
(19)  **Canadian
Intellectual Property
Office**

An Agency of
Industry Canada

**Office de la Propriété
Intellectuelle
du Canada**

Un organisme
d'industrie Canada

(11) **CA 457012** (13) **A**

(40) **31.05.1949**

(12)

(21) Application number: **457012D**

(51) Int. Cl:

(22) Date of filing: ..

(71) Applicant: **WITTGENSTEIN GERARD FRANCIS.**

(72) Inventor: **WITTGENSTEIN GERARD FRANCIS ()**.

(54) **LOGARITHMIC CALCULATOR**

(54) **DISPOSITIF DE CALCUL A DIVISIONS
LOGARITHMIQUES**

(57) **Abstract:**

This First Page has been artificially created and is not part of the CIPO Official Publication

S P E C I F I C A T I O N

To All Who It May Concern :

Be it known that I, Gérard F. WITGENSTEIN, of LA TOUR DE PEILZ, Villa Bellaria, Canton of Vaud, Switzerland, having invented certain new and useful improvements in and relating to a logarithmic calculator, do hereby declare that the following is a full, clear and exact description of the same :

One knows that the operator of a circular slide-rule must necessarily rotate the apparatus one or several times in order to place it in normal reading position of the figures. It is well-known that this drawback hinders an intensive development of the slide-rule of circular shape, in spite of the superiority which such a slide-rule presents, in respects of a

B

rectilinear slide-rule, by the quality inherent to its movable scale never to get out of the range of the fixed scale. The designs which comprise several movable scales, not only in respect of a fixed support but in relation to one another, impose to the operator even more complicated manipulations. One knows also some designs in which, on account of the absence of sliding index, one reading at least must necessarily be effectuated with a great inaccuracy joined to a great awkwardness.

The purpose of the present invention is to remedy all these drawbacks. The object of the present invention is a logarithmic calculation device, the scales of which are of circular shape, and such that the operator be liberated from the servitude of manoeuvring member other than that carrying at least one scale, but be enabled to read with precision all the terms of the calculation and its result in the rightway-up position and said result, moreover, always on the same spot.

In opposition to the devices which only resolve special and limited calculations, and to those with complicated manoeuvring, and to those of difficult and approximate reading, the object of the invention is universal in this sense that, resolving very simply and with the precision of reading insured by a reticule or its equivalent the universality of the arithmetical problems of multiplication and of division, it is also at reach of the universality of the public, and not only of the scientists and of the engineers, which, up to the present, were practically the only ones to use the former slide-rules.

The attached drawing shows by way of example several embodiments of the invention. Fig. 1 is a plan view of a wrist-watch combined with the logarithmic calculator. Fig. 2 is a vertical axial section thereof. Fig. 3 is an enlarged view of the control device of the sliding index enabling to bring it into coincidence with one of the factors of the calculation. Fig. 4 is a vertical axial section of Fig. 5; Fig. 5 is a partial plan view of a logarithmic calculator mounted on the outside of an object such as a time-piece, a telephone dial framing, a watch, or more generally of any object apt to be used as a support; on the figure is shown a sector of the support, which is supposed to be a watch;

and Fig. 6 is an enlarged section along O' and O" of Fig. 4 showing the control device of the sliding index for bringing it into coincidence with one of the factors of the calculation. Fig. 7 shows another embodiment of the slide-rule.

Referring to Fig. 1, 2 and 3, one sees in a the casing of a watch supporting a rotating ring b with knurled rim, c is the glass of the watch, e the clock work, f the dial carrying in addition to the hour scale a double circle q. On the inner circle of q is traced a logarithmic scale extending from 1 to 10 on the 360°, the figures 1 and 10 coinciding with one another, and the graduation reading in the direction of rotation of the watch hands. On the outer circle of q is traced a similar scale in the opposite direction extending also from 0 to 360°, or in other words a cologarithmic scale reading in the direction of rotation of the watch hands. Finally, a third scale similar to the first one is traced on the ring b. When the ring b is being rotated, this graduation moves under a fixed mark p.

A'

In the example described, the fixed mark p is purposely chosen in the prolongation of the radius passing through the noon of the watch. This radius determines also the common origin of the two fixed scales of the dial and the vertical plane passing through this radius will be the main reading plane.

The knurled rim of the ring b enables it to be rotated with the fingers. This motion can just as well be carried out by other means and in particular by means of a winding knob similar to that of the watch.

A groove d is cut in the ring b and a slider g fitted in this groove moves with the ring when the latter revolves in one direction or in the other. This motion of g, however, only lasts until its finger h causes the lever l, which pivots around i, to abut against the stop m or m' according to the direction of rotation. The arrangement of these members is such that the sliding index k always falls in the main reading plane at the moment of the abutment, whatever the direction of rotation of b. After the abutment, the slider cannot move any further, and when the operator continues the rotation of the ring b the latter glides on g.

The operation of the calculator is as follows:

One rotates the ring b so as to bring the sliding index into the main reading plane, where it stops automatically, and one then rotates the ring b further so as to bring the first factor of the operation into the main reading plane, i.e. under the fixed mark. The ring b is then rotated in the opposite direction so as to bring the sliding index k on the second factor of the calculation. The first factor is a multiplier or a divisor, whilst the second factor is a multiplicand read on the cologarithmic scale or a dividend read on the logarithmic scale of the dial. One reads the result on the scale of the ring in the main reading plane, i.e. under the fixed mark p.

For example, in order to multiply 51 by 114, one turns b until the multiplicand 51 read on the movable ring b lies under the mark p, together with the index k. Then one turns b in the opposite direction until the index k marks the multiplier 114 - see fig. 1 - on the fixed scale of the multiplications. The result 5810 is under the mark p.

In order to divide 510 by 88, one operates in the same manner : turning b until the dividend 510 of the movable ring lies under the mark p together with the index k. Then one turns b in the opposite direction until the index k marks the divisor 88 - see fig. 1 - on the fixed scale of the divisions. The result 5.8 is under the mark p.

B

One sees that the scale of the movable ring is always used in the vicinity of the main reading plane, so that it is sufficient that this scale, which may be simple or multiple, be visible in this sector only. This property enables to dispose the scale under a fixed protection, which can be the dial of a time piece, provided with the necessary indentures in the vicinity of the main reading plane.

It is of course possible to dispense with the automatic marking of the factor of the movable scale in the main reading plane and to point this factor elsewhere.

Referring to figs.4, 5 and 6, one finds again the casing a, the glass c, the clock-work e, the dial f, the groove d, the slider g, the finger h, the lever l, the shaft i, the stops m and m', the double circle q. The

B

movable logarithmic scale is traced on the ring t knurled on its periphery and which can rotate around the crown s mounted on the casing a, by means of a thread for instance. The fixed mark p and the two scales of q are traced on this crown s, provided with a groove r enabling the circular displacement of the finger h. A transparent celluloid sheet k' covers the three scales and carries the index k. The slider g and the finger h are rigidly linked with k'. The fixed mark p and the origin of the two scales of q are in the main reading plane and the operation of this embodiment is similar to that already described.

It is of course possible to renounce to the automatic marking of the factor of the movable scale and to mark the same by hand, and whatever it may be, for instance by preventing temporarily the rotation of k' whilst one turns t in such a way as to make coincide the said factor with the index k.

It is of course also possible, if the convenience of certain supports require such a disposition, to trace only one single scale on the fixed member and to place accordingly the double scale of the circle q on the movable member.

B Fig.7 shows another embodiment. The movable scale is traced on a disk t knurled on its periphery and fixed on a shaft T. p is as before the fixed mark, q the unmovable double circle traced on the face of the cover s. The shaft T revolves with light friction in the axis of the cover s and drives, also with light friction, the

slider g carrying the index k. The front face of the cover presents an indenture r along which can move the broach i fitted with a washer l. During its rotation, the finger h of the slider comes to strike the washer l which is somewhere in the indenture and drives it until the broach i comes to abut against the end of the indenture. The finger is dimensioned in such a way that, at this moment, the index finds itself in the main reading plane. On the face and at the back of the disk, one disposes with advantage various tables of the usual functions, such as X^2 and X^3 , log X, etc. For facilitating its keeping in the pocket, it is recommendable to provide the calculator making the object of the invention with a clip.

In the examples described, one has shown the mechanism linking the sliding element with the movable member as a simple friction coupling. It may be of advantage in particular for the resolution of calculations implying several consecutive operations, to bring the index back into the main reading plane after each operation. To that effect, one can for instance provide the element kg with a light spring in such a way that the said element comes under the action of the spring to abut against a stop m as soon as one proceeds to the release of the coupling linking the slider to the movable member. The first operation of the calculation being effected, it will thus suffice to release this coupling for letting

B

the index come automatically to place itself in the main reading plane and point out the result of this first operation which is already there. One then effectuates the second operation by driving the index (by rotating the movable member) until this index shows on the convenient fixed scale the factor involved in the second operation of the calculation; and so on.

If one renounces to the automatic return of the index by means of a spring or any other mechanism, one can displace it by hand as far as the position of the main reading plane, taking care that during this displacement the movable member be maintained immovable, for instance by blocking it by means of a brake-shoe or a push-button or providing it with a material the friction coefficient of which is comparatively high.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a logarithmic calculator, a rotatable support adapted to be manually turned, a fixed support, a logarithmic scale and a cologarithmic scale on one of said supports, said scales having a common origin, a logarithmic scale on the other support, a fixed pointer located on a radius passing through the origin of the scales on the fixed support, a slide member normally movable with the rotatable support, an index carried by said slide member, and means for arresting movement of said slide member at a position where the index is radially aligned with the pointer without preventing further rotation of the rotatable support.

2. A logarithmic calculator according to claim 1 wherein the means for arresting movement of said slide member is so arranged as to permit movement of the index through at least 360 degrees.

3. A device according to claim 1 characterized by the feature that said slide member is movable by hand without altering the position of the rotatable support.

4. In a logarithmic calculator, a fixed support, a circular logarithmic scale on said support, a second support rotatable about the axis of said scale, a logarithmic scale arranged in a circle on said rotatable support and having a center common to the first scale, a fixed pointer arranged on a radius of said scales adjacent the scale graduation on the rotatable support, and radially aligned with the origin of the first scale, an index member normally moved by said rotatable support for radial alignment with graduation of the first scale, and means for

arresting movement of said index member in radial alignment with said pointer during rotation of the rotatable support.

5. In a logarithmic calculator, a rotatable support adapted to be manually turned, a fixed support, a logarithmic scale and a cologarithmic scale on one of said supports, said scales having a common origin, a logarithmic scale on the other support, a fixed pointer located on a radius passing through the origin of the scales on the fixed support, a slide member normally movable with the rotatable support, an index carried by said slide member, and means for arresting movement of said slide member without preventing further rotation of the rotatable support.

D

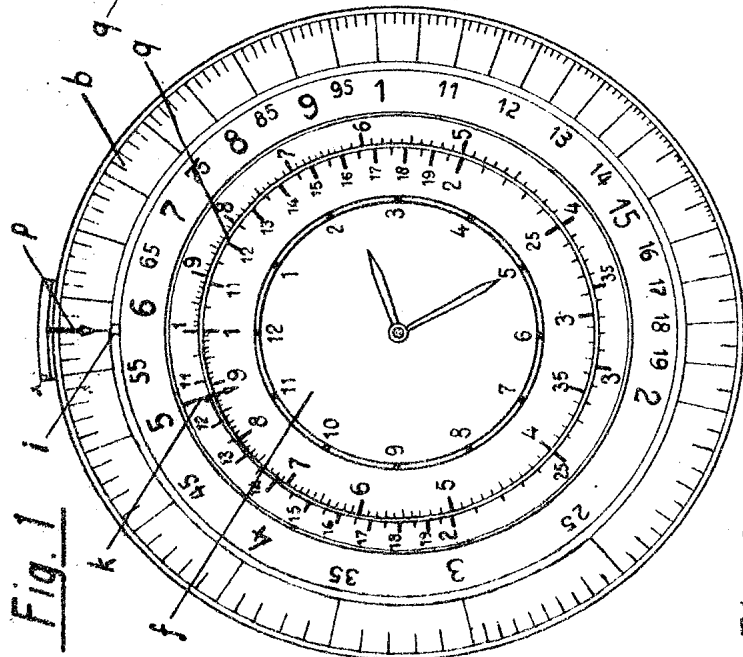


Fig. 1

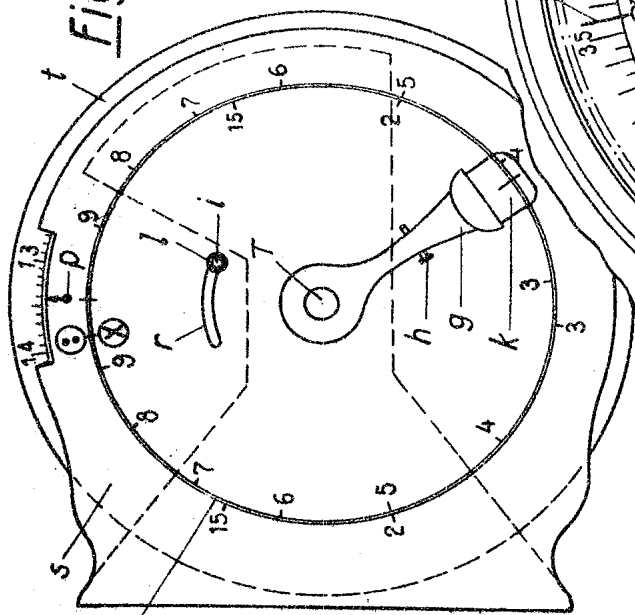


Fig. 7

CERTIFIED TO BE THE DRAWINGS
 REFERRED TO IN THE ABOVE MENTIONED
 PATENT OFFICE

Fig. 6

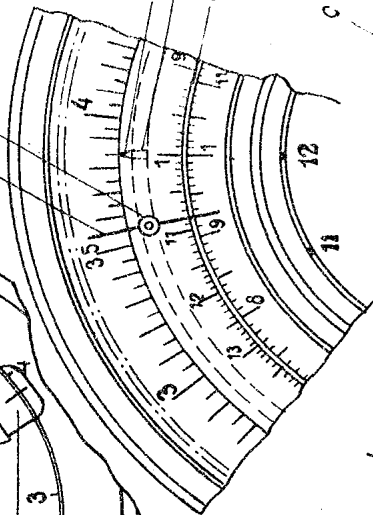
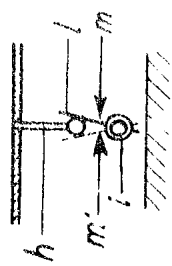


Fig. 5

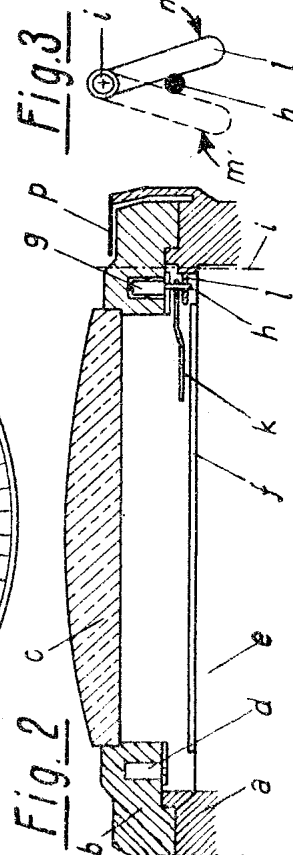


Fig. 2

Fig. 3

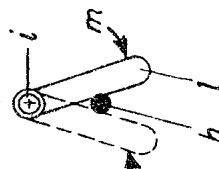
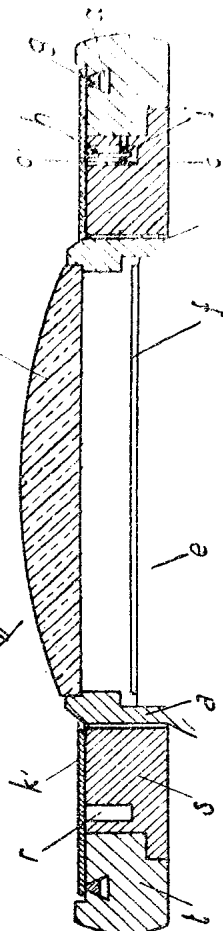


Fig. 4



G. F. Wittgenstein
 INVENTOR
 Mack & Clerk

OTTAWA May 23. 1914.