

PATENT SPECIFICATION

851,003

DRAWINGS ATTACHED.



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International Classification :—G06g.

COMPLETE SPECIFICATION.

Improvements in or relating to Calculating Instruments of the Slide-Rule or like Type for Making Calculations relating to Speed, Time and Distance.

I, HAROLD ALEXANDRE BABBINGTON BLACKWELL, a British Subject, of Thermetal House, Garston, Liverpool 19, in the County of Lancaster, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is for improvements in or relating to circular slide-rules for making calculations appertaining to time, speed and distance. Such an instrument is of particular value to motorists and others who may, for example, wish to know quickly and easily:—

(a) Speed, given distance covered or to be covered and time taken or available for covering said distance.

(b) Time, given average speed and distance covered or to be covered.

(c) Distance, given time and average speed.

An object of the present invention is to provide an instrument for the above-mentioned purpose in which a large range of figures can be read off directly without consideration having to be given to the position of a decimal point as is usual with instruments of the slide-rule type. This is of greater assistance to motorists, particularly when fatigued after long hours of driving. Linear slide-rules having such facilities are available but not circular slide-rules of the character with which the present invention is concerned.

According to the present invention there is provided a circular slide-rule for making calculations appertaining to speed, time and

distance, comprising a logarithmic scale graduated in speeds (e.g. miles or kilometres per hour) two or more logarithmic scales extending successively around the instrument and graduated in periods of time each succeeding scale having readings ten times greater than the readings of the preceding scale and two or more logarithmic scales also extending successively around the instrument and graduated in distances each succeeding scale having readings ten times greater than the readings of the preceding scale. In one particular embodiment of the invention the distance scale is movable and works against the time scale and also carries a pointer or index adapted to work over the speed scale.

Two particular embodiments of the invention as applied to an instrument of the circular slide-rule type for making rapid calculations involving a large range of speeds, times and distances, will now be described with reference to diagrammatic drawings of which Figure 1 accompanies the Provisional Specification and Figures 2, 3 and 4 the Complete Specification. In these drawings:—

Figure 1 is a face view of one embodiment;

Figure 2 is a side view of the embodiment shown in Figure 1;

Figure 3 is a face view of the second embodiment; and

Figure 4 is a side view of the embodiment shown in Figure 3.

The instrument shown in Figures 1 and 2 comprises a backboard or plate 10 to which a transparent disc 11 is rotatably secured as indicated at 12. The disc 11 is formed with a pointer or index 13.

[Price 3s. 6d.]

Inscribed on the backplate 10 in the form of an arc of a circle is a series of repeated logarithmic scales C which are graduated from one end of the series to the other in units of time, firstly in minutes and then in hours and minutes. Inscribed around part of the periphery of the disc 11 is a series of repeated logarithmic scales D graduated in distances from one end of the series to the other. The series of scales D works against the series of scales C, such scales corresponding in effect to the D and C scales of slide-rule.

It will be noted that the first scale of the series D (which is incomplete) is graduated in distances of from 3 to 10, the second scale of this series is graduated in distances of from 10 to 100, the third scale of this series is graduated in distances of from 100 to 1000 and the fourth scale (which is also incomplete) is graduated in distances of from 1000 to 3000. Similarly, the first scale of the series C is graduated in minutes from 1 to 10 (each $\frac{1}{10}$ th division in this scale representing six seconds), the second scale of the series C is graduated from 10 minutes to 1 hour 40 minutes (the $\frac{1}{10}$ divisions of this scale each representing 1 minute), the third scale of the series C is graduated from 1 hour 40 minutes to 16 hours 40 minutes (the $\frac{1}{10}$ th divisions in this scale each representing 10 minutes) and the fourth scale of the series C is graduated from 16 hours 40 minutes to 166 hours 40 minutes (the $\frac{1}{10}$ th divisions of this scale each representing 1 hour 40 minutes). Thus, distances of from 3 miles or kilometres to 3000 miles or kilometres and periods of time of from 1 minute to 166 hours 40 minutes can be read off directly from the instrument without the necessity of making a mental or other calculation to ascertain the correct position of a decimal point.

Inscribed on the backplate 10 in the form of an arc with its centre at the pivot 12 is a logarithmic scale C1 which is a reciprocal of the scale C. The scale C1 is graduated in speeds of from 18 to 180 which may, for example, represent 18 to 180 miles per hour, or 18 to 180 kilometres per hour or some other units of distance per unit of time. The pointer 13 works over the scale C1. In order to halt the pointer at the extreme ends of the scale C1 a pin or the like 14 on the underside of the disc 11 works in a groove or slot 15 in the backplate 10 and stops further movement of the disc 11 when it reaches the ends of said groove or slot. The pin 14 could, of course, be in the backplate and the groove or slot 15 in the disc.

Some examples of calculations which can be made with the instrument above described will now be given:—

Assuming it is required to make a journey of 198 miles at an average speed of 36 miles

per hour and it is desired to know the total time for this journey. To make this calculation the pointer 13 is set against the figure 36 on the C1 scale. The answer, 5 hours 30 minutes is then read off directly from the C scale against the figure 198 on the D scale.

Assuming that it is required to make a journey of 40 miles at an average speed of 48 miles per hour and it is desired to know the total time which will be occupied on this journey. The pointer 13 is set to 48 on scale C1 and the answer, 50 minutes is read off directly from the C scale against the figure 40 on the D scale.

Assuming that it is required to make a journey of 1540 miles at an average speed of 42 miles per hour, then, with the pointer 13 set against 42 on the C1 scale, the time which will be occupied (i.e. 36 hours 30 minutes) can be read off the C scale against the reading 1540 on the D scale.

Assuming it is desired to make a journey of 9 miles at an average speed of 27 miles per hour, then the pointer 13 is set to 27 on scale C1 and the answer, 20 minutes, is read off scale C against the distance 9 on scale D.

It will be noted that in none of the above calculations is it necessary to consider the position of a decimal point, all the readings being given by mere inspection of the instrument.

It is of course possible to calculate average speeds, given time and distance, or alternatively calculate distances covered, given time and speed. For example, given a distance covered of 900 miles in a time of 13 hours 20 minutes, then if the figure 900 on scale D is set against the figure 13 hours 20 minutes on scale C the pointer 13 will indicate the average speed, i.e. $67\frac{1}{2}$ miles per hour on scale C1. Similarly, assuming that a vehicle has an average speed of 35 miles per hour and has been travelling for 9 hours 10 minutes, then if the pointer 13 is set against the figure 35 on scale C1 the total distance travelled, i.e. 320 miles, can be read off scale D against the figure 9 hours 10 minutes on scale C.

The embodiment of the invention shown in Figures 3 and 4 is similar to that already described with reference to Figures 1 and 2 and like reference numerals have been used to designate like parts. The instrument shown in Figures 3 and 4 has, however, been designed particularly for making calculations in which only short distances are involved. In such circumstances some of the divisions in the wide end of the scale can be omitted.

Various other calculations which can be made with instruments according to the present invention are, for example, such as are set forth in the Specification of my

198 miles at an average speed of 36 miles

Patent No. 707,740. The instrument according to the present invention is in some respects an improvement in or modification of the instrument set forth in my Patent Specification No. 707,740.

WHAT I CLAIM IS:—

1. A circular slide-rule for making calculations appertaining to speed, time and distance, comprising a logarithmic scale graduated in speeds (e.g. miles or kilometres per hour) two or more logarithmic scales extending successively around the instrument and graduated in periods of time each succeeding scale having readings ten times greater than the readings of the preceding scale and two or more logarithmic scales also extending successively around the instrument and graduated in distances each succeeding scale having readings ten times greater than the readings of the preceding scale.

2. An instrument as claimed in Claim 1 wherein at least one of the relatively angularly adjustable members or discs on which the circular or arcuate scales are marked has a pointer, index or the like adapted to

work over a scale on the other member or disc.

3. An instrument as claimed in Claim 1 wherein the speed scale and the time scale are marked on a back-plate or member and the distance scale is on a disc pivoted to said back-plate so that the distance scale can be adjusted against the time scale, said disc also having a pointer or the like for the speed scale.

4. An instrument as claimed in Claim 2 or Claim 3 wherein stop means is provided for halting the pointer at the limit of the scale over which it works.

5. An instrument as claimed in Claim 4 wherein the stop means comprises an arcuate slot in one member or disc and a pin or the like on the other which projects into said slot.

6. An instrument substantially as herein described with reference to Figures 1 and 2 or 3 and 4 of the accompanying drawings.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Calculating Instruments of the Slide-Rule or like Type for Making Calculations relating to Speed, Time and Distance.

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(c) Distance, given time and average speed.

An object of the present invention is to provide an instrument for the above mentioned purpose in which a large range of figures can be read off directly without consideration having to be given to the position of a decimal point as is usual with instruments of the slide rule type. This is

of greater assistance to motorists, particularly when fatigued after long hours of driving.

According to the present invention there is provided an instrument of the slide-rule or like type for making calculations appertaining to speed, time and distance, comprising a logarithmic scale graduated in speeds (e.g. miles or kilometres per hour) two or more logarithmic scales extending successively around or along the instrument and graduated progressively in periods of time so that the graduations of one scale are a continuation of the other (e.g. in minutes and then in hours and minutes) and two or more logarithmic scales also extending successively around or along the instrument and graduated progressively in periods of distance so that the graduations of one scale are a continuation of the graduations on the other. In one particular embodiment of the invention the distance scale is movable and works against the time scale and also carries a pointer or index adapted to work over the speed scale.

One particular embodiment of the invention as applied to an instrument of the cir-

cular slide-rule type for making rapid calculations involving a large range of speeds, times and distances, will now be described with reference to the accompanying diagrammatic drawing which shows the instrument in plan view.

The instrument comprises a backboard or plate 10 to which a transparent disc 11 is rotatably secured as indicated at 12. The disc 11 is formed with a pointer or index 13.

Inscribed on the backplate 10 in the form of an arc of a circle is a series of repeated logarithmic scales C which are graduated from one end of the series to the other in units of time, firstly in minutes and then in hours and minutes. Inscribed around part of the periphery of the disc 11 is a series of repeated logarithmic scales D graduated in distances from one end of the series to the other. The series of scales D works against the series of scales C, such scales corresponding in effect to the D and C scales of a slide-rule.

It will be noted that the first scale of the series D (which is incomplete) is graduated in distances of from 3 to 10, the second scale of this series is graduated in distances of from 10 to 100, the third scale of this series is graduated in distances of from 100 to 1000 and the fourth scale (which is also incomplete) is graduated in distances of from 1000 to 3000. Similarly, the first scale of the series C is graduated in minutes from 1 to 10 (each $\frac{1}{10}$ th division in this scale representing six seconds), the second scale of the series C is graduated from 10 minutes to 1 hour 40 minutes (the $\frac{1}{10}$ th divisions of this scale each representing 1 minute), the third scale of the series C is graduated from 1 hour 40 minutes to 16 hours 40 minutes (the $\frac{1}{10}$ th divisions in this scale each representing 10 minutes) and the fourth scale of the series C is graduated from 16 hours 40 minutes to 166 hours 40 minutes (the $\frac{1}{10}$ th divisions of this scale each representing 1 hour 40 minutes. Thus, distances of from 3 miles or kilometres to 3000 miles or kilometres and periods of time of from 1 minute to 166 hours 40 minutes can be read off directly from the instrument without the necessity of making a mental or other calculation to ascertain the correct position of a decimal point.

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underside of the disc 11 works in a groove or slot 15 in the backplate 10 and stops further movement of the disc 11 when it reaches the ends of said groove or slot. The pin 14 could, of course, be in the backplate and the groove or slot 15 in the disc.

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It will be noted that in none of the above calculations is it necessary to consider the position of a decimal point, all the readings being given by mere inspection of the instrument.

It is of course possible to calculate average speeds, given time and distance, or alternatively calculate distances covered given time and speed. For example, given a distance covered of 900 miles in a time of 13 hours 20 minutes, then if the figure 900 on scale D is set against the figure 13 hours 20 minutes on scale C the pointer 13 will indicate the average speed, i.e. $67\frac{1}{2}$ miles per hour on scale C1. Similarly, assuming that a vehicle has an average speed of 35 miles per hour and has been travelling for 9 hours 10 minutes, then if the pointer 13 is set against the figure 35 on scale C1 the total distance travelled, i.e. 320 miles, can be read off scale D against the figure 9 hours 10 minutes on scale C.

Various other calculations which can be made with the instrument according to the present invention are, for example, such as are set forth in the Specification of my Patent Specification No. 707,740. The in-

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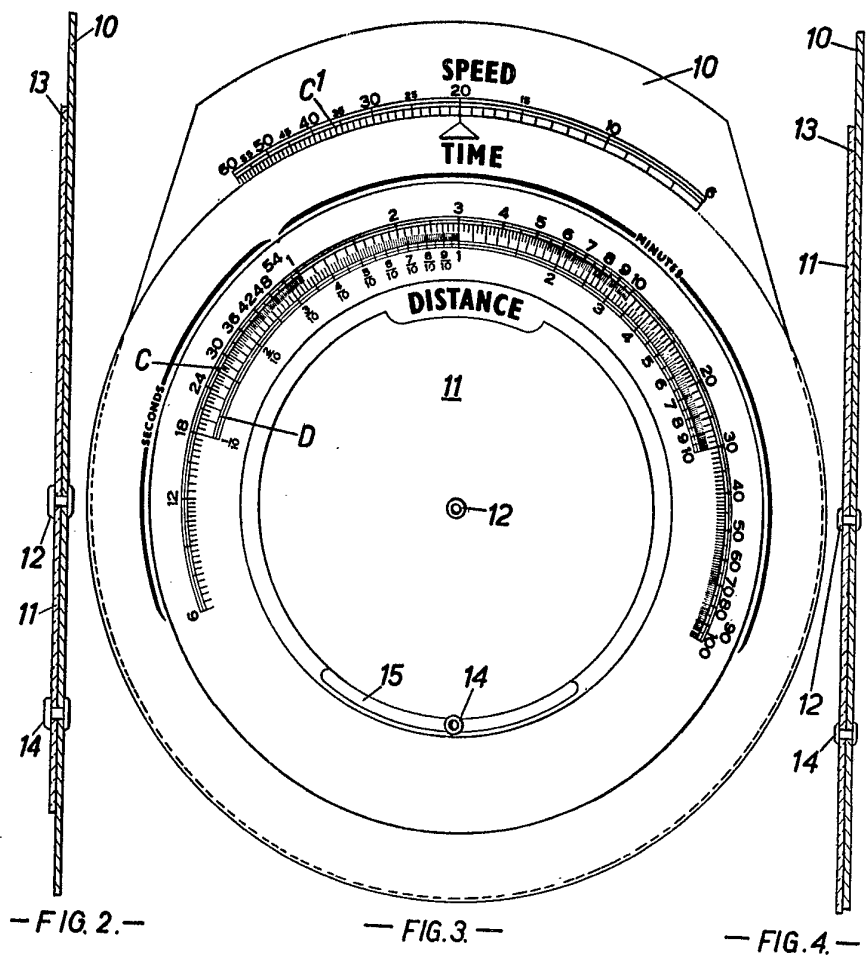
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strument according to the present invention
is in some respects an improvement in or
modification of the instrument set forth in
my Patent Specification No. 707,740.

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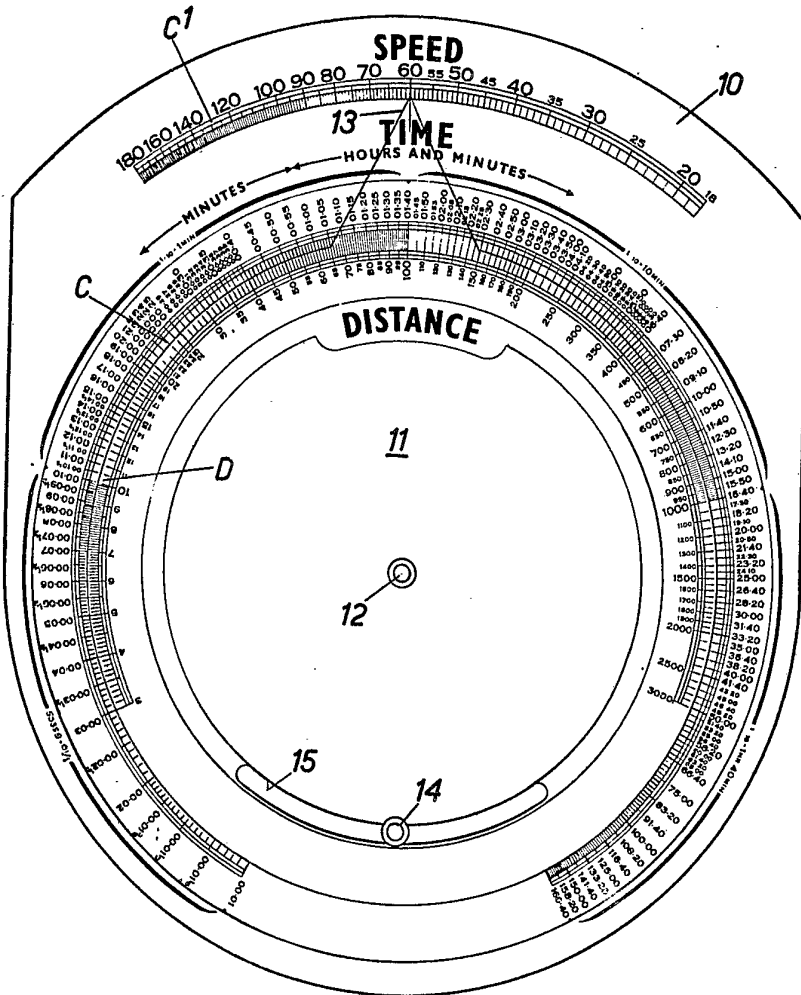
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- FIG. 2. -

- FIG. 3. -

- FIG. 4. -



— FIG 1 —