Dec. 4, 1923. 1,476,198

C. M. FRIDEN

CALCULATING MACHINE

Filed Nov. 12, 1921

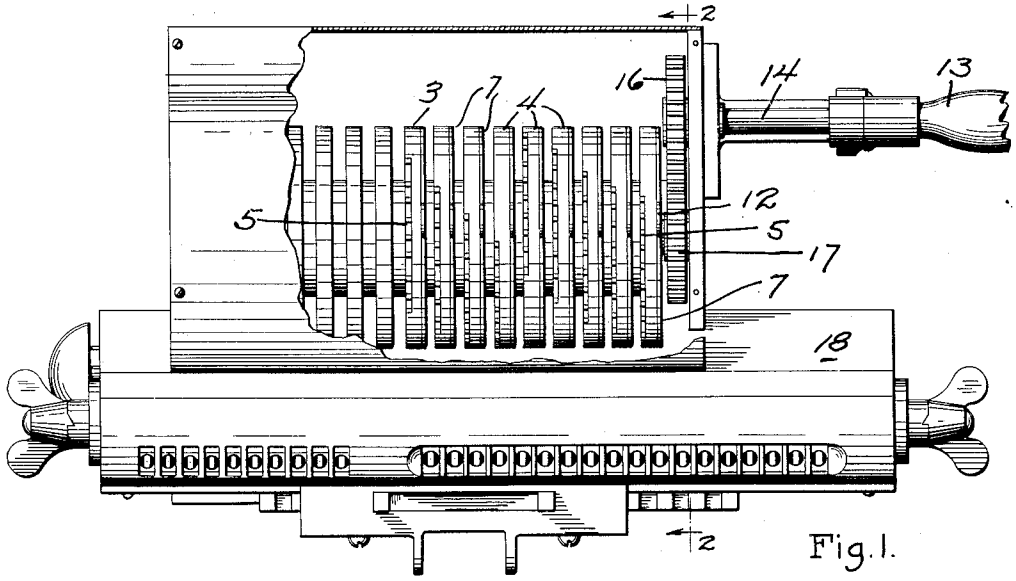


Fig. 1.

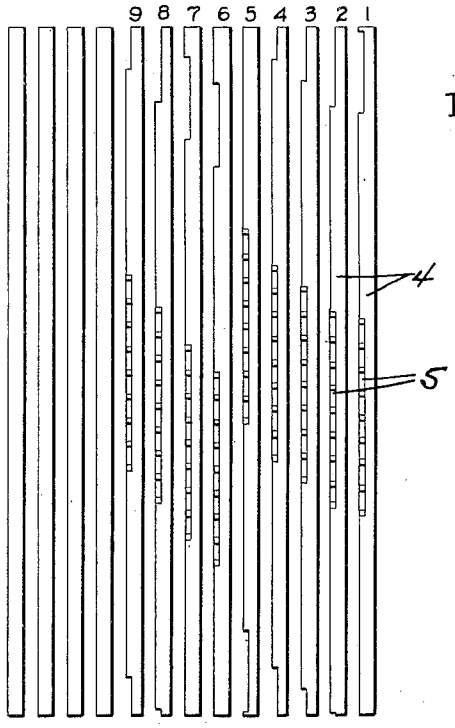
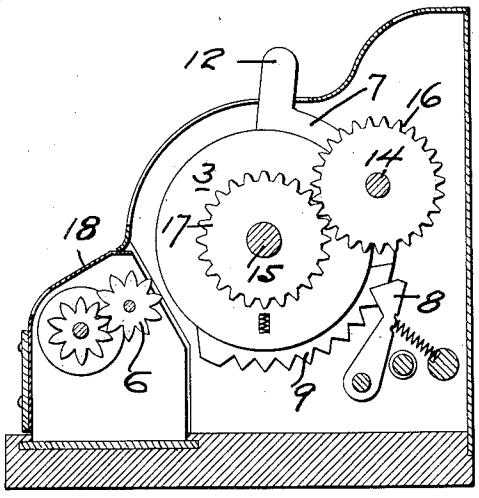


Fig. 3.

Fig. 2.



WITNESS

H. Sherburne

INVENTOR

C. M. FRIDEN

BY

White Frost & Evans

his ATTORNEYS

Patented Dec. 4, 1923. 1,476,198

UNITED STATES PATENT OFFICE.

CARL M. FRIDEN, OF PIEDMONT, CALIFORNIA.

CALCULATING MACHINE.

Application filed November 12, 1921. Serial No. 514,435.

To all whom it may concern:

Be it known that I, CARL M. FRIDEN, a subject of the King of Sweden, and a resident of Piedmont, Alameda County, State of California, have invented a certain new and useful Calculating Machine, of which the following is a specification.

The invention relates to calculating machines of the type embodying a rotatable drum, upon which the values to be calculated are set up, rotation of the drum being effected by a handle which projects to the outside of the machine. The values adjusted on the drum are transmitted, on the rotation of the crank handle, indirectly, by means of intermediate wheels, to the figure discs of the counting mechanism, which, for the purpose of making the direct action of the selected values on the intermediate wheel of the figure discs of highest value possible, is disposed in parallel displaceable relation to the value selecting mechanism axis.

Heretofore, machines of this type, one form of which is shown in my co-pending application, Serial No. 438,002 filed in the Patent Office on January 17, 1921, have comprised a drum, consisting of a plurality of wheels or discs secured to a shaft, each wheel or disc being provided with nine radially movable teeth, the teeth being either separately radially movable, as shown in the Trinks Patent No. 1,088,486 of February 24, 1914, or being radially movable as a unit, as shown in my aforesaid application. The projected teeth cooperate with the intermediate wheels, on rotation of the drum, to advance the figure discs of the counting mechanism a corresponding amount. The discs or wheels, with their associated teeth are usually termed selecting units, since they are adjustable to selected values. In calculating machines as heretofore proposed, the selecting units have been arranged in a row parallel to the axis of the drum, that is, the leading teeth of the units have been disposed in a longitudinal plane in which the axis of the drum occurs. Since the intermediate wheels are disposed on an axis which is parallel to the axis of the drum, the leading projecting teeth on the drum, all engage the intermediate wheels at substantially the same time, thus throwing a heavy load on the operating crank. The actuating teeth usually occupy an arc of about 90° on the drum, so that all of the effort required to actuate the crank is concentrated in one-fourth of its rotation.

An object of the present invention is to distribute the load over a greater angle of rotation of the crank.

Another object of the invention is to cause the drum to gradually take up the calculating load, so that the resistance of the crank to turning is gradually increased, instead of being suddenly increased, as is the case with machines heretofore proposed.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description where I shall outline in full, that form of the invention which I have selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings, I have shown one embodiment of the machine of my invention, but it is to be understood that I do not limit myself to such form, since the invention as set forth in the claims, may be embodied in a plurality of forms.

Referring to said drawings:—

Figure 1 is a plan view of one type of calculating machine embodying my invention, a portion of the casing being broken away to disclose the construction.

Fig. 2 is a cross section taken on the line 2—2, Fig. 1.

Fig. 3 is a developement on a plane surface, of the cylindrical surface of the drum shown in Fig. 1.

The calculating machine shown in the drawings comprises a rotatable drum 3, composed of a plurality of wheels or discs 4, each disc being provided with a selecting or counter actuating unit. In the present construction, the selecting unit is constructed as is shown in my aforesaid application and comprises a radially disposed, radially movable slide, guided in the disc and being provided on one end with a curved rack 5 provided with nine teeth, which, when pro-

jected, engage the intermediate wheel 6 of the counting mechanism, on the rotation of the drum. Each wheel or disc 4 is also provided with means for setting the value selected, this means cooperating with the selecting unit to cause the engagement of the selected number of teeth with the intermediate wheel of the counting mechanism. The value setting means in this instance, comprises a disc 7 journaled on the drum shaft and held against rotation with the drum, by a dog 8 engaging a rack 9 on the disc. A finger 12 on the setting disc projects through a slot in the casing and provides means for entering the selected values into the drum. The drum is rotated by the crank 13 secured to the shaft 14, which is geared to the drum shaft 15, by the gears 16 and 17.

For the purpose of distributing the load on the crank and producing a more easily operable machine, I have arranged the selecting units in different angular positions around the face of the drum, so that, upon rotation of the drum, the selecting units are brought successively into engagement with the counting mechanism. The selecting units are preferably arranged spirally of the drum, in one or more spirals, with each unit displaced angularly from the adjacent unit in the spiral, a distance equal to one tooth pitch. Any other arrangement may be selected which will cause the teeth of the selecting or counter actuating mechanism, to successively engage the counting mechanism, as the drum is rotated.

In Fig. 3, I have shown a development of the surface of the drum in a plane. The actuating racks in the first two discs are spaced apart angularly a slight distance. The racks of the third, fourth and fifth discs, each drop back one tooth from the next adjacent disc. The rack on the sixth disc starts a second spiral and is advanced two teeth with respect to the first disc and the racks of the seventh, eighth and ninth discs, each drop back one tooth from the next adjacent disc. While I have shown a machine containing nine selecting units, it is to be understood that the invention is applicable to calculating machines having any number of selecting units.

The counting mechanism, which includes the intermediate wheels, is mounted in a laterally displaceable carriage 17, as is the usual practice. The machine is also provided with the usual tens carrying mechanism, transfer levers, zero resetting devices and other elements necessary to provide a complete machine. The counting mechanism moves in a step-by-step movement, being advanced one step by each projected tooth of the selecting unit and the selecting units are preferably so arranged, that the successive leading projected teeth of the selecting units come into contact with the toothed wheels of the counting mechanism successively at the end of the successive step-by-step actions. The result is that on the turning of the drum, with values set therein, that in first step one counting disc is moved; in the second step two counting discs are moved; in the third step three counting discs are moved, and so on until the maximum is reached, when the number of discs turned per step gradually decreases.

I claim:

1. In a calculating machine, a rotatable drum, a counting mechanism and a plurality of selectively controlled counting mechanism actuating units arranged on said drum to successively engage the counting mechanism on the rotation of the drum.

2. In a calculating machine, a rotatable drum, a counting mechanism and a plurality of selectively controlled counting mechanism actuating units arranged spirally on said drum.

3. In a calculating machine, a rotatable drum, a counting mechanism including a plurality of toothed wheels and a plurality of toothed selecting units on said drum adapted to engage said toothed wheels upon rotation of the drum, said selecting units being spaced apart angularly on said drum.

4. In a calculating machine, a rotatable drum, a counting mechanism including a plurality of toothed wheels, and a plurality of selectively controlled counter mechanism actuating units arranged on said drum in such relation to said toothed wheels, that rotation of the drum causes the actuating units to successively engage the toothed wheels.

5. In a calculating machine, a rotatable drum, a counting mechanism, a plurality of selectively controlled counter mechanism actuating units arranged on said drum, each unit spanning an arc of about 90° on said drum and a crank connected to the drum so that a complete rotation of the crank is accompanied by a complete rotation of the drum, said units being so disposed on said drum that they may be set to be in engagement with said counting mechanism during rotation of the crank through an angle of about 180°.

6. In a calculating machine, a rotatable drum, counting mechanism actuating units on said drum, each unit occupying an arc of about 90°, said units being arranged to extend over an arc of about 180° on said drum.

7. In a calculating machine, a rotatable drum, selectively controlled toothed counting mechanism actuating units on said drum, the successive units being spaced angularly a distance of approximately one tooth pitch with respect to the next preceding unit.

8. In a calculating machine, a rotatable

drum, a plurality of toothed counting mechanism actuating units on said drum, a counting mechanism including a plurality of toothed wheels and unit counting discs, said counting discs being movable in a step-by-step movement from one value to the next, said actuating units being arranged so that upon rotation of the drum, an increasing number of counting units are moved during the successive steps.

In testimony whereof, I have hereunto set my hand.

CARL M. FRIDEN.