Dec. 12, 1950 N. T. PIERCE 2,533,954

CALCULATING MACHINE

Filed June 11, 1949

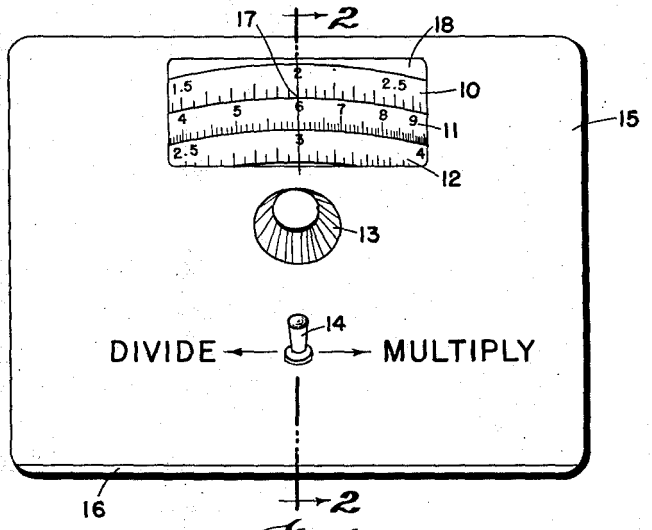

Fig. 1

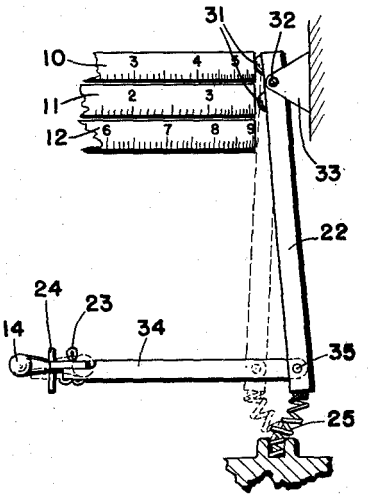

Fig. 3

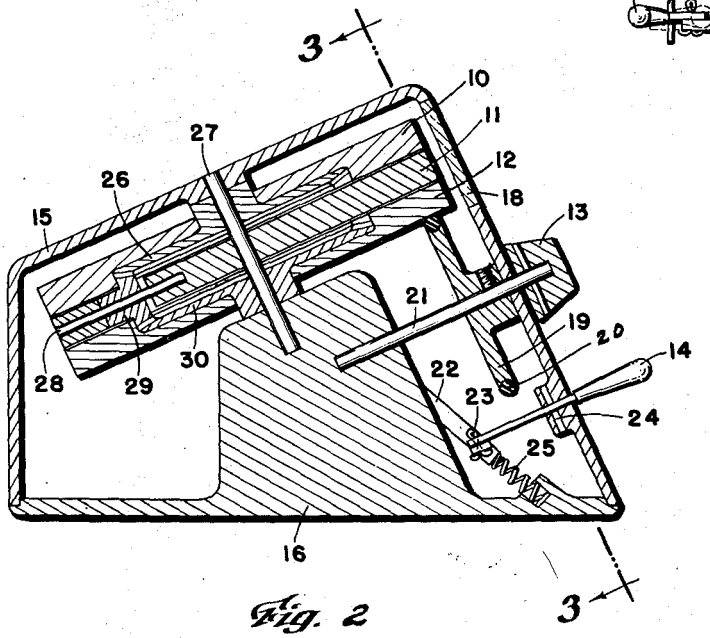

Fig. 2

Norton T. Pierce
Inventor
by: Dike, Calver + Porter
Attorneys

Patented Dec. 12, 1950 2,533,954

UNITED STATES PATENT OFFICE

2,533,954

CALCULATING MACHINE

Norton T. Pierce, Reading, Mass.

Application June 11, 1949, Serial No. 98,430

6 Claims. (Cl. 235—79.5)

1

My invention relates to calculating machines, and in particular to calculating machines for solving problems in multiplication, division, proportions, square roots, or a combination of multiplications and divisions in one problem.

The conventional way of solving such problems for practical engineering, scientific, and business purposes is to use a straight slide rule or circular slide rule of some sort, utilizing the logarithmic principle of the addition and subtraction of the logarithms of numbers for the multiplication and division of those numbers.

These slide rules all require both hands for their operation and are somewhat inconvenient at times, particularly when using one hand to record answers during a series of calculations. One of the primary objects of my invention is, therefore, to provide a small desk model calculating machine which can be operated easily and quickly with one hand, leaving the other free at all times during the calculation.

Another object of this invention is to provide a machine which can perform any number of alternate multiplications and divisions in one problem merely by shifting a single convenient lever and rotating a single knob to set the appropriate numbers on a scale opposite a fixed index-line.

I attain these objects by mechanism illustrated in the accompanying drawing, in which:

Fig. 1 is a front elevation.

Fig. 2 is a vertical sectional view taken on line 2—2 in Fig. 1.

Fig. 3 is a partially cut-away view taken substantially on line 3—3 in Fig. 2, showing the cylinder clamping lever and linkage.

As shown in the drawing, this calculator consists of three coaxially disposed cylindrical drums or annular bands 10, 11 and 12 all mounted in parallel relation on a common shaft 27 and free to turn thereon. Drums 10 and 12 each have fixed to them, or integral with them, bevel gears 26 and 30, respectively. The center drum carries the small bevel gear 29 which is free to rotate on its shaft 28, arranged at right angles to main shaft 27.

Means is provided for rotating the drums 10, 11 and 12, which includes a turning knob 13 fixedly mounted on shaft 21, arranged below the drums, and preferably at right angles to shaft 27. A friction wheel 20 having a friction surface, such as of rubber, is also fixed on shaft 21 which engages the underside of drum 12 for rotating the latter.

Means is provided whereby drums 10 or 11 may be clamped, which includes a lever 22 pivoted

2

at 32 on fixed bracket 33 and having two friction pads 31 fixed thereto. This lever is moved from one side to the other by means of hand lever 14 pivoted at 24 and connected by a suitable linkage 34 fastened to lever 14 by pin 23 and to arm 22 by pin 35. Arm 22 is constrained to stay in either side position, clamping either drums 10 or 11, by means of a toggle spring 25, which is fixed at the bottom in base 16 and connected at the top to arm 22.

The drums 10 and 12 each have fixed to their peripheral edges or molded integrally therein, a complete logarithmic cycle scale such as is found on the "C" or "D" scales of a conventional slide rule. Drum 11 has a scale consisting of two logarithmic cycles, as found on the double-cycle scale commonly called the "A" or "B" scales of a conventional slide rule, each cycle being half as long as the cycles on drums 10 and 12. The scales are viewed through a window 18 fastened in the housing 15 and the scale numbers are set opposite the fixed index-line 17 inscribed on window 18. The base of the housing 16 can also act as a bearing for shafts 27 and 21 and is fixed by suitable means to the housing 15.

In operation for multiplication, such as

$$R \times S = P$$

drum 11 is clamped, drum 10 is rotated through the differential gearing by means of knob 13 and set opposite index-line 17 to a number "R." The lever 14 is then shifted to clamp drum 10 and drum 12 is rotated through knob 13 until number "S" is set opposite index-line 17 on scale 12. The product "P" then appears opposite the index-line on scale 11.

For division, such as

$$\frac{T}{U} = V$$

the numbers are set in a similar manner, the number "T" being set on scale 11 while drum 10 is clamped, the number "U" then being set on scale 12 while drum 11 is clamped, and the answer "V" appearing on scale 10.

For a long combination of multiplications and divisions in one problem, a number is first set on scale 10, then all succeeding multiplications and divisions are performed alternately by merely shifting the lever 14 to either "Multiply" or "Divide" position and setting the appropriate numbers on scale 12. Answer appears on either scale 10 or 11 depending on whether last operation was division or multiplication.

I claim:

1. In a calculating machine, a fixed index line thereon, a series of three cylindrical drums rotatably mounted in parallel relation on a common shaft and having scale markings on their peripheral edges, said drums being rotatable with respect to said fixed index line, a differential gearing connecting said cylindrical drums, a turning knob engaging an outer drum for rotating it and a locking device for alternately locking one of the other two drums against rotation, as desired, as the third drum is rotated through said turning knob.

2. In a calculating machine, a fixed index line thereon, a series of three cylindrical drums rotatably mounted in parallel relation on a common shaft and having scale markings on their peripheral edges said drums being rotatable with respect to said fixed index line, a differential gearing connecting said cylindrical drums, a turning knob engaging an outer drum for rotating said drums through said differential gearing and a locking device for alternately locking one of the other two drums against rotation, as desired, as the third drum and the unlocked drum are rotated through said turning knob.

3. In a calculating machine, a window, a fixed index line thereon, a series of three cylindrical drums rotatably mounted in parallel relation on a common shaft and having scale markings on their peripheral edges said drums being rotatable with respect to said fixed index line, a bevel gear differential connecting said cylindrical drums, a turning knob engaging an outer drum for rotating said drums through said bevel gear differential and a locking device for alternately locking one of the other two drums against rotation, as desired, as the third drum and the unlocked drum are rotated through said turning knob.

4. In a calculating machine, a fixed index line thereon, a series of three cylindrical drums rotatably mounted in parallel relation on a common shaft and having scale markings on their peripheral edges, said drums being rotatable with respect to said fixed index line, bevel gears on the inner surfaces of the outer drums and a bevel gear rotatably mounted in the inner drum connecting the bevel gears on the outer drums, a turning knob engaging an outer drum for differentially rotating said drums through said bevel gears, and a locking device for alternately locking one of the other two drums against rotation, as desired, as the third drum and the unlocked drum are rotated through said turning knob.

5. In a calculating machine, a fixed index line thereon, a common shaft, a series of three cylindrical drums rotatably mounted in parallel relation on said shaft and having scale markings on their peripheral edges, said drums being rotatable with respect to said index line, differential gearing connecting said cylindrical drums, a turning knob rotatably mounted on a shaft at right angles to the shaft supporting said drums, and a locking device for alternately locking one of the other two drums against rotation, as desired, as the third drum and the unlocked drum are rotated through said turning knob and differential gearing.

6. In a calculating machine, a fixed index line thereon, a series of three cylindrical drums rotatably mounted in parallel relation on a common shaft and having scale markings on their peripheral edges said drums being rotatable with respect to said fixed index line, a differential gearing connecting said cylindrical drums, a turning knob engaging an outer drum for rotating said drums through said differential gearing and a locking device operating a pivoted frictional clamp for alternately locking one of the other two drums against rotation, as desired, as the third drum and the unlocked drum are rotated through said turning knob.

NORTON T. PIERCE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,726,370	Smith	Aug. 27, 1929
2,285,774	Horner	June 9, 1942
2,454,987	Bradner	Nov. 30, 1948