

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 GRUBER LEVEL

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#### 1. INTRODUCTION

Dear Fellow Collector,  
I do not collect only PLUMB BOBS (for the VERTICAL), but also instruments with plumb bobs, e.g.

- PLUMB LEVELS (the grandmother of the actual levels) for the HORIZONTAL
- INCLINOMETERS for the ANGLE and
- CHALK LINES for the STRAIGHT LINE

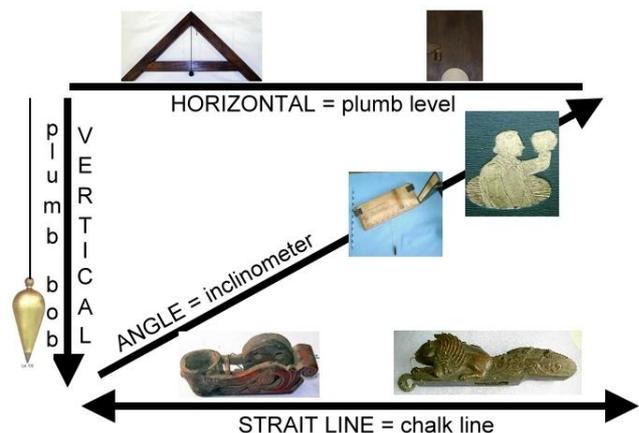
(See figure at the right sight.)

This time I want to talk about a measuring instrument that covers some of my interests.

I have chosen the German level from GRUBER, since it could be also of interest for other than plumb bob collectors. From this instrument I have a lot of information about patents and operating instructions. Moreover this instrument contains also a plumb bob and could be used as a plumb bob. Gruber called his water level a “UNIVERSAL MEASURING INSTRUMENT”.



Figure above: front part of the GRUBER level



## 2. THE GRUBER UNIVERSAL MEASURING INSTRUMENT

The UNIVERSAL-MEASURING INSTRUMENT by GRUBER was produced in two sizes: 50 cm (19 in) and 100 cm (38 in) length.

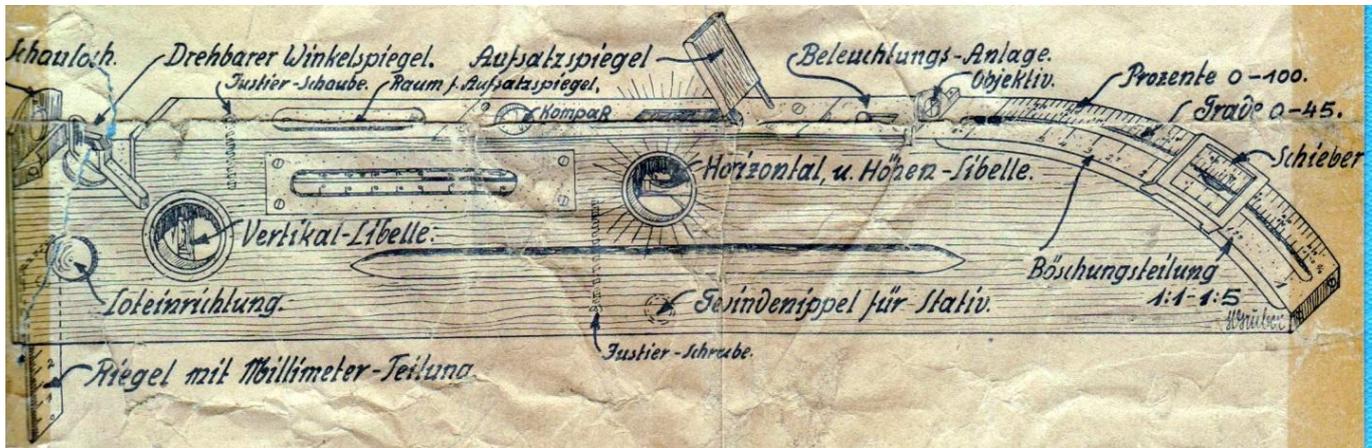
As MATERIAL he used OAK WOOD for the body and ALUMINUM for the mirrors and the sighting devices. BRASS was used for some of the scales, thermometer and cover plates. Later he used iron sheets for the cover plates. The screws are from brass or iron (when they are completely hidden in the wood).

The wooden box for the transport is from plywood. Additional options included (for extra costs) LIGHT, COMPASS, THERMOMETER and plywood BOX.

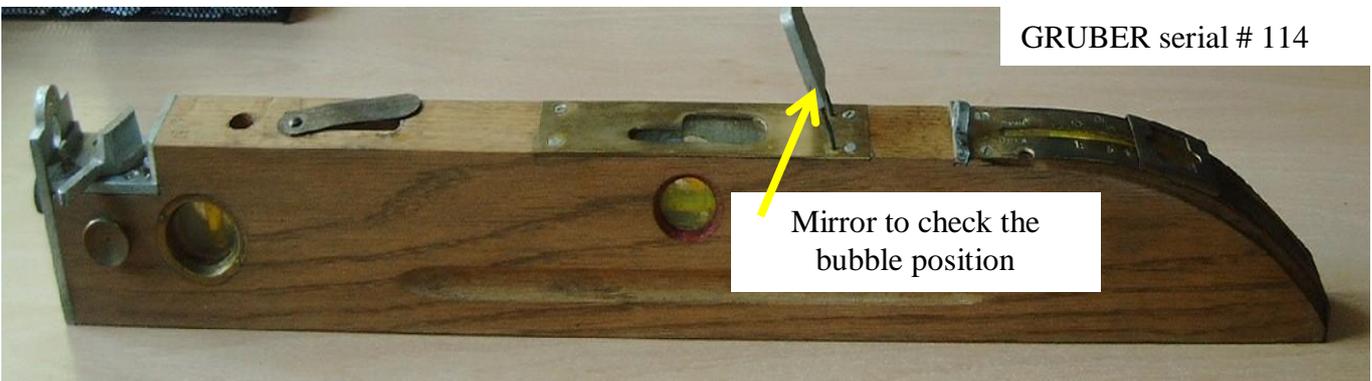
On the drawing below from the instruction sheet you will find all parts described (in German).

Figures below:

The GRUBER with serial # 38 from Kurt Heid and my GRUBER serial # 114



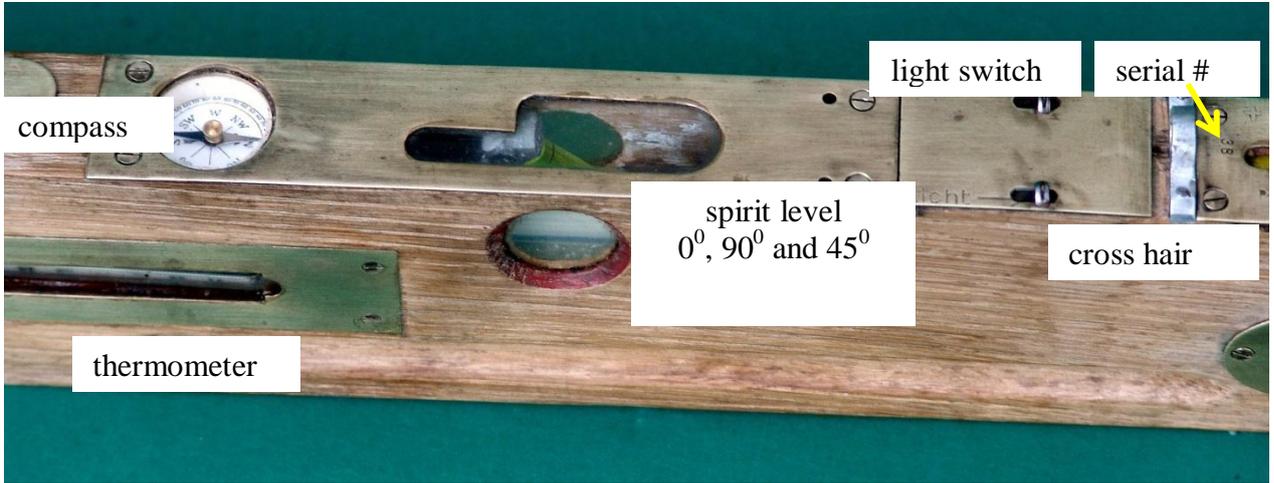
GRUBER serial # 38



GRUBER serial # 114

Mirror to check the bubble position

GRUBER serial #38 left side



compass

light switch

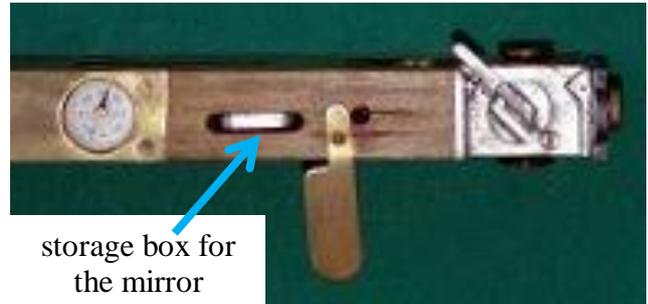
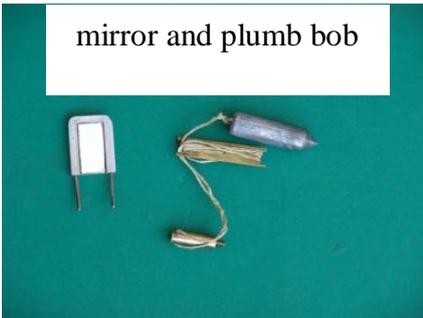
serial #

spirit level  
0°, 90° and 45°

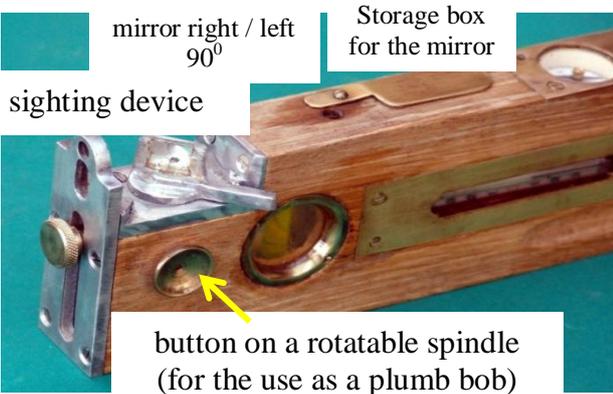
cross hair

thermometer

mirror and plumb bob



storage box for  
the mirror

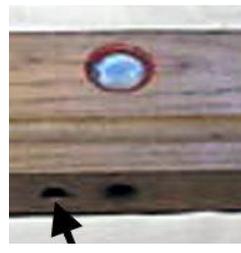


mirror right / left  
90°

Storage box  
for the mirror

sighting device

button on a rotatable spindle  
(for the use as a plumb bob)



3/8" thread for the tripod



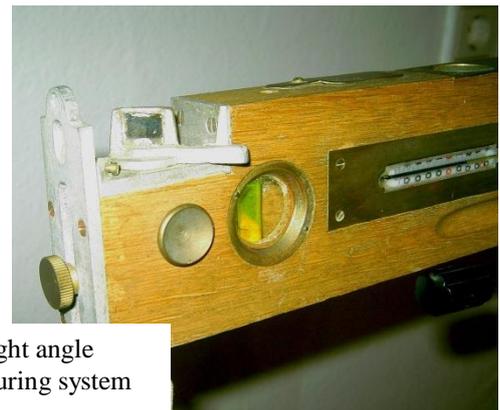
slide for inclination



GRUBER measuring instrument with  
plywood box



right angle  
measuring system

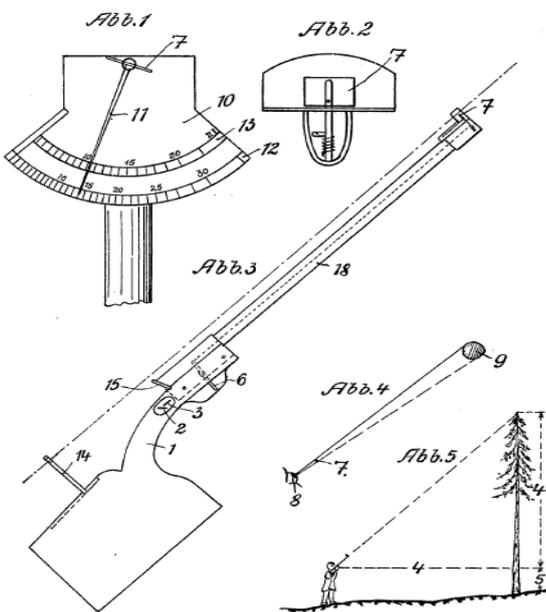


### 3. PATENTS OF HANS GRUBER

Remark: the complete original American patents you can find on <http://www.google.com/patents> ... Below on page 52-54 you will find the most interesting patent US 2,223,683.

The German patents are available on the site of the German Patent Office <http://depatisnet.dpma.de>

DE687878A GRUBER 1940 Instrument to measure the height and the width of objects (Gerät zum Messen der Höhe und Breite entfernter Gegenstände)



The described measuring instrument does not match exactly with one of the shown patents, but is a combination of different patents of Gruber. (The best adapted is the patent US 2,223,683, even when not all parts of the invention were used in the production model.):

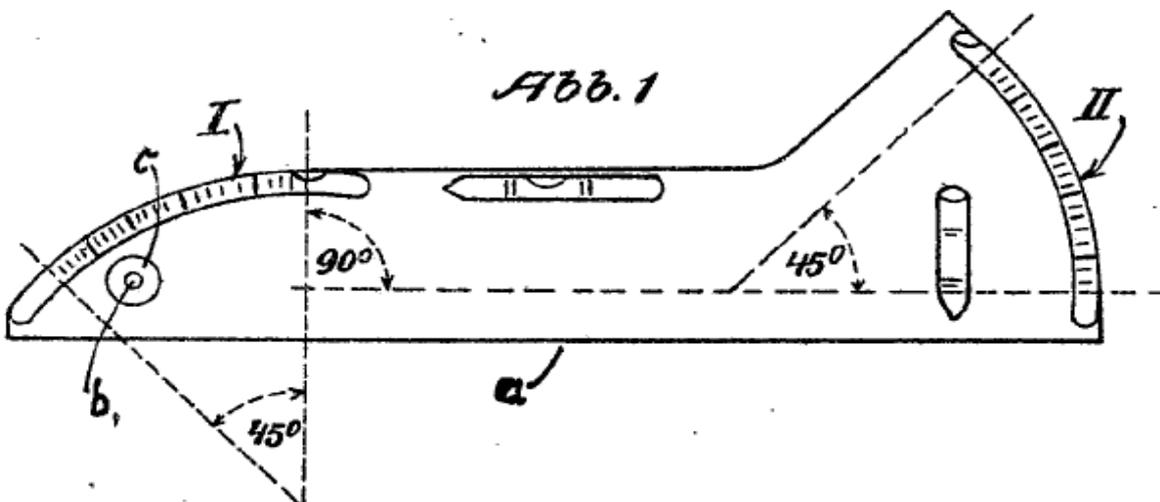
PATENTS OF INTEREST:

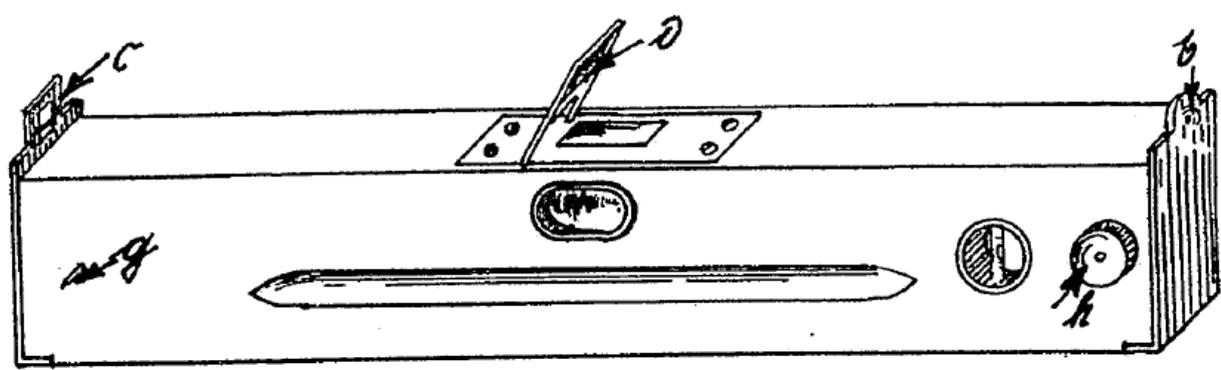
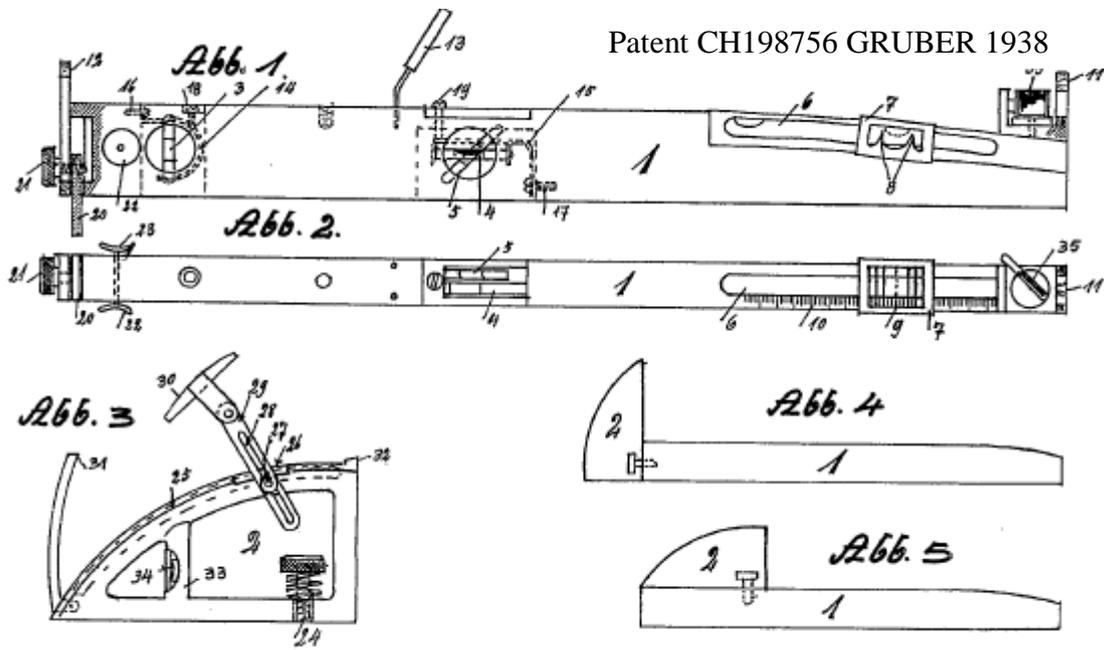
- Filed 1936: **DE687878A** GRUBER 1940 Gerät zum Messen der Höhe und Breite entfernter Gegenstände
- Filed 1936: **DE691206A** GRUBER 1940 Wasserwaage mit Längs- und Querlibelle
- Filed 1937: **DE689259A** GRUBER 1940 Wasserwaage mit Zieleinrichtung
- Filed 1938 in SWISS: **CH 198756** GRUBER 1938 VERMESSUNGSGERÄT
- Filed 1938 in den USA: **US 2223683** GRUBER 1940 Measuring or surveying instrument

(Further patents of Gruber not in relation to this measuring instrument you will find on the next page.)

Zu der Patentschrift **691 206**  
Kl. 42c Gr. 24 03

Water level with two different vials  
(Wasserwaage mit Längs- und Querlibelle)





**Abb. 6.** Patent DE689259 GRUBER 1940 Water level with sighting devices

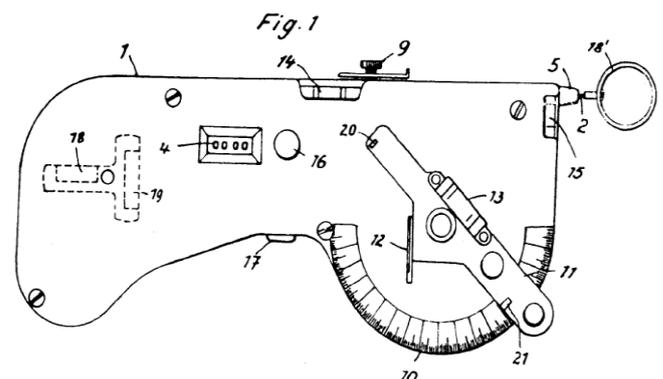
**Further patents of Hans Gruber for OTHER INVENTIONS:**

- CH112339 GRUBER 1925 **Schalbrett** für Decken und Wände
- DE479567 GRUBER 1925 **Landmine** in Scheibenform mit radial verlaufendem Zündgehäuse
- DE494183 GRUBER 1927 **Landmine** (Zusatz zu Patent DE479567)
- DE515458 GRUBER 1927 **Zünder** für Minen u. dgl.
- US1682560 GRUBER 1928 **Explosive mine**
- US1745758 GRUBER 1930 **fuse for mines** or the like
- DE1608358 GRUBER 1950 **Gepäckbinder** für Tret- und Krafträder (Gebrauchsmusterantrag)
- DE1615432 GRUBER 1950 **Ausflug- und Mörtelgerät**
- DE840160 GRUBER 1952 **Meßgerät**

- Filed Oct. 5, 1951 in the USA **US2706336** GRUBER 1955 measuring device for linear measurements.

**A sad footnote is:** The filing date for this patent was some days before his accident on Oct. 8, 1951 on the highway B12 near Mühldorf, where he died. So he never saw the answer from the American Patent Office.

Patent US2706336 GRUBER filed 1951 published 1955 Measuring device for linear measurements



#### 4. WHAT FUNCTIONS HAS THE GRUBER LEVEL?

In the instruction manual is listed:

1. Measuring of degrees
2. Slope in degrees and mm/meter
3. Using as a level up to 22 yard
4. Measuring right angles for buildings
5. Determine heights of houses, towers, trees etc.
6. Use it as a plumb bob.
7. Everything else that you can do with a common water level

More details see in the original patent text on page 52-54.

The plumb bob is attached under the body. (Position see figure below.)

I found no storage boxes for plumb bobs on serial numbers over # 100.

It seems that Gruber at the beginning put everything on his instrument and learned later that nobody needs a light, thermometer, plumb bob or compass for this tool.

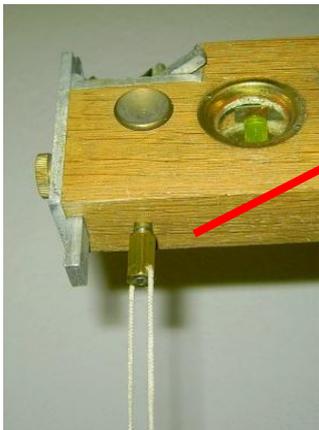
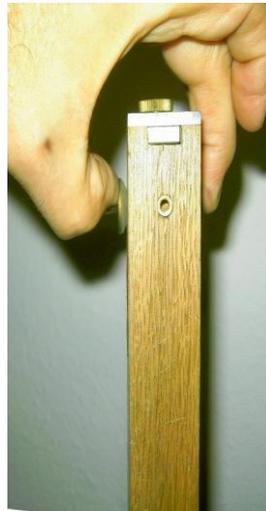
#### The instrument itself could be used as a plumb bob.

In the patent text we find: "At the end of the part 1 which carries the extension 20 are fitted on a rotatable spindle situated in the line of its center of gravity, two buttons 22 and 23, which are used for carrying out plumbing operations with the part 1." How it works you can see on the pictures below.

#### 5. THE PLUMB BOB ON THE GRUBER LEVEL - THE LEVEL AS A PLUMB BOB



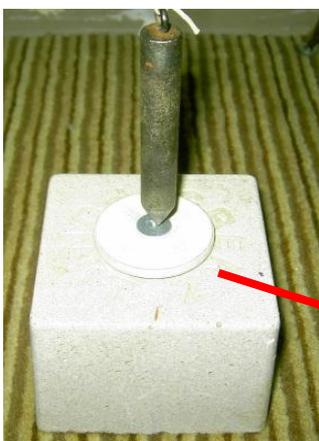
Storage box for the plumb bob



Plumb bob fixing point



Installation for measuring the right angle



6. PATENT US 2,223,683  
MEASURING INSTRUMENT

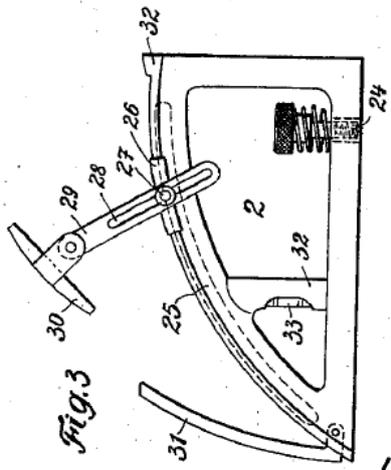
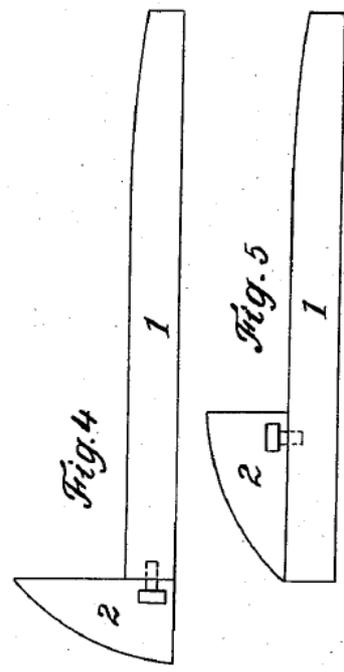
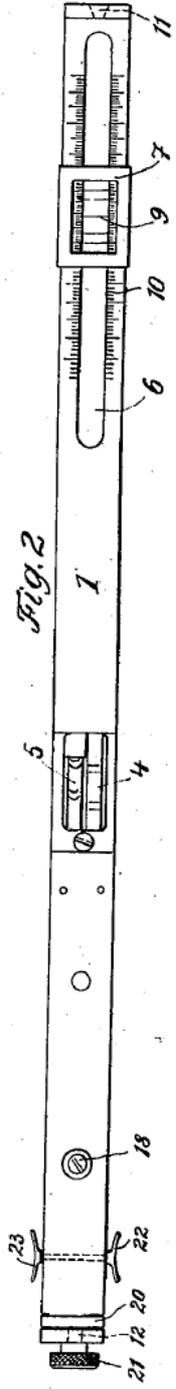
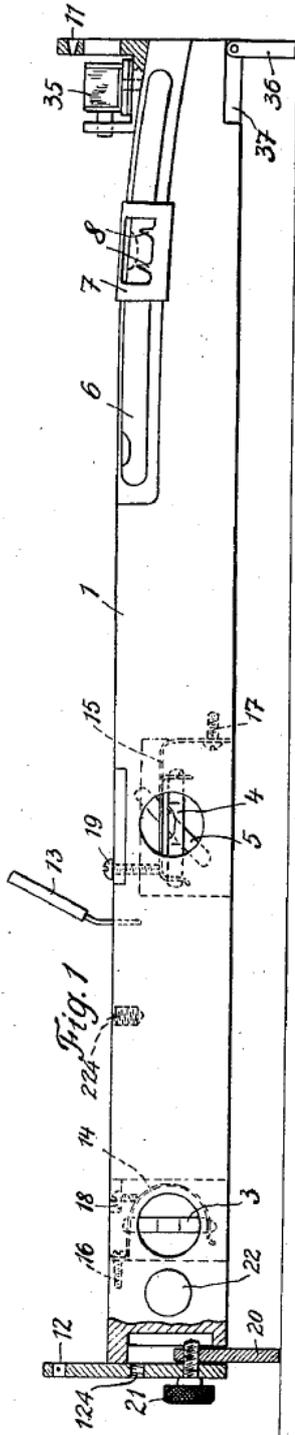
Dec. 3, 1940.

H. GRUBER

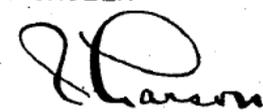
2,223,683

MEASURING OR SURVEYING INSTRUMENT

Filed Aug. 3, 1938



Inventor  
HANS GRUBER

By   
Attorneys

# UNITED STATES PATENT OFFICE

2,223,683

## MEASURING OR SURVEYING INSTRUMENT

Hans Gruber, Muhldorf, Upper Bavaria, Germany

Application August 3, 1938, Serial No. 222,910  
In Germany August 10, 1937

3 Claims. (Cl. 33—212)

This invention relates to a measuring or surveying instrument for use in the building trade, or for other purposes, which consists of two parts which can be assembled together. Each of the parts can be used separately for a number of different purposes and when assembled together the instrument can be employed for making particularly accurate measurements, in connection for example with the construction of buildings.

An object of the invention is to provide an improved instrument composed of two parts, which can be used separately or in combination. The instrument can be used for levelling, measuring heights, gradients and inclinations, and for plumbing and like purposes.

An instrument in accordance with the invention is illustrated by way of example in the accompanying drawing, in which

Fig. 1 is a side elevation partly in section of one part of the instrument,

Fig. 2 is a plan of Fig. 1,

Fig. 3 is a side view of the other part,

Figs. 4 and 5 are diagrams showing the two parts of the assembled device in two different positions.

Referring to the drawing, the instrument comprises a hydrostatic level 1 of the usual size and shape and a removable part 2 which contains a tubular level bent to the shape of an arc, the length of which is an eighth of the circumference of the circle of which it forms part.

In the part 1 which is made of wood or aluminium are fitted three straight tubular levels, namely the vertical level 3, the horizontal level 4 and the oblique level 5 which is inclined at an angle of 45° to the horizontal level and is covered together with the latter both laterally and also on top by a glass window. There is also fitted at the end of the part 1 a curved tubular level 6 which, in order to obtain accuracy of measurement, is preferably bent to the form of a small arc of a circle of large radius. This level, which is therefore very slightly curved, is inlet in the body of the part 1 in such a manner that it is visible not only from the top but also from both sides and obliquely from below.

For determining the position of the air bubble in the level 6 there is provided a slider 7 which, in any position of the instrument, enables the position of the air bubble to be fixed by means of the pointer 8 and to be read off by means of the line 9 on a scale which is fitted on the top of the part 2 at the sides of the level 6. A sighting device is formed by an eyepiece 11 and an objective 12 and this can be supplemented by means of a mirror 13 which can be fitted on the part 1 in such a way that the positions of the air bubbles in the levels 4 and 5 can be seen by the observer simultaneously with the object. In front of the eyepiece 11 is fitted a rotatable mirror 35 by

means of which an object which is situated out of the line of the axis of the instrument can be viewed.

The levels 3 and 4 are adjustably arranged in order on the one hand to be able to regulate them if need be and on the other hand to be able to undertake the surveying of gradients as hereinafter described. The adjustability is obtained by clamping the levels 3 and 4 at both ends in holes in suitably bent steel springs 14 and 15 respectively which are fixed by means of screws 16 and 17 in the interior of the level and can be moved by means of adjusting screws 18 and 19 in such a manner that the position of the levels which are held by the springs can be easily altered.

On the straight end of the part 1 is fitted an extension 20 which is adjustable and provided with a millimetre scale or with other scale divisions. This extension 20 can be pushed into or drawn out of the part 1 by means of a screw 21 which is movable in an elongated hole and can be fixed in any desired position. At the other end of the part 1 there is a corresponding extension piece 36 which can be turned upwards into a recess 37.

At the end of the part 1 which carries the extension 20 are fitted on a rotatable spindle situated in the line of its centre of gravity, two buttons 22 and 23, which are used for carrying out plumbing operations with the part 1.

The part 2 is fixed on the part 1 by means of a screw 24 and can be connected either as shown in Fig. 4 after removal of screw 21 by engagement of screw 24 through threaded opening 124, or as shown in Fig. 5, by engagement of screw 24 in threaded opening 224 in such a manner that the longer arm of the right angle bears either against the end or against the longitudinal surface of the part 1. The essential feature of the part 2 is a tubular level 25 which is bent into the form of an arc of a length equal to an eighth of the circumference of the circle and which is inlet in the part 2 which is of corresponding arcuate shape. This arc is provided laterally of the level with a scale and a slider 26 which is connected by means of a pin 27 and a slot 28 to a rotatable carrier 29 of a pivoted mirror 30. This mirror enables the observer using the sights 31 and 32 to see the state of the air bubble in the level 25. The sight 31 is pivoted and can lie against the arcuate surface of the part 2 being swung outwards when this part is used.

The part 2 is preferably made of cast aluminium and carries a further straight tubular level 33.

The curved levels 6 and 25 can be provided with a number of different scales which enable the gradients and inclinations measured to be read off directly in angular degrees, percentages or other values.

The instrument which has been described is very handy and can be used for a large number of different purposes and is superior in this respect and also in the accuracy of the measurements obtained to all instruments which have hitherto been employed for similar purposes.

The part 1 of the instrument can not only be used, like all instruments having horizontal and vertical levels, for horizontal and vertical determinations but can also be used, owing to the inclusion of the slightly curved level 6, for the determination of quite small deviations from the horizontal, as well as for plumbing and measuring the height of a distant object.

The plumbing, for example, of a structural upright of a structure is done as follows:

The part 1 is held up with the finger and thumb on the buttons 22 and 23 and, when the instrument is suspended, the structure is sighted along the longitudinal edge of the level.

For measuring the heights of houses, towers or other structures, the sights 11 and 12 of the part 1 are directed on the top of the building and the observer then moves forwards or backwards until the air bubble in the level 5 is horizontal. After this it is only necessary to measure the height  $a$  of the observer's eye above the ground and the distance  $l$  of the observer from the building in order to determine the total height  $h+a=l+a$  of the building above the ground.

When levelling with the aid of the part 1, assuming that the level 6 is curved into the arc of a circle of radius equal to 2 metres, the accuracy of measurement is such that a division on the scale indicates a departure from the horizontal of  $\frac{1}{2}$  mm. in 1 metre.

The visibility of the level 6 both from the sides and from below is of particular advantage when working in mines and canals and also when laying pipes and conduits in which case the extensions 20 and 36 act as supports. On the other hand in the construction of any surfaces having a definite slope or running at a definite angle to the horizontal or vertical the extension 20 on the part 1 in combination with the adjustability of the levels 3 and 4 is of particular use. Thus, for example, if a chimney is to be constructed which decreases by 12 mm. per metre of height, the extension 20 is drawn out to a distance of 12 mm. and fixed by its screw, and the instrument is placed on an accurately vertical surface so that at its lower end the extension and at its upper end the edge of the instrument itself is supported against the vertical surface. Then the level 3 is adjusted by means of the screw 18 until the air bubble is central and the extension 20 is pushed back again into the instrument. When the instrument is now placed with its base on the brickwork it indicates, when the level 3 is horizontal, that the reduction of the chimney is the desired 12 mm. per metre.

Obviously a similar procedure is adopted with the extension 20 when definite departures from the horizontal have to be maintained. In this case the instrument is placed on a horizontal surface and the level 4 is adjusted by means of the screw 19.

Verticals and horizontals can also be determined by means of the part 2 of the instrument although with somewhat less accuracy. For determining the horizontal the part 2 is set up on its shorter arm and the level 33 is observed; or, the observation may be made with greater accuracy by placing the longer arm on the sur-

face to be measured and observing the level 35. Verticals are determined by placing the long arm on a vertical surface and adjusting until the level 33 is horizontal.

The part 2 also enables inclinations and gradients between  $0^{\circ}$ - $45^{\circ}$  and  $45^{\circ}$ - $90^{\circ}$  to be measured according as to whether the long or the short arm of the right angle is placed on the inclined surface to be measured. Although in this case the accuracy of the measurement is not extremely great this part is useful for mountain climbers, skiers and the like, since, owing to its light weight and small size, it can be carried anywhere and unreliable estimates need no longer be made.

With the instrument composed of the two parts assembled together, all gradients and inclinations round the periphery of a complete circle, that is to say from  $0^{\circ}$ - $360^{\circ}$ , can be determined, in which case the parts are placed on the gradient to be measured for measurements of  $0^{\circ}$ - $45^{\circ}$ ,  $45^{\circ}$ - $90^{\circ}$ ,  $90^{\circ}$ - $135^{\circ}$  and so forth. In this case owing to the great increase in the length of the supporting surface a much greater accuracy can be obtained than with the part 2 alone. Thus for example a reading which is correct to  $1^{\circ}$  can be obtained directly from the instrument composed of the assembled parts.

I claim:

1. A surveying instrument comprising an elongated member having a straight edge, a horizontal level, the axis of which is parallel to the longitudinal axis of said member, a vertical level, the axis of which is at right angles to said horizontal level, an oblique level, the axis of which is inclined at  $45^{\circ}$  with respect to said horizontal and vertical levels, a curved level in the form of an arc to which said straight edge is tangential, the axes of said levels being in the vertical plane of said member, a second member having at least one straight edge, a curved level in the form of an arc, the length of which is an eighth of the circumference of the circle of which it forms a part, and means on said members for removably securing the same together with said straight edges in flat engagement with one another.

2. A surveying instrument comprising an elongated member having two straight edges at right angles to one another and parallel to the horizontal and vertical axes, respectively, of said member, horizontal and vertical levels, the axes of which are parallel, respectively, to said horizontal and vertical axes of the member, an oblique level, the axis of which is inclined at  $45^{\circ}$  with respect to said horizontal and vertical levels, the axes of said levels being in the vertical plane of said member, a second member having at least one straight edge, a curved level in the form of an arc, the length of which is an eighth of the circumference of the circle of which it forms a part, and means on said members for removably securing the same together with said straight edge of said second member in flat engagement, selectively, with one of said straight edges of the first-mentioned member.

3. In a surveying instrument as claimed in claim 2, a mirror, and sliding pivot means on said second member adjustably supporting said mirror above said curved level for sliding adjustment over the length thereof, whereby the curved level may be viewed when said second member is engaged with either edge of the first-mentioned member.

HANS GRUBER.

## 7. WHAT WE CAN FIND IN THE WWW ABOUT GRUBER?

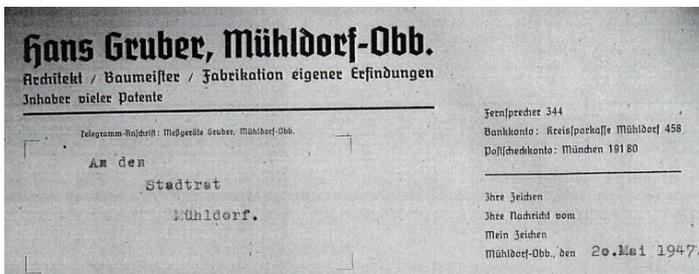
The result of this search is published only in the German version of the WOLF'S PATENT NEWS, (WOLFS SENKLOT NEWS 2012-04). If you are interested, please visit [www.plumbbobcollector.info](http://www.plumbbobcollector.info)

## 8. WHO WAS HANS GRUBER?

Hans Gruber lived since 1912 in Mühldorf a. Inn, Bavaria, Germany  
Profession (1950): Architect and master builder.  
Fabrication of own inventions.  
Figures below show his signature, rubber stamp and letter head.



**Hans Gruber**  
Architekt u. Baumeister  
Fabrikation eigener Erfindungen  
Mühldorf/Obb.



From the **historical registration documents in Mühldorf:**

- Name JOHANN GRUBER
- Son of Johann Gruber, farmer roman catholic and Therese Katterlaher both deceased in Ebersberg
- Born: April 20., 1889 in Ebersberg, Munic
- Profession: architect and master builder
- Religion: Roman catholic (rk),
- Moved to Mühldorf March 1, 1912 in the Altmühldorferfußweg
- Moved into own house Bahnhoffußweg 179a (since July 1923 Nr.3)
- Deceased Oct. 8, 1951 street accident
- Married since Nov. 8, 1916 with Rosa Kaußner \*12.6.1890 in Munic rk. + March 15, 1977 in Mühldorf

**Newspaper MÜHLDOERFER NACHRICHTEN**  
**from Oct. 11, 1951**  
**DEADLY ACCIDENT**

„On Oct. 8, 1951 at 5 pm an accident happened on the State Road B 12 near Harting where the

married master builder Hans Gruber from Mühldorf was killed. Gruber was hit on the crossing by an American Army truck with a German driver and died in his car.

### **Obituary in the Mühldorfer Nachrichten** **(Newspaper)**

(reduced free translation)

“Hans Gruber was born in Ebersberg near Munic, Germany and moved 1912 to Mühldorf, Germany. Here he had his first job in the office for distribution of water (Wasserwirtschaftsamt). After the WW I he started a career as an architect. Since 1928 the architect Gruber was member of the town-council of Mühldorf, in which he was elected as founder and chairman of the Business Party (Wirtschaftspartei). Because of his political intransigence his business was closed during the war. In 1945 after the WW II when Mühldorf was heavily damaged, Gruber was called for the job of a municipal architect (Stadtbaumeister) for rebuilding the town. Through his energy and with the help of the inhabitants he managed to eliminate the chaos in the city until the end of 1947. For his inventions of measuring instruments Gruber obtained national and foreign patents.”

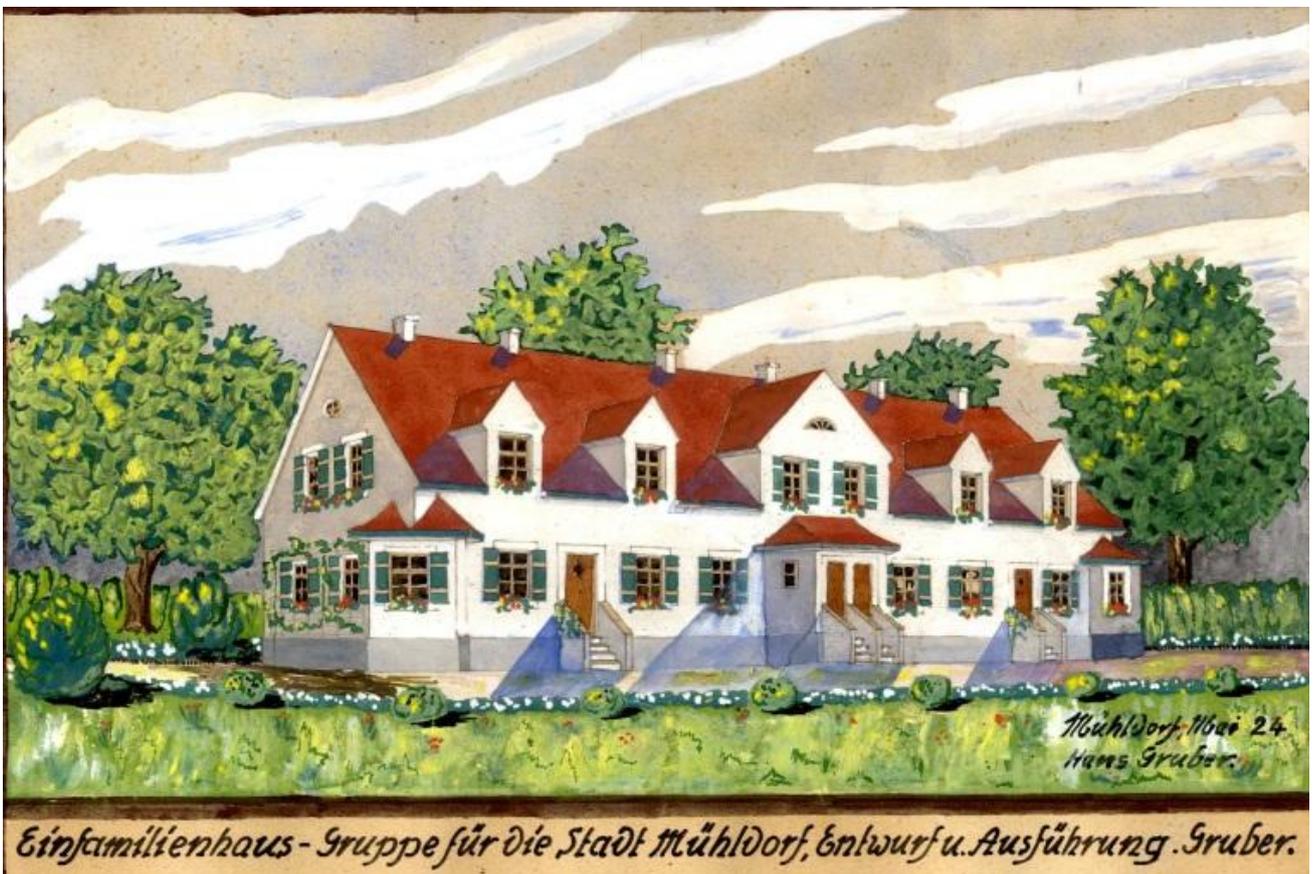
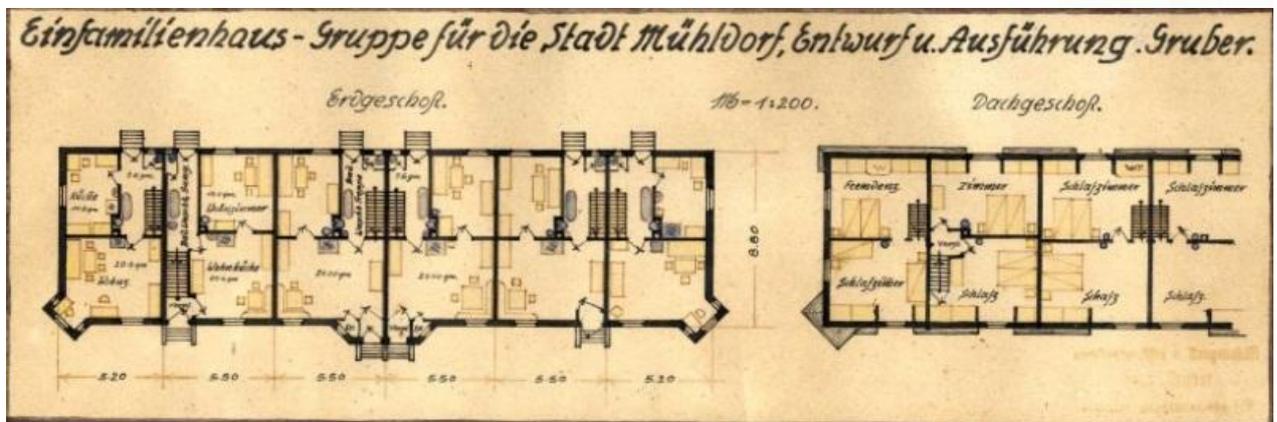


**MORE DETAILS** in the German version of this **WOLF'S PLUMB BOB NEWS**.

Figures below show the house of Gruber and drawings of houses that he built in 1924 as an architect.



House (demolished in 1973) Bahnhoffußweg 3



Einfamilienhaus - Gruppe für die Stadt Mühlendorf, Entwurf u. Ausführung Gruber.

## 9. ADDITIONAL INFO

George Gaspari offered in March 2011 on EBay a GRUBER instrument in Santa Cruz, CA, U.S.A. This shows that the instrument was also in America. Perhaps an American soldier took it back home, leaving Germany after the WW II.

I had two good sources that helped me to write this article.

Many thanks to both:

- The German tool collector Kurt Heid sent me his photos of the GRUBER serial # 38 with thermometer, compass, light and plumb bob.
- Mr. Hamberger from the town archives of Mühlendorf a. Inn gave me a lot of information about the person Gruber.

## 10. REMARKS

*Mike Hoefler (left) and me (right) revising the English version of this NEWS:*

**WHO KNOWS A GRUBER LEVEL IN THE U.S.A.?**



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](http://www.plumbbobcollectors.info)

Remarks and contact by email: [plumbbobwolf@t-online.de](mailto:plumbbobwolf@t-online.de)

Thank you for your interest

Wolf

**Please join us for the  
4<sup>th</sup> 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.**