

PATENT SPECIFICATION



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256,903

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COMPLETE SPECIFICATION.

Improvements in and relating to Circular Calculators.

We, **FREDERICK AINSWORTH ROBINSON**, of "Rose Mount", Helmshore Road, Helmshore, near Manchester, in the County of Lancaster, a subject of the King of Great Britain and Ireland, and **LANCASHIRE OPTICAL MANUFACTURING COMPANY LIMITED**, of 30 to 32, Exchange Street, Cheetham, Manchester, in the County of Lancaster, a company incorporated under the laws of Great Britain, do hereby declare the nature of this invention and in what manner the same is to be particularly described and ascertained in and by the following statement:—

This invention relates to that kind of circular calculators wherein a calculating disc and a superposed calculating finger are employed and arranged to be set by two independent hand operated means, and has for its main object to provide a novel construction which renders the calculator more convenient to use and enables the moveable parts thereof to be set more quickly and finely when calculating.

According to our invention the calculating disc and calculating finger are independently rotated by means of setting members which rotate about axes parallel with the common axis of rotation of the disc and finger and are connected to the said parts by spur gearing, the rotary axes of which are also parallel to the said common axis.

The said setting members are preferably in the form of discs or arms arranged behind the casing of the calculator and adapted to be rotated by means of a single human finger.

An important feature lies in arranging the said setting members near together whereby they can be manipulated by the same human finger or adjacent human fingers whilst the calculator is held in an unchanged position in the

hand to which that finger or those fingers belong.

The said spur gearing is preferably in the form of trains of spur wheels which connect the setting members singly to the disc and calculating finger. 50

The trains of wheels and the calculating disc and calculating finger may be all provided on a base to form therewith a complete unit which can be entirely removed from the casing for inspection or repair purpose. 55

Stressed springs are provided to bear on the cylindrical surfaces of rotating portions of the calculator to prevent accidental displacement of the calculating disc and calculating finger without creating an amount of friction which would interfere with smoothness in the movement and setting of the said disc and finger. 65

Where the circular calculator is intended for making calculations relating to cotton cloth or the like calculations the centre of the dial portion is provided with suitable tables such as tables relating to widths of looms, reeds and picks, counts of yarn, and so forth. 70

In order that our invention may be fully understood and more readily carried into practice we have caused to be appended hereunto a sheet of drawings illustrating a constructional example thereof, wherein:— 75

Figure 1 is a front view of a rotary calculator. 80

Figure 2 is a rear view, and Figure 3 is a plan view thereof.

Figure 4 is a detached front view of parts of the calculator and 85

Figure 5 is a rear view thereof, Figure 6 is a detached front view of a dial of a rotary calculator.

Figure 7 is an enlarged view in section on line 7—7 of Figure 5 regarded in the direction of the arrows, the said 90

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view showing the dial and movable finger in position.

Figure 8 is an enlarged view in section on line 8—8 of Figure 5 regarded in the direction of the arrows, the said view showing the dial and movable finger in position.

Figure 9 is a fragmentary rear view of a rotary calculator and illustrates a modification.

Referring to the drawings, in the construction shown in Figures 1 to 5 and 7 and 8, a casing 1 contains a plate 2 secured therein by means of screws which pass through holes 3 provided for that purpose in the plate 2 which is conveniently provided with apertures 4 and 5 to reduce the weight thereof.

Brackets 6, 7 and 8 are attached to the plate 2 at the rear thereof by means of screws 9, 10 and 11 respectively.

A gear wheel 12 is provided on an arbor 13 to rotate therewith and the arbor is mounted in the plate 2 and bracket 7 so as to project rearwardly through the bracket 7. The gear wheel 12 meshes with a gear wheel 14 of greater width and projecting into a hole 15 provided through the plate 2.

The gear wheel 14 is rotatably mounted on a stud 16 fixed to the bracket 8 and is held against axial movement thereon by a disc-nut 17 screwed onto the stud 16 and recessed into the wheel 14. A gear wheel 18 meshes with the wheel 14 and is mounted to rotate on a bush 19 fixed in a hole 20 in the plate 2, the wheel 18 being situated in a recess 21 provided in front side of the plate 2 and being held against axial displacement by a washer 22 attached to the bush 19 by screws 23.

The wheel 18 is provided on its front side with screw-threaded holes 24 for the reception of screws 25 which serve to secure the dial 26 of the calculator to the wheel 18.

An arbor 27 is journaled in the bracket 6 and plate 2 to project rearwardly from the plate and a gear wheel 28 is mounted on the arbor to rotate therewith. The gear wheel 28 meshes with a gear wheel 29 mounted on an arbor 30 journaled in the bracket 6 and plate 2. The gear wheel 29 meshes with a gear wheel 31 mounted on an arbor 32 to rotate therewith, and the arbor 32 is journaled in the bracket 6 and the bush 19 and projects forwardly through the said bush and the disc 22.

The movable finger 33 of the calculator is mounted on the forward end of the arbor 32 by means of a pin which engages an axial hole in the said end.

All of the parts more particularly

shown in Figures 4, 5, 7 and 8 form together a complete unit which can be readily inserted in and removed from the case 1 in an entire state, whereby disassembly for inspection or repair and reassembly is facilitated.

The rear of the casing 1 is provided with two holes for the arbors 13 and 27 to project through and with recesses 34, Figures 2 and 3, to receive knurled discs 35 and 36 respectively mounted on squared parts 37 and 38 respectively of the arbors 13 and 27 and secured axially in position by disc nuts 39 and 40 respectively recessed into the discs 35 and 36. The recesses 34 break through the periphery at places in close proximity to each other.

The arbor 13 is provided with an enlarged part 41 on the periphery of which presses a stressed flat spring 42 attached to the bracket 7 and a similar spring 43 is attached to the bracket 6 to press under stress on the periphery of an enlarged part 44 provided on the arbor 27. These springs assist in preventing accidental displacement of the dial 26 and finger 33 when set but do not appreciably add to the effect necessary to move the dial or finger and do not cause a lack of uniformity in power necessary to move the same. Furthermore the employment of spur gearing to move the said parts ensures a uniformly smooth but very slow resistance to the movement and therefore facilitate the quick and accurate setting of the dial and finger into the required position. The ease and speed of setting is also enhanced by the comparatively large diameters of the setting disc 35 and 36 and it will be observed in this connection that one revolution of the setting disc 35 or 36 produce a complete revolution of dial 26 or finger 33 and the distance moved by the finger operating the setting disc is a direct measure of the distance moved by the dial or finger.

In operation, the circular calculator can be held with the palm and some of the fingers of one hand or between two or more fingers of one hand and the discs 35 and 36 are then turned by one or more fingers of the same hand by pressing the fingers on the edge or back of the disc and moving the finger to produce the required angular displacement of the disc. If desired two hands may be used but this is not necessary and in fact the calculator can be comfortably and speedily operated by a person having only one hand.

It will be observed that the same finger can be moved from one operating

position to the other without changing the position of the calculator in the hand and without loss of time.

In lieu of operating discs, operating arms 45 and 46, Figure 9, may be mounted on the arbor 13 and 27 to rotate therewith. The usual fixed pointer 47 is provided in the front removable cover 48 of the casing 1.

10 In Figure 6 we have illustrated an improved form of dial for a circular calculator. It will be observed that the marking of the dial for calculation purposes is confined to a ring like space 49 adjacent the cover 48.

15 The circular space 50 surrounded by the space 49 is provided with data to which it may be necessary for the calculator to frequently refer. For example 20 where the circular calculator is intended more particularly for use in making textile calculations, the space 50 is filled with cotton cloth tables relating to widths of looms, reeds and picks, and 25 counts of yarn. The markings of the dial are each provided with figures which indicate to or remind the user that the marking may indicate values in decimals, units, tens, hundreds, or thousands. 30 Furthermore the sub-divisional markings between the main divisions are each provided with a number similar to those shown between the markings 9—0 and 1—0.

35 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

40 1. A circular calculator of the hereinbefore specified kind, wherein setting members are provided to rotate about axes which are parallel with the common axis of rotation of the calculating disc 45 and calculating finger and are connected to the said rotary parts by spur gearing, the rotary axes of which are also parallel to the said common axis.

50 2. A circular calculator according to Claim 1 wherein the setting members are in the form of discs or arms arranged behind the casing of the calculator and adapted to be conveniently rotated by a single human finger.

55 3. A circular calculator according to either of the preceding claims, wherein the setting members can be manipulated by the same human finger or adjacent human fingers whilst the calculator is 60 held in unchanged position in the hand

to which that finger or those fingers belong.

4. A circular calculator according to Claim 1 wherein the spur gearing is in the form of trains of spur wheels which connect the setting members singly to the calculating disc and calculating finger. 65

5. A circular calculator according to any of Claims 1, 3 and 4, wherein the said gearing or trains of wheels and calculating disc and calculating finger are all provided on a base to form therewith a single unit which can be removed entire from the casing for inspection or repair purposes. 70 75

6. A circular calculator according to any of the preceding claims wherein stressed springs are provided to bear on the cylindrical surfaces of rotating portions of the calculator to act against accidental displacement of the calculating disc and calculating finger without creating an excessive or non-uniform frictional resistance to movement of the said parts. 80 85

7. A circular calculator according to any of the preceding claims wherein the calculating disc is provided at the centre with suitable tables for use in making cotton cloth calculations or the like calculations, such as tables relating to widths of looms, reeds and picks, counts of yarn and so forth. 90

8. A circular calculator of the hereinbefore specified kind comprising a plate contained within a casing, discs or arms or their equivalents accessible and adapted for operation by the human finger from the exterior of the casing and arranged near to each other, gearing 100 carried by the said plate and connecting one of the discs, arms or their equivalents to the calculating finger and gearing 105 carried by the said plate and independently connecting the other of the discs, arms or their equivalents to a rotary calculating disc, the axes of rotation of the discs or arms or their equivalents being parallel with the 110 common axis of the finger and calculating disc.

9. The improved circular calculator substantially as hereinbefore described with reference to the accompanying 115 drawings.

Dated this 5th day of May, 1926.

For the Applicants,

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4, Corporation Street, Manchester. 120

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

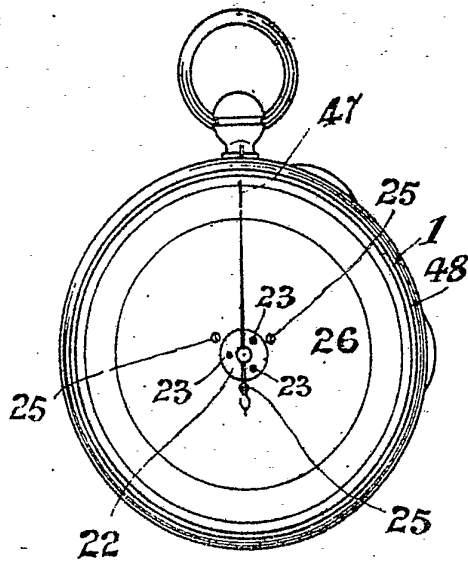


Fig. 2.

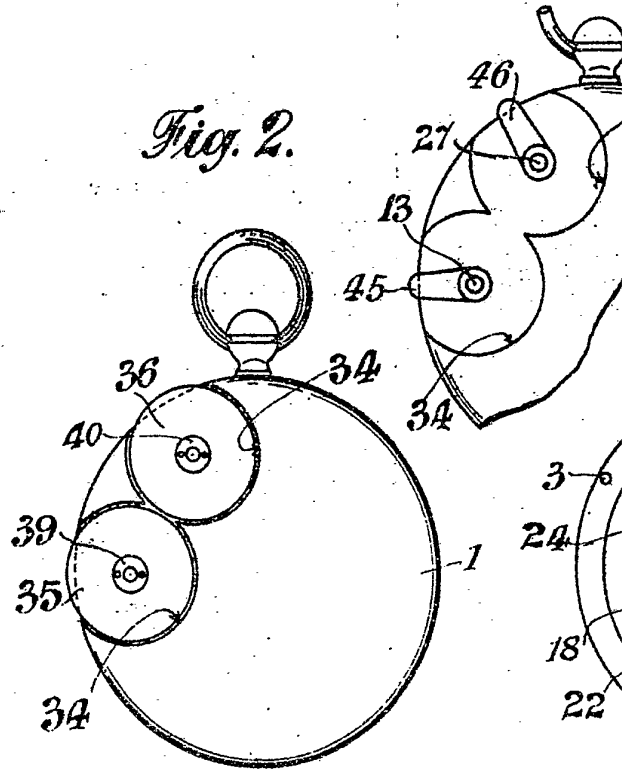


Fig. 3.

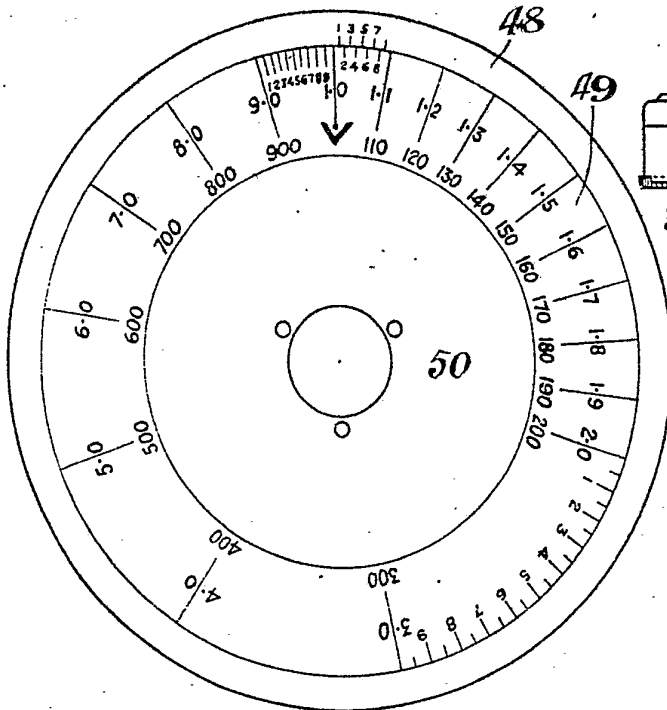
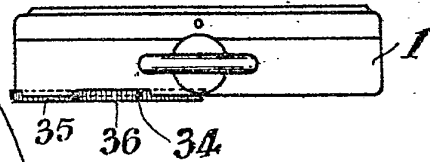
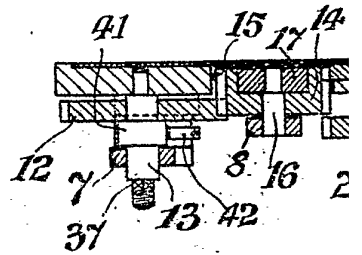


Fig. 6.



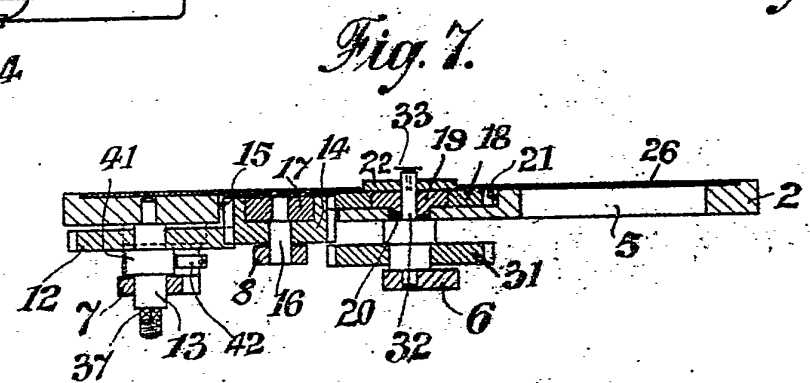
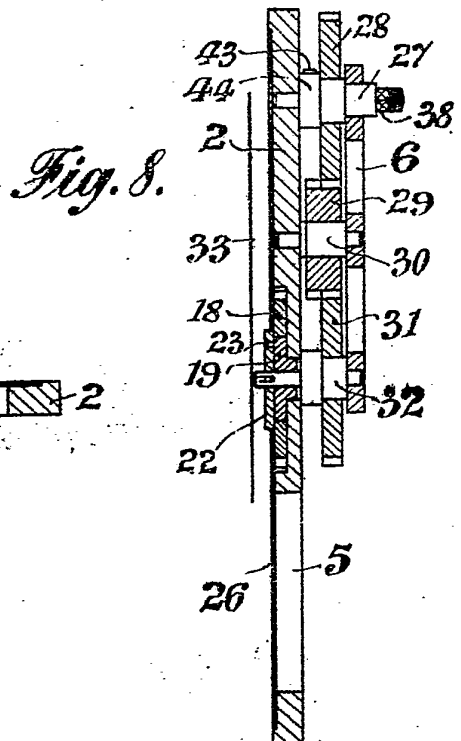
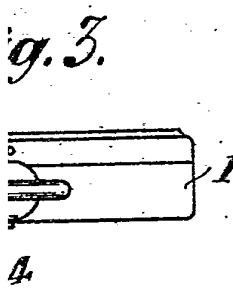
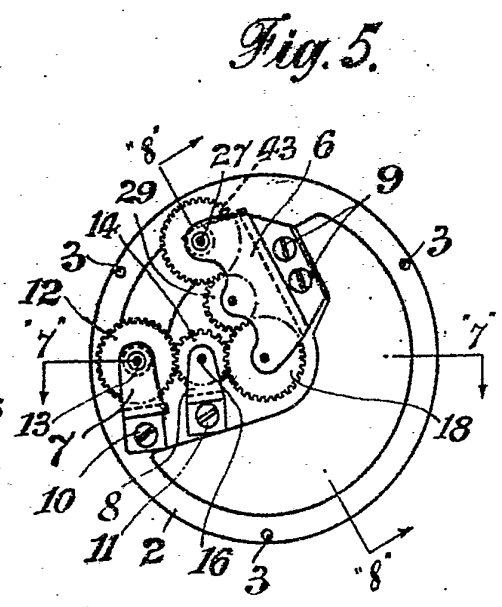
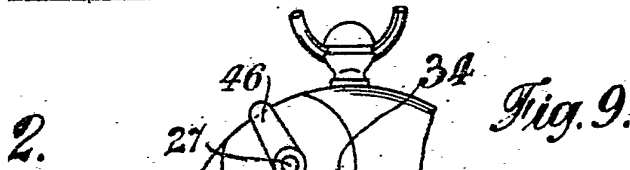


Fig. 1.

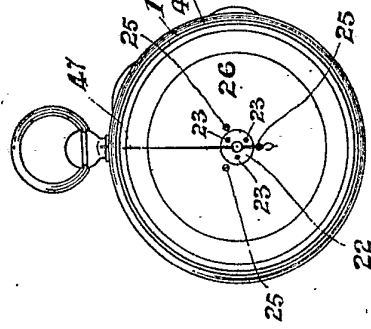


Fig. 2.

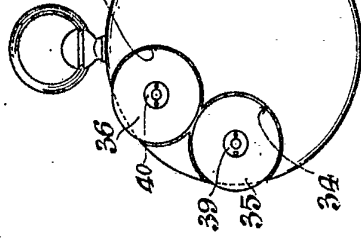


Fig. 3.

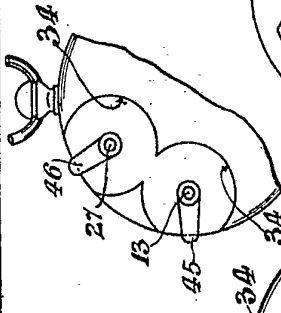


Fig. 4.

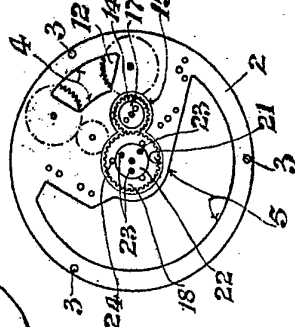


Fig. 5.

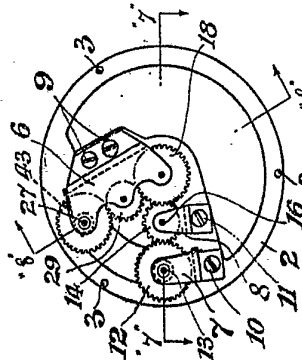


Fig. 6.

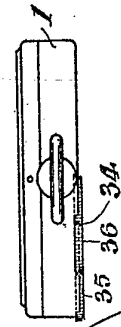


Fig. 7.

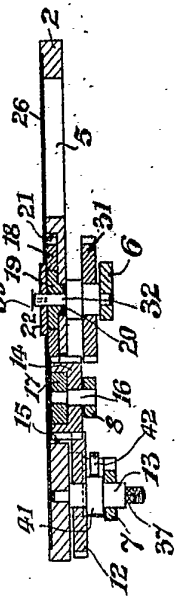


Fig. 8.

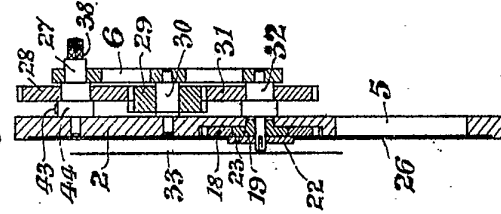
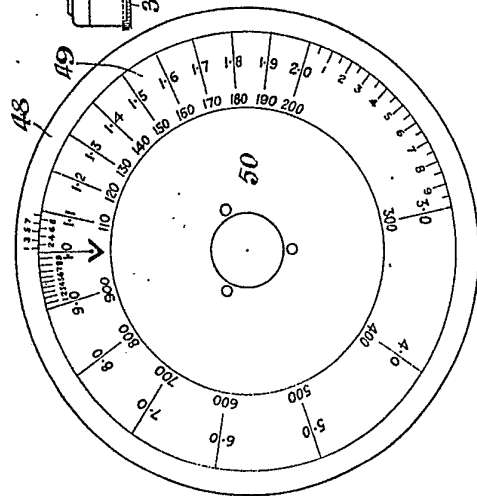


Fig. 9.



[This drawing is a reproduction of the Original on a reduced scale.]