

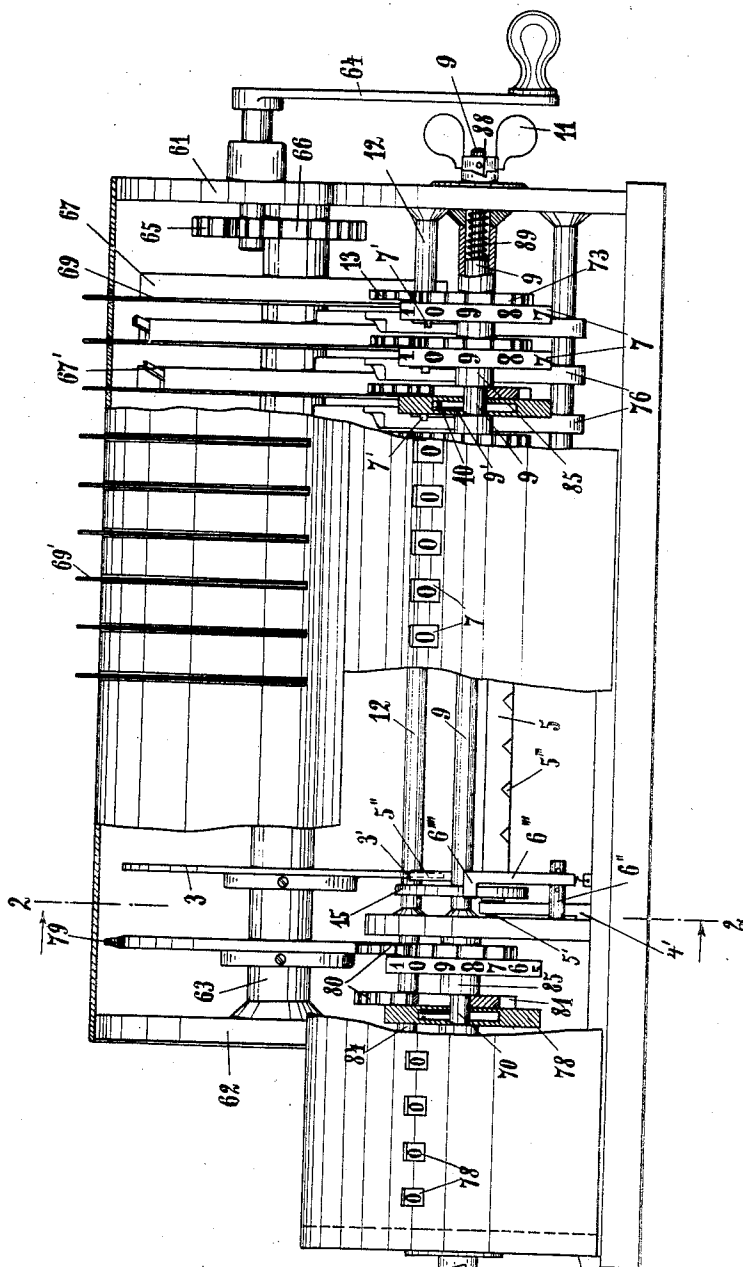
F. TRINKS.
 CALCULATING MACHINE.
 APPLICATION FILED MAY 22, 1912.

1,040,059.

Patented Oct. 1, 1912

3 SHEETS-SHEET 1.

Fig. 1.



Witnesses:

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3 SHEETS—SHEET 3.

Fig. 4.

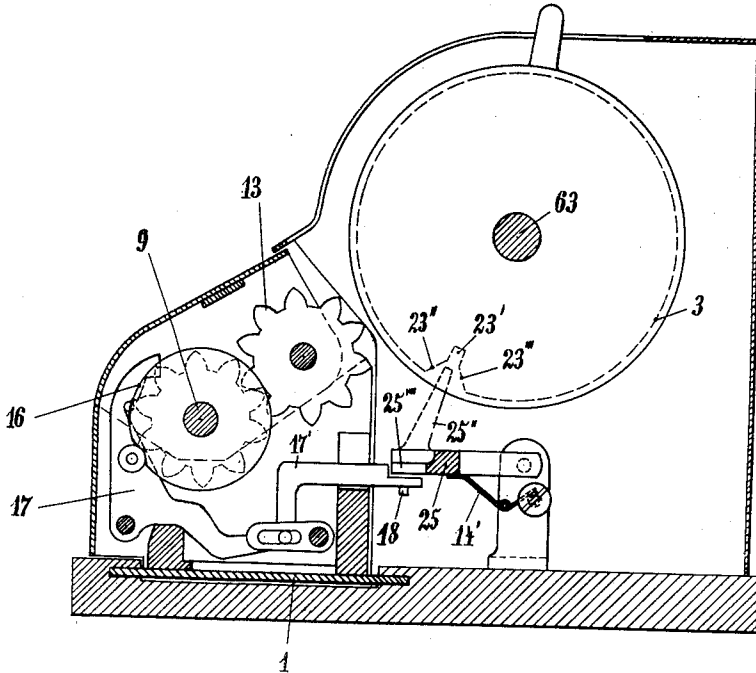
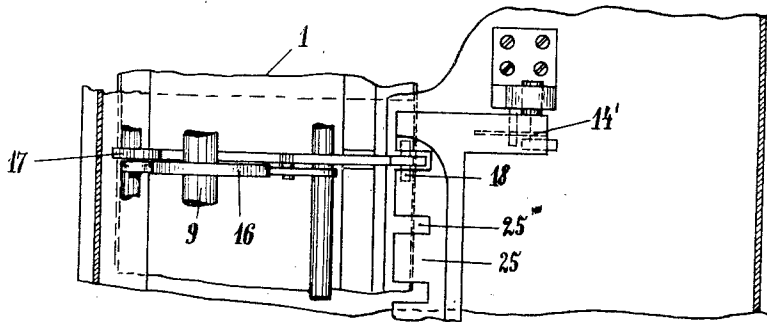


Fig. 5.



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UNITED STATES PATENT OFFICE.

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CALCULATING-MACHINE.

1,040,059.

Specification of Letters Patent.

Patented Oct. 1, 1912.

Application filed May 22, 1912. Serial No. 698,977.

To all whom it may concern:

Be it known that I, FRANZ TRINKS, manufacturer, citizen of the Duchy of Brunswick, Empire of Germany, residing at 71 Kastanienallee, Brunswick, Germany, have invented certain new and useful Improvements in Calculating-Machines, of which the following is a specification.

My invention relates to improvements in calculating machines, and more particularly to that class of calculating machines in which a setting mechanism coöperates with a registering mechanism mounted on a carriage which is movable along the setting mechanism. And the object of the improvements is to provide a calculating machine of this class, in which after starting the resetting operation the carriage is locked, and, vice versa, while shifting the carriage the resetting mechanism can not be operated.

With this object in view my invention consists in providing a frame for locking the setting mechanism which is adapted to be rocked into locking position by means of a rocking lever mounted on the carriage, and providing the said rocking frame with notches which are adapted to lock said carriage against displacement.

For the purpose of explaining the invention several examples embodying the same have been shown in the accompanying drawings in which the same letters of reference have been used in all the views to indicate corresponding parts.

In said drawings—Figure 1, is a front view of the calculating machine with the cover of the casing removed, Fig. 2, is a cross-section taken on the line 2—2 of Fig. 1, Fig. 3, is a detail view of a part of the machine shown in Figs. 1 and 2, Fig. 4, is a cross-section similar to that shown in Fig. 2 and showing a modification of the invention, and Fig. 5, is a partial plan of the machine shown in Fig. 4 with the cover of the casing removed.

Referring to the example illustrated in Figs. 1 and 2, in the lateral uprights 61 and 62 of the machine casing a shaft 63 is mounted for rotation, which is adapted to be rotated from the machine crank 64 acting through the intermediary of spur gears 65 and 36. To the said shaft setting disks 67 are secured each of which is equipped with nine radially movable teeth 68 (Fig. 2) adapted to be shifted into or out of operative positions by a rotary cam disk 69

mounted coaxially with the setting disk. If it is desired to shift the said teeth, the cam disks 69 are rotated relatively to the setting disks 67 by means of handles 69' provided on the cam disks and projecting through slots of the casing. For shifting the teeth outward the handles are moved in the direction of the arrow shown in Fig. 2. By thus turning the cam disks at the proper angle, the desired number of teeth 68 is set on the setting disk 67 in operative position. When rotating the setting disks 67 by means of the machine crank 64, such rotation is transmitted through the intermediary of gear wheels 13, 73 to the numeral wheels 7 of the main registering mechanism, which is supported on a shaft 9 rotatably mounted on a carriage 1. The latter is movable in a direction parallel to the axis 63 of the setting mechanism, so that the teeth 68 of the setting disks 67 can also be used for operating the numeral wheels 7 of higher orders, which is desirable for example for performing multiplications with a minimum of revolutions of the crank. The main registering mechanism is equipped with carrying mechanisms which in the example shown consist of levers 76 in the form of hammers. When one of the numeral wheels 7 passes from nine to zero, or vice versa, the corresponding hammer is rocked by a pin 7' secured to the numeral wheel, so that a beveled part 76'' of the lever 76 is set in the path of a rocking tooth 67' of the setting disk 67 and forces the same into position for engagement with the teeth of the co-operating intermediary gear wheel 13 of the numeral wheel 7 of the next higher order. Thereby the said numeral wheel is shifted one tooth forward or backward. Each of the hammers 76 is formed with two beveled faces 76'' and coöperates with two rocking teeth 67', one of the said beveled faces and teeth being operative for right hand rotation of the machine crank 64, and the other ones for left hand rotation thereof.

Coaxially of the main registering mechanism 7 a revolutions counting mechanism 78 is mounted on the carriage 1, by means of which the number of the revolutions of the machine crank 64 is registered. The said revolutions counting mechanism is operated by means of a single tooth wheel 79 secured to the axis 63 of the setting mechanism and adapted to engage in the teeth of one of a plurality of intermediary spur gears 80 once

for each rotation of the machine crank. Each of the numeral wheels 78 coöperates with an intermediary gear wheel 80 of its own, and each of the said intermediary gear wheels is in mesh with gear teeth 81 connected with the corresponding numeral wheel 78. In the same way as the intermediary gear wheels 13, the intermediary wheels 80 are preferably loosely mounted on a common shaft. Preferably the intermediary wheels 80 and the numeral wheels 78 are locked against axial displacement by spacing sleeves 84 and 85 respectively. The same or equivalent means may if desired be provided for securing the wheels 13 and the numeral wheels 7 of the main registering mechanism in position. Carrying means are not necessary in combination with the revolutions counting mechanism 78.

The registering mechanisms 7 and 78 are provided with common or, as shown, with separate resetting devices by means of which at the end of a calculation and before starting another one the numeral wheels may be set to zero. For this purpose the shaft 9 projects with one end through the side wall 1' of the carriage 1, and its projecting end is equipped with a thumb nut 11. Internally of the numeral wheels 7 the shaft 9 is equipped with pins 9' which are normally out of the paths of stops 10 secured to the numeral wheels 7. When the shaft 9 is rotated by means of the thumb nut 11, it is first shifted axially against the action of a spring 89 by means of a beveled face 88, so that the pins 9' are brought into position for engagement with the stops 10 of the numeral wheels and for returning the same into their zero positions. At the end of the resetting operation the spring 89 forces the shaft 9 into normal position, so that the pins 9' release the stops 10. Resetting devices of the same construction are provided in combination with the revolutions counting mechanism 78, and these resetting devices are operated by means of a thumb nut 90 secured to the rotary shaft 70.

To the shaft 63 of the setting disks 67 a disk 3 is secured which at its circumference is formed with a notch 3' (Fig. 2). On a pair of brackets 4' secured to the base plate 4 of the machine a rocking frame 5 is pivotally supported at 5', which frame carries an upwardly directed tooth 5''. As appears from Fig. 2, the latter is in such a position relatively to the notch 3' of the disk that, when the frame is rocked upward, it is immediately brought into engagement with the said notch, so as to lock the disk 3 against rotation. Thereby also the machine crank 64 is locked, which is operatively connected with the disk 3. On the other hand, when the machine crank 64 is turned out of its normal or zero position, a full part of the circumference of the

disk 3 is brought into the path of the tooth 5'', so that the frame 5 can not be rocked upward, as long as the machine crank is out of its normal or zero position. At its free end the frame 5 is supported on the horizontal arm 6' of a bell crank lever 6 which has its fulcrum on an axis 6'' mounted on the carriage 1. The upwardly projecting arm 6''' of the said bell crank lever is formed with a wedge shaped nose 6'''' which, under the action of a spring 14 tending to pull frame 5 and the horizontal arm 6' downward, engages in a notch of a disk 15 secured to or operatively connected with the resetting shaft 9. When turning the shaft 9, the nose 6'''' is forced out of the notch of the disk, and the horizontal arm 6' of the bell crank lever 6 which engages the frame 5 from below is rocked upward. Thereby the tooth 5'' is brought into engagement with the notch 3'. Therefore, when resetting the registering mechanism 7 the machine crank 64 is locked. On the other hand the resetting shaft 9 is locked when the machine crank has been turned out of its normal or zero position, because the frame 5, which by the disk 3 is prevented from being rocked upward, prevents the nose 6'''' from disengaging the notch of the disk 15. The length of the frame 5 corresponds to the largest displacement of the carriage 1, so that the parts are interlocked in the manner described in all the ordinary positions of the carriage 1. When shifting the carriage in a direction parallel to the axis 63 the horizontal arm 6' slides on the lower surface of the frame 5 bearing thereon, which frame in locking devices as heretofore constructed is perfectly smooth at its lower face. In the present case the construction is different as will hereafter be explained.

The mechanism so far described is satisfactory where only interlocking of the resetting shaft 9 and the machine crank 64 is aimed at. But it does not prevent shifting of the carriage 1 when the resetting shaft 9 or the machine crank have been rotated out of their zero positions, because the arm 6' of the bell crank lever 6 can slide on the bottom face of the frame 5. If now the carriage is shifted during the operation of the shaft 9 or the crank 64, errors are brought into the calculation. To avoid such errors I provide means for locking the machine crank 64 and the resetting shaft 9 when the carriage 1 is being shifted, and for locking the carriage 1 when the crank 64 or the resetting shaft 9 are being rotated. With this object in view my invention consists in forming angular notches 5''' within the bottom face of the frame or locking bar 5, as is shown in Figs. 1 and 3, which notches are adapted to be engaged by the wedge shaped end of the

arm 6' of the bell crank lever 6. A separate notch 5''' is provided for each position of the carriage 1. If now the carriage is shifted, the wedge shaped end of the arm 6' is disengaged from its notch 5''' and forces the locking bar or frame 5 upward with its tooth 5'' into engagement with the notch 3' of the disk 3, so that the machine crank is locked. Now the resetting shaft 9 can not be operated either, because the locking slide 5 which has already been lifted by the wedge shaped end of the arm 6', is prevented from being further rocked upward, so that the nose 6''' can not disengage the notches of the disk 15. Therefore, the machine crank 64 and the resetting shaft 9 are locked during the movement of the carriage. When upon the further movement of the carriage the arm 6' arrives in position for engagement with one of the following notches 5''' of the locking slide, that is when the carriage is again in one of its operative positions, the locking mechanism is released. If the machine crank or the resetting shaft have been rotated out of their normal or zero positions, the carriage 1 can not be shifted, because in case of a rotation of the crank the locking slide 5 can not be rocked upward, and in case of a rotation of the resetting shaft the locking slide 5 which has been lifted can not be further lifted.

In the modification of the invention shown in Figs. 4 and 5 the notches 25''' of the locking frame or bar have rectangular form, and the frame 25 is held in a medium position by means of a spring 14'. The locking tooth 25'' projects a short distance into a notch 23' of the disk 3 formed with beveled side walls 23'' and 23''', and upon each rotation of the disk 3 secured to the axis 63 of the setting mechanism either one of the side walls rocks the tooth 25'' and thereby the locking frame 25 downward. Therefore when rotating the shaft 63 of the setting mechanism the lever 17' which is adapted to lift the locking frame 25 is embraced by one of the notches 25''', so that, after rocking the well known key for locking the carriage (not shown), the carriage can not be shifted.

In the example shown in Figs. 4 and 5 to the resetting shaft 9 a cam disk (not shown) is secured which is located in front of the disk 16 (Fig. 4) and is supported on a fixed part of the carriage. By the said disk the resetting shaft 9 is rocked upward at the beginning of its rotation and about the axis of the intermediate gear wheels 13. Thereby the teeth of the numeral wheels are thrown out of engagement with the well known locking pawls in order to facilitate the resetting operation. When starting rotation of the shaft 9 and lifting the same as described, a locking

hook 17 is simultaneously disengaged from the resetting shaft 9 by being rocked by a second cam disk 16 secured to the resetting shaft 9, which hook has the function to hold the resetting shaft 9 in its normal or operative position while calculations are being performed. At the side of the setting mechanism the said hook is constructed in such a way as to engage the locking frame 25 from below. When starting rotation of the resetting shaft 9, the cam disk 16 rocks the hook 17 into inoperative position, and throws the same with its opposite end 17' into engagement with the locking frame 25. To the rear extension 17' of the hook 17 a pin 18 is secured which simultaneously lifts the frame 25 sufficiently to move the tooth 25'' into complete engagement with the notch 23' of the disk 3, so that rotation of the setting mechanism is prevented. When the locking hook 17 engages the frame 25 with its rear extension 17', also the carriage is locked against displacement. While the carriage is out of its ordinary position the end 17' of the locking hook 17 is located below a part of the frame 25 intermediate two consecutive notches 25'''. After starting rotation of the setting mechanism 63 the frame can not yield, so that the setting mechanism is locked. On the other hand the locking hook 17 can not be rocked, as is necessary for rotating the resetting shaft 9, because the notch 23' limits the rocking stroke of the frame 25 and thereby also that of the hook 17.

I claim herein as my invention:

1. In a calculating machine, the combination with the setting mechanism, the registering mechanism, a carriage supporting said registering mechanism, and resetting mechanism for the registering mechanism, of locking means for the setting mechanism adapted to be thrown into locking position by the operation of the resetting mechanism, and means operative when shifting the carriage to throw said locking means into locking position.

2. In a calculating machine, the combination with the setting mechanism, the registering mechanism, a carriage supporting said registering mechanism, and resetting mechanism for the registering mechanism, of a member adapted to lock said setting mechanism, means on said carriage operative in the normal or zero position only of the setting mechanism and adapted to shift said member into locking position, and means on said member operative when the setting mechanism is out of its normal or zero position to lock said carriage.

3. In a calculating machine, the combination with the setting mechanism, the registering mechanism, a carriage supporting said registering mechanism, and resetting mechanism for the registering mechanism,

of a rocking bar adapted to lock said setting mechanism in zero position and to be locked by the setting mechanism when the setting mechanism is moved out of its zero position and formed with notches, and a rocking lever on said carriage engaging said notches and tending when rocked to rock said bar.

4. In a calculating machine, the combination with the setting mechanism, the registering mechanism, a carriage supporting said registering mechanism, and resetting mechanism for the registering mechanism, of a rocking bar adapted to lock said setting mechanism in zero position and to be rocked and locked by the setting mechanism when the setting mechanism is moved out of its zero position, and formed with notches, and a rocking lever on said carriage adapted to be engaged by said notches when the bar is rocked by the setting mechanism and when it is itself rocked.

5. In a calculating machine, the combination with the setting mechanism, the registering mechanism, a carriage supporting said registering mechanism, and resetting mechanism for the registering mechanism, of a rocking bar adapted to lock said setting mechanism in zero position and to be rocked and locked by the setting mechanism when the setting mechanism is moved out of its zero position and formed with notches, and a rocking lever on said carriage adapted to be engaged by said notches when the bar is rocked by the setting mechanism and when it is itself rocked, and means on said lever adapted to rock said bar.

6. In a calculating machine, the combination with the setting mechanism, the registering mechanism, a carriage supporting said registering mechanism, and resetting mechanism for the registering mechanism, of a rocking bar adapted to lock said setting

mechanism in zero position and to be rocked and locked by the setting mechanism when the setting mechanism is moved out of its zero position, and formed with notches, and a rocking lever on said carriage adapted to be rocked by the resetting mechanism and to lock said resetting mechanism and to be engaged by said notches when the bar is rocked by the setting mechanism and when it is itself rocked.

7. In a calculating machine, the combination with the setting mechanism, a rotary shaft carrying said setting mechanism, a circular disk secured to said shaft and having a notch formed with inclined side walls, a carriage movable along said setting mechanism, a rotary shaft on said carriage, registering mechanism and resetting devices mounted on said shaft on the carriage, of a rocking bar disposed alongside said setting mechanism and carriage and formed with notches, a tooth on said bar normally partly extending into the notch of said circular disk and into the path of the inclined side walls thereof, a rocking lever mounted on said carriage and in position for engagement with said notches of the bar and adapted to rock said bar with its tooth into complete locking engagement with the notch on said circular disk and to be locked by the non-notched portions of the bar, and means intermediate said lever and resetting mechanism adapted to lock the resetting mechanism and to be rocked by the operation of the resetting mechanism.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANZ TRINKS.

Witnesses:

WILHELM LEHRKE,

JULIUS SECKEL.