

EGYPT PLUMB BOBS + SCALES WITH PLUMMET

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Dear Fellow Collector,

In this issue let's go back to Egypt in the time of the construction of the pyramids, one of the early civilizations with evidence of the use of plumb bobs. You know that one of the birth places of the plumb bob could be Egypt. Another is Babylon (the region between the rivers Euphrates and Tigris) now Iraq. See "THE PLUMB LINE CONTINUUM (pp. 38 + 45-48) by Bruce Cynar and Nelson Denny on www.plumbbob.de

Figure above: On the camel, that's not me, but my son Thomas. ☺

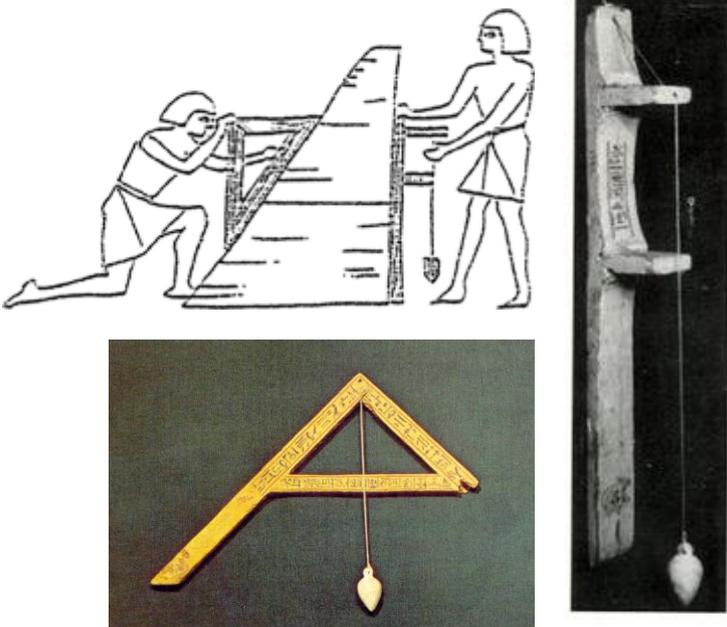
illustration a plumb bob is used to build an A-level or a plumb board. You are familiar with these devices from other articles in my publications.



In WOLF'S PLUMB BOB NEWS 2008-02 you also find the Egypt stamp with the A-level. Here we see the use of the plumb bob as an integral part of a tool used by masons or architects.

Plumb bobs used as weights on scales are familiar in the last 200 years on scales used on farms and in laboratories. A few years ago I found some articles about the use of the plummet / weight / plumb bob in Egypt as part of a scale.

(figure right: Cairo Museum)



In an earlier issue of "Wolf's Plumb Bob News", there is a photo of the plumb level taken in the Cairo Museum (pictured above). In this

1. INTRODUCTION

This issue is a small newsletter: although I have worked on it periodically for many years. The major problem in my research has been the vast discrepancies in my source material.

Since there no real examples of Egyptian balances exist ¹, (the Cairo Museum example is a reproduction) every Egyptologists have constructed reproductions from stone carvings and paintings found in monuments, buildings and burial sites throughout the area. (see pp 22+23) These depictions are not always clear, having partially decomposed over the centuries. To add to

the problems of interpretation, the Egyptians never mastered “drawing perspective” or “scaled technical drawings”. Thus, the evidence is largely artistic in temperament, subjective in viewpoint and very much open to interpretation.



Since we are an INTERNATIONAL group of collectors, we always faced with the “problem” of definition. What is the true nature of a “plumb bob”? In different countries the definition of the word “plumb bob” differs.

In this article, I have the same problem. Is a plumb bob a tool to measure verticality only, or can it be simply a simple “weight” suspended on a line?

In this article I used the **original text from English, French and American books; there is no one that is definitively “correct”.**

You can decide for yourself, if only one or both are worthy of being included in your collection.

I will not write about Egypt scales and balances, rather I will include only the illustrations that **look like plumb bobs or plummets.**

The sources, (if I know it) will be footnoted.

¹ Dissertation Thomas Ibel 1908 p16

2. WEIGHING OF THE HEART

The most famous picture with a scale and a plummet is the **ceremony** “WEIGHING OF THE HEART”.



The Ancient Egyptians believed that when you died, you travelled to the Hall of the Dead.

Here you can see Ani on the far left watching while his heart is weighed against an ostrich feather representing Maat. Anubis is checking the scales while Thoth writes down the result. Ammit who is part lion, part hippopotamus and part crocodile waits in to see if a meal will be on offer (the heart would be eaten if the dead person was found wanting).

About the ceremonial use of plumb bobs you will find many sources on the www.

Everybody has his own idea, what this “plumb bob” is and if or why it is being touched by hand. Is this fellow “tipping the scales”? ☺



The Egypt ceremony “WEIGHING” you can also buy on Ebay for 200\$ as jewelry tag as a symbol for the SIGN OF THE ZODIAC:

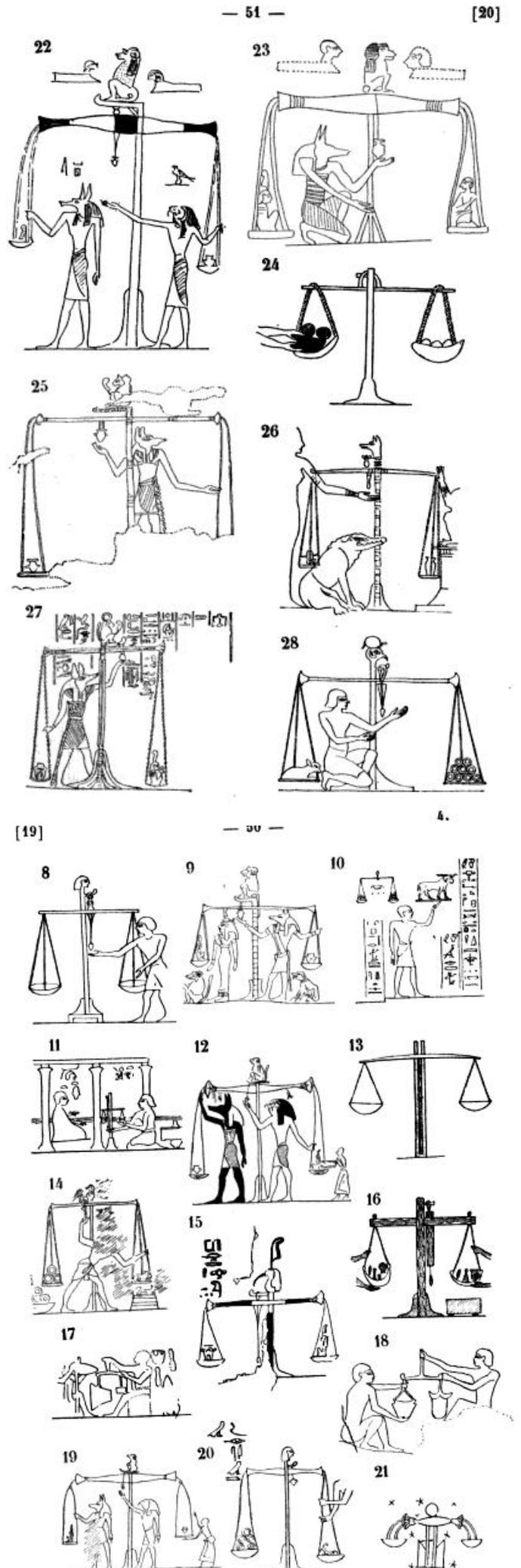
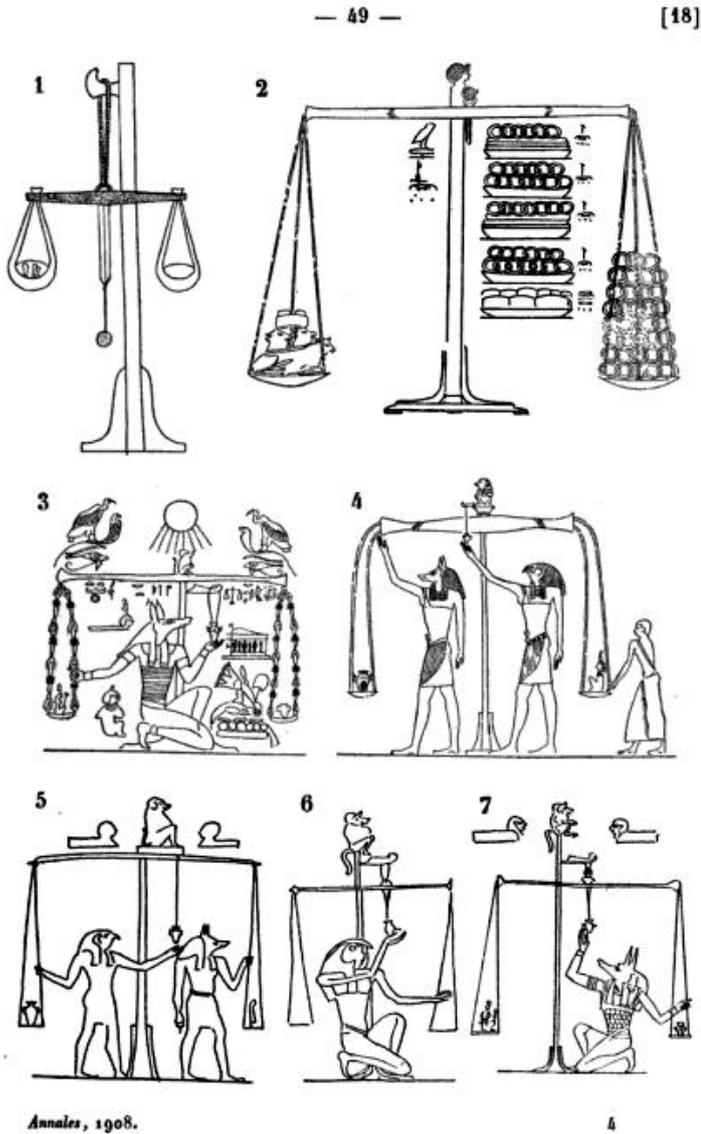
♎- LIBRA (The Scales) (cardinal, air, social): In astrology Libra is ruled by the planet Venus. The tropical duration of Libra is September 23 to October 22.

3. WHAT TYPES OF "SCALE-PLUMMETS" exist?

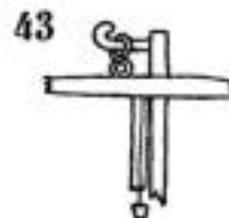
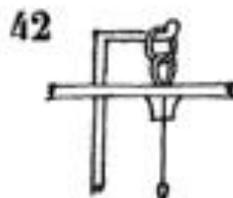
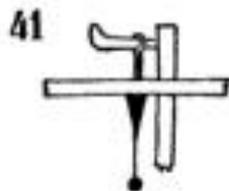
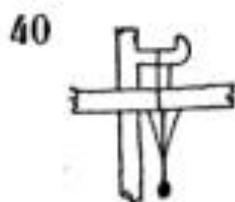
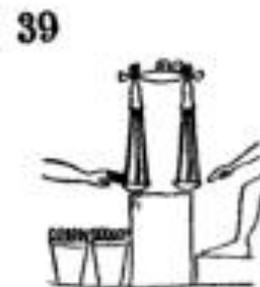
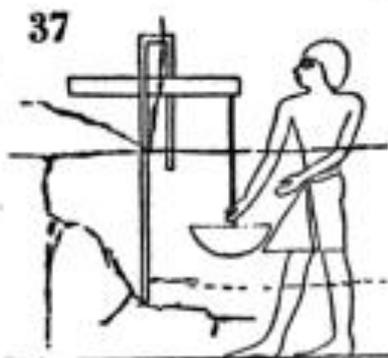
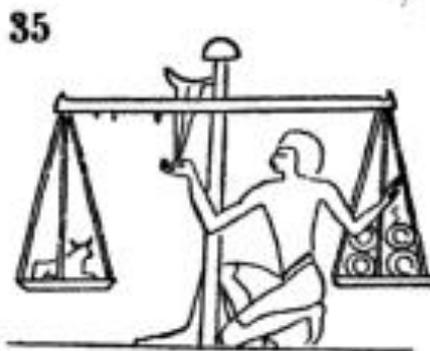
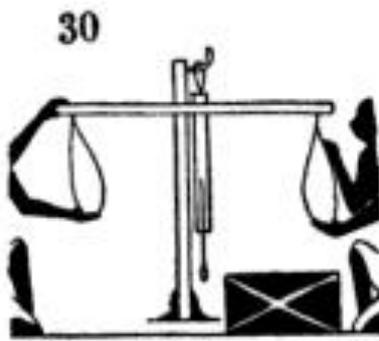
Found in old books (thanks to GOOGLE BOOK SEARCH) different uses of the "plumb bobs" and "plummets" on Egypt scales.

To give you an idea how many different types, here are some pages from a French book from 1906².

A vast field open to interpretation. ☺



² ANNALES DU SERVICE DES ANTIQUITÉS DE L'ÉGYPTE Paris 1906 pp 49-53



**3 a) FIRST TYPE:
WEIGHT/PLUMMET HANGS ON 3 LINES**

In a German book, a picture illustrating “weighing of silver or golden rings”
The author says: “The man watches the scale. The weights are equal, if all 3 lines appear tight.” Is one is loose, the beam is not level.

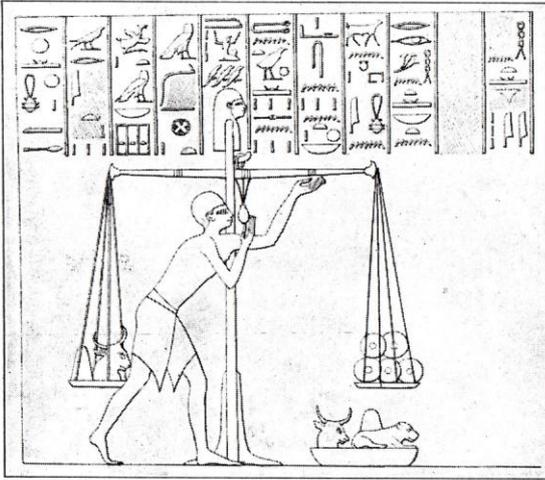
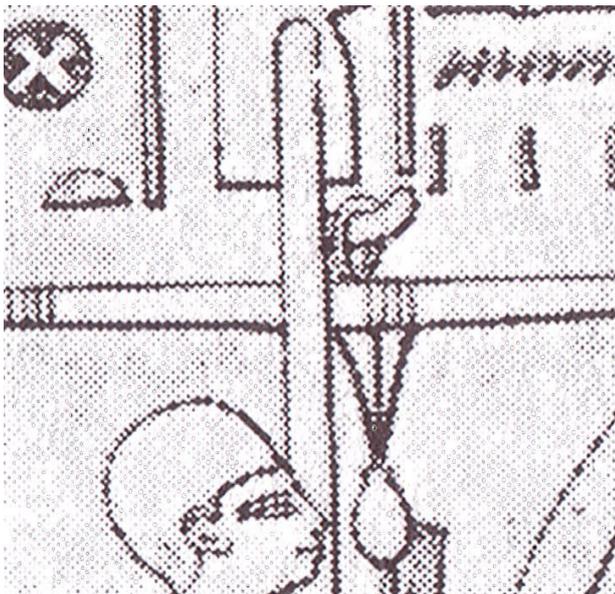


Abb. 48. Abwiegen mit Geldringen.
Der Mann beobachtet, ob die Wage einspielt. Gleichgewicht ist vorhanden, wenn die drei Säden, an denen das Sentgewicht von der Mitte des wagerechten Wagebalkens herabhängt, sämtlich gespannt sind. Ist ein Säden lose, so ist die Wage nicht im Gleichgewicht. 18. Dynastie (um 1550 v. Chr.).
Aus Gräbern von Abd el Guma, Theben.

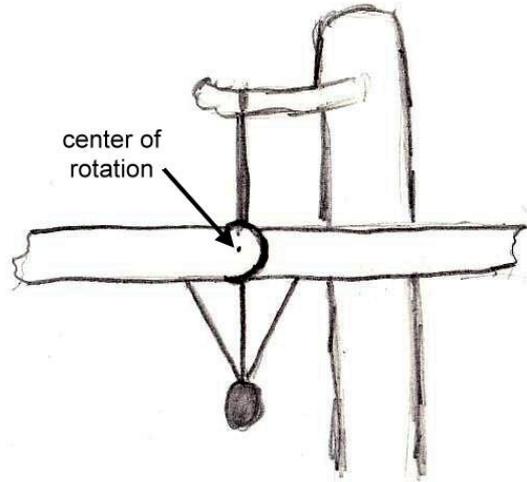


The worker looks very closely at the plummet and not (as in other pictures) to the weight. This way he can gauge the tightness or slack in the different strings.

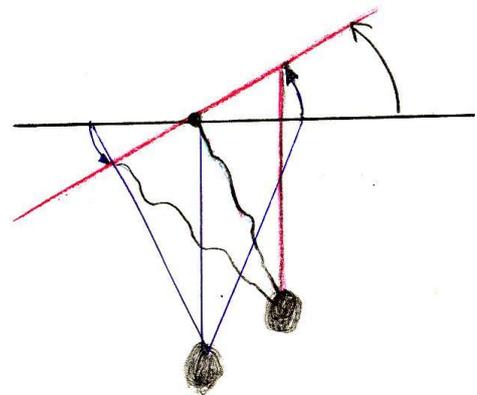
The construction of this scale must be as follows:
The vertical beam is suspended in a ring that hangs in a hook.
UNDER the beam (in the middle) we find a plummet (weight) suspended by 3 lines.
Figure right: from a French book



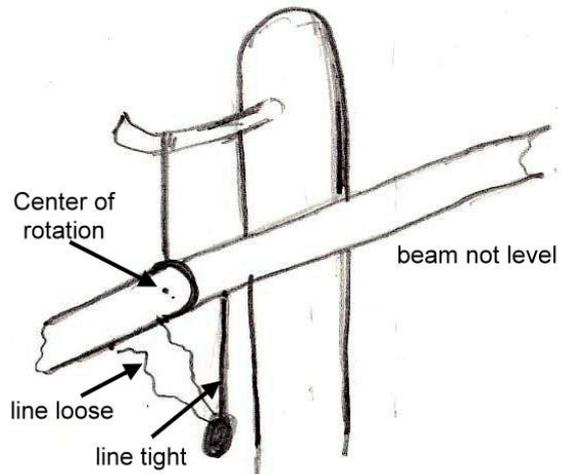
For better understanding, I made for me some sketches:



In this construction the **CENTER OF ROTATION** is directly over the plummet (in line with the hook).



If the weight is higher than the goods, the beam rotates and the plummet will hang on one line only and the other two lines are (more or less) loose. Drawing for a **EXTREME ROTATION**.



From my perspective this construction is **NOT A PLUMB BOB** following my definition, even if it looks like a plumb bob.
Personally, I think this is an interesting use, but I don't think that it was an idea used in Egypt. The idea looks great (I made a test scale), but it is too difficult to fix the lines exactly, etc.

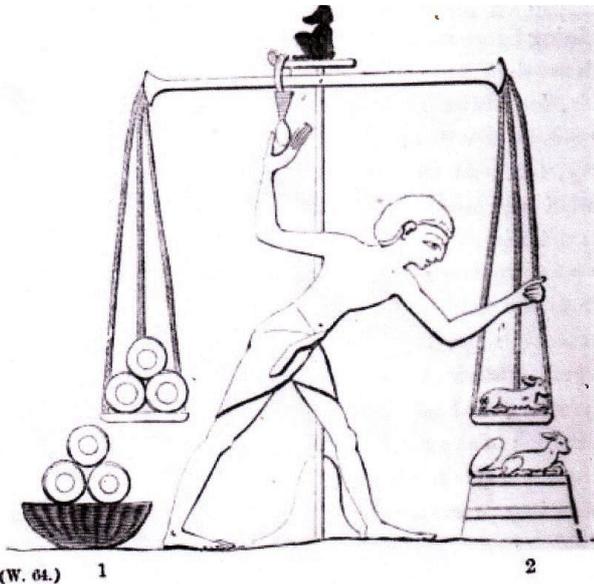
**3 b) Second type:
BEAM THROUGH RING**

In an English book ³ I found a description:
“The principle of the common balance was simple and ingenious; the beam passed through a ring suspended from a horizontal rod, immediately above and parallel to it, and when equally balanced, the ring, which was large enough to allow the beam to play freely, showed when the scales were equally poised, and had the additional effect of preventing the beam tilting, when the goods were taken out of one, and the weights suffered to remain in the other. To the lower part of the ring a small plummet was fixed, and this being touched by the hand, and found to hang freely, indicated, without the necessity of looking at the beam, that the weight was just.”

From a book ⁴ :
“Another kind, used for light objects, had a registering plummet fastened to the beam; but the ordinary scales for weighing the rings of gold and silver that served for money, and for heavy goods, had the beam fastened to the pillar, with a transverse bar above, supporting a ring through which the beam passed; and which not only showed, when hanging free, that the two scales were equally poised, but prevented the beam “tilting” when the weight was taken out of the one of the scales.”

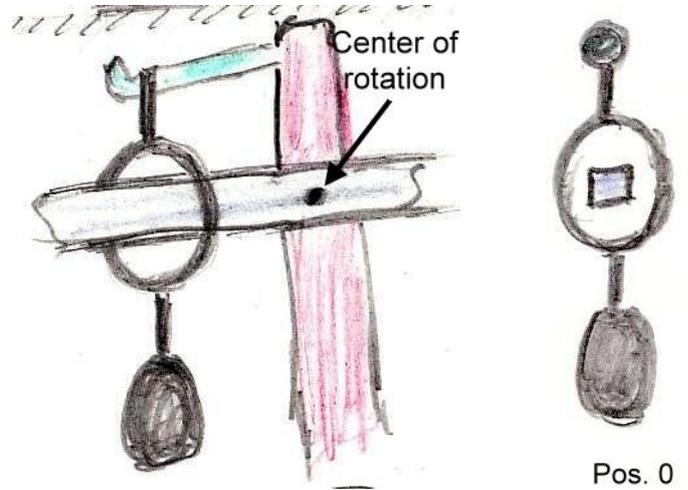
WHY THE WORKERS TOUCH THE PLUMMET?

In this picture (source unknown) you can see very clearly, how the worker (weighing metal parts; left) LOOKS AT THE ANIMALS, HEADS (the weights had the shape of animals or animal heads), WHILE TOUCHING THE PLUMMET (BEING USED AS A SENSOR), to feel if the beam touches the ring. In this solution there is NO NEED TO LOOK AT THE PLUMMET. (An early one man operating system). Today

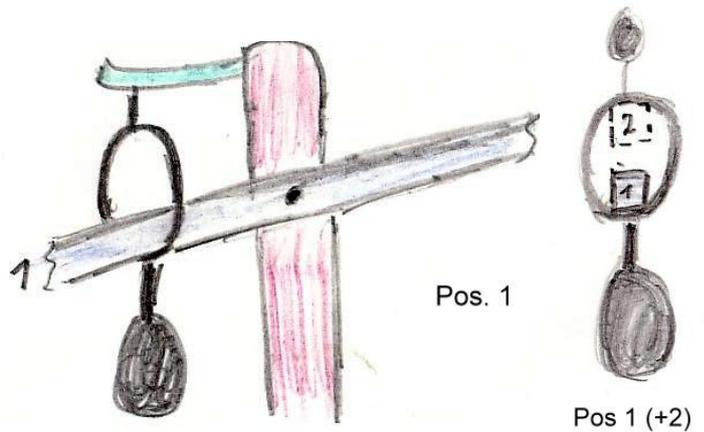


you would use an electrical circuit with an alarm bell, or a light indicator.)

Here we find a weight/plummet suspended by a ring. This weight has (in my opinion) nothing to do with a plumb bob. It is only to add weight to the ring that it hangs correctly in a defined position under the hook.



Position 0: The beam is free of the ring and the beam is level. Weight = goods



Position 1: If the goods are heavier than the weight, the beam touches the ring (and you can feel it on the weight)

Position 2: If the weights are heavier than the goods, the beam rotates to the right, but will not be stopped in a defined position.

3 c) Third type
BEAM WITH „TONGUE / NEEDLE / POINTER“

A third type is shown on different pictures as follows.

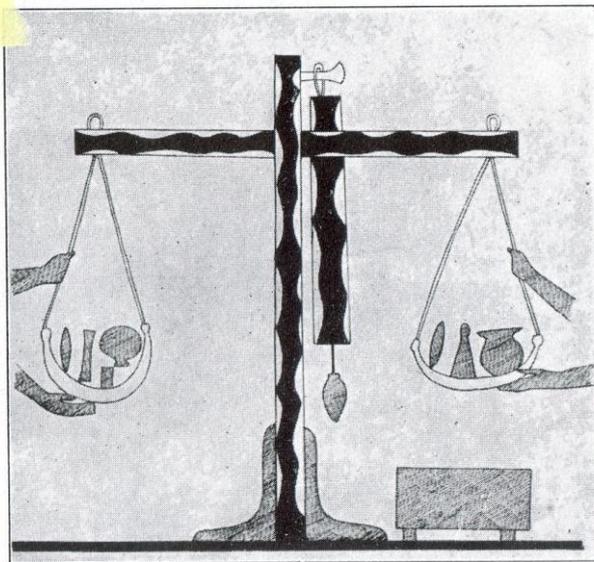


Abb. 49. Anderer Bau einer ägyptischen Wage.
 Am Wagebalken ein nach unten gerichteter Zeigebalken mit Lot, das gegen eine jedenfalls am Standfuß angebrachte Marke einspielen muß.

The text in a German book says: There is a **POINTER/INDICATOR** fixed to the beam with a plumb bob, which points to a mark at the bottom.
 (I can't see any mark 😊)

In an English book from 1895 I read under the same picture:
 "... The cross-beam was apparently fixed to an upright, which itself hangs by a loop from the peg. The balance is told by a plummet, showing the verticality of the upright."

THE SOLUTION !?

A reproduction in the **Cairo Museum** shows nearly the same situation, but if you look at the **NEXT PICTURE**, you can see that the **PLUMB LINE IS BEHIND THE POINTER**.

I think arrangement could be correct. The plumb line gives the vertical and the pointer must be covered by the line. I think in this illustration we can really speak of a **"plumb bob" or "plumb line"**. It is the same as the way masons would employ a plumb bob to compare a vertical line with another object such as a wall.

Another kind of TONGUE:

From an unknown book in the chapter "THE BOOK OF THE DEAD" p 128 I found: "... he says that the beam was suspended by a loop or ring from a bracket; below the beam a long tongue was attached, while a plummet hung down the tongue to test the level of the beam.

The god Thoth watches this plummet to see if the tongue remains vertical and the beam horizontal. ..."



Balance du Musée du Caire (face).



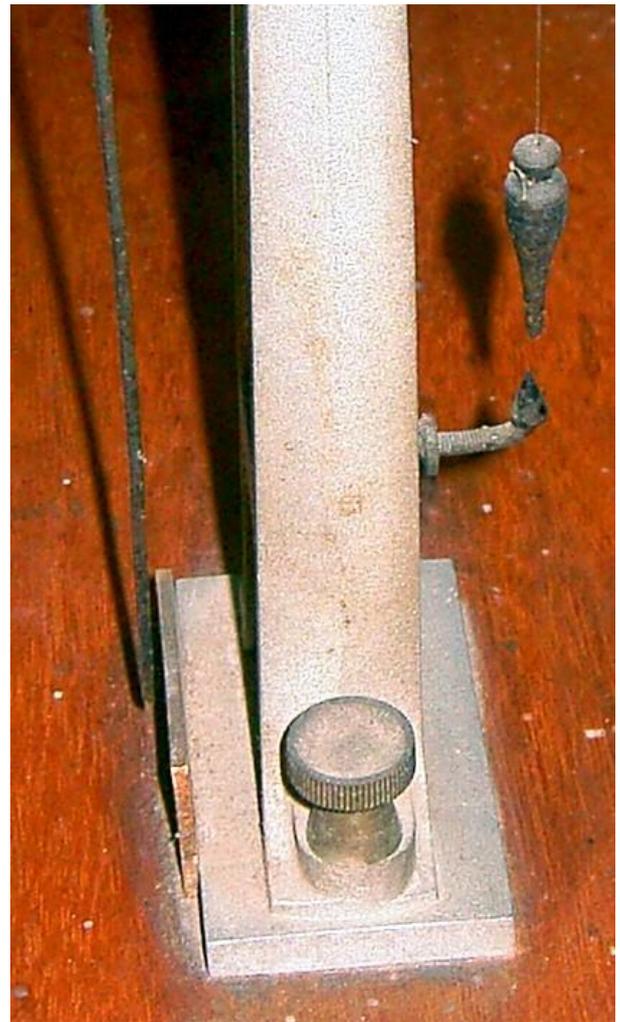
Balance du Musée du Caire (profil).

Here we see a **combination** of “TONGUE” and “BEAM THROUGH RING”

On this picture we see both: the tongue and “3 strings” or “beam through ring”.



In my collection I have an incomplete WILL SCALE from USA that shows a combination of TONGUE / NEEDLE to show the position of the beam (and the weight difference) on a marked scale and a PLUMB BOB that shows if the complete installation is in correct position.



In an Encyclopedia I found:

*“... to test the evenness of the balance a **tongue** was attached to it, but instead of observing the tongue against a long vertical sling of the balance, as in modern times, **the ancient tongue was below the beam**, and the **verticality of it** (and evenness of the beam) was **observed against a plummet**.*

*As the plummet was easily set swinging by a **lurch of the stand**, the characteristic action shown in weighing is for the **man to steady the plummet with his hand in order to read its position....**”*

I think, this is NOT the reason to touch the plummet. If the balance is in so bad condition that it swings while used that is not worth to fix it on a picture.

4. EGYPT, Roman and Greek PLUMB BOBS and A-LEVELS

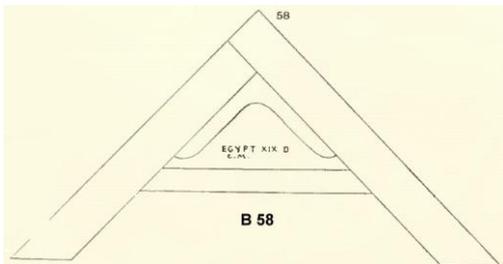
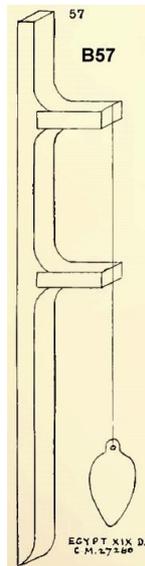
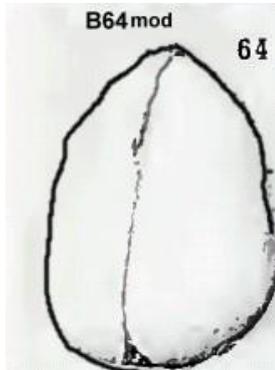
A very good overview about the early tools especially those from Egypt, found in an English book from 1917⁵ titled "TOOLS AND WEAPONS". This book is also of interest for woodworking tool collectors of saws and axes. (see footnote).

Remark: I had to modify (marked: "mod") some pictures, because the quality was not good. Also I inserted the single tools directly in the text. (The original source listed them in a table at the end of the book).

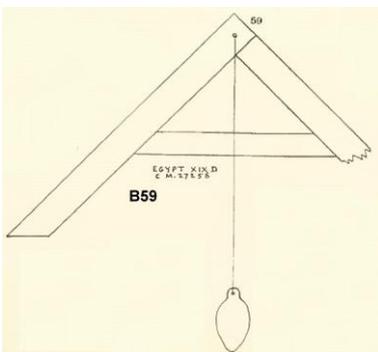
"118. The use of the plumb line must have started with Egyptian building, and the plumb bob has been found at the end of the iird dynasty,

B 64, xlvi. (The drawing was bad. I restored some lines)

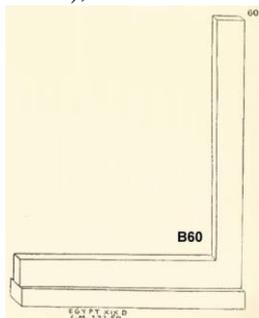
The mode of using the plumb line is shown by a mark on pottery of the xith dynasty (Gizeh Rifeh, xiii, J. 5), and the model **B 57** of the sixth dynasty. This, with the squares and level, **58-60** (xlvii), all come from the tomb of an architect Sen-nehem, a group now in the Cairo Museum.



These were not the actual working tools, but copies of them made to place with the burial.



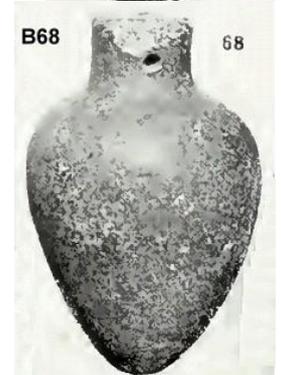
used in Roman work, as shown on the stele of Aebutius



⁵ TOOLS AND WEAPONS ILLUSTRATED BY RTHE EGYPTIAN COLLECTION IN UNIVERSITY COLLEGE, LONDON 1917: Copyright-free. [www-link: http://www.archive.org/details/toolsweaponsillu00petr](http://www.archive.org/details/toolsweaponsillu00petr)

in the Capitoline Museum, Rome.

The plumb bob in Egypt was first made with a groove round it, in which to tie the line, see **B 64** (above) from Meydum, and **B65**, both probably from the end of the iird dynasty (pl. xlvi). The square bob of hard brown limestone (**B 66**), with a hole through it for the line, was found at Gizeh ; it bears the name



Khuf, and is doubtless of Khufu. **B 67**, **68** are without a history, but belong probably to the



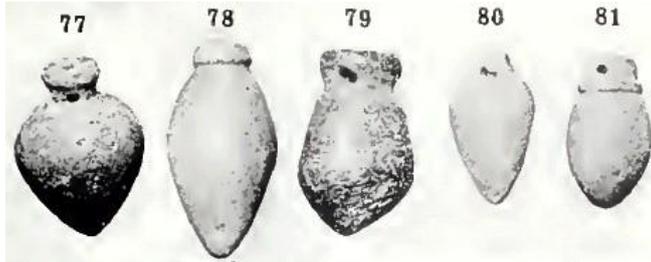
with or xiith dynasty. **B 69** is from Quft, undated. **B 70** is of limestone, **71** of alabaster. **B 72** of limestone, and **73** of marble, are from Kahim, of the xiith dynasty ; the system for the line was to have a short vertical hole in the axis, and across



this a hole from side to side ; the line was put through the axial hole, the end pushed out to one side, and knotted to retain it. **74** is of limestone. **75** is of yellow limestone, **76** of wood,

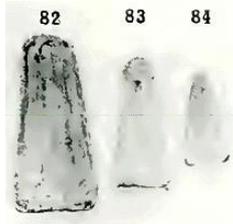


and 77 of shelly limestone, all three from Kahun. 78 is of limestone, 79 of steatite, 80 of limestone,

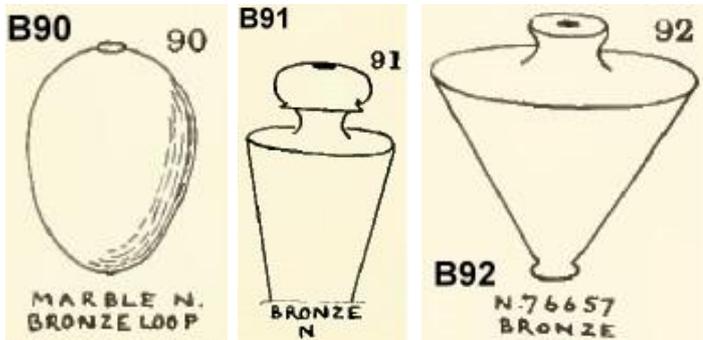


81 from Kahun of limestone. 82, 83, 84 are of lead, probably of Greek age.

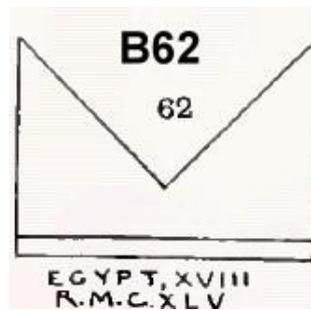
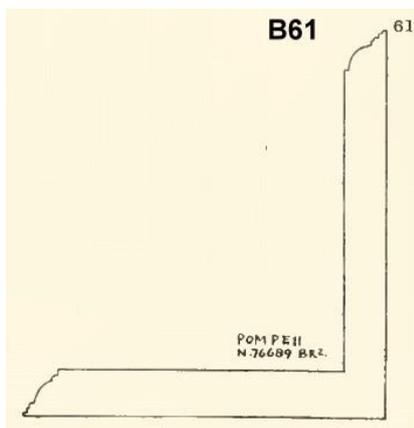
(the pictures of B85 to B89 were too bad for reproduction ☹) 85 is of steatite, 86 of diorite, 87 of limestone, 88 of black steatite. B 89 is a remarkable Roman cubic plumb bob of nummulitic limestone, with figures of gods on the sides; Horus, Hathor, and Amen ? can be distinguished.



The **Roman bobs** on pl. xlvii are **B90**, of marble with a bronze loop ; **91**, **92**, **93** of bronze. **92** is of the form on the stele of Aebutius.



119. The square was doubtless used in early times in Egypt, but no example occurs until the model from the tomb of Sen-nehem, **B 60**.(above p22). A similar form, with a foot, is figured in the tomb of Rekhmara (xviiiith dynasty) and on the stele of Aebutius. The plain square of wood, **B 94** (xlix),(no picture) was found in the destroyers' rubbish at the pyramid of Lahun, probably Ptolemaic. Another plain square, from Pompeii, **B 61**, is of bronze.



The need of a mitre square was naturally felt in Egypt ; a carpenter of the xviiiith dynasty has the form **62**, with a foot to slide along an edge ; a bronze square with a foot, and mitre slope comes from Pompeii ; and another without a foot is represented on a stele, **63**.”

REMARK: To have an idea of the extremely long time span of the use of the plumb bobs they are noted in these Egyptian Dynasties. The iird, vith, xith, xiith, xiii, xviiiith, and xixth. (from WIKIPEDIA).

The **Third Dynasty** of ancient Egypt is the first dynasty of the Old Kingdom. Other dynasties of the Old Kingdom include the Fourth, Fifth and Sixth. The capital during the period of the Old Kingdom was at Memphis. Old Kingdom is the name commonly given to the period in the 3rd millennium BC when Egypt attained its first continuous peak of civilization in complexity and achievement – the first of three so-called "Kingdom" periods, which mark the high points of civilization in the lower Nile Valley (the others being Middle Kingdom and the New Kingdom).

The **Eleventh dynasty** (2134 BC – 1991 BC) of ancient Egypt was one group of rulers, whose earlier members are grouped with the four preceding dynasties to form the First Intermediate Period, while the later members are considered part of the Middle Kingdom. They all ruled from Thebes.

The **Eighteenth Dynasty** (1550-1292 BC) is perhaps the best known of all the dynasties of ancient Egypt. As well as boasting a number of Egypt's most famous pharaohs, it included Tutankhamun, the finding of whose tomb by Howard Carter in 1922 was a sensational archaeological discovery despite its having been twice disturbed by tomb robbers. The dynasty is sometimes known as the 'Thutmosid Dynasty' because four of the pharaohs had the name Thutmosis, which means "(The God) Thoth (Appears as a) Child." Hatshepsut and perhaps two others of a handful of native women known to be crowned king of Egypt, ruled during this dynasty, as did Akhenaten (also known as Amenhotep IV), the "heretic Pharaoh" who with his wife, Nefertiti, instituted what many identify as the first recorded monotheistic state religion. “

5. CONCLUSION

Preparing this article I learned of some new and interesting novelties about plumb bobs.

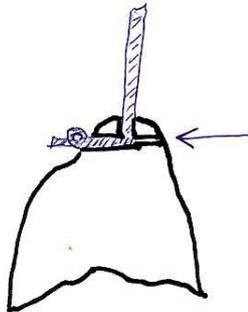
- In Egypt the very first SHAPED PLUMB BOBS had a **groove cut round it**, to contain the line and keep it in place.
I made a reproduction of this type of line attachment from a “wooden egg” ☺



This works and looks much better than the reproduction that I made using a common stone cross tied with line. The suspended stone is no doubt the earliest type of plumb bob.



- In a slightly more sophisticated version, an elongated stone was selected through which a hole was drilled laterally; the line passed through the hole and knotted. Yet another improvement would be to add a vertical hole to intersect a horizontal hole. In this example:
1.) the line would have been threaded downward through the axial hole,
2.) the end pushed out to one side,
3.) and knotted to retain the string in place.
Drilling was not usual at this time.
(drawing by WR)



- New materials (for me) were (SHELLY) LIMESTONE, MARBLE, STEATITE and DIORITE (stone types)

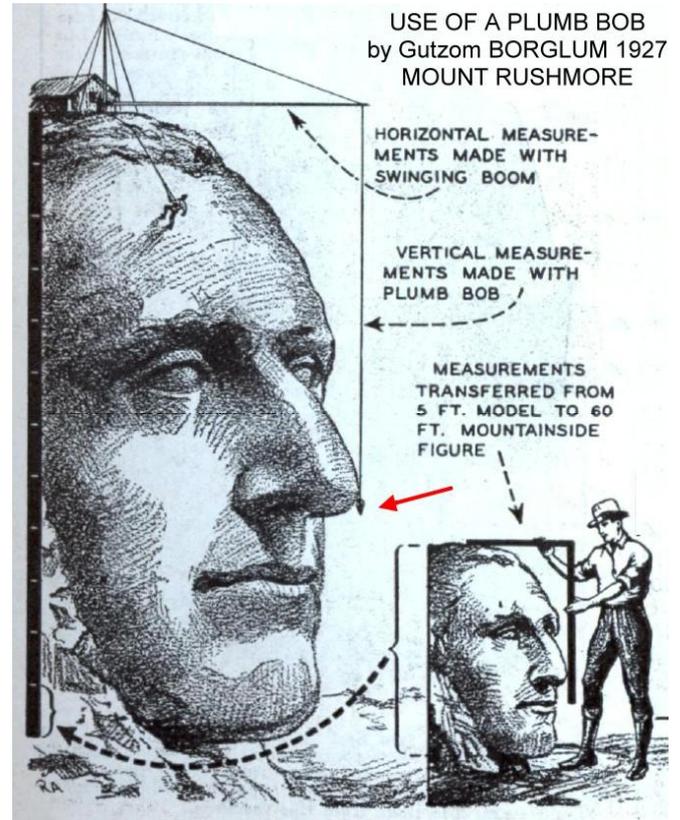
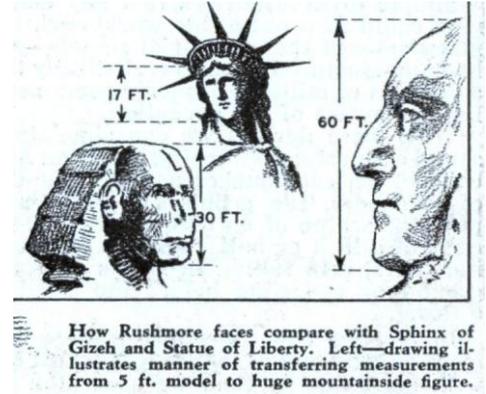
After reading the sources and writing this article, I am really not sure, WHAT IS THE TECHNIC USED BY THE EGYPTIANS. ☺

... XXX ...

Especially for our American friends:

Just before “time to going to press” I found a relation between the SPHINX in Egypt and MOUNT RUSHMORE in the U.S.A.

Later I will write about the system used by Gutzom Borglum. I hope the president must not sneeze, when the plumb bob touches his nose. ☺



REMARK:

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