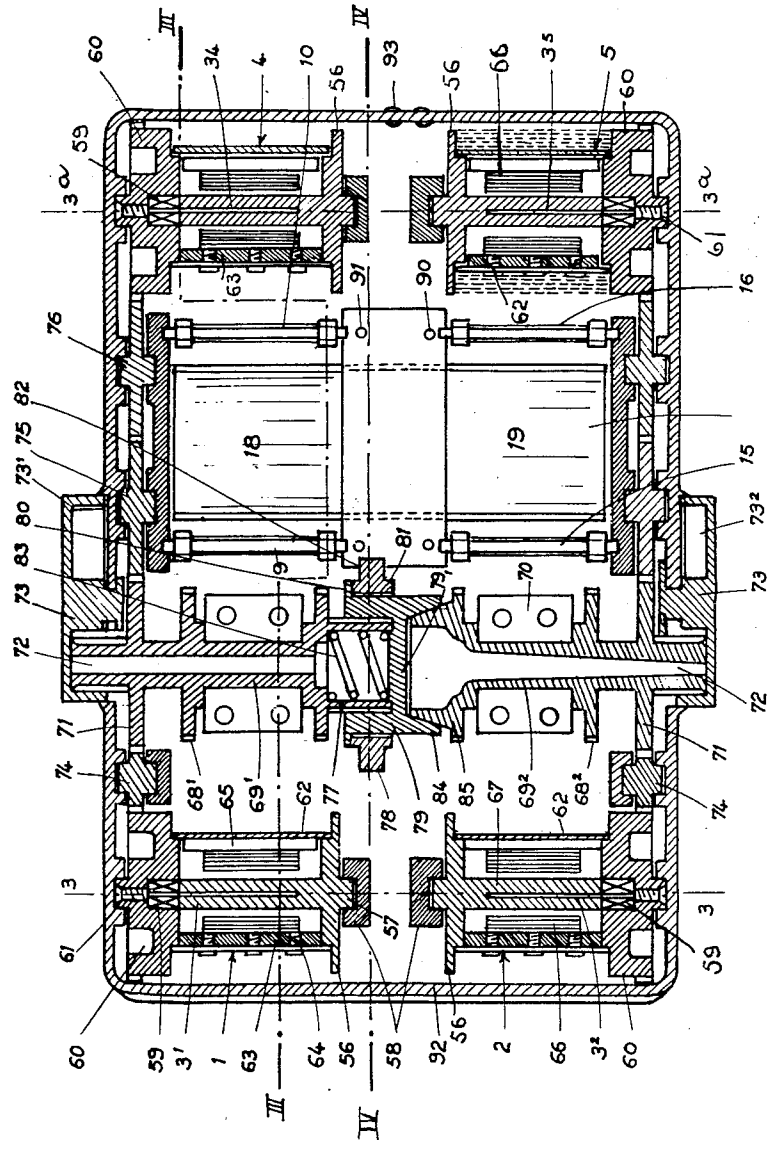
Nov. 14, 1950 A. P. CLOUEZ 2,530,191

CALCULATING APPARATUS

Filed Aug. 9, 1945 3 Sheets-Sheet 1

FIG. 1



INVENTOR
A. P. CLOUEZ
BY
Glascock, Downing & Seebold
ATTYS.

Nov. 14, 1950 A. P. CLOUEZ 2,530,191

CALCULATING APPARATUS

Filed Aug. 9, 1945 3 Sheets-Sheet 2

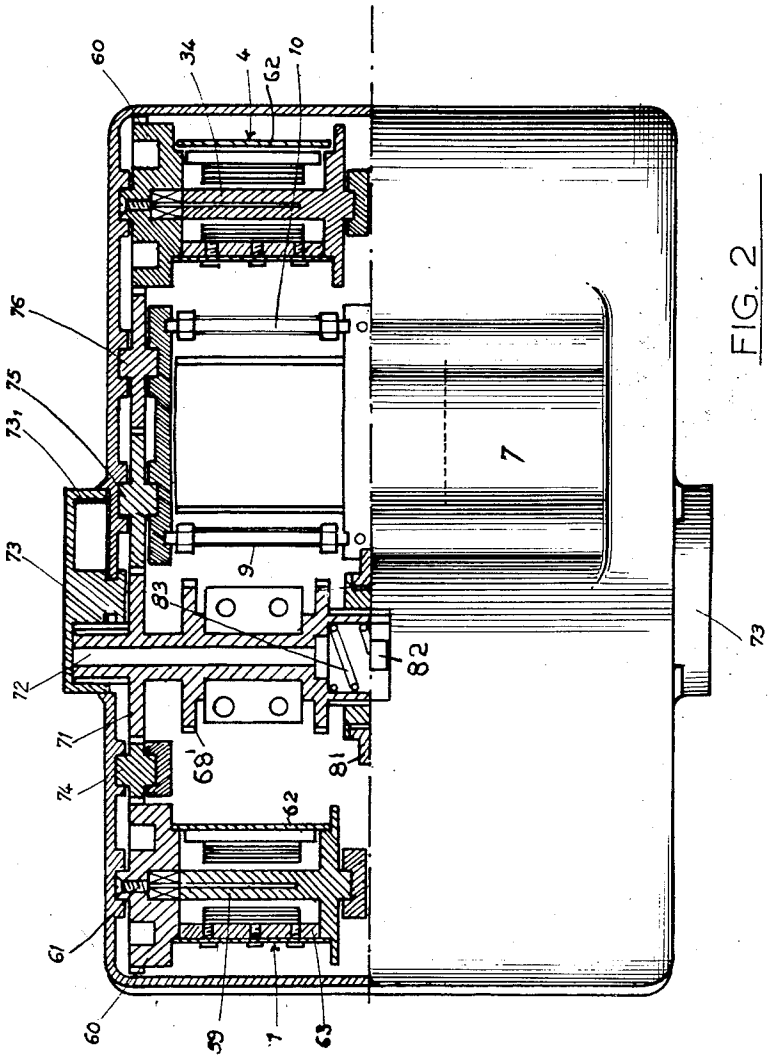


FIG. 2

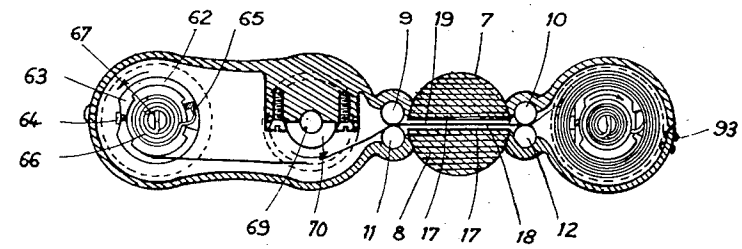
INVENTOR
A. P. CLOUEZ
BY
Glascock, Anning & Seebold
ATTYS.

Nov. 14, 1950 A. P. CLOUEZ 2,530,191

CALCULATING APPARATUS

Filed Aug. 9, 1945 3 Sheets-Sheet 3

FIG. 3



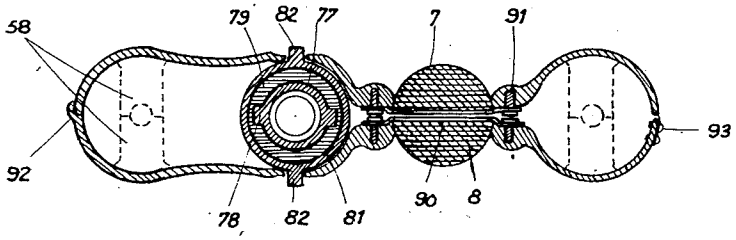


FIG. 4

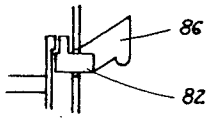


FIG. 5

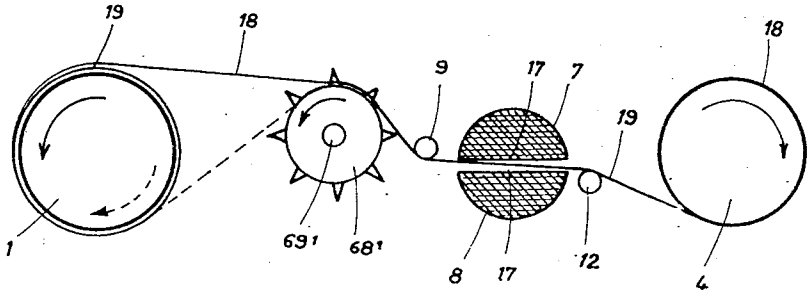


FIG. 6

INVENTOR
A. P. CLOUEZ
BY Glascock, Downing & Seebold
ATTYS.

Patented Nov. 14, 1950 2,530,191

UNITED STATES PATENT OFFICE

2,530,191

CALCULATING APPARATUS

André Philippe Clouez, Paris, France

Application August 9, 1945, Serial No. 609,762
In France July 22, 1943

4 Claims. (Cl. 235—71)

1

This invention relates to a calculating apparatus.

Calculating apparatuses are already known which comprise two graduated bands wound round barrels, the winding movement of each band being controlled by a driving device.

The present invention has for its object to provide a calculating apparatus of the above mentioned type making it possible to facilitate the displacement of the band and to insure the correct reading of its divisions.

The present invention has also for its object to provide a calculating apparatus of the above mentioned type in which rubbing of the bands on the magnifying glasses is avoided which can be used for facilitating the reading.

A calculating apparatus making it possible to attain the above mentioned objects shows the characteristic features which will appear from the following description and more particularly from the appended claims.

A calculating apparatus according to the invention is shown by way of example in the appended drawings, in which:

Figure 1 is a sectional view showing the calculating apparatus according to the invention.

Fig. 2 is a plan partly in section of the apparatus.

Figures 3 and 4 are sectional views showing the apparatus of Figure 1 on lines III—III and IV—IV of said figure respectively.

Figure 5 shows the inclined planes for the engagement of the friction discs.

Figure 6 is a diagram showing the manner in which one of the bands is driven.

The calculating apparatus shown in Figures 1 to 4 comprises: two barrels 1 and 2 mounted on shafts 3^1 and 3^2 so that they can rotate independently about a common axis 3, and two other barrels 4 and 5 mounted on shafts 3^4 and 3^5 so that they can rotate independently on a common axis 3a. Both said barrels 4 and 5 are parallel with the barrels 1 and 2 and mounted near the latter so as to reduce the space required by the apparatus.

Each of said four barrels comprises, on one side, a flange 56 provided with a journal 57 maintained in a bushing 58 and, on the other side, a square piece 59 onto which a second flange 60 is fitted which, on the other hand, is secured to the related barrel shaft by a screw 61.

Between the flanges 56 and 60 of each barrel can rotate a cylinder 62 which comprises, on one hand, an inner boss 63 provided with three screws 64 securing the bands 18 or 19 onto the barrels

2

and, on the other side, with a second boss 65 serving to maintain one of the ends of a spiral spring 66 the other end of which is itself fastened in a slot in the related barrel shaft.

The apparatus comprises further:

Two bands 18 and 19 carrying on both their faces the divisions which are necessary for the calculation operations to be effectuated, the first band being wound on both barrels 1 and 4 and passing between four guiding rolls 9, 10, 11 and 12, while the second band is wound on both barrels 2 and 5 and passes between four guiding rolls similar to the rolls 9 to 12 of which only the two rolls 15 and 16 are visible in Figure 1.

Two magnifying glasses 7 and 8 and a reference line 17 render possible a precise reading of the divisions of the bands on each face of the apparatus; said magnifying glasses are secured to the frame by metal plates 90 fastened by means of screws 91.

The barrel groups 1—4 and 2—5 can rotate in the same direction or in contrary directions; on the contrary the driving device for the barrels on one side of the magnifying glasses must rotate in a direction contrary to that of the barrels on the other side of the magnifying glasses; this arrangement offers the advantage that the bands run on rolls 10 and 11 or 9 and 12, for example in front of the magnifying glasses and behind the latter, which brings the division to be read under the mark of said magnifying glasses so that said division lies half-way of the distance between the glasses as shown in Fig. 6. On the other hand, the oblique position of the bands with respect to the magnifying glasses avoids rubbing of the latter against the bands (Figure 6).

Furthermore, a driving device for each group of barrels 1—4 and a driving device for each group of barrels 2—5 are also provided.

Each driving device controls the displacement of each band 18 and 19 by means of a toothed drive-wheel 68^1 for the group of barrels 1—4 and by means of a toothed drive-wheel 68^2 for the group of barrels 2—5. Said drive wheels rotate with their respective shafts 69^1 and 69^2 mounted on the frame by means of bushings 70 and carrying along the bands 18 and 19 by means of their teeth which engage holes 94 provided in the edges of said bands 18 and 19.

The movement of rotation of each drive wheel 68 is controlled by an outer roller 73 comprising an inner crown 73^1 and engaging a pinion 72 mounted on the shaft of each drive wheel 68^1 and 68^2.

The outer rollers driving the drive wheels lie each on one side of the casing.

The rotation of one roller 73 causes the rotation of the pinion 72 and, accordingly, the rotation of the related shaft 69^1 or 69^2 integral with the same and of the corresponding drive wheel.

The rotation of one driving roller 73 also causes the rotation in a contrary direction for example of the barrels 1 and 4 and rotation of the other roller 73 drives the barrels 2—5.

Said rotation is effected for each group of barrels 1—4 and 2—5 by a gear 71 mounted on the shaft 69^1 or 69^2 of the corresponding drive wheel 68^1 or 68^2. Said gear 71 engages on one side for example a pinion 74 itself engaging a toothed wheel integral with the outer flange 60 of the related barrel of one group and on the other side a pinion 75 itself engaging a pinion 76 controlling the rotation of the other barrel of the same group. Thus, with the rotation of one of the rollers 73, for example, one drives on one hand the corresponding drive-wheel 68^1 which causes the displacement of the band 18. On the other hand, one controls thru the gears 71—74 and the gears 71, 75 and 76 the rotation in a contrary direction of the shaft 3^1 of barrel 1 and of the shaft 3^4 of barrel 4. This rotation of each shaft of barrels 1 and 4 is transmitted to the barrels themselves thru the medium of their spiral springs 66, said springs being normally set in a light manner so as to render possible a positive or negative acceleration of the movements of rotation of the barrels with respect to their shafts.

These arrangements insure the constant stretching of the band under consideration between both barrels while compensating the differences in the winding diameters of both barrels which vary at every moment according to the position of the band.

On the other hand, the movement of both bands can be rendered interdependent of each other.

To this end both drive wheels 68^1 and 68^2 are manually coupled and uncoupled by means of a coupling device made in the following manner:

The drive wheel 68^1 is extended by a cylinder 77 over which slides a coupling cylinder 79 keyed onto the first cylinder by means of two keys 78 and provided with a flange 80 and finally extended to form a conically recessed coupling member 84.

On the other hand, drive wheel 68^2 is extended to form a coupling member 85 engageable in the member 84.

A coil spring 83 axially mounted in cylinder 77 rests, on one hand, on the inner end of the drive wheel 68^1 and on the other hand on an inner part 79^1 of coupling cylinder 79, said spring tending to move said cylinder 79 away from the drive wheel 68^1 so as to apply the coupling member 84 to the member 85 in order to effect the coupling.

The control of the coupling is effected by means of a ring 81 axially sliding around the coupling cylinder 79. Said ring 81 is provided with two lugs 82 each of which rests against an outer inclined edge of a slot 86 provided on each side of the casing of the apparatus (Figure 5). Said ring 81 supports the coupling cylinder 79 by means of its flange 80, said cylinder being urged in a contrary direction by the spring 83.

Thus, according to the axial position of the ring 81, one couples both drive wheels 68^1 and 68^2 by allowing spring 83 to act or one disengages both said wheels by conveniently turning ring 81 both projections 82 move in the inclined slots and compelling the coupling cylinder 79 to move away from the male cone 85.

Of course, the bands 18 and 19 of the calculating apparatus according to the invention can be made with scales of different natures according to the particular professions for which it is intended.

It is also possible to make the graduated bands of any suitable material such as: metal, plastic material and the like.

Furthermore, according to the invention, a calculating apparatus of a small volume is obtained which is contained in a casing formed of two shells united on one side by a joint 92 and on the other side by a bolt 93.

I claim:

1. A portable calculator including a casing, at least one web having correlated indicia on the opposite faces thereof supported in said casing for movement therein parallel with the major axis thereof, said casing having aligned windows on opposite sides extending transversely of said axis, means for independently moving said web between and past said windows, reading means supported in each window and index mark means on each reading means extending transversely of said axis and in alignment with each other, said index mark means co-operating with the indicia on the opposite faces of the web so that the same may be read from opposite sides of the casing in a single plane perpendicular to the web to establish a correspondence between the indicia on one face with the indicia on the opposite face of the web.

2. A portable calculator including a casing substantially rectangular in plan, at least one movable web having indicia on the opposite faces thereof, supporting means for said web disposed transversely of the major axis of said casing, including reeling means disposed adjacent the opposite ends of the casing, driving means operably connected to said reeling means for moving the web longitudinally of said axis, said casing having a reduced cross sectional area extending for a portion thereof intermediate said reeling means, reading means disposed in said portion and extending transversely of said axis, said reading means including opposed plane surfaces supported in closely spaced relation to one another, said web passing beneath and between said surfaces, the cross sectional area of said reading means perpendicular to said web being less than the similar cross sectional area of the casing at the opposite ends thereof whereby said reading means are protected from damage, and the indicia on the opposite faces of the strip may be correlated by reading the same in a single plane perpendicular to the said axis by reversing the position of said casing.

3. A portable calculator including a casing having a major axis, at least one movable web having indicia on the opposite faces thereof within said casing, supporting means for said web including reeling means disposed transversely of said axis and within the casing adjacent opposite ends thereof, means for moving said web longitudinally of said casing from end to end, said casing having a reduced cross sectional area perpendicular to said web for a portion intermediate said reeling means, a magnifying lens supported on each side of said casing at said reduced portion, said lenses extending transversely of said axis and each including a plane surface extending

parallel to said axis, said plane surfaces being parallel and slightly spaced from one another, said web passing between said surfaces, index mark means carried by each lens and extending transversely of said axis and said web, said index mark means lying in a common plane extending perpendicular to said web, the cross sectional area of said lenses in said plane being less than the cross sectional area of said casing in a plane extending perpendicular to said web and transversely through both said reeling means and said driving means whereby said lenses are protected from damage, and said index mark means cooperating with the indicia on the opposite faces of the web so that the indicia may be correlated from the opposite sides of the casing in said common plane.

4. A portable calculator as claimed in and by

claim 3 wherein means are provided for guiding said web obliquely with respect to said surfaces during the passage thereof therebetween.

ANDRÉ PHILIPPE CLOUEZ.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
786,102	Cooper	Mar. 28, 1905
1,067,483	Murphy	July 15, 1913
1,068,982	Counio	July 29, 1913
1,387,267	Holle	Aug. 9, 1921
1,645,335	Lewis	Oct. 11, 1927
1,667,449	Wompner	Apr. 24, 1928
1,777,692	Fuss	Oct. 7, 1930