L. E. PICOLET.

CALCULATOR.

APPLICATION FILED JULY 11, 1916.

1,207,439. Patented Dec. 5, 1916.

Fig. 1.

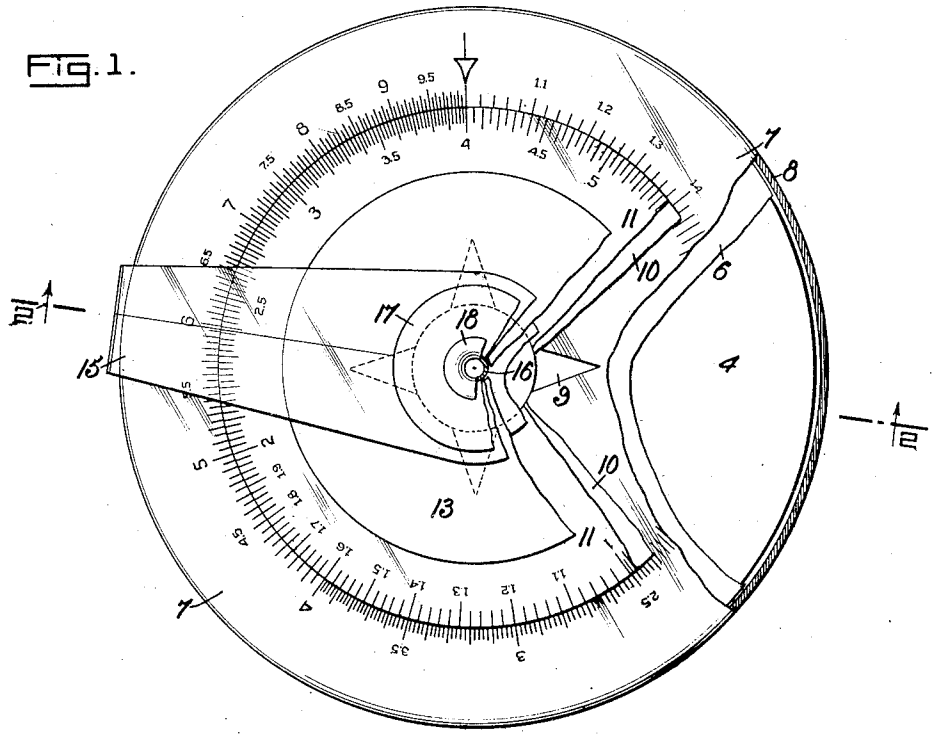


Fig. 2.

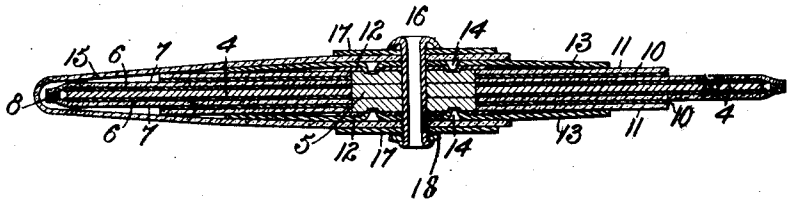
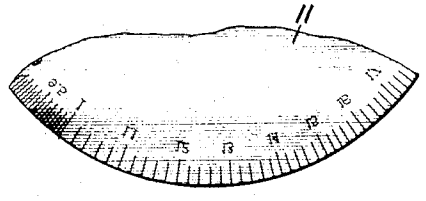


Fig. 3.



WITNESSES

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CALCULATOR.

1,207,439. Specification of Letters Patent. Patented Dec. 5, 1916.

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To all whom it may concern:

Be it known that I, LUCIEN EMILE PICOLET, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and Improved Calculator, of which the following is a full, clear, and exact description.

My invention relates to calculators having relatively movable scales and has reference more particularly to the way the relatively movable parts of the calculator are constructed.

An object of the invention is to provide a simple and inexpensive calculator in which the divisions of the scales are protected from injury, although clearly visible.

A further object of the invention is to provide a disk calculator, easy of manipulation and certain in action, with which various arithmetic operations, such as addition, multiplication and evolution, may be performed according to the nature of the graduations inscribed thereon.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts as herein fully described, illustrated and claimed.

In the accompanying drawings, forming part of the application, similar characters of reference indicate corresponding parts in all the views.

Figure 1 is an elevation of a calculator embodying my invention, certain parts of which are broken out to show the details of construction; Fig. 2 is a cross section on line 2—2, Fig. 1; and Fig. 3 is a fragmentary inside elevation view of a transparent member.

Referring to the drawings, 4 is the central steel disk or plate which is apertured centrally to fit snugly a central laminated core 5. Each face of the disk supports a reflector disk 6, made of paper. The paper disk is covered by a transparent disk 7. The back face of each transparent disk 7 is translucent, while the upper faces thereof are transparent. On the translucent faces (see Fig. 3), the divisions of the scales are printed. The paper disks 6 are white, forming a background for the divisions of the scales printed on the back surface of the transparent member and rendering the divisions clear and distinct on the translucent surface of the transparent disks.

The transparent disks are of a diameter greater than the paper disks, and the marginal portions thereof beyond the peripheral edge of the paper disks are united by a suitable cement 8 which seals the metal and paper disks within the transparent disks. The transparent disks 7, which are made of celluloid, are affected by a change of atmospheric conditions, and to prevent their gripping the periphery of the core 5, each of said disks is provided with a plurality of radial notches 9, preferably triangular with apices remote from the center of the disk. By forming these notches the gripping power of the transparent disks upon the core is greatly reduced and the disks are allowed to contract and expand without prejudicially increasing the frictional contact between the transparent disks and core.

Mounted over each transparent disk 7 is a paper disk 10 the diameter of which is such as to expose a portion of the division of the scales formed on the transparent disks 7. Mounted over each paper disk is a transparent disk 11 of material similar to that of the disk 7 and of a diameter equal to the corresponding paper disks. The upper surface of the transparent disks 11 is transparent, while the bottom surface is translucent. The translucent surfaces carry the divisions of the scales which coöperate with the corresponding scales on the transparent member 7.

In cases where the calculator has scales on both of its faces the divisions will be formed on all the transparent disks. In cases where the scales are formed on only one side, on the opposite sides the transparent members are without any divisions. But the structure of the calculator in both cases is identical. The transparent disks 11, as well as the paper disks 10, have central apertures with which they fit snugly on the core 5. The transparent disks 11 are secured to the core by paper binders 12, the diameters of which binders are greater than that of the core, so that the margins of the binders engage the transparent disks 11 and can be cemented thereto by any suitable means, as well as to the core. The paper disk 10 is also secured to the disks 11.

Each transparent disk 11 supports a metal disk 13, each of which metal disks has dia-

metrically opposite protuberances 14 which pierce the paper binder 12 and enter the core 5, so that the core 5 is keyed to the metal disks 13. The rotation of the metal disks is controlled by an indicating arm 15 which embraces the two faces of the calculator. The ends of the arms are secured to the disks by a tubular rivet 16 which passes through the axes of the core and disks.

A washer 17 is interposed between the ends of the arm 15 and the head of the rivet at one side, and the end of the arm and the spring washer 18 at the other side. The spring washer 18 makes the friction between the ends of the arm and the metal disk 13 greater than the friction between the core 5 and the unit formed by the central disk 4, the paper disks 6 and the transparent disks 7, which all revolve on the core. Thus, when the said unit is retained and the arm 15 is moved, the smaller unit formed by the core, the metal disks 13 the paper disks 10 and the transparent disks 11, will rotate with the arm.

When it is desired to revolve the arm relative to the second or smaller unit, the smaller unit is gripped and the arm rotated, whereby the tubular rivet is caused to rotate within the core. The arm 15 is of celluloid and carries a radial line which serves for the purpose of reading divisions off the scale during the computation.

From the above description it will be seen that the calculator is formed of two independent units. The larger one has visible sealed scales so that the divisions thereof are protected from any injury. In the second unit the divisions are protected from injury by extensive use of the scale by the provision of the paper disks between the transparent disks 11 and 7. The said paper disks 10 serve, therefore, two purposes, they prevent the rubbing off of the divisions on the disks 11 during the use of the calculator and also serve as a background for the divisions to render the same more distinct, as has been previously pointed out. The provision of the radial notches in the transparent disks 7 allows a free rotation to the core and, therefore, prevents the arm 15 from turning normally independently of the second or smaller unit.

I claim:

1. In a disk calculator of the class described, a central metallic disk presenting white surfaces, a transparent disk on each side of the metallic disk and of a diameter larger than said metallic disk, means binding the margins of said transparent disks whereby the metallic disk is sealed therein, said transparent disks having a translucent back or lower surface, scale divisions formed on said translucent surfaces, a core on which said disks are mounted to rotate, a transparent disk on each of the first mentioned transparent disks and mounted to revolve with the core, said second mentioned transparent disk being of smaller diameter than the first mentioned, and each having a translucent back or lower surface, scale divisions on said translucent surfaces for coöperating with the scale divisions of the first mentioned transparent disks, means backing the second mentioned transparent disks to prevent injury to the scale divisions thereon by the relative movement of the disks, an arm embracing all of said disks, and means securing said arm to the core to revolve with the core or relative thereto when the core is prevented from turning, substantially as and for the purpose set forth.

2. In a pocket calculator of the class described, a central metallic disk presenting white surfaces, transparent disks sealing the metallic disk at the margin, said transparent disks having a translucent back or lower surface, scale divisions upon said translucent surfaces of the disk, a core on which said transparent and metallic disks are mounted to rotate, said transparent disks having triangular radial notches at the core, the apex of each notch being remote from the center of the disk, transparent disks of a smaller diameter on each of the first mentioned transparent disks, means securing said second mentioned transparent disks to the core to revolve therewith, each of said second mentioned transparent disks having scale divisions on the lower surface thereof, means backing the lower surface of each of the second mentioned transparent disks, an arm, and means securing the arm to the core to revolve therewith and relative thereto when the core is prevented from rotation.

3. In a pocket calculator of the class described, a metallic disk, a reflector disk supported on each surface of the metallic disk, transparent disks sealing the reflector and metallic disks at the margin, each of said transparent disks presenting a translucent back surface, scale divisions formed on the translucent surfaces of the disk, all of above mentioned disks having a central opening, said transparent disks having radial triangular notches at the opening, a core fitting snugly into the central opening of the disks and on which said disks are free to turn in a unit, a transparent disk of smaller diameter mounted to revolve on each of the first mentioned transparent disks, means securing the second mentioned transparent disks to the core whereby they are bound to participate in the movement of the core, each of said second mentioned transparent disks having a translucent back surface, scale divisions on said translucent surfaces, means backing the translucent surfaces of said second mentioned transparent disks whereby

the divisions thereupon are protected from injury and wear, an indicating arm, and means securing the indicating arm to the core to revolve therewith and relative to the core when the core is prevented from rotation.

4. In a disk calculator of the class described, a central disk having scale divisions, a core on which said disk is mounted to rotate, a transparent disk on each side of the central disk, means binding the transparent disks to the core, scale divisions on the under side of the transparent disks coöperating with the divisions of the central disk, means backing the under side of the transparent disks, a metallic disk for each transparent disk and secured to the adjacent end of the core, an indicating arm embracing all of the above mentioned disks, and means for securing frictionally the ends of the arms to the metallic disks so that said arm revolves with the metallic disks or relative thereto when said metallic disks are prevented from revolving.

5. In a disk calculator of the class described, a pair of transparent relatively-movable members, scale divisions on said members adapted to coöperate, each of said transparent members having the lower surface thereof translucent, said scale divisions being formed on said translucent surfaces whereby the divisions are rendered more prominent and are protected from injury or contact during the manipulation of the calculator.

6. In a disk calculator of the class described, a pair of transparent relatively-movable members, scale divisions on each of said members adapted to coöperate, each of said members having a translucent back or lower surface on which the scale divisions are formed whereby the scale divisions are rendered clearer and protected from contact when the calculator is manipulated, and a non-transparent light-reflecting member in contact with each of the translucent surfaces of the transparent members for rendering said scales more prominent and for protecting the divisions of said scales from injury during the relative movement of said members.

7. In a disk calculator of the class described, a pair of transparent disks mounted to revolve on a common axis relative to one another, scales on each of said disks adapted to coöperate with one another, the divisions of said scales being formed on the lower or back surfaces of the disks, whereby the divisions or the scale are protected from contact during the manipulation of the calculator, the lower or back surfaces of said disks being translucent to make the divisions more prominent, a reflector backing the translucent surface of each disk to render the scale divisions more distinct and to prevent injury to said divisions during the relative displacement of the disks, an indicating arm for coöperating with the scale divisions of the two disks, and means connecting the arm to one of the disks to revolve therewith and relative to said disk when said disk is prevented from turning.

8. In a disk calculator of the class described, a central disk having scale divisions on each side, smaller transparent disks revolubly mounted on each side of the central disk, scale divisions on the under side of the second-mentioned disk for coöperating with the scale divisions on the corresponding side of the central disk, members backing the under side of each of the transparent disks to render said divisions more distinct and to prevent injury to said divisions when said disks are moved relative to the central disk, a metallic disk of smaller diameter than the transparent disk associated with each of said transparent disks and constrained to revolve therewith, an indicating arm adapted to coöperate with the divisions on the transparent and central disks, and means to frictionally secure the indicating arm to the metallic disks so as to revolve therewith or relatively thereto when said metallic disks are prevented from revolving.

LUCIEN EMILE PICOLET.