebo I of the XXXth Dynasty added to the great temple of Bubastus.

6-On the western side of the mounds of Tell-Basta lies an area in which lay the famous cat cemetery. From this area countless mummified cats, and bronze statuettes of the same useful animal have been excavated. (Baikie, J.: p.20)

7-Close to Zagazig runs the sweet water canal (Ismailia Canal) a comparatively modern work of engineering. It follows in part of its course the ancient Canal which was originally dug in the days of the New Empire by Ramses II about 1290-1223 B.C., and was subsequently cleared and deepened by Darius the Persian, and Ptolemy II. This anticipation of the Suez Canal ran from the Nile by Zagazig through Wadie Tumilet into the Bitter Lakes and then from the Lakes into the Red Sea thus establishing a navigable water way between the cities of Island Egypt and the Red Sea and also in the event of necessity between the Mediterranean and the Red Sea by way of the Nile. Though there is no absolute evidence for the existence of a similar Canal at an earlier date. Existing remains of the Masonry work of the ancient canal shown it to have been about 150 feet broad and 16 to 16.50 feet deep.

Material:

THE PIECE (Fig. 1) according to museum records was made from alabaster or from gypsum. Alabaster ordinarily means calcium sulphate (gypsum). In ancient Egypt it was called alabaster. It was employed as a subsidiary building material chiefly for lining passages and rooms, particularly shrines from early Dynastic times to at least as late as the nineteenth Dynasty. Alabaster occurs in Sinai and in various locations in the desert on the East side of the Nile. Some of the nearest quarries are in Cairo-Suez desert and in Wadi Gerrawi near Helwan. The uses of alabaster for purposes other than for building will be dealt with separately. (Lucas : pp.75-77). Gypsum consists of hydrated calcium sulphate and in appearance it resembles alabaster. Apart from its use for mortar and plaster, gypsum was employed only to a comparatively small extent in ancient Egypt. A large number of gypsum vases and dishes were made in Fayum and Giza during the 3rd Dynasty. Gypsum is softer than alabaster and may be scratched with the finger-nail whereas alabaster cannot be scratched with

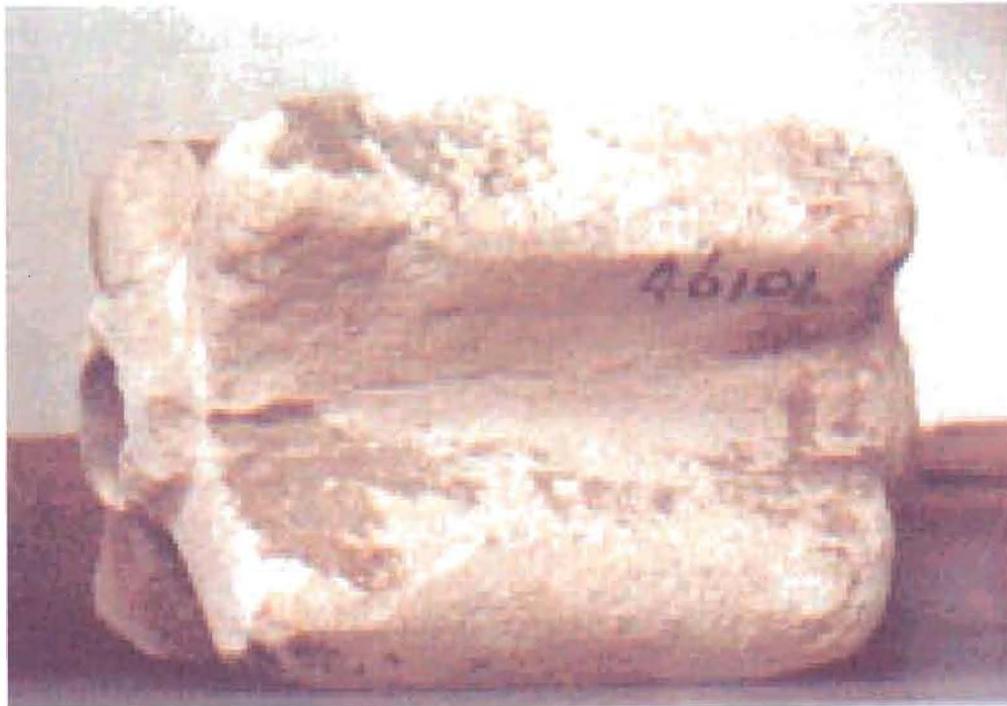


Figure.1
The pharaonic mysterious gear

anything softer than steel. Petrie found a few gypsum boxes of Roman date. (Lucas: pp.470-471).

Analysis of laboratory is needed to determine if this piece was made of gypsum or alabaster.

What is the function of this object?

I BELIEVE it was a part of a machine. It could be a gear or turbine in a machine. But what kind of machines may have such a part made of alabaster or gypsum? The question is why did the maker of this piece made it from stone and not from any other material like wood or from Bronze for example. It would

be easier, even stronger if it was made of wood or cast it in metal. Ancient Egyptians were clever to cast statues and several objects of metal since the Old Kingdom times. Making it from alabaster gives the idea that it was used with liquids. The reasons we believe it was a turbine are simple. If we looked carefully at its two ends we will realize that it has regular circular hollow from inside to allow a cylinder or tube like axle with ½” diameter to get inside it in order to keep it horizontal or vertical. The two ends are similar in shape and have a neck end so as to facilitate fixing the turbine to the axle, even to another part of a machine. The neck of one of the two ends is thicker from the other one. For sure it was not a kind of

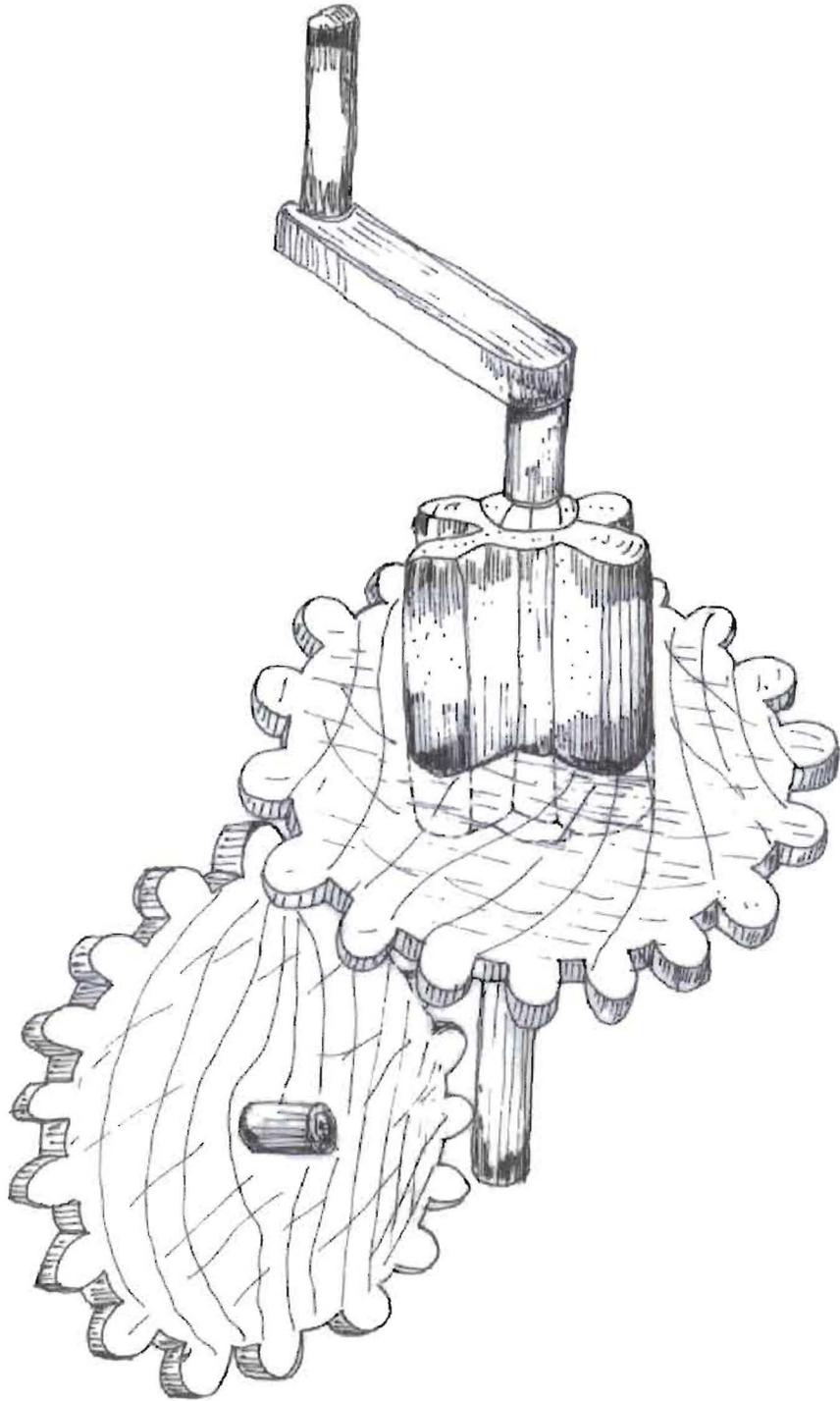


Figure No.2

vessels or vases because it was opened from both sides. It was not connected to rituals or religious believes. We have no evidence or similar part was used as a symbol of a Deity or God, or even as an amulet. Also, it was not a decorative or ornamental element. Mystery will deepen if we sure the material was gypsum not alabaster. Our question then will be what is the use of such a piece of soft stone? Could it be a replica of another piece made of metal, or it was a form to cast metal turbine or gear? Ancient Egyptians used gypsum forms to cast bronze statues and objects. The hollow part of the piece is regular hollow like cylinder with diameter about ½". Deep traces of spiral and circular grooves are still visible when looking inside it. The traces could be of the driller that made the channel or because of an inclined axle. Note that two other pieces excavated near the site and have been recorded in the Egyptian museum; were a head of a vulture and a head of a cat statue made from terra cotta.

In fact the original function of this piece is not easy to determine since there are more than one possibility for its use:

1-It could be used as a simple gear. The four teethes were ready to transmit the movement to another gear. (fig. 2). The theory of pulley was used by ancient Egyptians. They used toothed wheels in capstan to draw water from the Nile. Heron of Alexandria (first century A.D.) used a combination of several pulleys of unequal size for altering the rate of movement of dancing figures; that is, he used the device which nowadays call gearing. (Neuberger:p.208). Note that the gear have four thick teeth which were effective to transmit motion power but not great speed movement.

2-FIXING IT to a vertical or horizontal axle will give the ability to turn the water or any other liquid easily. (figs. 3, 4). It could be

then used as a turbine. Except liquids that affect alabaster or gypsum like acids, the turbine could be used with boiling water or even hot liquids for example. Wooden turbine will not be practical for a long time in such cases. Heat will cause cracks in wood.

3-It could be used as a hydraulic turbine. If it was set in a horizontal position and the water rushed against the blades to move the turbine; water power will give motion to the turbine. The idea of a hydraulic turbine is not very successful. The motion power will be very weak because the blades are only four and not very large in size. Also, its material is not very hard to stand against water rush.

4-It could be a rotor pump, this type is well known in mechanical engineering. The rotor pump composed of two gears which are called inner rotor and outer rotor are meshed together, internally. The inner rotor is mounted on the driving shaft and which provides drive to the outer rotor. The outer rotor has the number of teeth one more than on the inner rotor. From inlet port the oil (in our case could be oil or any other liquid material) is filled in the segments of the outer rotor. When the pump shaft is rotated then the oil is squeezed between the two rotors and is pushed out under pressure from the outlet of the pump. Refer to fig. 5. (T.R. Banga & Nathu Singh: pp. 461-462)

5-There are many possibilities for using such piece, but all of them for sure are connected with motion or transmitting motion power.

The activities in Bubastus through the Pharaonic history and the late period showed a great work of engineering in building temples and dug the canal. Inventions in Hydraulics and simple machines occurred during the so-called scientific era of the late period 300B.C. to 300A.D. Most probably the gear or turbine was made and used through this period in engineering purposes.

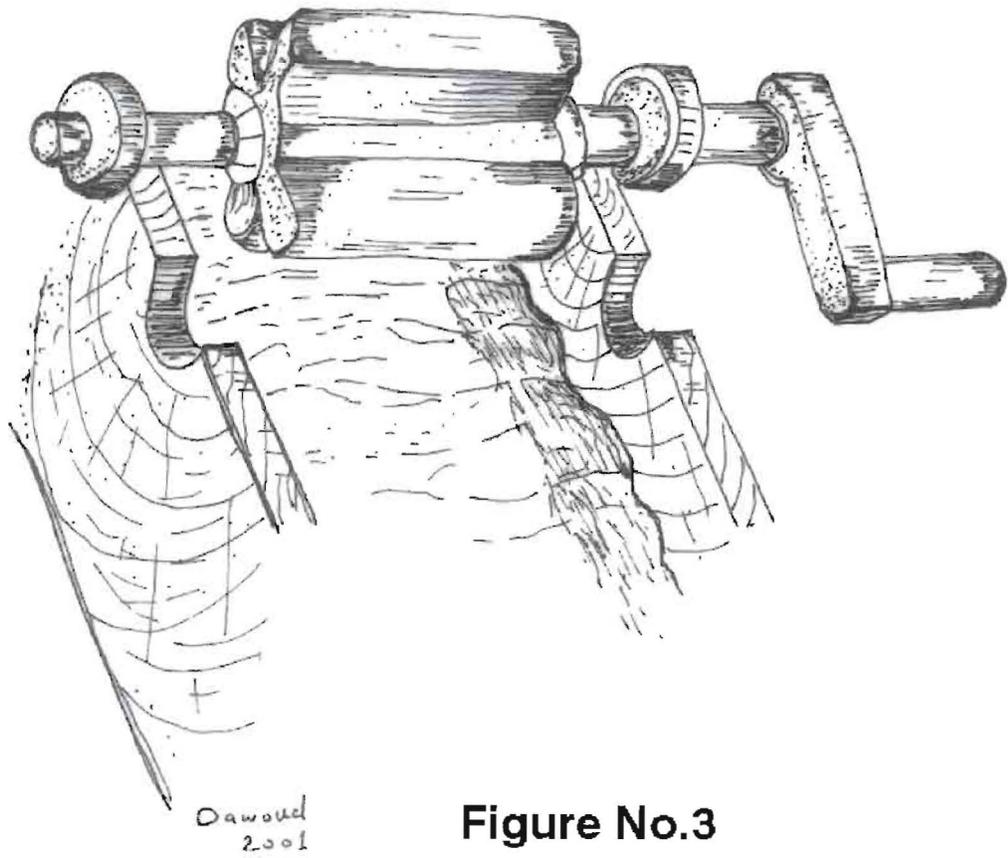
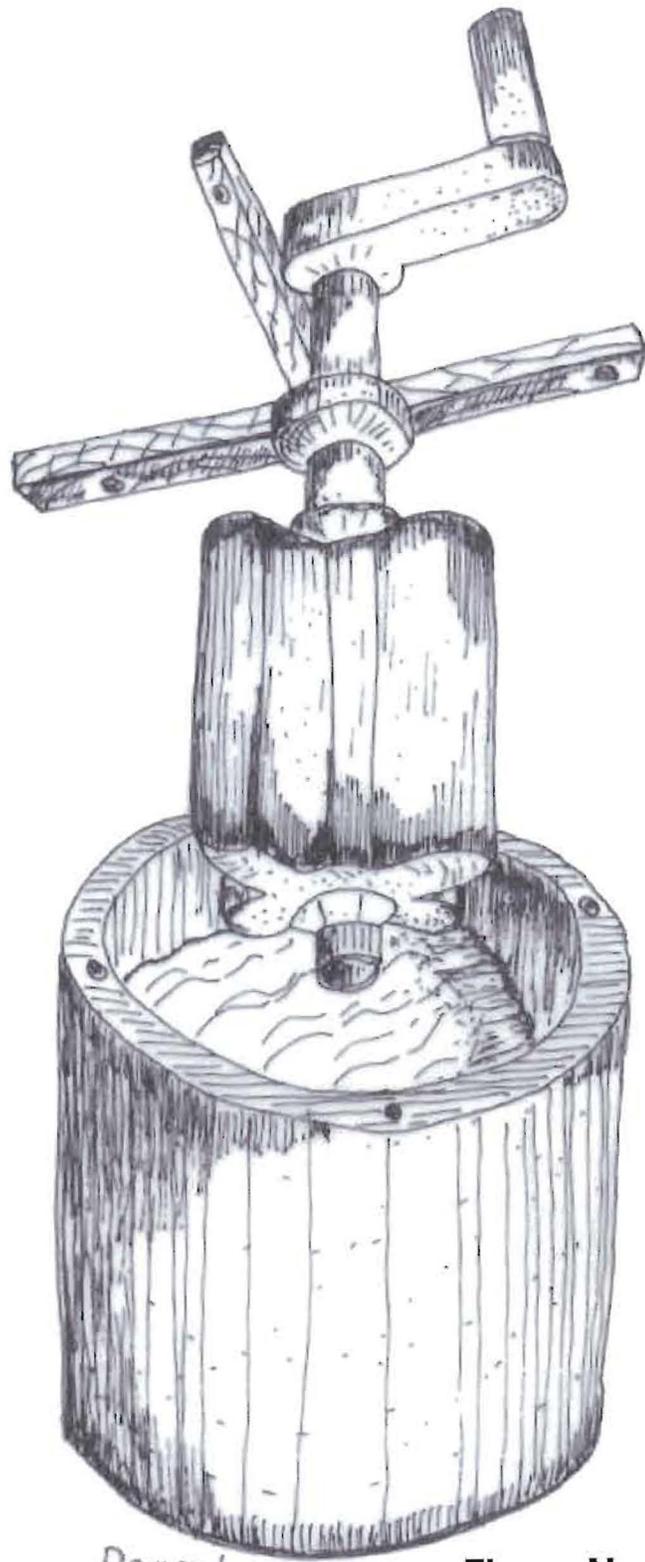


Figure No.3



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Figure No.4

Does the stone gear or turbine was a part of a secret machine of sacred statue?

A BASE OF a statue 58.00 cm L x 24.00 cm x 26.00 cm H from the Ptolemaic period was excavated in Al-Behera Governorate having a secret tunnel in the base running from the base to inside the statue of the diety (most probably Hathour or the sacred bull Apis). (Hassan, S.: vol.9, pp.464-465). Another example was found in the valley temple of king Sahu-Ra 4.50 km north of Saqqara. Five containers covered with copper sheets were built down the floor of the sanctuary and its annex rooms. Especial copper pipes were

used for sanitary system of the liquids used through rituals. (Fakhry, A.: pp.247-250) Did the ancients used a kind of turbines or gears like this one in such cases? It could be a part in a special system to push water or other liquids through tunnels in a building or inside a statue like the mentioned examples. Realize that the piece was not a big one, it was only 12 cm long, and 8.5 cm width, so it could be a part of a hidden machinery system.

Research will be continued to find out the truth.

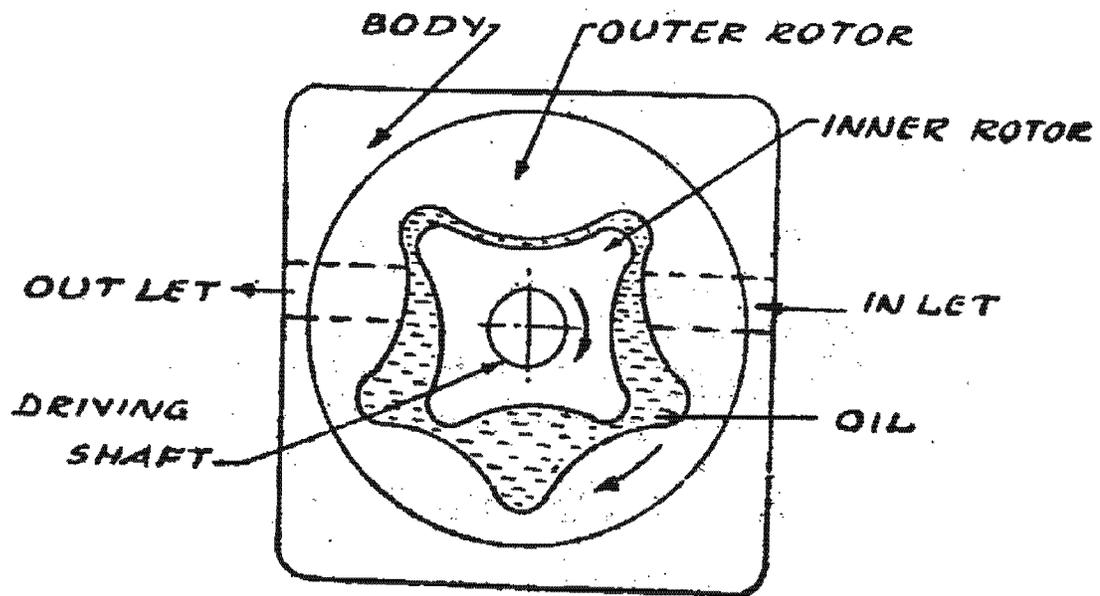


Fig. 5 Rotor pump

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