

PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventor: RICHARD BOYD NORTON

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COMPLETE SPECIFICATION

Improvements in Band Calculators

We, ROLLER RULES LIMITED, a British Company, of 1, Paper Buildings, Temple, London, E.C.4, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns a band calculator which works on a principle similar to that of a slide-rule, and provides a simple quick method for multiplication and division.

According to the invention a band calculator comprises a container and a movable endless band which passes around two rollers mounted within the container, one run of the band being untwisted and the other run being twisted half a turn, the container having a longitudinal slot through which part of the untwisted run of the band is exposed to view, and the band and the two longitudinal sides of the slot being marked with graduations. In the preferred construction, the two longitudinal edges of the slot are marked with log scales from 1 to 10, one scale reading from left to right, and the other from right to left. Means is provided for gripping the band at any required point, within the slot, and moving it a required distance in relation to the scales. The band is marked with an integral number of slot lengths by means of hairlines.

A band with a twist in it has the properties of a Moebius strip: as viewed through the slot the apparent length of the band is twice the material length, since the surface of the band is viewed continuously. Thus if the material length of the band is two and a half times the length of the slot, the apparent length as viewed through the slot is five times the length of the slot. This is a convenient length for the band.

The ends of the slot in the container co-

incide accurately with the ends of the log scales marked along the edges, and the top of the container beyond the ends of the slot are preferably formed of transparent material, so that the band may be viewed a short distance beyond either end of the slot.

The band may be moved by means of a sharp stylus inserted through the slot to engage the face of the band. The band is made of a material which does not stretch, and has roughened surfaces so that the point of the stylus will grip the band and be able to move it. A steel band with roughened surfaces is suitable. Preferably a platform beneath the untwisted run of the band resists substantial deflection of the band by the stylus.

A preferred alternative arrangement for moving the band is as follows: a push-button mounted on a cursor actuates a device which grips the band at a point behind the push-button, by means of two clamps pinching the band between them, above and below. To move the band, the button is depressed, the cursor is moved the required distance in relation to the slot, and the push button is then released.

An example of a calculator according to the invention will now be described with reference to the accompanying drawings, of which:

Figure 1 is a plan view of a calculator with the top of the container removed to show the band and its mounting;

Figure 2 is a plan view with the top of the container in place, showing the scheme of markings on the scale;

Figure 3 is a section on the line III—III in Figure 2;

Figure 4 is a section on the line IV—IV in Figure 3;

Figure 5 shows a stylus;

[Price 4s 6d.]

Figure 6 is an enlarged view of the end of the stylus; and

Figure 7 shows the markings on the band having been broken at the line A—B and opened out as a straight length.

A container 2 in the form of rectangular-topped box has a base 3, two longitudinal sides 4, 5, two ends 6, 7, and a top 8 having a longitudinal slot 10. An endless band 12 passes around rollers 13, 14 mounted in bearings 15, 16 at either end of the container 2. The band is twisted through half a turn, and is marked as shown in Figure 7. Its material length is two and a half times the length of the slot 10. Its apparent length as viewed through the slot is therefore five times the length of the slot 10, and it is marked with three hairlines 18a, 18b, 18c on the part of its surface shown in the top half of Figure 7, and two hairlines 18d and 18e on the part of its surface shown in the bottom half of Figure 7.

The band is supported by a platform 20 which prevents any substantial deflection of the untwisted run of the band 12, when a stylus 22 is pressed onto the band 12. The stylus 22 has a point 24 mounted on its end as shown in Figure 6.

The longitudinal edges of the slot 10 are marked with logarithmic scales 25 and 26, which increase in opposite directions. Only the integers from 1 to 9 are shown on the scales in Figure 2, but further graduations are necessary for accurate working of the calculator.

As shown in Figure 7, the hairlines 18a—18e on the band 12 are marked with powers of ten: if the band is moved from right to left across the slot, that is in the direction of the arrows marked "DIVIDE" in Figure 2, then on the left of the hairlines the powers which appear successively at the right end of the slot read from .1 to .00001. If the band is moved from left to right of the slot, that is, in the direction of the arrows marked "MULTIPLY" in Figure 2, on the right of the hairlines the powers which appear successively at the left end of the rule read from 1 to 10,000.

For convenience we will call the scale 25 above the slot 10, reading from 10 to 1 from left to right the A scale, and the scale 26 below the slot 10, reading from 1 to 10 from left to right the B scale. To make a calculation, the band is set so that the two hairlines marked .1 and 1 are opposite the ends of the slot. All numbers are multiplied or divided by a power of 10, if necessary, so that they are then numbered between 1 and 10, and the calculation is performed on these "reduced" numbers, note being made that the answer will require a subsequent rectification by multiplication or division by a power of 10 corresponding to this "reduction". To multiply a given number X by a given number Y,

both X and Y being between 1 and 10, the hairline 18a is placed opposite the number X on scale B, and the stylus is then placed on the band opposite the number Y on the scale A; the band is then moved to the right until the stylus meets the end of the slot. To divide a given number P by a number Q, again both these numbers P and Q being between 1 and 10, the hairline 18a is placed opposite the number P on scale B and the stylus is then placed opposite the number Q on the B scale; the band is then moved to the left until the stylus meets the end of the slot. In each case the numerical result is read off on the B scale opposite the hairline, within the slot, and the position of the decimal point in the numerical result is then found by reading off the power of ten which is shown beside this hairline. If the resultant movement of the band is a movement to the left then the power of ten is given on the left of the hairline, and if the resultant movement is to the right the power is given on the right of the hairline. To this power of ten is added the power of ten corresponding to the previous "reduction" of the numbers at the beginning of the calculation, and the position of the decimal point is thus determined.

To assist the operator to remember the power of ten corresponding to the "initial" reduction of the numbers, a sliding bead may be provided which may be set against numbers from -10 to +10 on a separate scale.

One advantage of this calculator is that the container may be fixed to a bench, in which case one hand is required to operate it. Another advantage is that the correct power of ten for the answer to a calculation is determined positively.

Short cuts in calculations becomes apparent in use. Refinements such as square and square root scales, logarithm scales and trigonometric scales, may be added as on a normal slide rule. Again this calculator would provide an advantage when using a logarithmic scale as the correct power of ten would be obtained. The scale would in this case be engraved directly onto the band.

WHAT I CLAIM IS:—

1. A band calculator comprising a container and a movable endless band which passes around two rollers mounted within the container, one run of the band being untwisted and the other run being twisted half a turn, the container having a longitudinal slot through which at least a part of the untwisted run of the band is exposed to view, and the band and the two longitudinal sides of the slot being marked with graduations.

2. A band calculator according to claim 1 in which the two longitudinal edges of the slot are marked with logarithmic scales, increasing in opposite directions and the end-

less band is marked out with an integral number of spans each equal to the length of the slot.

5 3. A band calculator according to claim 1 or claim 2 in which a platform is mounted beneath the untwisted run of the band in order to prevent any substantial deflection of the untwisted run of the band downwards towards the twisted run of the band.

10 4. A band calculator according to any of claims 1 to 3, in which means is provided for gripping a portion of the untwisted run of the band at a point along its length within the slot, and moving it a required distance in relation to the slot.

15 5. A band calculator according to claim 4 in which the means for gripping the band is a stylus, the point of which may be engaged with the surface of the band.

20 6. A band calculator according to claim 5

in which the surface of the band is roughened to enable it to be gripped by the point of the stylus.

7. A band calculator according to claim 4, in which the means for gripping the band includes two clamps which pinch the band between them, one above and one below the untwisted run of the band. 25

8. A band calculator according to any of claims 4 to 7, in which a push button is mounted on a cursor or operating the means for gripping the band. 30

9. A band calculator substantially as described with reference to the accompanying drawings. 35

For the Applicant:—
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
51/52 Chancery Lane,
London, W.C.2.

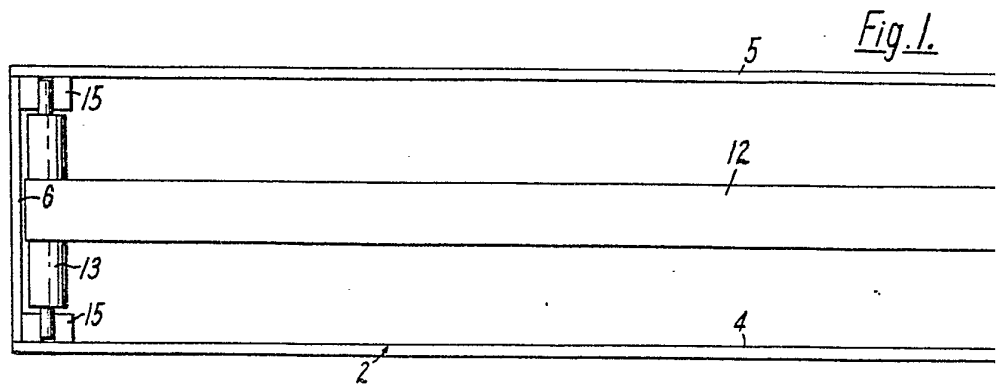


Fig. 1.

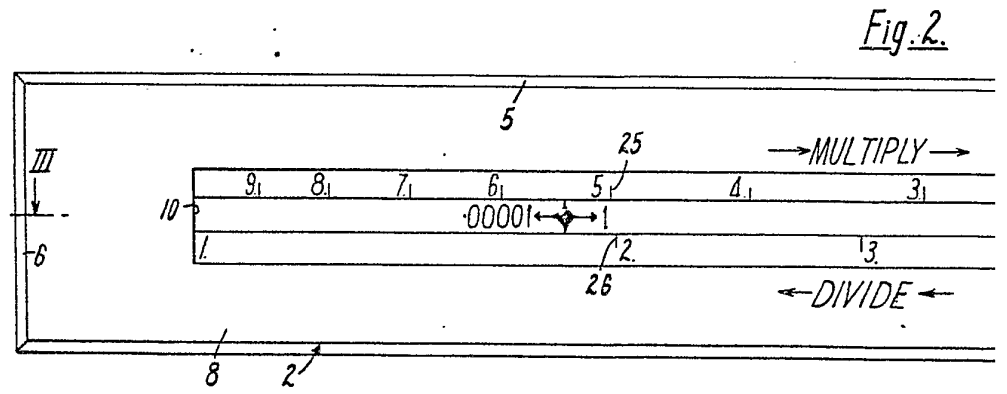


Fig. 2.

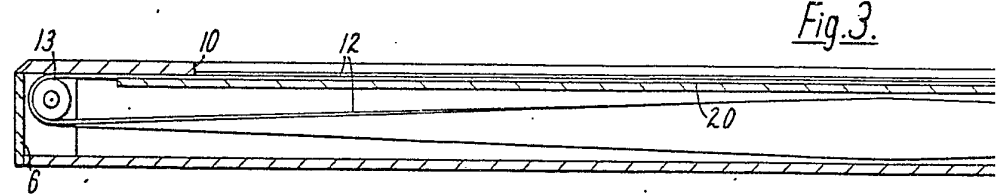


Fig. 3.

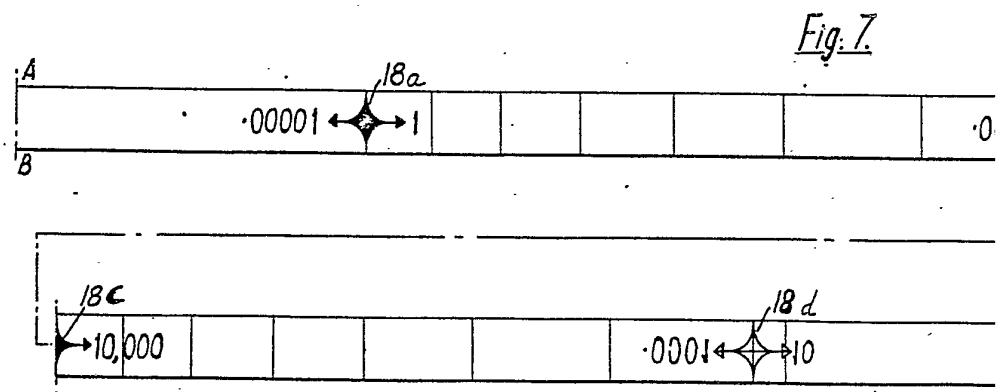
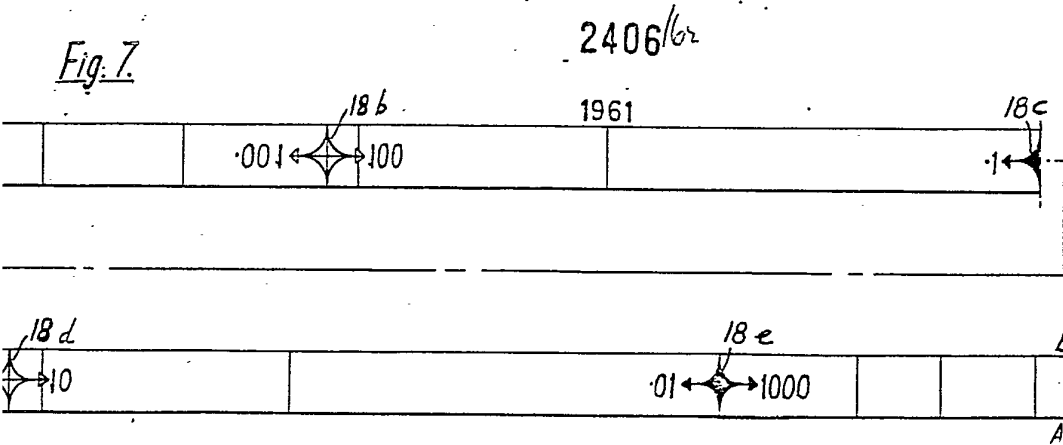
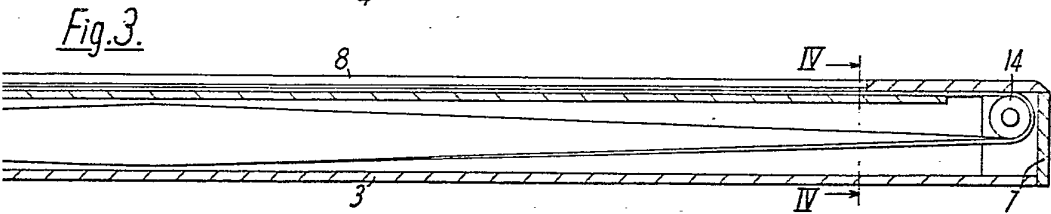
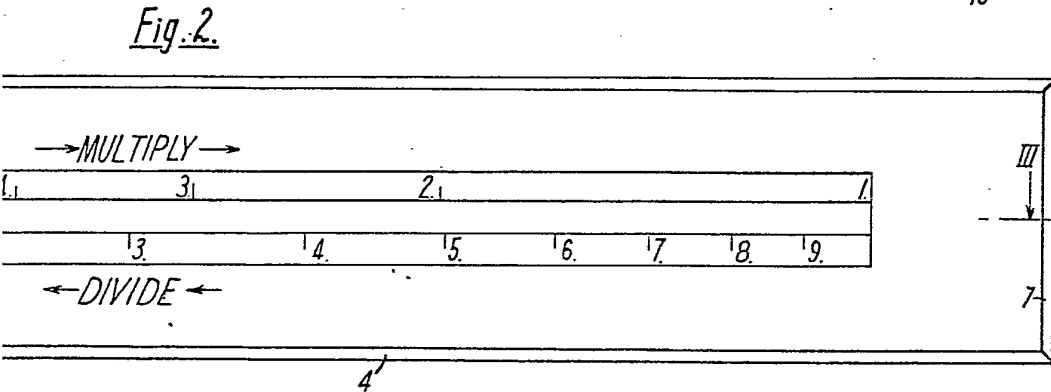
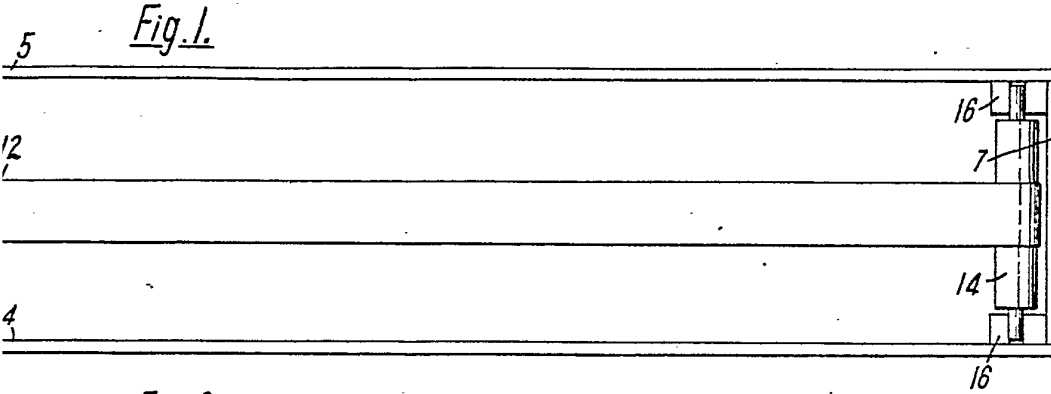


Fig. 7.



1010461 COMPLETE SPECIFICATION
 This drawing is a reproduction of
 the Original on a reduced scale
 2 SHEETS
 Sheet 1

Fig. 1.

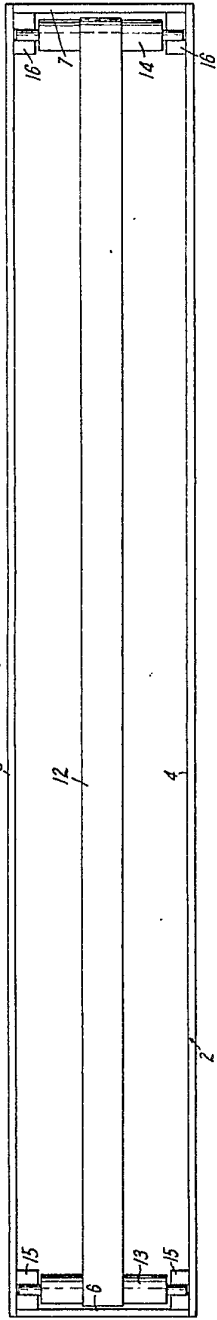


Fig. 2.

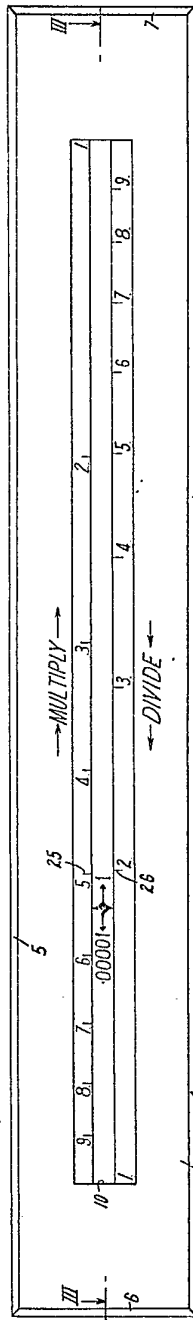
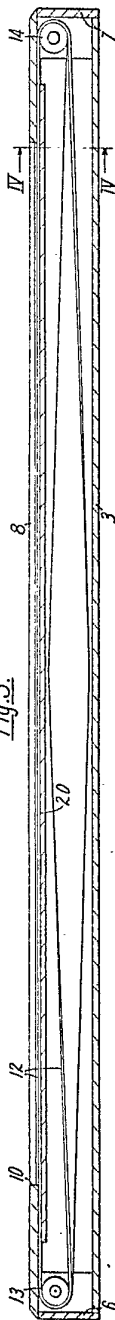


Fig. 3.



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Fig. 4.

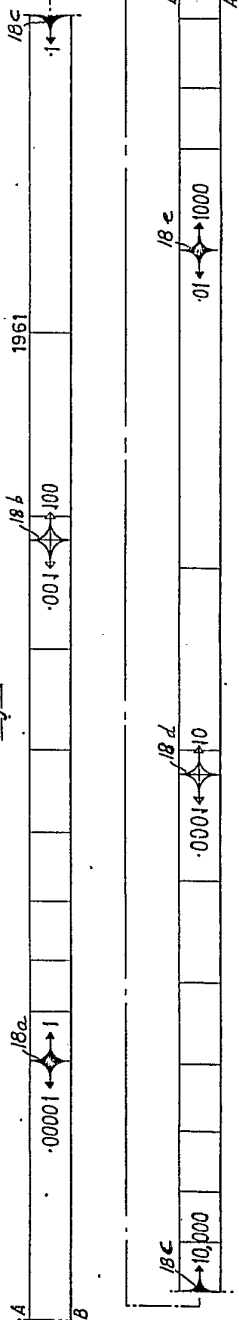


Fig. 4.

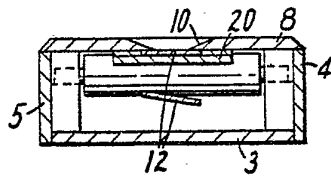


Fig. 5.



Fig. 6.

