WOLF'S PLUMB BOB NEWS 2012
Issue 06 June 1, 2012

THE WELL WHISTLE

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Dear Fellow Collector,
Dear reader of the PLUMB BOB NEWS,

Please, as always I am in search of new photos, catalogs, articles or personal stories about any aspect of PLUMB BOBS from you. Any help is appreciated.
If you have any information or pictures for these themes, please let me know.
Thank you, looking forward to hearing from you

Wolf

THE WELL WHISTLE

Content

1. INTRODUCTION

Dear Fellow Collector,
in my collection are indeed devices for depth measurement, such as plumb bobs from the marine (sounding weights) or measuring instruments for wells. This includes the current tool, the so-called WELL WHISTLE. It is only known in Germany where it was developed.

2. WHAT IS A WELL WHISTLE?

A well whistle (bathometer, well depth finder, well depth sounder) is an aid to determine the depth of the ground water level below a certain point on the earth's surface; such as the rim of the well or the top of a measuring tube for ground-water monitoring.
-The well whistle is an instrument with which the water level in a well (or level measuring tube) is measured -.
The well whistle is a metal cylinder open at the bottom with a small whistle hole in the otherwise closed top.

The outside of the cylinder is divided by circumferential grooves in distance of 1cm. The graduation starts at ZERO near the whistle. The well whistle is lowered hanging on a measuring cord (or measuring tape) down the well. When the water from below enters into the cylinder it presses the air through the whistle hole and makes a sound. Once the sound is heard, the instrument must not be lowered any further. The depth to the water level resulting from the sum of the required length of the measuring line and the number of NONE water-wetted centimeter rings of the well whistle.
The method is suitable for depths up to 30 m (100 feet). The measurement accuracy is 1 cm, which corresponds to the distance of the outer rings. This tool is now - for professional use - completely replaced by an instrument using electricity and light instead of air and sound.
Figure left: Hole at the bottom and whistle
Fig. right: Well whistle from my collection

3. WHO INVENTED THE WELL WHISTLE?

The well whistle in its present shape is based on a utility model registration / design patent (DRGM) of an employee of the company in Frankfurt, Germany, Spohr, **Mr. Ludwig Rang**, the Rang'sche Brunnenmesser (Rang's wells whistle) of **1902**. Unfortunately, the documents of the application from 1902 are no longer available. ☹
With this design patent, a unit of Prof. Max Pettenkofer in **1856 - the cup apparatus** – was improved. See below for details. **1938** there was another design patent (DRGM) of the company **Wehlte & Co,** Halle, Germany with three modifications.

Some time ago I had the opportunity to correspond with the current owner of Spohr in Frankfurt, Peter Spohr. He was able to contribute some information about the history of the well whistle, and sent me the publication of 1984 for the 100th anniversary.

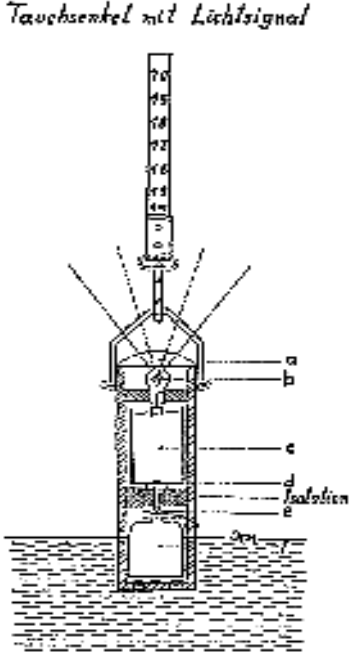
From their web site:

Company's History [1]

"Well Whistle" - utility model of 1902

The SPOHR company was founded in 1884 by Heinrich Christian Spohr (1853 – 1923) and was engaged in the production of measuring and recording equipment for the monitoring of ground and surface water since its very beginning.
As early as in 1902 the primary "Well Whistle" – the idea of an employee – was protected as a utility model (see adjacent picture).

Carl Spohr (1877 – 1957) was the head of the company since 1908. In difficult times with World War I, inflation and global economic crisis he and his employees succeeded in keeping the company alive, in the beginning mainly with the production and installation of master and slave clock systems, then with the repair of switchgears and later again increasingly with the manufacture of measuring equipment for the water management. While his son and successor Heinz Spohr was at war and in captivity, Carl Spohr, now almost at the age of 70, assumed control of the company again.



"Lichtlot" (Plummet with Light Signal) - utility model of 1933


Water Level Meter ("Kabellichtlot") made in 1962

Heinz Spohr (1912 – 2002) joined the firm in 1931 and became co-partner in 1939. He mainly concentrated in water level measuring technology, and already in 1933 he had his plummet with light signal ("Lichtlot" – see adjacent picture) protected as a utility model. Improvements of this instrument in the 1950ies resulted in the invention of a water level meter with light signal at the cable reel ("Kabellichtlot") which should become the standard portable water level detecting instrument in wells and bore holes from that time on. Furthermore many different models of float recorders matching the respective application purposes were developed and produced.
*In 1979 business operations were taken over by the re-established SPOHR-Messtechnik GmbH. After graduating as an engineer in Electrical Engineering and Business Sciences and after some years with the family business, fourth generation Peter Spohr (*1949) became the managing director of the new company.*
In subsequent years existing instruments were improved, for example with new electronic circuitry, and new and enhanced graduations for the hot stamped measuring tapes were introduced. Once more the proportion of world-wide exports could be increased. In 1996 a Quality Management System as per DIN EN ISO 9001 was established and updated in 2002 and 2008.
For decades the production of the SPOHR company is organized as a crafts enterprise. All employees are highly qualified and are working at their own responsibility. Hereby a consistent high quality and reliability of the instruments is ensured as well as a flexible after sales service for many years. Cost-efficient internal handling and minimal administrative expenses provide for best value for money for all instruments, spare parts and services.

[1] http://www.spohr-messtechnik.de

Original ads from a catalogue of the factory Heinrich Christian SPOHR, at Frankfurt, Germany from the 1930s.

H. CH. SPOHR, FRANKFURT A. M.

Rang's Brunnenmesser.

NEU! Einfach. D. R. G. M.

NEU! Praktisch. D. R. G. M.

Messinstrument mit akustischem Signal
für Flüssigkeit-Oberflächen.

Dieses neue Instrument dient zum Feststellen der Tiefenlage von Flüssigkeit-Oberflächen in Brunnen, Behältern etc.. überhaupt in allen schwer zugänglichen Räumen ähnlicher Art.

Bisher dienten verschiedene Behelfe, wie Klötzchen, Flaschen, Becherstäbe u. s. w. zu diesem Zweck, die jedoch für den Messenden stets eine grosse Unsicherheit hervortreten liessen, da die vorher unbekannten Tiefenlagen der Messspiegel erst durch mehrfache Versuche annähernd festgestellt werden konnten.

Das oben abgebildete Instrument unterscheidet sich sehr vorteilhaft von den bisherigen dadurch, dass es an einem Messbande befestigt beim Eintauchen in die Flüssigkeit ein deutliches Signal **(Pfeifen)** abgiebt und so den Messenden augenblicklich in Kenntnis setzt, dass das Instrument die Flüssigkeit erreicht hat.

Zur noch genaueren Feststellung des Flüssigkeitspiegels sind auf dem Mantel des Instrumentes Rillen in Centimeterteilung eingedreht, die sich beim Eintauchen mit Flüssigkeit füllen.

Um allen Auforderungen gerecht zu werden, z. B. wo nur gewöhnliche Messungen vorgenommen sollen werden, wird das Instrument auch ohne Rillen (als Modell II) geliefert. Sämtliche Modelle haben einen Durchmesser von 37 mm, wodurch die Möglichkeit gegeben ist, schon in Messrohren von 40 mm zu messen.

Abb. 8:
Aus einem Werbefaltblatt um 1903

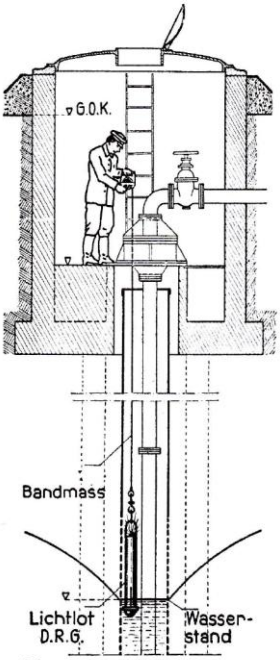
H. CH. SPOHR, FRANKFURT (Main) 1

Gegr. 1884 BAUMWEG 10 Gegr. 1884

FERNSPRECHER 44104 .·. POSTSCHECKKONTO: 5529 FRANKFURT (MAIN)

Geräte für Wasserstandsbeobachtung

LICHTLOTE * BRUNNENMESSER
BANDMASSE

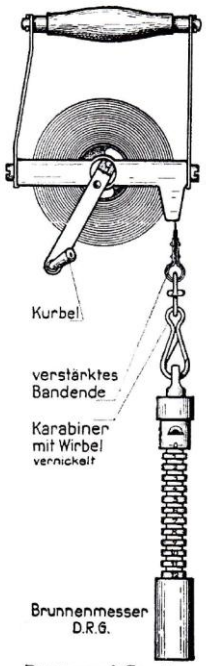


Messung mit Lichtlot u. Broncebband in einem Brunnenschacht

Lichtlote und Brunnenmesser sind die **einfachsten** Instrumente zur **genauen** Beobachtung des Grundwasserstandes und zur Messung der Tiefe des Wasserspiegels bei Brunnen, Behältern usw.

Mit meinen Original-Instrumenten wird bei fast allen Städt. Wasserwerken täglich gemessen. Ihre Konstruktion ist in allen Teilen äußerst stabil und zweckmäßig.

Brunnenmesser werden für einfache Messungen benutzt, wenn am Meßort **kein störender Lärm** zu erwarten ist; Lichtlote ermöglichen sehr genaue Messungen selbst großer Tiefen und können auch bei laufenden Pumpen und sonstigen Störgeräuschen Verwendung finden.



Brunnenmeß-Garnitur No. 22, 50 Meter lang Broncebband

Internationale Wasser-Ausstellung Lüttich 1939
2 Silbermedaillen

BRUNNENMESSER

Brunnenmeß-Garnitur No. 21 15 Meter lang D. R. G. M.

Rangs' Brunnenmesser
mit akustischem Signal

Wenn am Meßort Störgeräusche auftreten, verwende man Lichtlote (s. S. 1).

Wirkungsweise:

Die Brunnenpfeife besteht ganz aus Messing, ist hohl und hat oben einen Pfeifenschlitz. Außen sind 12 oder 14 Rillen eingedreht, deren Abstand genau 1 cm beträgt. Wenn das untere Ende der Brunnenpfeife ins Wasser eintaucht, entweicht die Luft oben durch die Pfeife. Bei diesem Pfeifsignal wird das Bandmaß ruhig angehalten und die Tiefe abgelesen. Die Tiefe des Wasserspiegels ist dann = Ableselänge am Meßband + Anzahl der an der Brunnenpfeife **leer** gebliebenen Rillen in cm.

NEU! Die Brunnenmesser besitzen Innenpfeife, und der Kopf ist aus einem Stück, ein Abbrechen ist daher ausgeschlossen.

Zum Brunnenmessen benutzt man Broncebänder in Messingrahmen! Nur diese Bänder können ohne Bedenken immer naß eingerollt werden.

Für wirklich sichere und schnelle Messungen ist außer der Brunnenpfeife ein geeignetes, genau passendes Bandmaß erforderlich. Ich empfehle meine kompl. Garnituren (Preise s. u. rechts).

Diese Garnituren sind für den besonderen Zweck der Wasserstandsmessung geschaffen und entsprechend widerstandsfähig ausgeführt. Gewöhnliche Bandmaße ergeben meist ungenaue Messungen und werden bald schadhaft.

Bestell-No.	Außendurchm. des Messers in mm	Für Tiefen bis zu ca m	Brunnenpfeife allein RM	Preise der kompl. Garnitur wie Abb. Länge des Meßbandes 5	10	15	20	25	40	50	100 Meter
21	27	25	**11.50**	**26.— 28.50 31.50 35.— 40.—**							RM
22	27	100	**14.50**						**55.— 65.— 106.—**		RM
23	20	75	16.50	31.— 33.50 36 50 40.— 45.— 57.— 67.—							RM
24	15	50	16.50								RM

Bei Bestellung von Garnituren die Bestell-No. **und** die Länge des Meßbandes angeben. Bei Bezug von Brunnenpfeifen allein zur Unterscheidung „lose" hinter die Bestell-No. setzen. Brunnenpfeifen mit Leinenbändern No. 140 zum billigeren Preis. Günstig ist ein möglichst großer Durchmesser der Brunnenpfeife. Bestell-No. 23 und 24 sind nur für enge Rohre bestimmt.

Die obenstehenden Garnituren sind meist am Lager. Andere auf Anfrage. Starke Rindledertaschen mit Tragriemen für Garnituren . . . . . .

LICHTLOTE

Lichtlot-Garnitur 50 Meter lang D.R.G.M.

Beim Lichtlot wird die genaue Tiefe sofort am Bandmaß abgelesen.

Wirkungsweise:

Das Lichtlot wird am passenden Bandmaß befestigt herabgelassen. Sobald nur das untere Ende ins Wasser eintaucht, sendet das Lot einen hellen Lichtstrahl nach oben. In diesem Augenblick hat der Nullpunkt des Bandmaßes gerade den Wasserspiegel erreicht. Die Tiefe kann jetzt direkt am Meßband abgelesen werden. Durch leichtes Auf- und Abbewegen des Meßbandes erhält man noch eine zuverlässige Kontrolle: das Licht erlischt und flammt wieder auf. Die Meßgenauigkeit ist deshalb sehr groß (etwa 0,003 Meter) und Fehlmessungen gänzlich ausgeschlossen.

Die neue „feldmäßige" Ausführung:

Das Lot kann ohne Werkzeug mit wenigen Handgriffen ganz auseinandergenommen werden. Deshalb wird der Zustand des Instruments immer leicht kontrolliert. Die normale Stabbatterie läßt sich leicht auswechseln. Das Lot ist außen vernickelt und poliert und hat einen Platin-Kontakt.

Die Lichtlot-Garnituren werden mit den bewährten Bandmaßen in Messingrahmen Nr. 110 geliefert. Die Garnituren sind zweckmäßig und erleichtern das Messen ganz bedeutend. Die Preise der Garnituren verstehen sich mit genau zum Lichtlot eingestelltem Bandmaß einschl. Federende und starken vernickelten Karabinerhaken.

Bestell-No.	Außen-Durchm. d. Lotes in mm	Lichtlot allein RM	Preise der kompletten Garnitur wie Abbildung 10	15	20	25	40	50	75	100 Meter
54	44	28.50					69.—	79.—	102.—	120.— RM
55	**35**	**27.—**	**44.— 47.— 50.50**			**55.50**	**67.50**	**77.50**	**100.50**	RM
56	23	29.50	46.50	49.50	53.—	58.—	70 —	80.—		RM

Die Garnituren mit Bandmaß Nr. 110 sind meist am Lager. Andere Längen und Ausführungen **auch für größere Tiefen** bitte ich anzufragen. Garnituren können auch mit Bandmaßen Nr. 120, 130 und 140 zusammengestellt werden. Günstig ist ein möglichst großer Durchmesser des Lichtlots. Bestell-Nr. 56 ist nur für enge Rohre bestimmt.

Sämtliche Preise dieser Liste sind in Reichsmark angegeben und verstehen sich netto ab Fabrik ausschließlich Verpackung. Alle Angaben, insbesondere Preise, Maße, Abbildungen und dergleichen sind nicht bindend, und ihre Änderung bleibt vorbehalten. Lieferung an mir unbekannte Besteller erfolgt gegen Nachnahme oder Vorauszahlung.

4. OPERATING INSTRUCTION

The reference point (ZERO) of the measuring section is marked near the whistle. (see figure right)

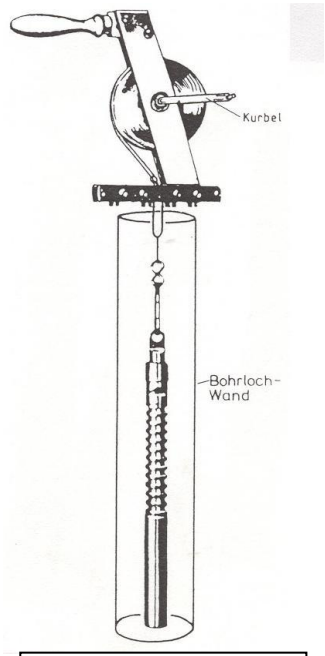
a) Attach the well whistle on the matching tape and then push the fuse clip on the opening point of the snap hook. Let down the well whistle to the water level.
b) When you hear the whistle, stop lowering the tape and read the depth (i.e. 8.60m)
c) Pull up the well whistle to see how many grooves are EMPTY (i.e. 5 grooves)
d) The correct depth is: length of the tape **plus** number of **empty** grooves in cm. (In this example 8.60 m + 5 cm = 8.65 m)

ATTENTION!

- ***Before** measuring, **all grooves** have to be **empty**; **after** the measurement the well whistle has to have **above empty and below full** grooves. If **all** grooves are full or **all** grooves are completely **empty**, the measurement must be **repeated**.*
- *After the measuring tape was read (see b), don't further lower the whistle but immediately pull it up.*
- *The tape is shortened (to have ZERO on the whistle) for a correct measurement and the special framework will facilitate the measurement and protects the tape. The winding direction is marked on the frame.*

Figure right from an Austrian web site[2] with a complete measuring unit (tape + well whistle) shows the use in a well or hole:

In my museum I have installed a reproduction of a hole with a complete well whistle measuring equipment to show the visitors the use and let them hear the sound of the whistle. ☺



Brunnenpfeife. (aus Richter, 1989, S. 399)

[2] Institut für Wasserwirtschaft, Hydrologie und konstruktiven Wasserbau (IWHW) http://iwhw.boku.ac.at oder http://iwhw.boku.ac.at/gewaesserkunde_alt/html/Kapitel8.html

5. WHAT WAS USED BEFORE THE WELL WHISTLE? The evolution 1862-1939.

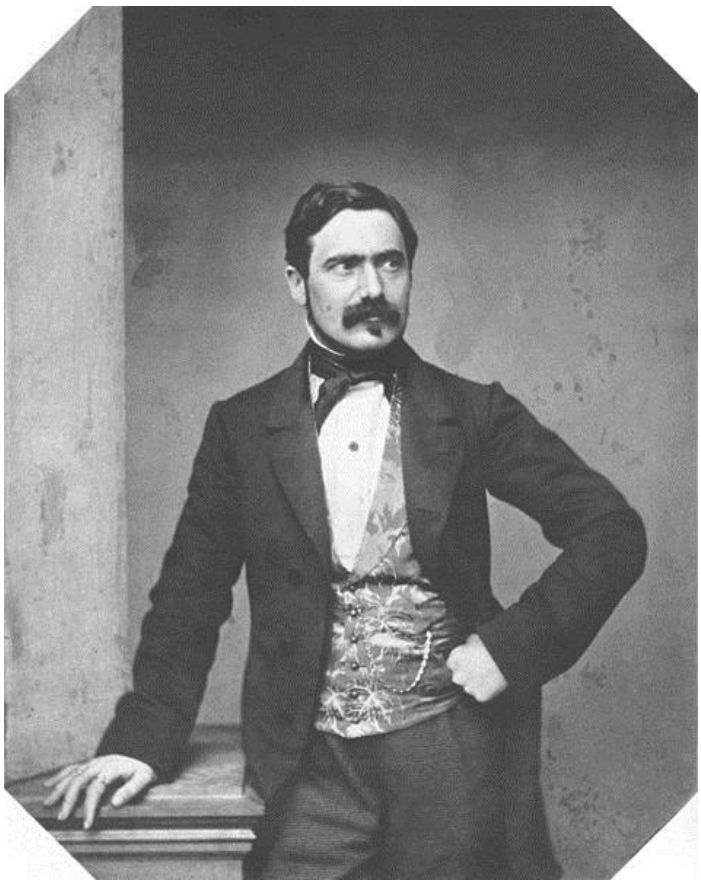
For sure, you can measure the level in a well with other methods:
You can tie an object to a string (water resistant and stable in length) and let it "clap" in the water. Then pull the cord up and measure with a **measuring rod** or **tailor yard stick**. Quite a time consuming affair.
You also can use tins instead of stones.
Also used were rods that were pushed to the ground. The wet part was measured.
Sometimes at the lower part of the rods linen clothes were attached to better see the dividing line between wet and dry.
All these methods are time consuming and of course, quite inaccurate by our standards today.

During my researches I found on www.books.Google.com (searching for "Brunnenpfeife"= well whistle in German) some books where the first big ground level measuring activity in Germany was described.
The reason for the overall measurement was the cholera epidemic in Munich, Germany 1853/54. **Professor Max von Pettenkofer** wanted to prove that the increase of cholera deaths correlated with the increase in groundwater levels. There are a lot of published texts in Germany and worldwide. (Diseases connected with Moisture and Ground Water). His experiments then were continued in other big cities like Berlin, Germany, Buda-Pesth, Hungary, Calcutta, India etc. The evidence was discussed very controversial. (In Germany Pettenkofer's views on the spread of cholera have not met with universal acceptance, though there are several instances in support.)

A short bio[3]:
Pettenkofer, Max von, hygienists, born 3rd December 1818 in Lichtheim / Neuburg on the Danube, Germany. Died on 10 February 1901 by suicide, since 1847 Professor in Munich, ... Founded the experimental hygiene. .... made studies of cholera and typhoid. ("Studies and Observations on the method of dissemination of cholera (Munich 1855) ...

In the year 1883 he was awarded the hereditary a title of nobility.

For more details see WIKIPEDIA [4] where I got the picture below.



1856
METHOD AND INSTRUMENTS: (Pettenkofer)
*"The measurement I make with a number of **5-foot-long wooden sticks** that can be **screwed together**. To see exactly how far the bottom rod dipped into the water, there is **fixed a device on the last rod**, that fills with water as high as this is in the well. **These small bowls or cups are fixed at intervals of 1/8 inch on a thick paternoster-like wire.** From the top bowl filled with water the distance is measured from a fixed point of the well."*

Unfortunately **I could not find any pictures or drawings of this instrument before 1880**, I only found descriptions. But finally I found some very good illustrations in the later publications.
MORE DETAILS YOU CAN FIND IN THE ORIGINAL TEXTS IN THE GERMAN VERSION OF THE "PLUMB BOB NEWS".
Feel free to ask.

[3] Meyers Kleines Konversationslexikon **1906**

[4] http://en.wikipedia.org/wiki/Max_Joseph_von_Pettenkofer

In **1866**[5], **1867** [6], and **1868**[7]:

*For Munich, Germany five different observations had been found sufficient, of which two were on the right side and three on the left side of the river Isar, at a distance of about a thousand yards from the river itself. He (*Pettenkofer*) measured the water from a fixed point in the well to the level of the water,* ***by means of a rod*** *or a* ***piece of tape covered with tar****, at the lower end of which* ***small cups were fixed****, at a distance of about an eighth of an inch each, which, on being removed, were found filled with water. The uppermost cup that was full indicated the distance of the level of the water from the fixed point on the surface. For Munich, Germany it had been found sufficient to take these measurements once a fortnight.*

1887[8]: *Professor Pettenkofer uses* ***a rod*** *on which are* ***fixed a number of little cups****, and, when let down into the well and drawn up again, the uppermost cup which contains water marks, of course, the height of the water; the length of the cord or rod used for letting down the cups being known, the changing level of the well can be estimated to within half an inch. Some* ***precautions*** *are necessary in making these observations: if a rope is used* ***it may stretch*** *with use, or in a hot dry wind,* ***or contract*** *in wet weather, and thereby* ***make the observation incorrect****…*

Pettenkofer also uses a ***large float which is suspended by a chain*** *travelling over a pulley: this supports an indicator at its other end, which marks the height on a fixed scale.*

Figure right from [9]

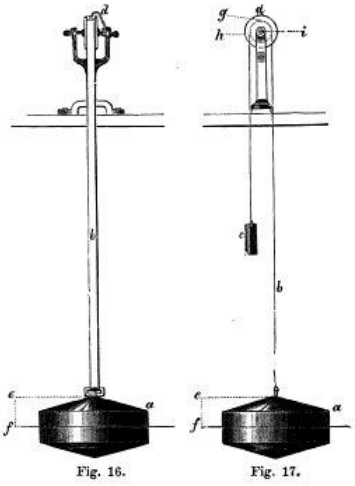


Fig. 16. Fig. 17.

I had to search a very long time to find the right name of this instrument of Pettenkofer. Later I could search on www.books.Google.com for "cup apparatus" and "Schälchenapparat" (German) and found some sources with drawings of the instrument that is the grandfather of the common well whistle.

Below you find the **history since 1881**:

1881: [10]

*Pettenkofer introduced the far more perfect apparatus. This consists in a measuring tape, on which is mounted below a series of small cups in a very short distance. See figures 52 (*No diameter indicated)

1893[11] and **1899**: [12]


Fig. 83.—Cup apparatus.

§ 172. In order to determine the level of the water (ground water) in a well with accuracy and trustworthiness, we proceed as follows, according to Pettenkofer: At the end of a ***sufficiently long measuring-cord (in general 10 m),*** *graduated in decimeters, hangs a* ***rod of brass****, fitted at intervals of 1 cm with* ***small, flat, horizontal cups*** *(Cup apparatus, Fig. 83).*

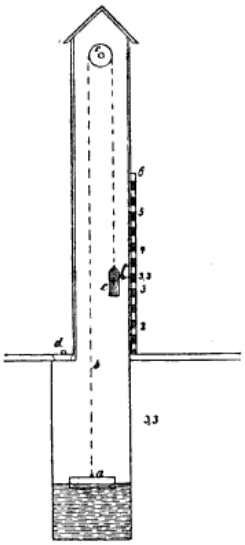


Fig. 84.—Well for Observing Ground-Water.

The measuring-line is cautiously uncoiled, and let down into the well with the cup apparatus first, after the plat of stone or iron which closes the shaft has been removed (Fig. 84,d). We observe at the bottom of the shaft a small, shining, quiescent surface of water, which suddenly takes a tremulous motion as soon as it is touched by the point of the cup apparatus. From this moment the measuring-cord is lowered only until the upper margin of the opening of the shaft coincides with the nearest decimeter mark of the cord. The cord is then drawn up, and the number of metres and decimeters showing the depth of the well is read off: to the value thus ascertained is added the piece of the cup apparatus which projects above the water-level, i. e., as many centimetres as cups have remained ***un****filled.*

If, e.g., we have read off 3.62 m. on the measuring-cord, and two cups have remained unfilled, the level of the water would be 3.62 m. below the surface of the earth.

[5] In GERMAN: LOTOS Zeitschrift für Naturwissenschaften 16. Jahrgang Prag 1866 Seite 59

[6] Aus der Natur. 39. Band Leipzig 1867 S292 „Über das Grundwasser und seine Bewegung"

[7] THE MEDICAL TIMES AND GAZETTE London 1868 p102

[8] A MANUAL OF PRACTICAL HYGIENE, London 1887 p10, 11

[9] Lehrbuch der Hygiene May Rubner 1899 S 60 ff

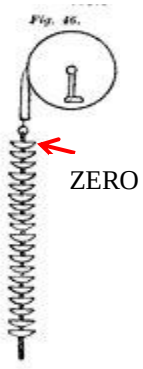
[10] Lehrbuch der HYGIENISCHEN UNTERSUCHUNGS-METHODEN, Flügge Leipzig 1881 S 211 ff

[11] In English: METHODS OF PRACTICAL HYGIENE;Lehmann, London; 1893 p 308, 309

[12] In German: Die Methoden der Praktischen Hygiene, Lehmann Wiesbaden 1890 S 198 ff

Remark:
An inexperienced operator sometimes commits the error of overlooking the movement of the surface of the water, which is often not easily perceptible, and ***immersing the measuring-cord so deeply that the entire cup apparatus is under water,*** *and even the* ***measuring-cord is wetted****. Such a measurement is, of course, useless, and must be repeated after the cups have been emptied out. For accurate and repeated observations of ground-water* ***the measuring-band must be checked from time to time, as the slips of leather or wax-cloth used vary considerably in length in course of time.***

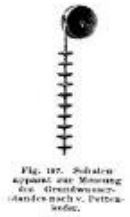
1892: [13]
At the end of a measuring tape is attached - according to von Pettenkofer's proposal - a metal rod with metal cups at intervals of 0.5 cm and are mounted in such a way ***that the edge of the first small cup is the zero point of the measuring tape*** *(Fig. 46)…*



1895 [14]***:*** *The measurement of the ground-water, best indicated by the height of the water-level in wells. Pettenkofer uses* ***a rod for shallow wells*** *and* ***a cord for deep wells*** *to which are* ***attached a number of little cups*** *which are let down into the well and drawn up again.*

1895 [15]***: Measurement of Level of the Ground-Water****.-This may be easily found by determining the depth at which water stands in a well; or a special boring may be made for this purpose. A long rod marked in feet and inches, or metres and centimetres, let down until it touches the water; or a tape measure with a weight at the end, will show the depth at which water is standing in a well. Pettenkofer fixes a number of little cups on to a rod, the uppermost cup that contains water showing its depth from the surface. Or, a float on the surface of the water may be attached to a cord passing over a pulley, at the other end of which is an indicator, which of course rises or falls inversely with the float.*
Whichever arrangement be adopted, it is important

1. *To note a* ***fixed point for the datum****, from which the depth is measured*
2. *A number of observations should be made in* ***different wells*** *in the neighbourhood*
3. *In the case of a well, either the well* ***must not be pumped for hours previously.***



1898: [16]
If the water level ***is too deep for a rod,*** *a measuring tape with the cup-apparatus by Pettenkofer can be used. (Fig. 197) …*

1899: [17]
For the measurement is used Pettenkofer's cup apparatus (Fig. 61). Small round cups are ***soldered*** *to a rod at a distance of 0.5 cm.*


Fig. 61. Schalenapparat zur Messung des Grundwasserstandes nach Pettenkofer.

"Well Whistle" - utility model of 1902

1902[18]**UTILITY MODEL** #169234. Rillen **Brunnen-messer mit akustischem Signal**. (well measuring device with acoustic signal). Ludwig Rang, Frankfurt a/M. Mörfelderlandstr.

1908 [19] shows the well whistle from Pettenkofer (a) and the floating level indicator (b) in a well.

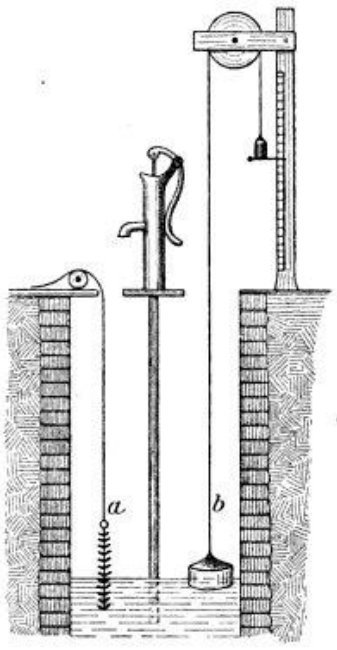


Fig. 6. Grundwassermessung. Schematischer Durchschnitt durch einen Grundwasserbrunnen. Bei *a* Messung mit Pettenkofers Schälchenapparat; bei *b* Schwimmer mit oben abzulesendem Zeiger.

[13] Anleitung zu Hygienischen Untersuchungen Emmerich, Trillich München 1892 S 150 ff
[14] ANNUAL UNIVERSAL MEDICAL SCIENCES, Philadelphia, 1895 p F11
[15] HANDBOOK OF HGIENE, London 1895 p 415
[16] Die Untersuchung landwirtschaftlich wichtiger Stoffe. König, Berlin, 1898 S 600
[17] Grundlagen der Hygiene 1899
[18] Patentblatt Kaiserliches Patentamt 1902 Gebrauchsmuster S 301
[19] Grundriss der Hygiene, Flügge, Leipzig 1908 S 115

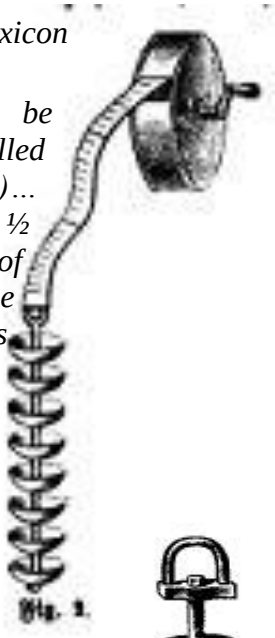
1906 [20]**:**I found the first article, where the well whistle (with **37** mm diameter) of Mr. Rang from the factory Spohr is described very detailed:

RANG'S ACOUSTIC
WELL MEASURING INSTRUMENT
By Engineer J. Heil from Darmstadt, Germany

This instrument is designed by the foreman Mr. Rang at Frankfurt a / M., Germany from the electro-technical factory of H. Ch Spohr made there and used for several years to detect the depth of the water level ***in wells, bore holes, tanks, etc., even in all the hard to reach areas*** *of similar nature with great advantage.*
In the past for this purpose have been used several, more or less inadequate auxiliary methods such as blocks, bottles, cups, bars etc., which were associated with an inevitable uncertainty of the measurement results. With them the required depth was only found approximately by repeated trials.

The instrument shown in the right figure is a cylindrical pipe of 37 mm diameter and 15-20 cm in length. The pipe is hollow and closed at the top by a cover, in which is a whistle opening. Once in the hollow pipe a stream of air is pressed upwards through the whistle opening, a loud sound is heard. The application of the instrument is now in such a manner that a measuring tape is fixed to the upper-end bow on which the instrument is allowed to slide into the deep. When the instrument reaches the water level and begins to immerse into the liquid the in the pipe included air is pushed up and a loud and clearly audible whistle signal penetrates from the depths and informs the observer at once of the situation.
For exact determination of the liquid level are turned in the mantle of the instrument ***cup-shaped grooves in centimeters distance.*** *They are filled in with water during immersion, while the grooves above the water surface remain unwetted.*
The measuring tape must be attached to the suspension hook so that the zero point of the instrument coincides with the zero point of the tape.When the whistle is heard, you must let fall the plummet a few inches further, then read the position of the measuring tape and now pull up the instrument carefully. …

1908 *from Brockhaus Lexicon looking for „Groundwater"*: [21]
… the ground water can be measured easily by the so called CUP APPARATUS (Fig.2)… distance of the cups is 1 to 1 ½ cm … For construction of buildings and wells, the knowledge of these conditions is important. You can see from this how deep you can go with the foundation wall into the ground without being placed under water, and how deep you must dig wells in order to get always plenty of water. …



In ***1910 + 1920*** *I found the first time that* ***a relation was mentioned between Mr. Rang and Prof. Pettenkofer:***[22]
1910:

Water level measuring
in bore holes and wells

… the tool shown in Fig. 59 is a ***combination of the Pettenkofer cup apparatus with an acoustic signal installation****…*

Fig. 59.

From the same book in ***1920****: … the* ***distance of the cups is 0.5 cm****. … Since it is very* ***dark in some wells*** *the worker* ***cannot find easily the water level*** *with the old instrument by Pettenkofer. So they* ***added a whistle invented by Rang****. See Fig.195 …..*

Abb. 195. Wasserstandsmesser (Brunnenmesser) mit Pfeifvorrichtung. (Nach Rang.)

1918:[23]
The depth could be measured very easily by the instrument of Rang, that ***makes a loud sound when it touches the water level*** *(Fig. 212)…You can buy the apparatus from Paul Altmann, Berlin NW, Luisenstr. 47, Germany.*

Fig. 212.
v. Pettenkofersche Schalenapparat.

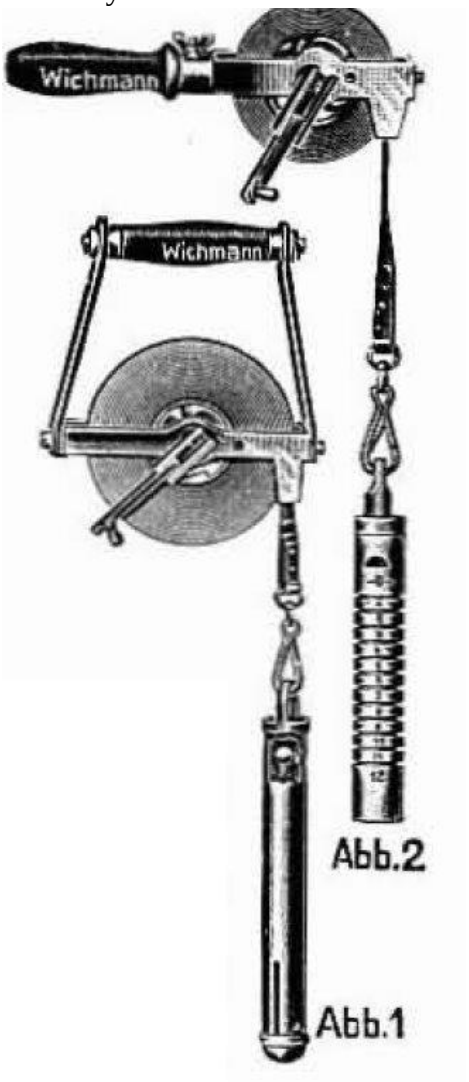
[20] Zeitschrift für Vermessungswesen XXXV. Band 1906 Stuttgart S 648 – 652

[21] Brockhaus Konversations-Lexikon Achter Band 1908 S 461, 462

[22] Die Untersuchung und Beurteilung des Wassers und des Abwassers. Ohlmüller, Spitta, Berlin 1910 bzw. 1920

[23] Chemie der Nahrungs- und Genussmittel König, Berlin 1918 S 479, 480

1939 from the catalog of Wichmann, Berlin, Germany: [24].



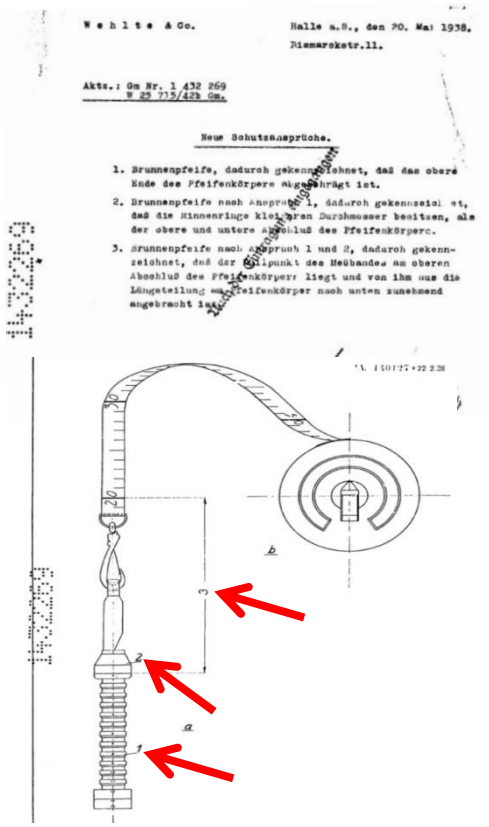
REMARK: The full text of the sources mentioned above you can read in the German version of this Plumbbob NEWS.

1938

The well pipe by Mr. Rang from 1902 was improved in 1938 by the firm Wehlte & Co in Halle an der Saale, Germany with the UTILITY MODEL 140127 and. 382238 called:. ACUSTICAL WELL MEASURMENT INSTRUMENT.

Below the original pages with a drawing and the 3 NEW CLAIMS:

1. **Diameter** of the cups **reduced** (So the water cannot drop into the cups when pulling up the instrument in the hole)
2. **Tapered shoulder** (so the instrument cannot be stopped by obstacles in the hole)
3. **Adapted measuring tape** (Point ZERO of the tape is identical with ZERO of the whistle)



W e h l t e & Co. Halle a.S., den 20. Mai 1938.
Bismarckstr.11.

Akte.: Gm Nr. 1 432 269
W 25 715/42b Gm.

Neue Schutzansprüche.

1. Brunnenpfeife, dadurch gekennzeichnet, daß das obere Ende des Pfeifenkörpers abgeschrägt ist.
2. Brunnenpfeife nach Anspruch 1, dadurch gekennzeichnet, daß die Hinnenringe kleineren Durchmesser besitzen, als der obere und untere Abschluß des Pfeifenkörpers.
3. Brunnenpfeife nach Anspruch 1 und 2, dadurch gekennzeichnet, daß der Nullpunkt des Meßbandes am oberen Abschluß des Pfeifenkörpers liegt und von ihm aus die Längsteilung am Pfeifenkörper nach unten zunehmend angebracht ist.

Advertisement by WEHLTE & CO, Halle, Germany ca. 1941

[24] WICHMANN, Berlin Haupt-Katalog 20. Ausgabe 1939

6. ARE THERE STILL WELL WHISTLES ON THE MARKET TODAY?

Price list of the factory Spohr in Frankfurt, Germany[25]

SPOHR-Messtechnik GmbH • Länderweg 37 • D-60599 Frankfurt a.M.

Netto Preisliste 11/1 zu den Prospekten B730/06 und R18/81

Preise freibleibend in EURO, ab Werk, ausschließlich Verpackung, zuzüglich gesetzlicher Mehrwertsteuer. Gültig nur bei Anerkennung unserer allgemeinen Liefer- und Zahlungsbedingungen.

Kabellichtlote mit LED und akustischem Signal und Ledertaschen/-beutel

Länge	15 m	30 m	50 m	80 m	100 m	150 m	200 m	300 m	500 m
Nr.	731	732	733	734	735	736	737	738	739
EURO	150,00	169,00	193,00	253,00	278,00	335,00	398,00	530,00	738,00
Nr.	LT	LT	LT	LB6	LB6	LB6	LB6	LB7	LB7
EURO	61,00	61,00	61,00	56,00	56,00	56,00	56,00	80,00	80,00

Lotgeräte (Sonderlängen auf Anfrage)

Länge	50 m	100 m	200 m	200 m	350 m	350 m	500 m	500 m
Nr.	LS1	LS2	LO21	LO25	LO41	LO45	LO51	LO55
EURO	129,00	181,00	359,00	262,00	539,00	369,00	718,00	475,00

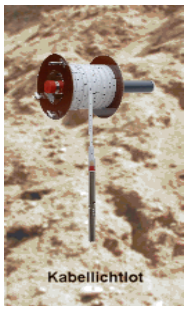
Brunnenmessgarnituren mit Brunnenpfeife Nr. 22 und Ledertaschen

Länge	10 m	15 m	20 m	25 m	30 m
Nr.	2242	2243	2244	2245	2246
EURO	109,00	115,00	117,00	122,00	126,00
Nr.	LB2	LB2	LB2	LB2	LB2
EURO	69,00	69,00	69,00	69,00	69,00

Garnituren mit Brunnenpfeife Nr. 24: Mehrpreis EURO 8,00

Ersatzbrunnenpfeifen, Brunnenthermometer, Wasserprobenentnahmegerät

Nr.	22	24	TH3	TH4	EG1
Techn. Daten	27 mm ∅	15 mm ∅	30° C	40° C	300 ccm
EURO	47,00	55,00	60,00	59,00	87,00



Makers in Poland offer the WELL WHISTLE:

Hydrogeological steel whistle
dimensions: length 235 mm,
diameter Ø30 mm; weight: 550g

application: measuring of water level with Correction collars allow to check accurate water surface depth.

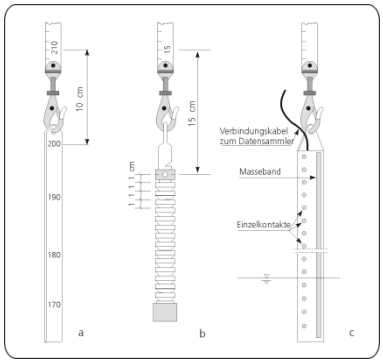
measuring accuracy: ±1 cm

Also offered: WITHOUT CUPS, but with a WHISTLE. (fig. left)
Accuray **+/- 10 cm instead of +/- 1 cm**.

.

Hydrogeological steel whistle
dimensions: length 235 mm,
diameter Ø24 mm; weight: 354g
application: measuring of water level
measuring accuracy: ±10 cm

The instruments today are for sure connected with the computer to display the data…



There are still other depth measuring instruments like the SEBA, Germany (see figure below) or the former ALPINA EASTMAN that I described in WOLF'S PLUMB BOB NEWS 2008-05 „DEPTH MEASURING INSTRUMENTS"

[25] http://www.spohr-messtechnik.de/html/produkte.html

7. A VISIT TO MY WATER SUPPLIER

After my visit to the past I wanted to know what instruments are used today. So I asked the director of my Purpose association water supply Trollmühle in Windesheim, Germany www.trollmühle.de for a meeting.
So I had the opportunity to visit the installation with an electrician.
Thank you very much for this chance.

Administration building and
removal of uranium in the background

Some key figures for this organization:

- Founded 100 years ago
- Working for several counties
- 14 000 homes
- 420 km of main pipelines
- 24 town communities
- 21 high tanks
- 25 deep wells
- 33 employees
- 2 million m³ of water / year

The latest acquisition is an ion exchange process for removing uranium and an ion exchange water softening process (partial desalination).

When I asked for a well whistle I got - as expected - a negative answer. Although the staff worked for over 20 years in this company, he had never seen any well whistle.
Today, its successor, the so-called Cable Light Gauge (plummet with light signal; from the company Spohr in Frankfurt, Germany) is used for mobile use in monitoring wells or well-shafts.

The water levels in the various tanks (reservoirs), - for the stationary operation- , sensors are inserted into the outlet pipes that measure the hydrostatic pressure and pass the values to the computer system. These hidden "brownies" are not really of interest for collectors. ☹
However, I have seen as a parallel / replacement device also a floating level meter. (See figure right.) The small hydrostatic pressure sensor can only be found sleuthing with the help of insiders. (See figure below)

float level meter

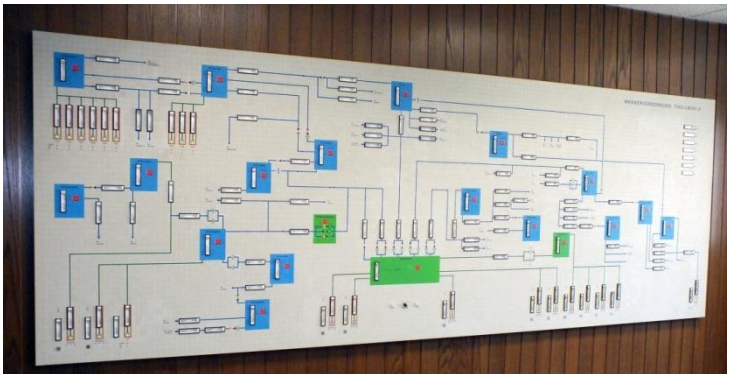
float

counterweight

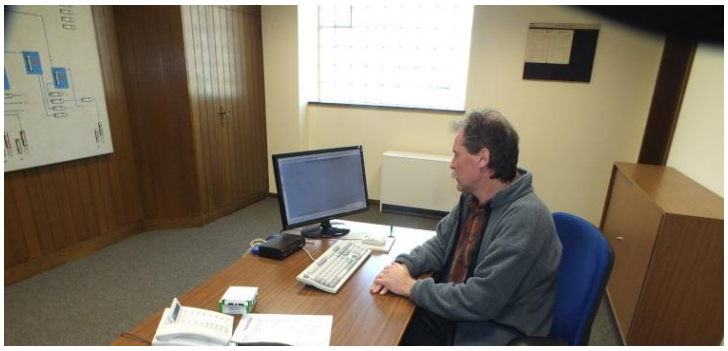
This water tank is monitored
by the device

In the basement under the grid you can see the sensor

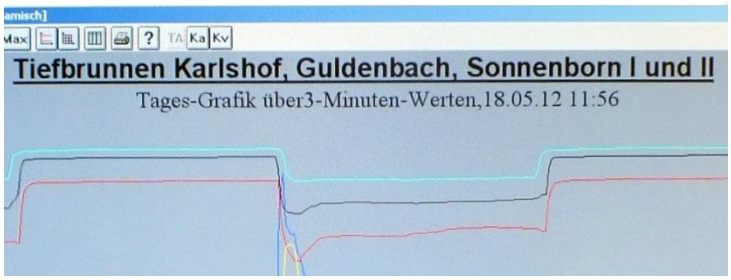
For the monitoring a large information board exists, where all data will be processed on the computer and are available at any time.



Display of current values



Monitoring place with current values

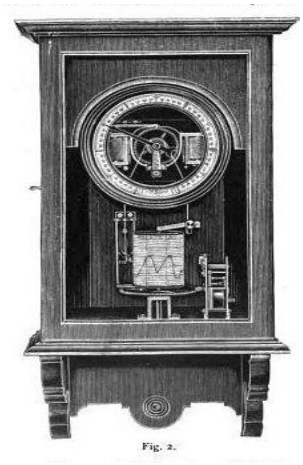


In the next room I found, however, a museum piece, something familiar to me. There was a unit with three-level indicators and scribes of Lechner & Co. in Frankfurt, Germany.

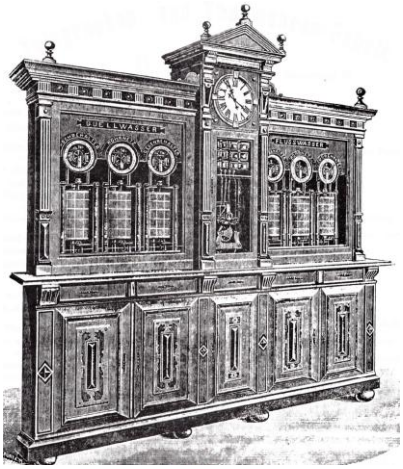
Elektrischer Pegelschreiberschrank
Lechner & Co Frankfurt, Germany

When I came back home I found the solution in a publication of the Association of Electrical Engineers, Frankfurt 1898. There we read about the company H. CH. Spohr, Factory of electric clocks, water level indicators, telephones and telegraphs:

... founded in 1884 under the name Lechner & Spohr. In 1886 the business came in sole ownership of H. Ch. Spohr, ... The principal special apparatuses for electrical water level remote message are .... ***Figure 2*** *Registration work and* ***displays for the continuous recording of water levels.*** *The upper part of Figure 2 represents a pointer element, which is intended to indicate the reported water levels. The simple design ensures long operating life of this instrument. The Registry installations are supplied with various equipment ... The recorded curves on the graphs are characterized by great clarity and accuracy.*



(Figure 3, right) represents a large registry instrument which continuously records graphically and displays electrically the water level in 4 reservoirs and the level of two mercury manometers of the wells- and river water line of the city of Frankfurt..



So I'm on my search for the latest technology still hit the past. That's the interesting part of my research for my PLUMB BOB NEWS.

But one thing must be said: the old equipment looks nicer, even if it does not reach today's quality standard.

8. Last but not least SOMETHING TO SMILE ABOUT

In a German book[26] *from* ***1860*** *I found a very funny fairy tale about* ***the mayor and a city council who did not want to pay the full price for drilling a water well****. The City "Krähwinkel" (small city where the cock is crying" is a synonym for a city with people who thought to be very clever, but they aren't…)*

The council of a city would provide not only for bread and salt for the citizens, but also for water. ***So they ordered a hydraulic engineer to build a well: with a depth of 30 men.*** *The man built this well, but the* ***fee was much higher*** *than the people had thought.* ***The council looked for a pretext*** *they could use to reduce the price. They thought they had the excuse, if they stated in a precise measurement of the depth that the well is more or less than* ***exactly*** *30 man lengths deep. They tried hard to figure out a way to make the measurement. The mayor said he anyway bears the entire burden of his position on his shoulders and it would not be so difficult to hold 30 people at his feet.* ***He therefore suggested that as the head of the city, to hang as the first to a crossbar above the well****. Then should hang on his feet the first alderman and so on according to their rank and dignity the other members of the council until they reached the bottom of the well.*
This plan was carried out. The mayor was hanging with full vestments on the beam and waited for his successor. The first alderman hangs on to the feet of the mayor and this example was followed by the others. After six people were hanging on his feet, the mayor said: "I did not think that the Collegium weighs so heavily. I ask my colleagues ***for their kind permission to rub my hands so I can than keep holding more tightly"****. And he releases his grip and* ***BANG! BANG! BANG****!*
Thus, all the men fell into the water and struck their heads against the wall. Some were drawn out of the well dead and others injured. There was great wailing and grief among the people…

Perhaps a simple well whistle would have been a better idea!

9. REMARKS

This is an article of the monthly 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
Remarks and contact by email: plumbbobwolf@t-online.de

Thank you for your interest

Wolf

Please join us for the

4th PLUMB BOB COLLECTORS MEETING
Autumn 2012 in ATHENS, Greece.
Oct. 5, to Oct. 7, 2012

If you are interested to come to Athens, please let me know.

[26] Lustige Reise nach Krähwinkel