

WOLF'S PLUMB BOB NEWS 2015

Issue Q 01 SPRING February 1, 2015

PLUMB BOB NEWSLETTER

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www.plumbbobcollectors.info

Dear Fellow Collector,

Dear reader of the PLUMB BOB NEWS,

As always, I am searching for new material and information associated with plumb bobs.

Please feel free to share new photos, catalogs, articles or stories of a personal nature.

I welcome input from fellow collectors!

Wolf

PLUMB BOB NEWSLETTER 2015- Q 01

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1. INTRODUCTION

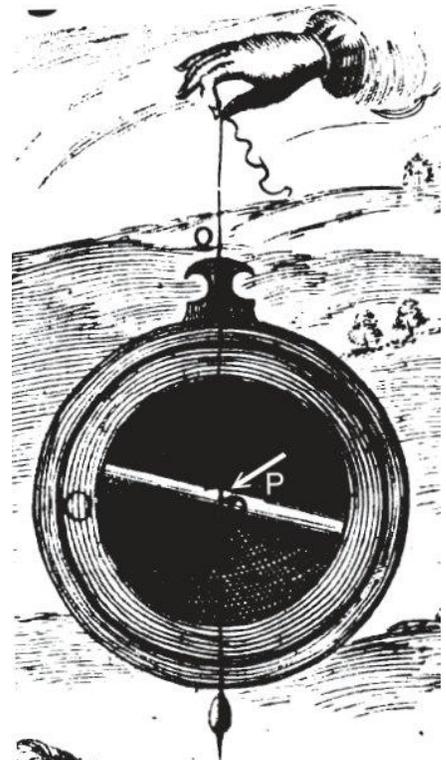
Since 2007, I have researched background material for plumb bobs for both the average and connoisseur collector of plumb bobs. Selection and development of my monthly newsletter, although personally interesting and rewarding, has also been very time-consuming and challenging. You can review a compilation of all of these research materials on plumb bobs by simply accessing the attached monthly editions of "Wolf's Plumb Bob News", which always accompany each new edition I produce.

Therefore, going forward, I will produce my newsletter on a quarterly basis (four editions/year), rather than monthly. My quarterly newsletter will cover more topics. In addition, many subjects I address which are associated with plumb bobs will include more detail and depth on the individual topics I cover. The primary topic covered in my first quarterly newsletter will be "the use of a plumb bob, in conjunction with a quadrant", employed by soldiers to align artillery (including cannons and mortars) in the correct position for accurate targeting.

Significant research for this article was garnered from "Google Books", where I located numerous

ancient German military instructions with helpful drawings. Using this resource, I identified excellent photos of quadrants from books originally scanned by universities. My personal archives also contain some booklets with

instructions for French artillery. The drawing in the figure above, from the cover of a French magazine, served as the "catalyst" for development of this article.



2. ARTILLERY and PLUMB BOBS

Our special tool, the plumb bob has been used by over 40 professions, an estimate I made several years ago. Most of us consider the typical professionals who employ plumb bobs to be technicians, such as surveyors: craftsmen, including masons and carpenters, and scientists, such as astronomers and physicists. However, soldiers used the plumb line or the plumb bob to bring their weapons (cannons, mortars) in correct position.

A tool, such as a plumb bob, can be employed both for humane and inhumane purposes: by masons **to build a house** and by soldiers **to destroy a building!**

The disadvantage with using research material scanned by libraries onto the Internet is that these pictures/drawings are not fully visible when the pages scanned were folded. In the example below, I asked the Bavarian Library in Munich to make "custom scans" for me of the material I found to be incomplete, because it was obscured during their original copying process.

The additional materials which I uncovered from old books from these "custom scans", revealed specific instructions, along with detailed drawings of plumb bobs and instruments which employ plumb bobs in their design.

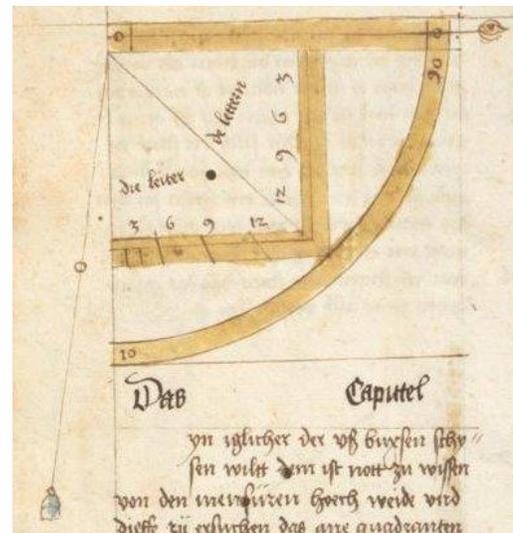
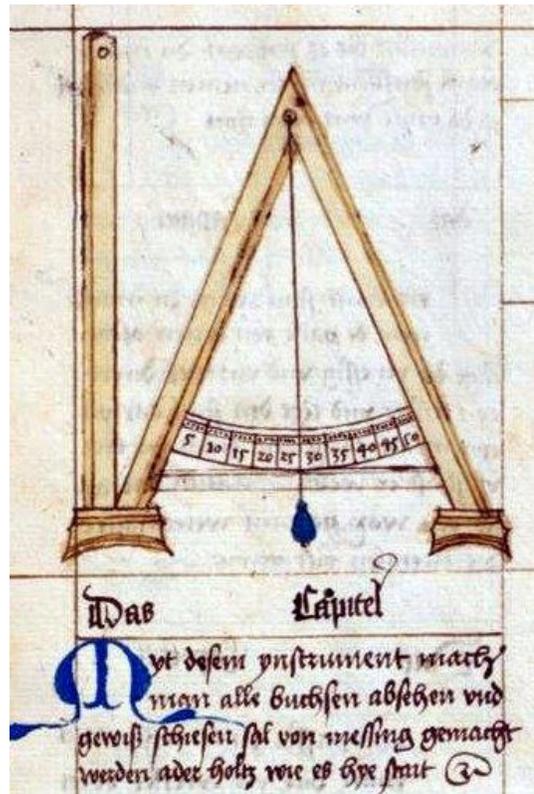
THE PLUMB BOB IS USED BY THE SOLDIERS FOR THREE PURPOSES:

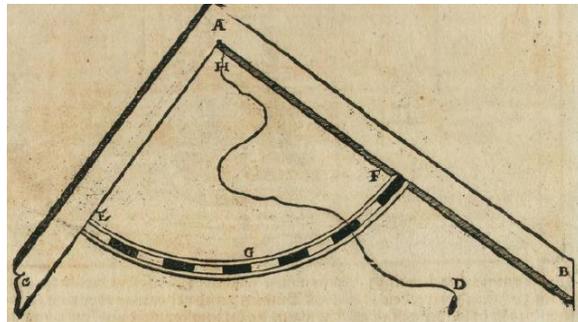
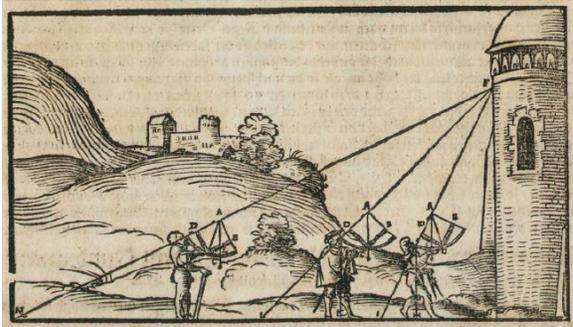
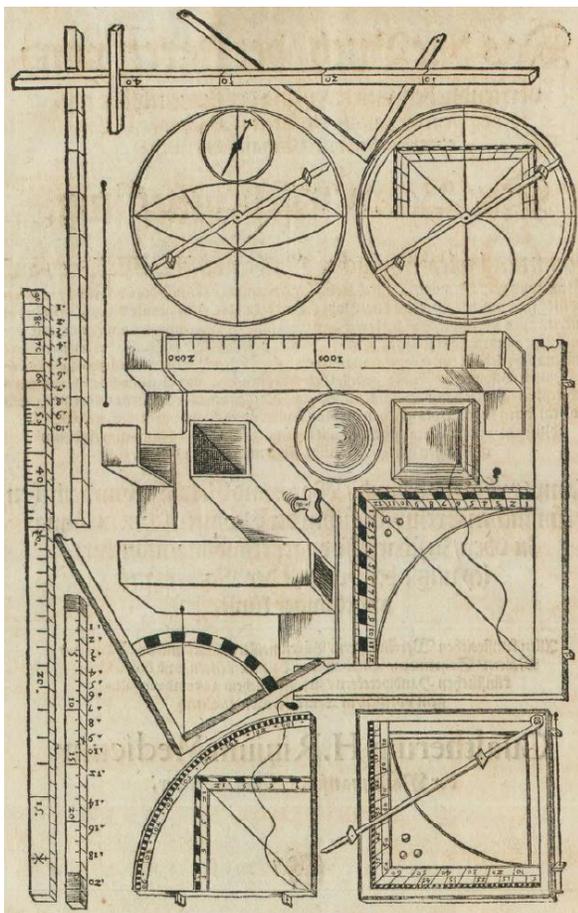
- 1) **Alignment of a cannon** with its intended target. Alignment is performed, using a **plumb bob and plumb bob line, which is held by hand.**
- 2) To bring the cannon or mortar into a right vertical angle, called the "**angle setting**". To accomplish this, a **gunner's quadrant**, employing a plumb bob, is used.
- 3) To **find the center axis** of the cannon barrel with a plumb bob.

Details see below.

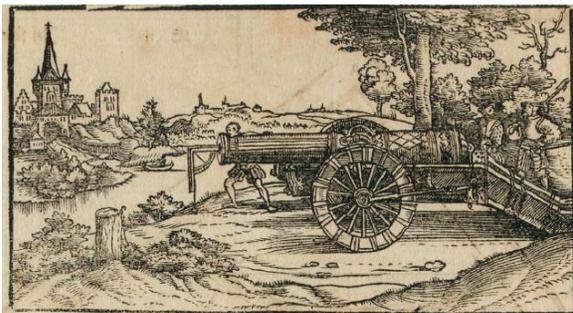
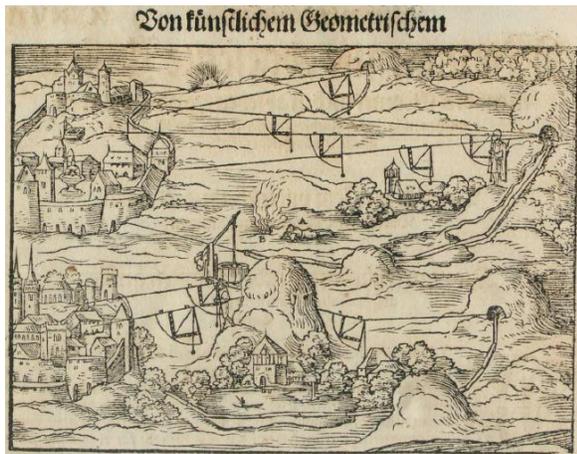
The earliest written information I found in a German HANDWRITTEN (not printed) book with COLORED DRAWINGS from **before 1500.**

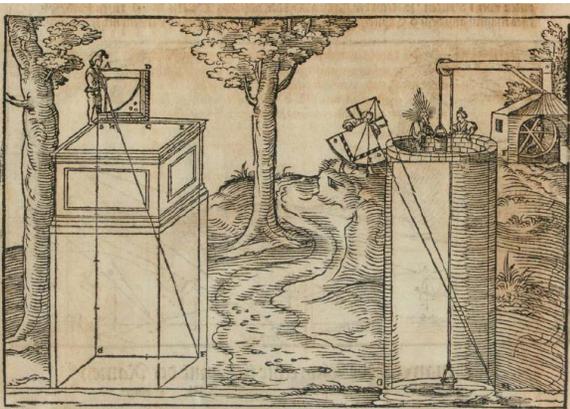
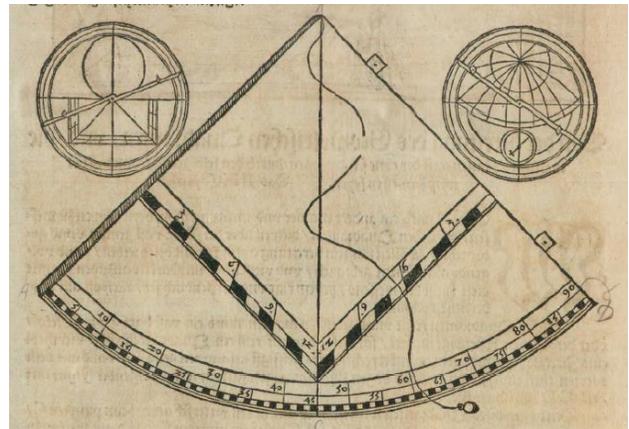
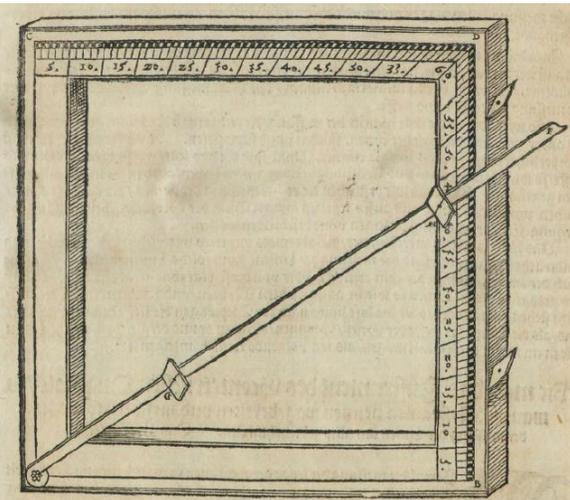
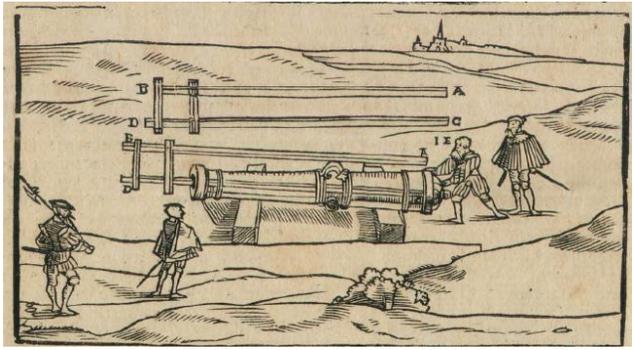
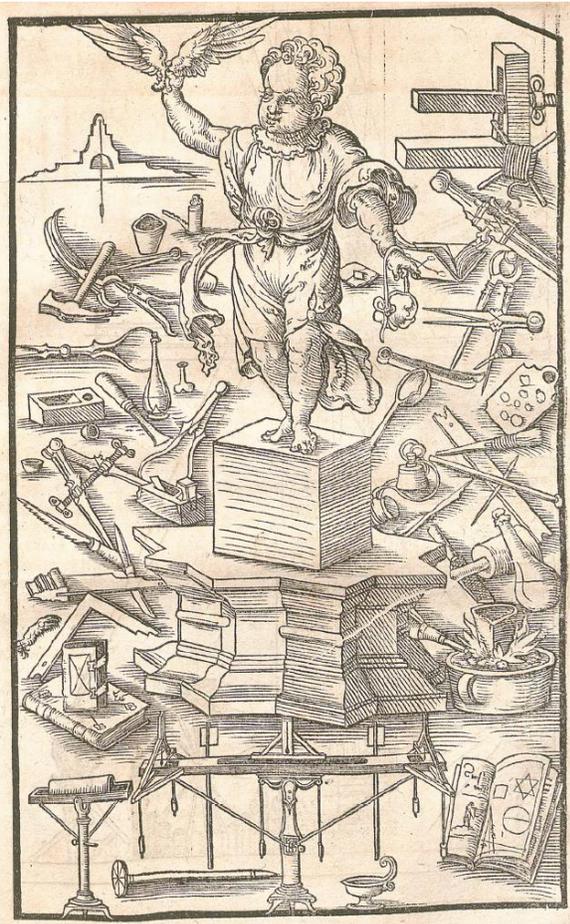
Excerpts from the book below were scanned from the library of the Goethe University Frankfurt, Germany. Even when the text was exactly written I had some problems to read and to "translate" this old German description. Before 1500 they used other words and wrote differently than today. Here are some samples: Here are different Gunner's Quadrants or inclinometers used for cannons of measuring the height of buildings.





Die neue Büchsenmesterei

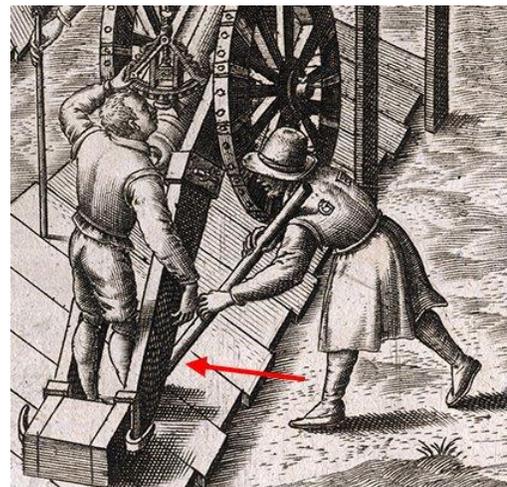
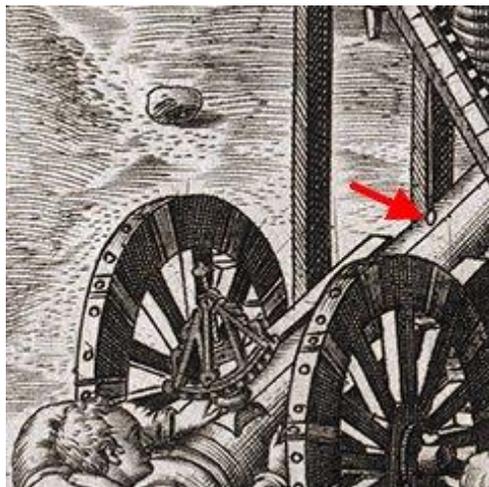
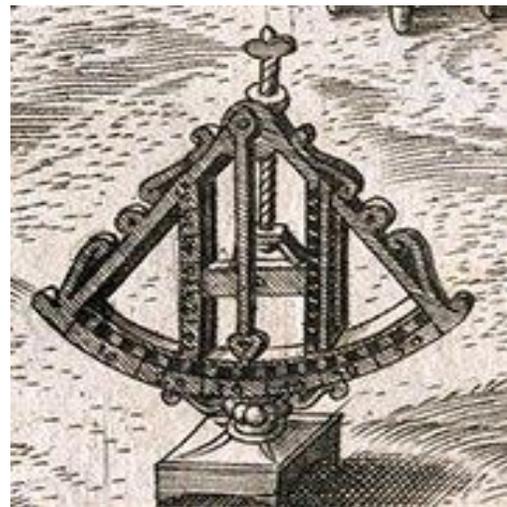
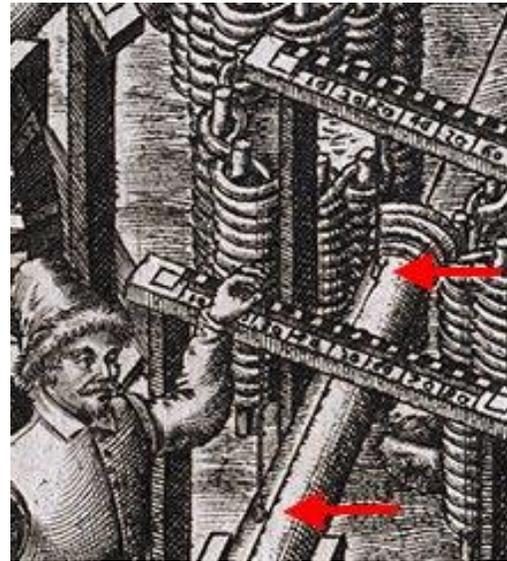
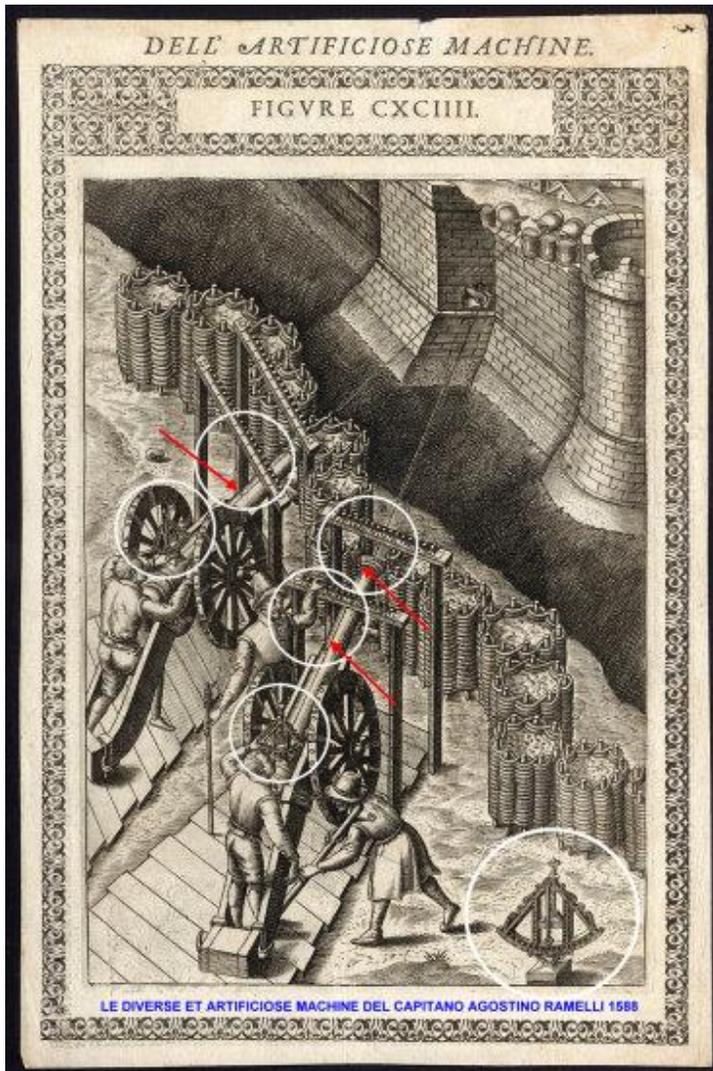




In a book from **1588** written in Italian and French I found the drawings below that show the use of the plumb line(s) and the gunner's quadrants to bring the cannons in the right position. One soldier holds a plumb line (see arrow) in his left hand and another plumb bob hangs on the graduated scale over the mouth of the cannon (see arrow).

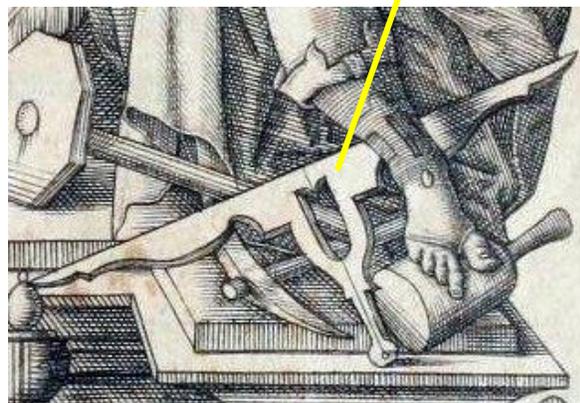
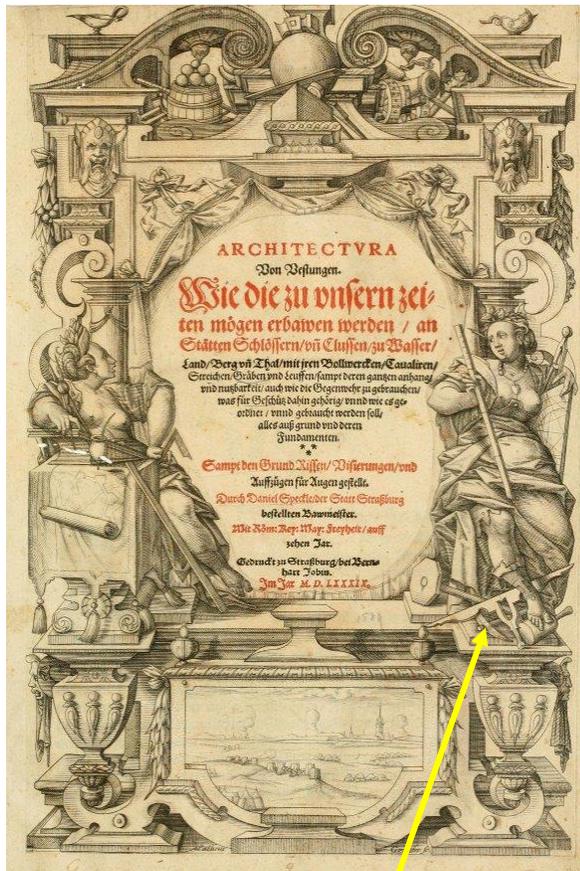
On the magnification below you see how a third soldier pushes the tail of the cannon in correct position. (see arrow)

With the gunner's quadrant they check that the axle (between the wheels) is horizontal and in the other case they check the correct inclination. The scales over the cannon are for reproducibility at night, when they can't see the target in the darkness. (Measuring in the daylight and shooting at night.)



From a German book **1589** “Architecture of FORTESSES”:

Cover and a plumb level on the cover.

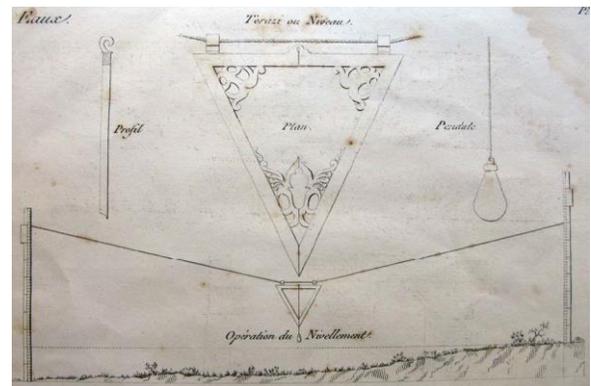
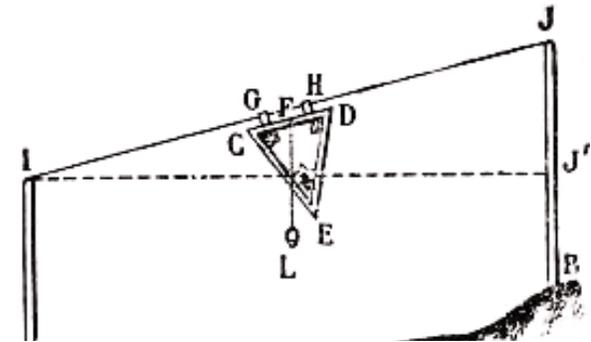


Beside some gunner’s quadrants (next page) I found a very interesting **triangle plumb bob** that we know were already used by the Ottomans in Istanbul Turkey by engineers who built the water pipes from the mountains to the city of Istanbul. I wrote about this special triangle plumb bob in my newsletter about Ottoman plumb bobs 2009-08. It is available on my web site for download. There I wrote: “The *tèrazi* or level

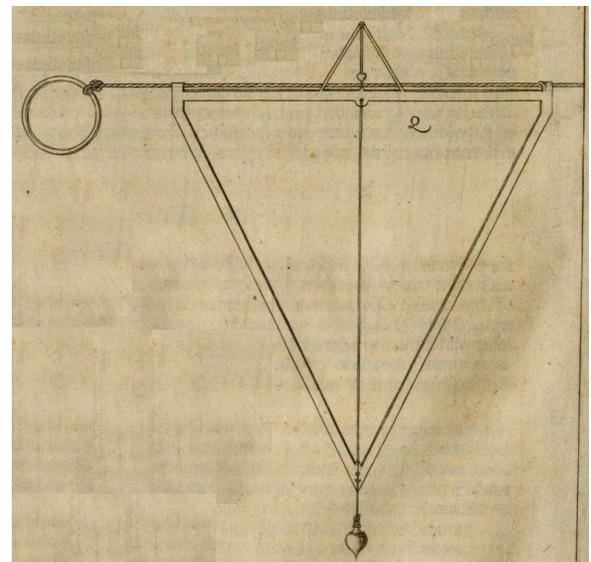
with plumb bob of Beha-Eddin (16th century).

In his writing “Geometric Calculations”, the Syrian author Beha-Eddin (1547-1622) described a leveling tool used with a plumb line or “*tèrazi*.” A similar device was also known in Poland and recorded by Strumieinski in 1573. This type of instrument was the tool of preference for the surveyors, “fountainiers,” of Constantinople (Istanbul), Turkey, at the beginning of the 19th century.

The drawings from Andreossi in 1828 were these two below:



Here in the 1589 book is looks as follows.



It looks a little bit different and has a second plumb bob on top. The author Daniel Speckle did not mention that it hung between two rods without tension (not pulled by hand, but hanging loose in the middle of the line). The one depicted appears to show that the line was tightly stretched by hand by pulling rings. We see that this instrument was used in Europe in different countries at that time.

Another gunner's quadrant with a COMPASS on top.

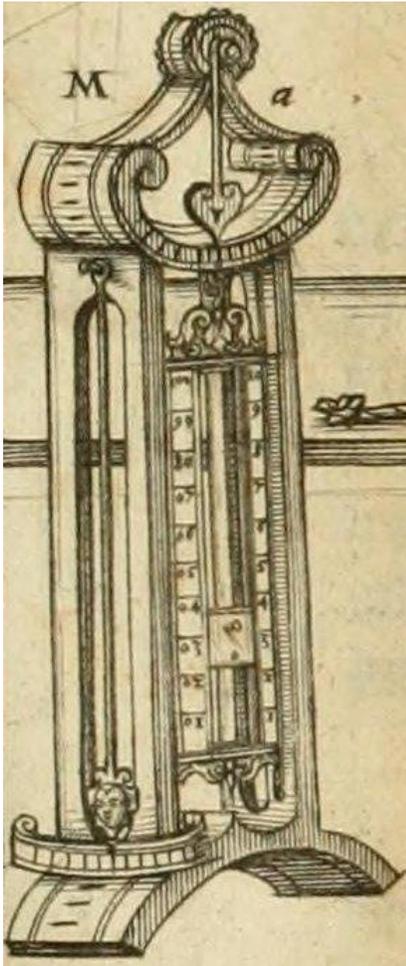
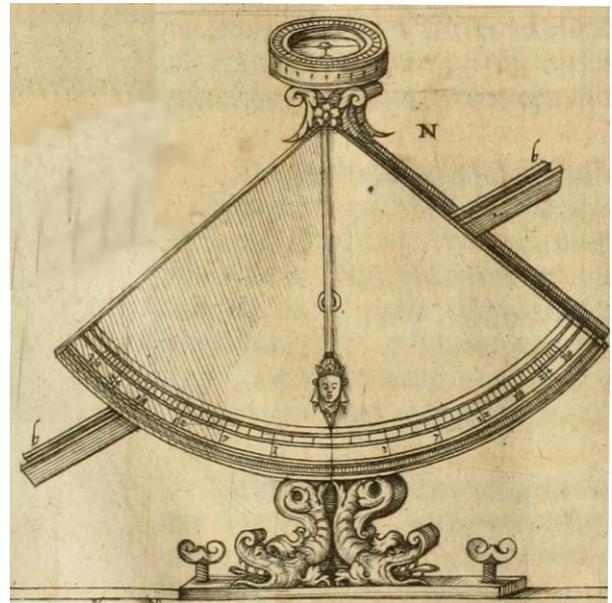


Fig. left:
This is an instrument with TWO plumb bobs!



On this drawing is shown how they tried to get a solid base for their cannons (to have stable conditions for better results).

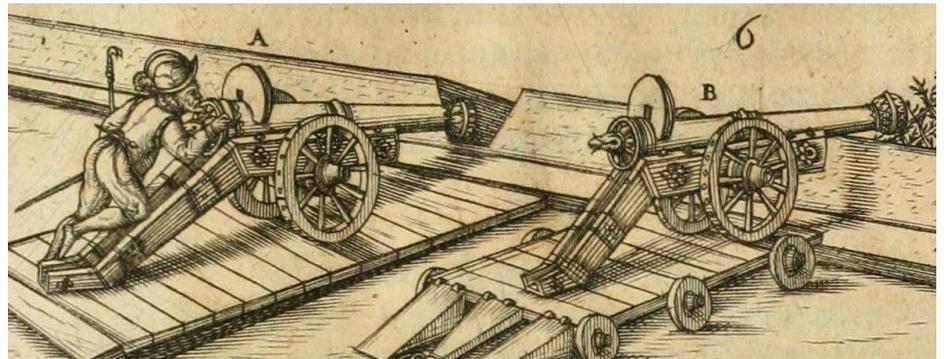
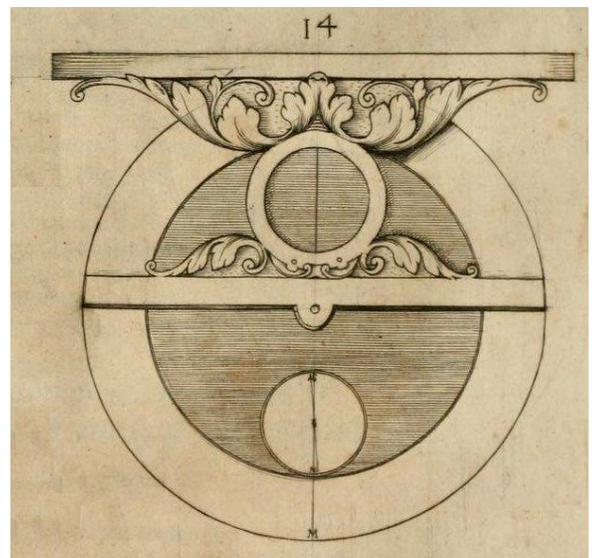
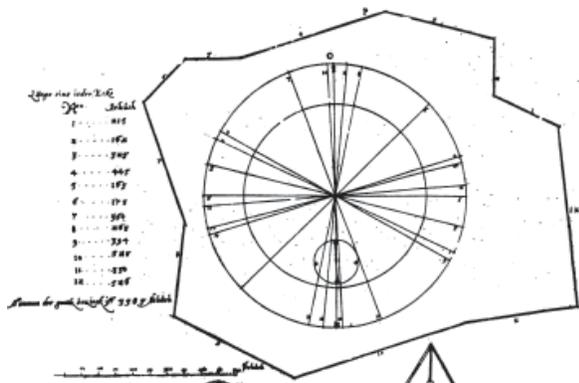


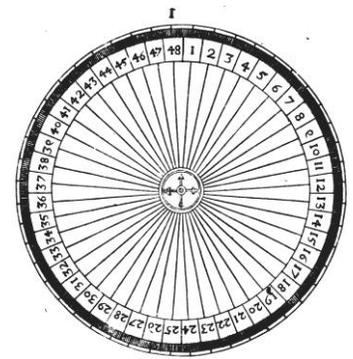
Figure right: a compass with a parallel line to draw measured lines directly into a map (figure below shows the outline of Strassburg, France taken in one day by the surveyor.)



Another German book from **1614** shows good drawings of artillery instruments and instructions in German and French:



For one instrument they divided the full circle into 48 parts. (figure 1)



The Gunner's quadrants are usually shown with ZERO in the middle and 45 degrees to each side.

Figure 2 (left column) divides the 90 degrees (quarter of the full circle) into 12 sectors with 7.7 degrees each.

Figure 3 (left column) divides the 90 degrees into 9 parts with 10 degrees each.

When the plumb line is in the middle of the scale it shows **45 degrees**. This is the OPTIMUM angle for the longest distance, as you can see in the drawing below. When you use a higher or lower angel the distance is shorter!

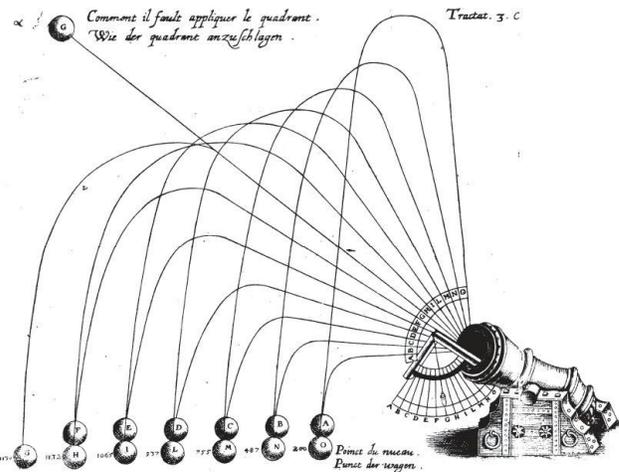
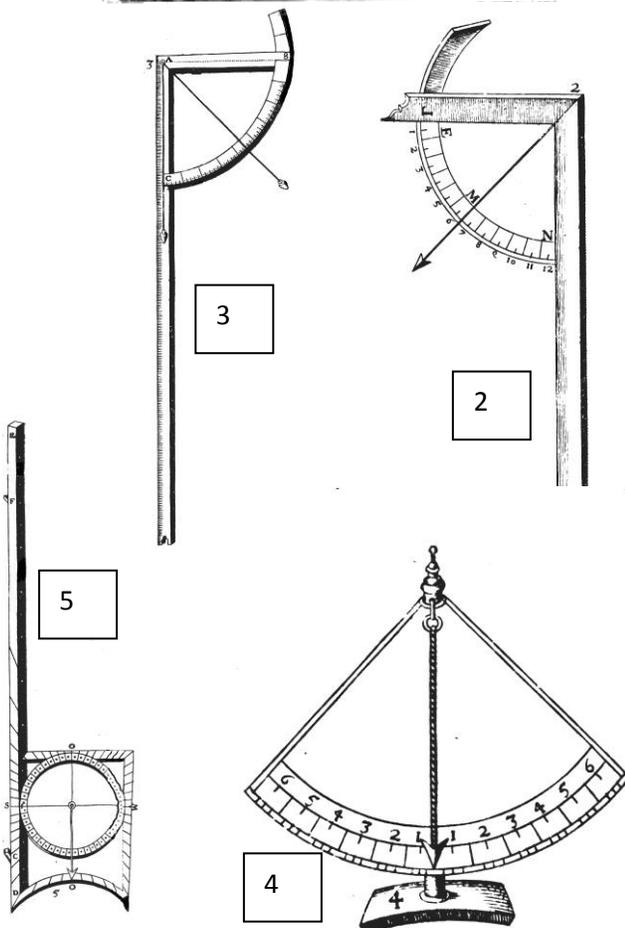


Figure 4 (left) is a gunner's quadrant that divides the 90 degrees into 12 parts (6 parts with 7.5 degrees to each side)

Figure 5 (left) shows an instrument (In this book called Cartabón (= Spanish = set square) with the full circle and is divided into 48 parts.

Many different systems were used at that time. It was difficult for soldiers to master all of these multiple instruments and methods for aligning ballistics.

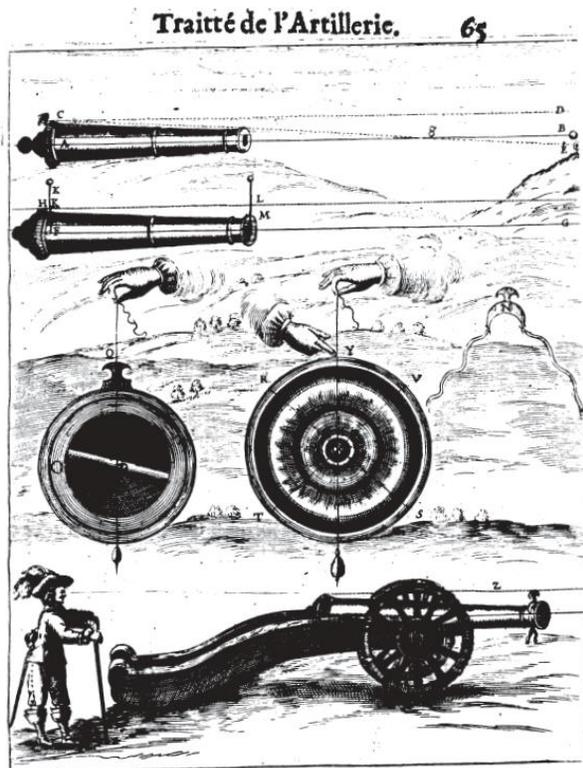


I bought a French art magazine "L'OEIL" (= THE EYE) from 1957, because there was a drawing on the cover with a plumb line searching for the axe of a gun barrel. The seller said:



En couverture : Manière de déterminer au fil à plomb le point central de la culasse d'un canon, illustration de l'ouvrage de Malthus, Pratique de la Guerre (1646/50): I had hoped that there was text in the magazine which supported the drawing - unfortunately there was none. ☹️

What could I do, but search for material on Google Books which supported this picture on the cover of the magazine? Luckily, I found additional drawings, along with instructions from a book written in 1650:



The manufacture of cannons in the 1600s posed many difficulties. The walls were different thick and the axe of the tube was not in the middle of the barrel. Proper placement of cannon sights required very specific positioning.

Cover of the book from 1650:

341521 N^o

PRATIQUE DE LA GUERRE

CONTENANT L'USAGE
DE L'ARTILLERIE, BOMBES
& Mortiers, Feux Artificiels & Petards, Sappes
& Mines, Ponts & Pontons, Tranchées &
Trauauk, avec l'ordre des assauts aux Brèches.

ENSEMBLE VN TRAITÉ DES
Feux de loye.

PAR LE SIEVR MALTHVS,
Gentilhomme Anglois, Commissaire general
des Feux & Artifices de l'Artilleerie de France,
Capitaine general des Sappes & Mines
d'icelle, & Ingenieur es Armées du Roy.

ENRICHIE DE FIGVRES.



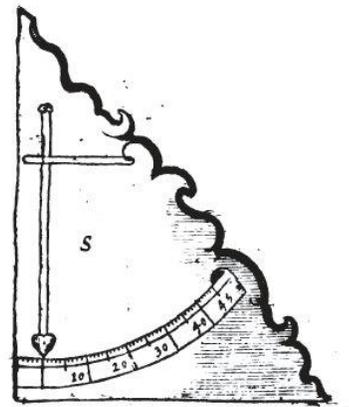


A PARIS,
Chez GERVAIS CLOYSIER, au Palais, sur les degrez
de la sainte Chapelle.
M. DC. L.

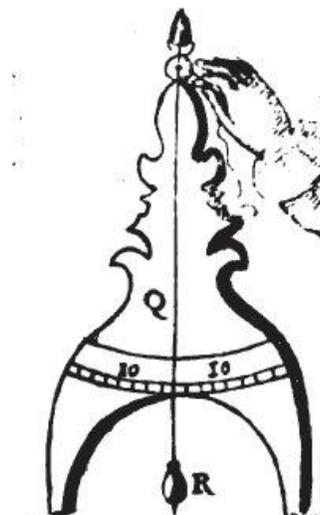
AVEC PRIVILEGE DV ROY

Two plumb levels:

This one is for measuring the angle in direction to the target (scale +/- 45 degrees)



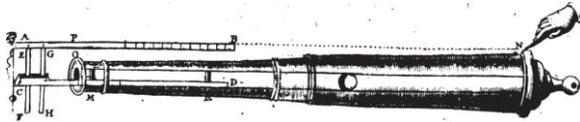
This is for the cross slope / transverse inclination (scale +/- 10 degrees)



The following are drawings that show the use of the plumb bob to help the soldiers to get a good result with their cannons:

The cannons at that time had no fixed sighting devices (notch and bead; sight and foresight; front and rear sights).

Since numerous parameters influence the proper positioning of fixed, external sights (different hard ground under the wheels, ground not in level, not the same diameter of the wheels, etc.), soldiers had to adjust these sights at the last



moment, based on the specific placement of the cannon in the field. As you can see in the

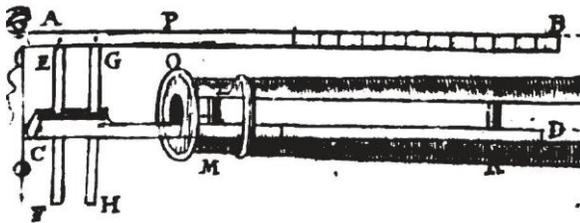


figure below, cannons did not have the same wall thickness. The cannon artillery soldiers employed instruments, in conjunction with a plumb bob to identify a parallel line to the axe in the middle of the cannon barrel.

To find out how high the front sight should be, they measured the tube with a stick and marked it. See arrows below.

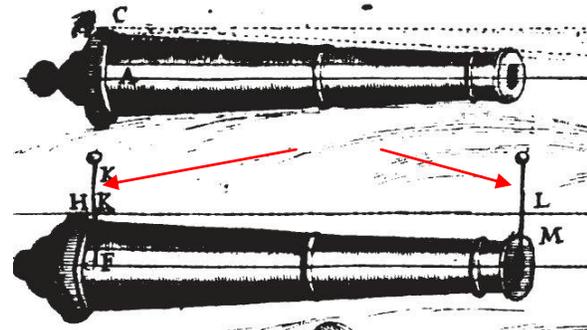
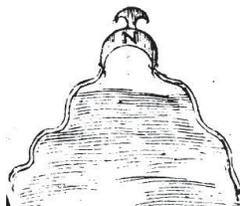
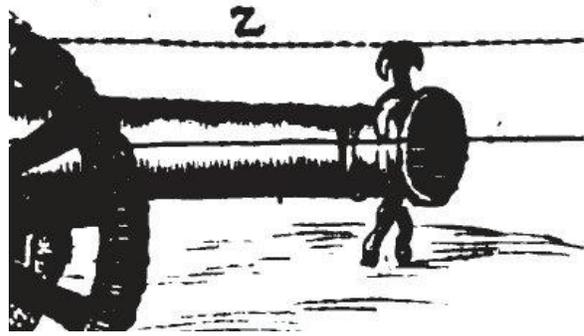


Fig. right: This is the shape of the front device (N) with two strings to position it on the cannon barrel. The upper part has the same radius as the barrel.



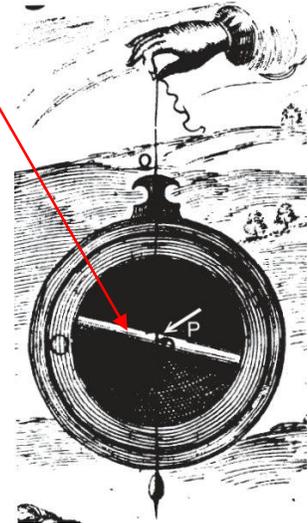
Sighting device fixed in position.



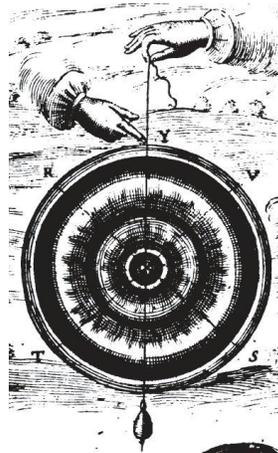
To make certain the artillery soldier located the position of the sight exactly **OVER THE MIDDLE** of the barrel (center, axe) they used the plumb bob and a **small wooden stick**. ☺

The stick adapted to the diameter of the barrel was **divided in two parts and marked in the middle (P)**. P is the center of the barrel = axe. The stick should be set in nearly in horizontal position (not very important, but gets a better result). Then the front device was put on the cannon and fixed in position O according to the plumb line.

The book I used for reference for using the plumb bob suggested taking a line and a stone or a plumb bob, but you also can use a round rifle bullet.



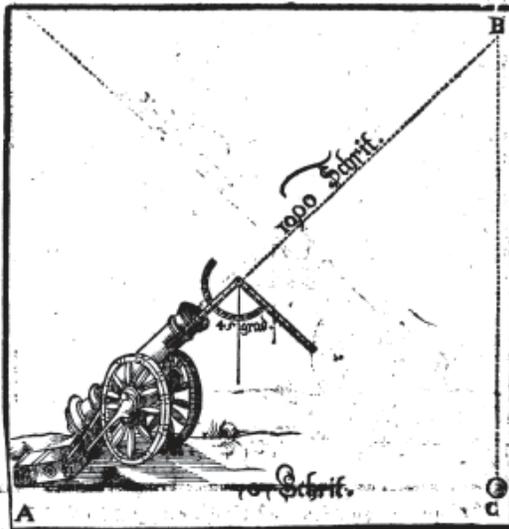
The same was done at the rear side of the cannon to mark the rear sight on the iron.



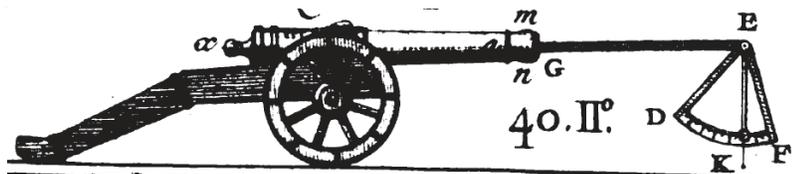
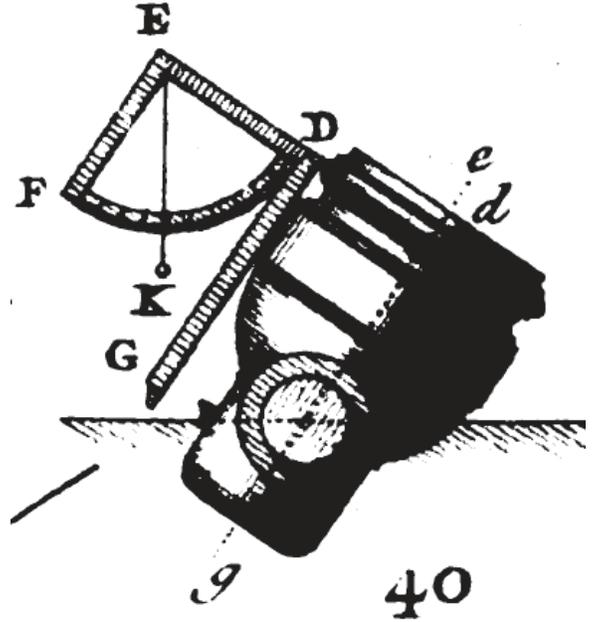
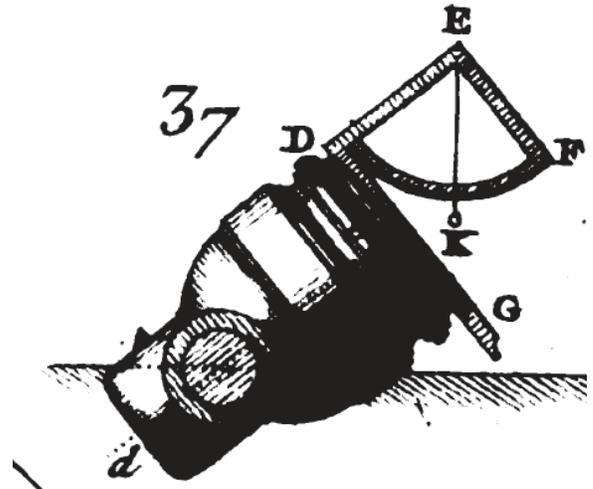
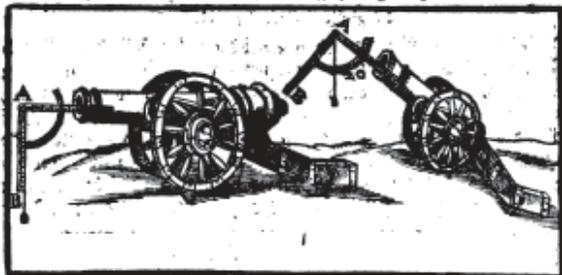
By the way, this drawing that I saw on the cover of the French magazine provided the catalyst to write this newsletter about plumb bobs used by soldiers.

In a 1626 German book, I found some good drawings for the use of a gunner's quadrant with CANNONS.

1773 French book "Element generaux des principales":



Winkelstab auff 101. so da ist der siebenachtel/ auff den gefundenen 707
Schuhen/ (dann 707 durch 7 dividirt/ kommen 101.) dergleiche schreibet
an

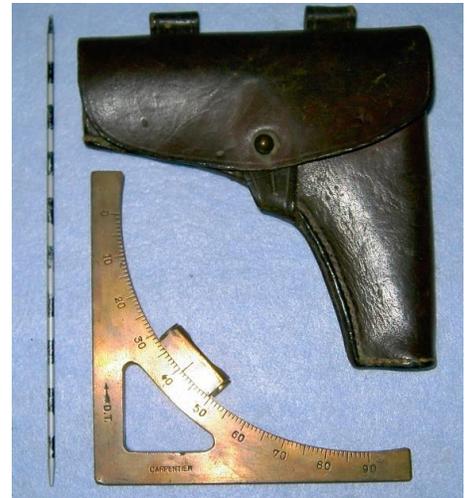


From previous research on this subject, I located an **1869** book from Switzerland about a gunner's quadrant which employed a vial containing water, which served as a "bubble level" (used in recent wars), in lieu of a plumb bob.



For comparison here you see some of this type from my collection.

FRANCE



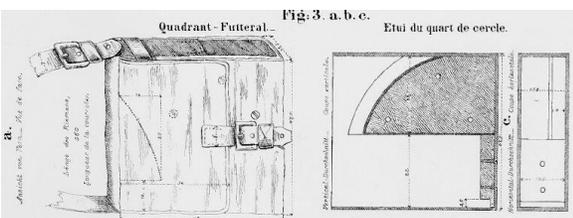
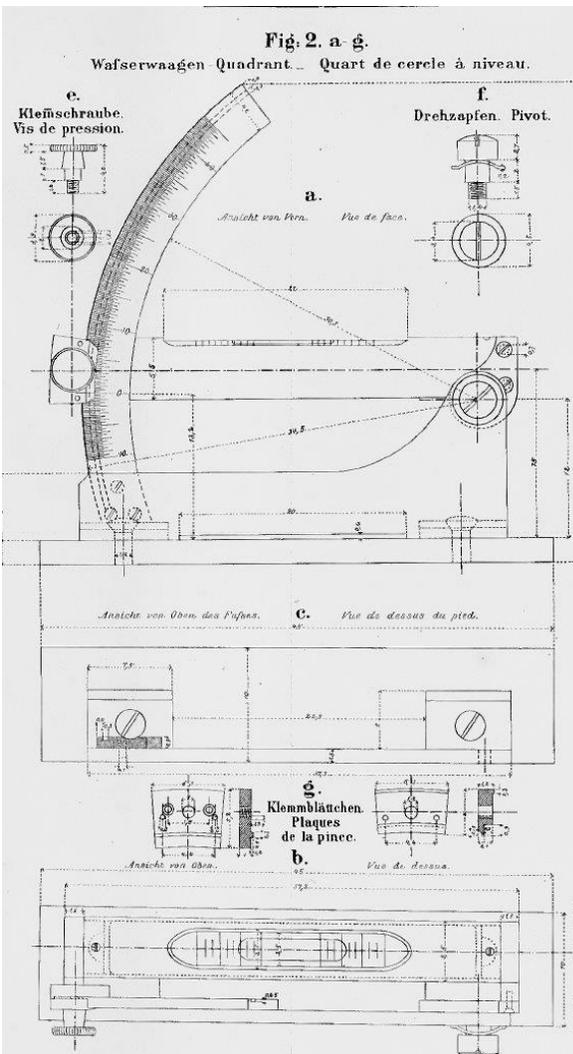
GERMANY



ENGLAND

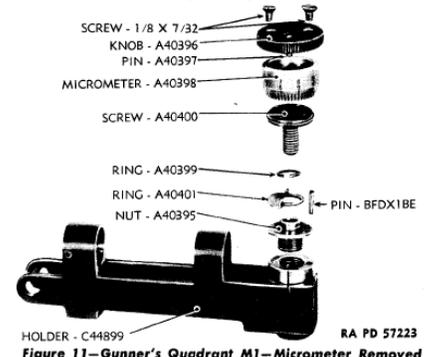
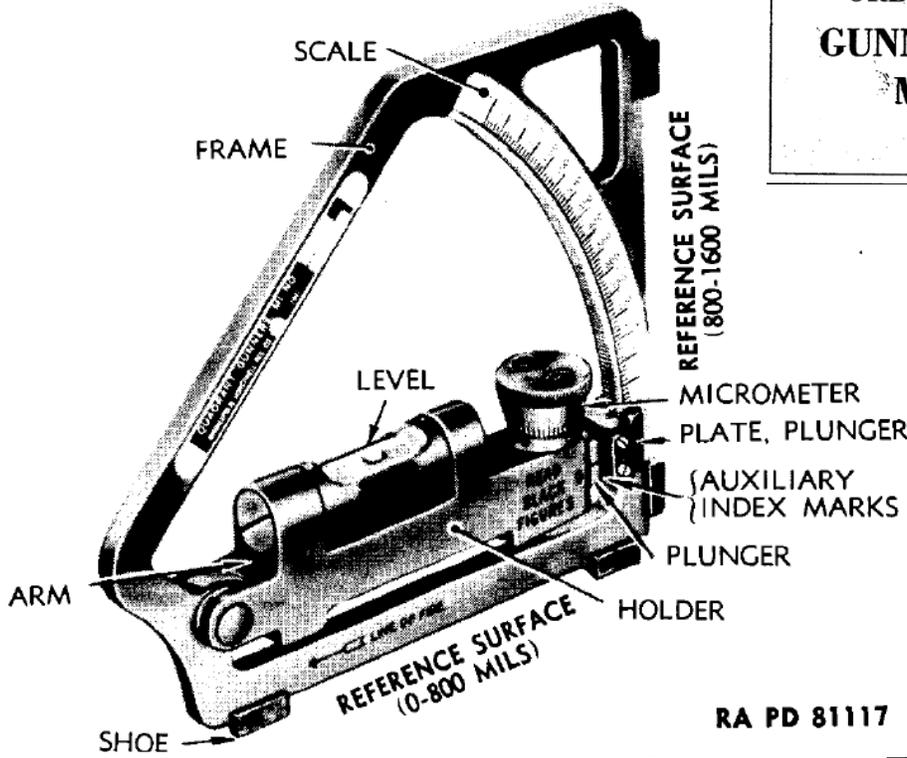


And this one is a Russian inclinometer from the last WW.



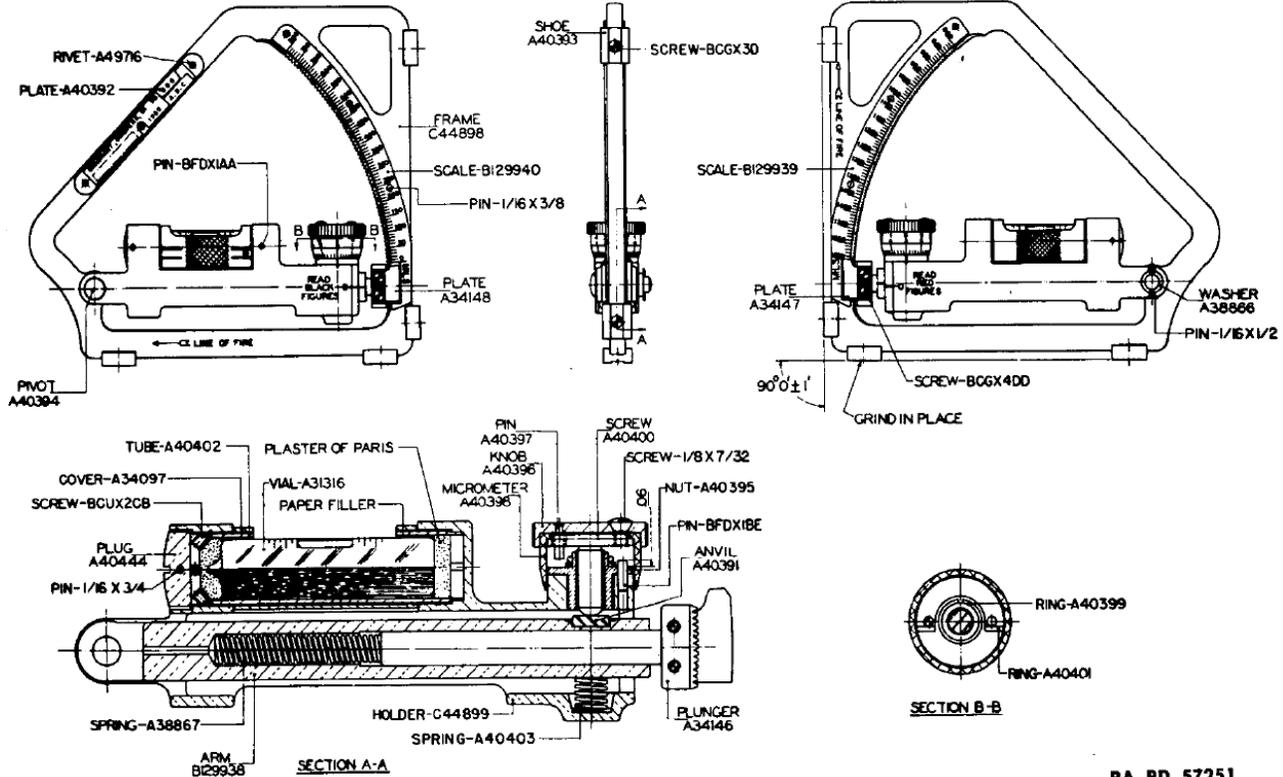
Performing an Internet search, you can download the Technical Manual from 1943 for a modern (1918 but still in use) Gunner's Quadrant.

WAR DEPARTMENT
 TECHNICAL MANUAL
 ORDNANCE MAINTENANCE
GUNNER'S QUADRANTS
M1 AND M1918
 16 AUGUST 1943



RA PD 57223
 Figure 11—Gunner's Quadrant M1—Micrometer Removed
 17

RA PD 81117



RA PD 57251

Figure 19—Gunner's Quadrant M1—Assembled and Sectioned Views

TIN SOLDIERS

While searching for information for this newsletter I found that the gunner's quadrants are also used by the **collectors of tin soldiers**. ☺

From a seller nearby I got some of these figures and instruments:

A soldier (Jamak) of the Ottoman Artillery in the battle of Vienna in (1529 and)1683 with an instrument to measure the angle of the cannon.

The crew for one cannon was 10 soldiers.



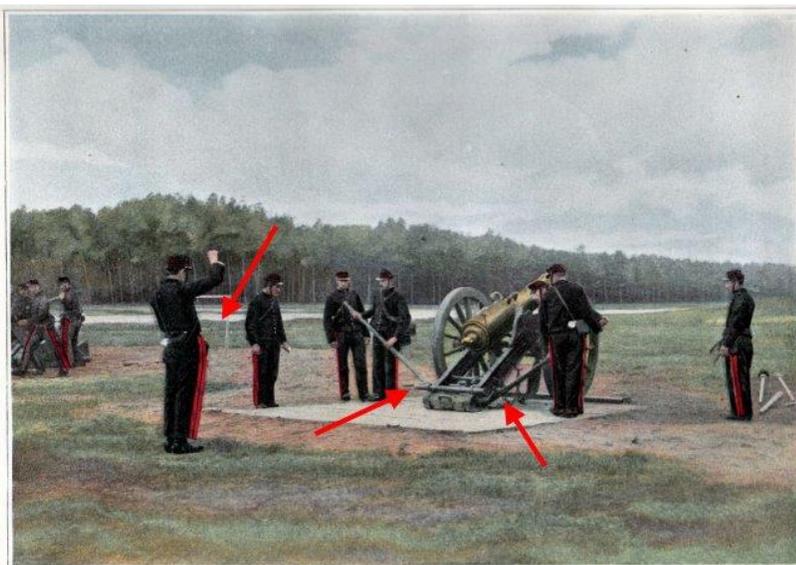
Right figure: A soldier of the Emperor Maximilian I. with a plumb level.

Finally after my conversation with the seller I bought a small diorama that gives a good idea of the fights of the Ottomans. ☺



This is a painted cannon and an unpainted soldier. Just to show the difference....

In my archive I have a French booklet (no date known) "ALBUM MILITAIRE, Artillerie a pied" that shows how the French Artillery operated cannons in former times. One photo clearly depicts use of plumb bobs for "pointage" (the French term for alignment).



POINTAGE AU FIL A PLOMB D'UNE PIÈCE DE 24 DE SIÈGE

Ce canon est en bronze et se charge par la bouche; il fait encore partie de l'armement des places. Le pointage se fait à l'aide du fil à plomb.



You also can see how the "tail" of the cannon is brought into position with two long wooden rods.

At the end of this chapter are some **links** and **photos** from **web sites** where you can find more information if you'd like:

The gunner's quadrant (fig. right) and other information can be found on the site of John Francis Guilmartin, Jr. Prof. of History, Ohio State University:

<http://www.angelfire.com/ga4/guilmartin.com/fig08.html>

Site of the Museum of the History of Science, Oxford, UK

<https://www.mhs.ox.ac.uk/>



Over 250 pictures, such as the one to the left can be found by searching for **QUADRANT** in the **DATABASE** of the previously mentioned site.

Gunner's Level
German Early 18th Century

Unfortunately, I can not identify which web site from quadrants I found these photos below and on the next page.

Sorry. ☹.

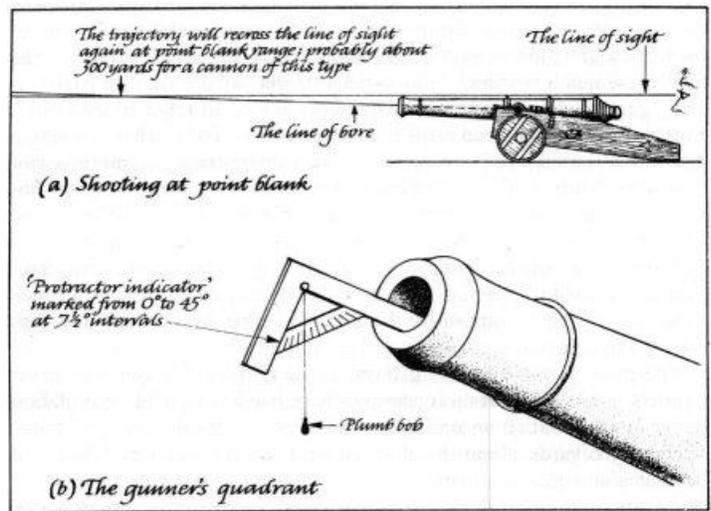
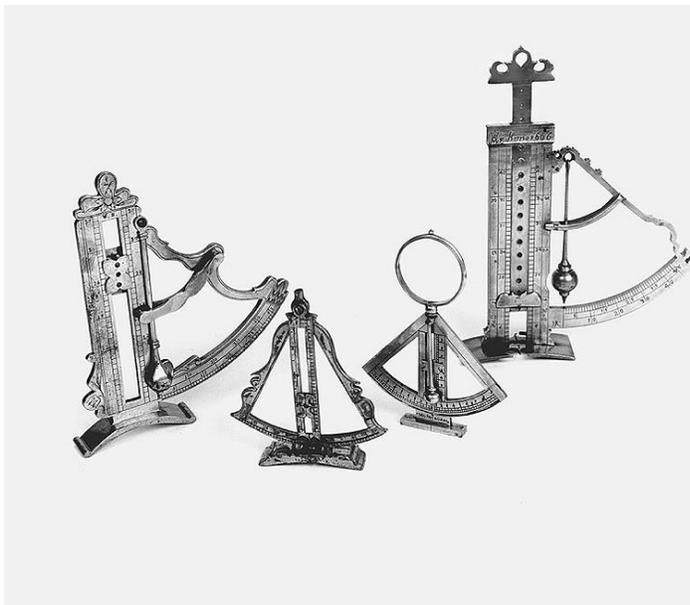
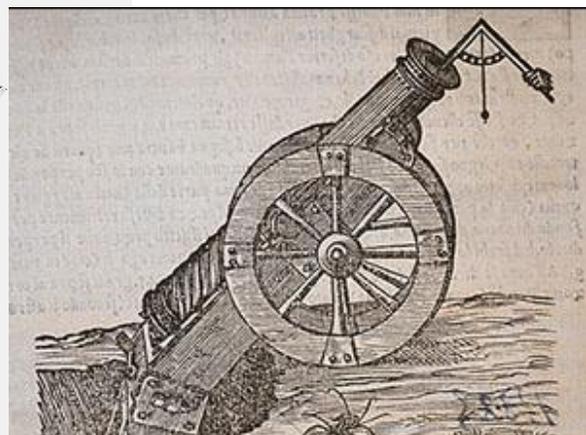
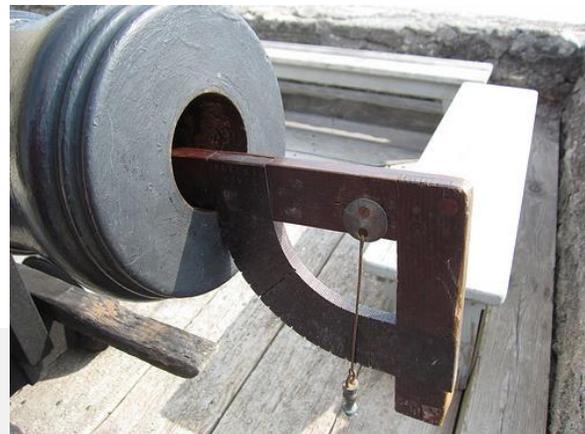


Fig. 8 Shooting at point blank and the use of the gunner's quadrant
NOTE. Aiming 'by the line of metals' at a target level with the gun results in a positive angle of elevation of the bore of the gun of 1-3°, depending on the geometry of the gun.

On a site (a blog from Craig Swain about civil war etc.) named

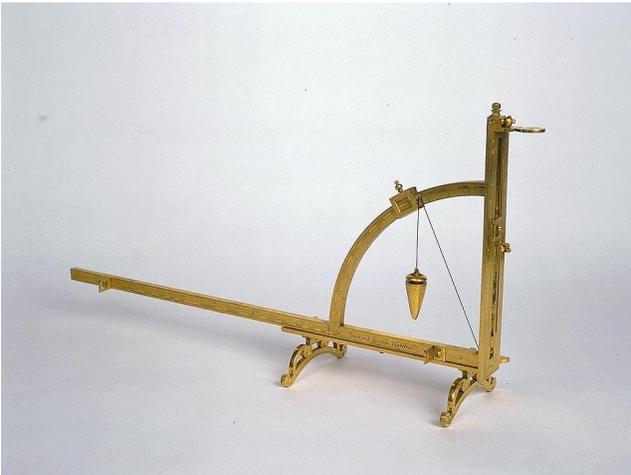
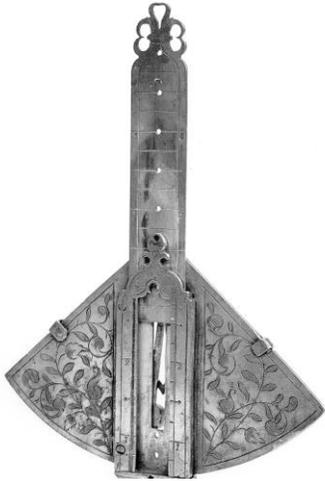
To the Sound of the Guns

Civil War Artillery, Battlefields and Historical Markers I found this reproduced instrument and the drawing below.



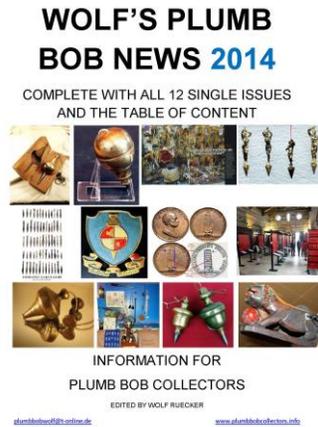
Look how precisely these instruments are built!

Would be a great addition to every collection.



6. NOTE TO NEWSLETTER BOOKLET 2014

I have assembled all 12 issues of my 2014 newsletters in one PDF-file. This file can easily be printed for personal use for assembly into a booklet. You can obtain a booklet from me. Simply send me an e-mail for further details!



7. SOME MORE X-MAS-CARDS

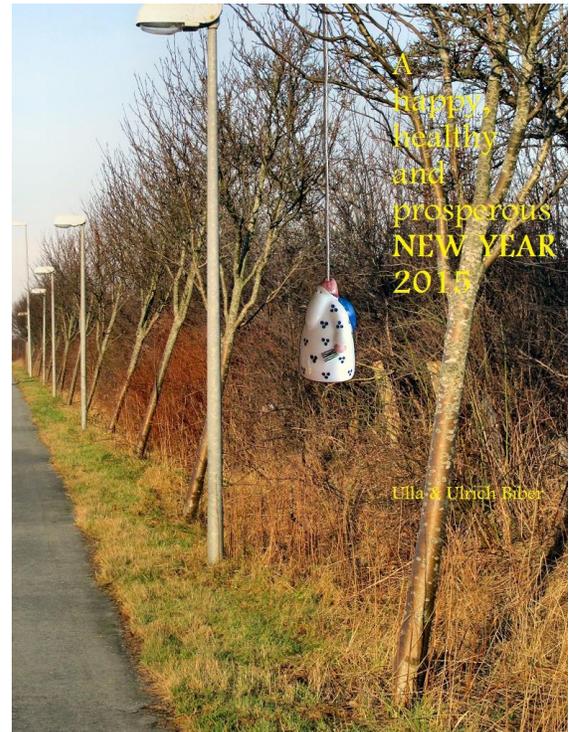
In the December newsletter I showed some X-Mas-Cards from collectors. Here are some more:



Galleries Lafayette, Paris, France.
X-Mas "plumb bob" ☺

From Ulrich Biber, Germany.

To see that the trees are not vertical in the northern part of Germany you don't need a plumb line. ☺



Greetings from SPAIN:

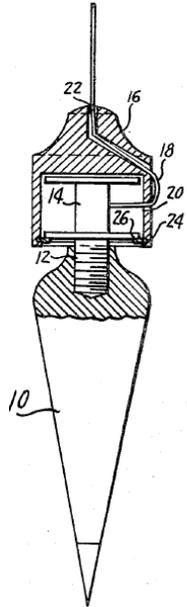


8. WHO HAS A "PEACOCK" FOR ME?

For my collection I am looking for this patented PEACOCK tool to add it to a common American carrot.



R. T. PEACOCK
PLUMB BOB
Filed July 18, 1966



If you have one for me, please let me know.
Thanks

10. REMARK

DEAR READER OF THE PLUMB BOB NEWS,
DEAR FELLOW COLLECTOR,

This is an article of the regularly published WOLF'S PLUMB BOB NEWS that is sent on demand as PDF-file attachment by email. FREE.

You can see all former publications on the website www.plumbbobcollectors.info on sub page "download publications".

Remarks and contact by email: plumbbobwolf@t-online.de

Enjoy it

Wolf Ruecker

PS. This NEWSLETTER is also available in GERMAN.

9. SOMETHING TO SMILE ABOUT

Sometimes items to the right are sold as plumb bobs. Unfortunately, these are not plumb bobs but HANDLES for a CHINESE FIGHTING CHAIN.



On Wikipedia you can read: *The chain is a weapon used in some Asian martial arts, particularly traditional Chinese disciplines, in addition to modern and traditional wushu. It consists of several metal rods, which are joined end-to-end by rings to form a flexible chain.*

Below some pictures of this tool.



Logo of the IPBCA
INTERNATIONAL PLUMB BOB
COLLECTORS ASSOCIATION.
For us THE WORLD TURNS
AROUND THE PLUMB BOB