E. JAHNZ.

CALCULATING MACHINE.

APPLICATION FILED SEPT. 13, 1909.

946,367.

Patented Jan. 11, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

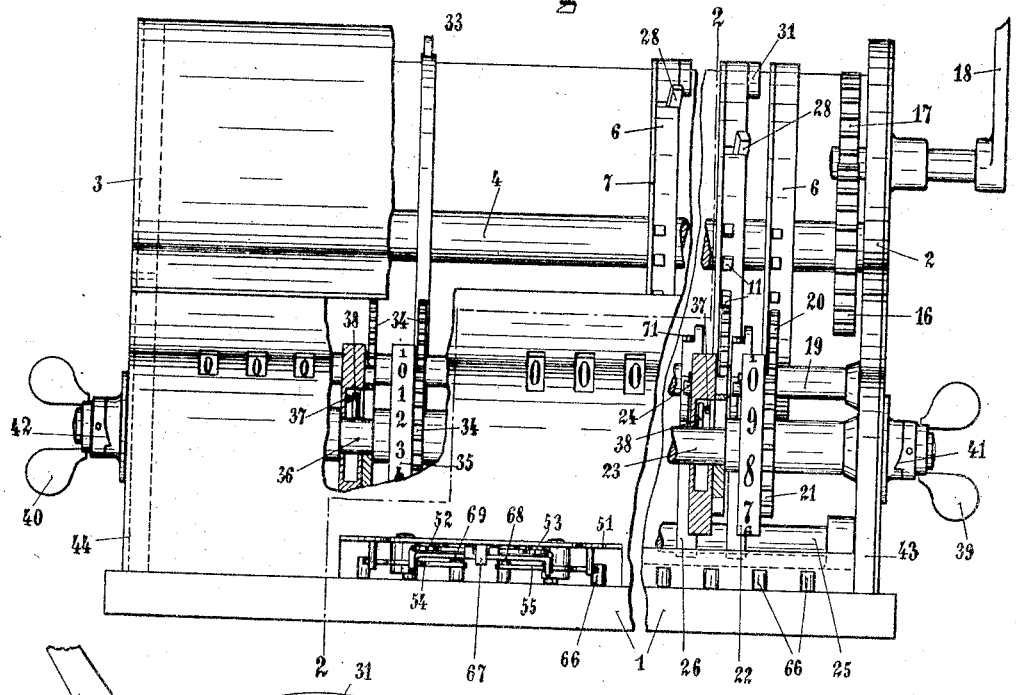
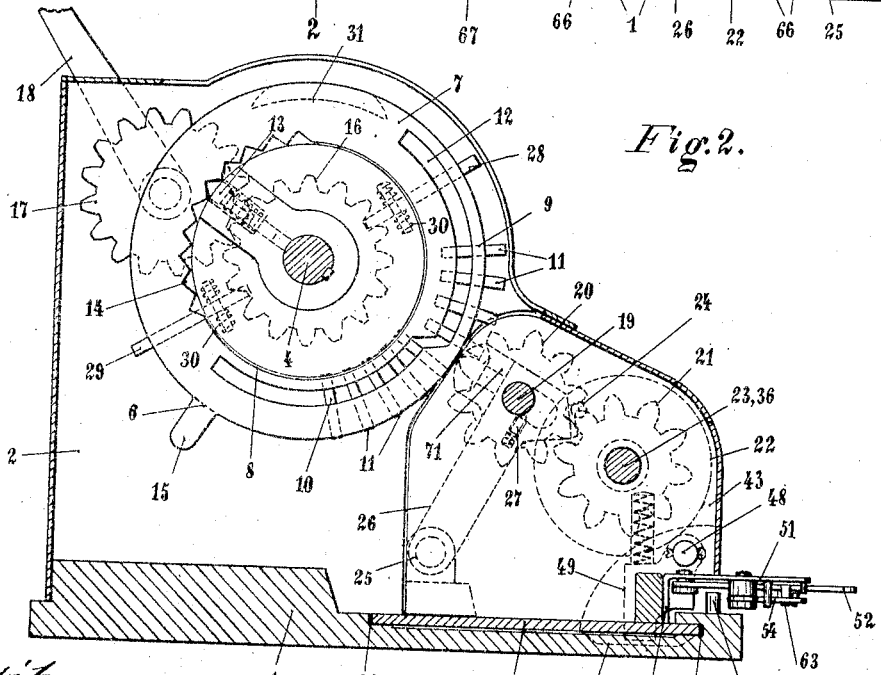


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

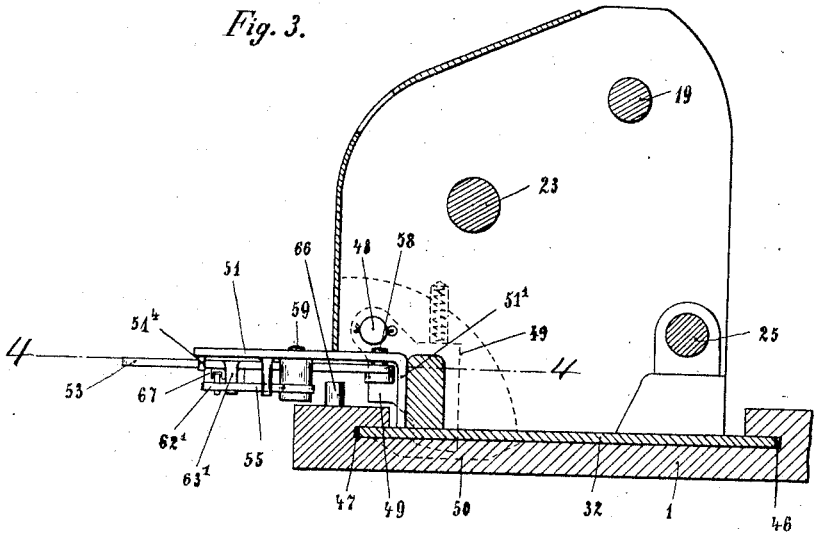
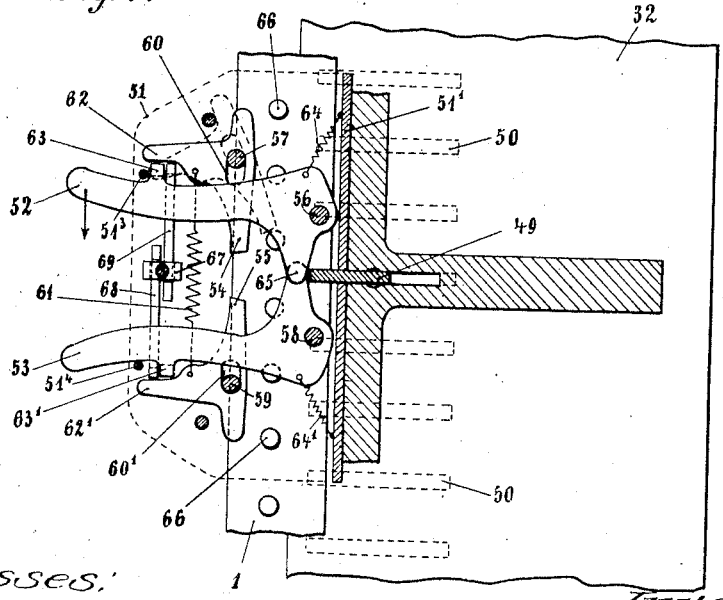


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

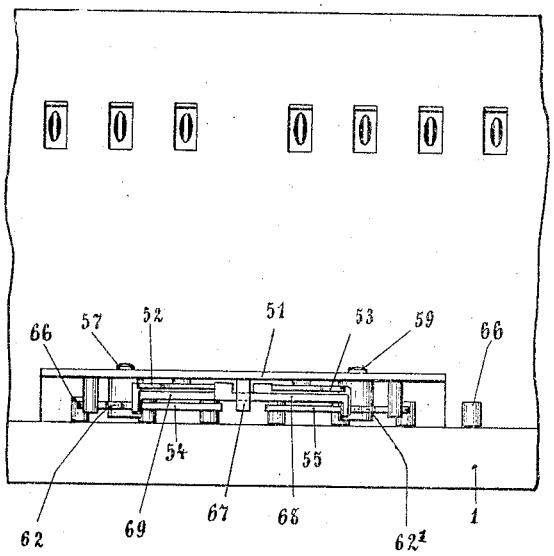


Fig. 6.

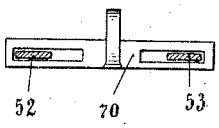
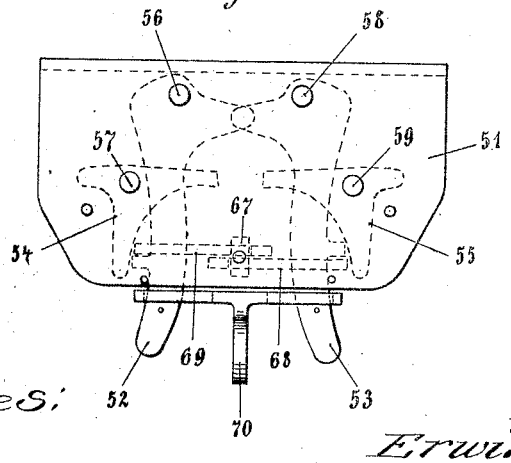


Fig. 7.



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UNITED STATES PATENT OFFICE.

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CALCULATING-MACHINE.

946,367. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed September 13, 1909. Serial No. 517,456.

To all whom it may concern:

Be it known that I, ERWIN JAHNZ, engineer, subject of the Emperor of Germany, residing at Berlin, Province of Brandenburg, Kingdom of Prussia, Empire of 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 in which the registering mechanism has a shifting movement relatively to the setting mechanism.

More particularly the invention relates to the mechanism for locking the carriage supporting one of said mechanisms in its positions relatively to the other one of said mechanisms and to the mechanism for shifting the said carriage. And one of the objects of the improvements is to provide a combined locking and shifting mechanism which permits of a rapid operation of the machine.

A further object of the improvements is to so construct the locking and shifting mechanism that a step-by-step movement of the carriage is insured, and that, if required, the carriage can be disengaged from its step-by-step shifting mechanism, and moved into any desired position.

With these objects in view my invention consists of the parts described hereinafter and particularly pointed out in the claims.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawings in which the same numerals of reference have been used in all the views to indicate corresponding parts.

In said drawings, Figure 1, is a front view of the machine in which the cover is partly removed, Fig. 2, is a vertical cross-section of Fig. 1 taken on the line 2—2, Fig. 3 is a vertical cross-section through a portion of the machine particularly showing the locking mechanism at the side opposite that illustrated by Fig. 2. Fig. 4 is a horizontal section taken on the line 4—4, Fig. 3. Fig. 5, is a detail view showing parts of the machine illustrated in Fig. 1 on an enlarged scale, Figs. 6 and 7, are detail views showing a modification of the handle of the shift device.

As shown in the said drawings, 1 indicates the horizontal base plate of the machine, 2 and 3 indicate the vertical side walls which are attached to and rise from the sides of the said base plate and which afford the support for the shaft 4 of the setting mechanism. The shaft 4 carries a plurality of setting disks 6 which are rigidly secured thereto. Each of the said setting disks is provided with an annular cam disk 7 having a rotary support on a circular concentric shoulder 8 of its disk 6. Each of the setting disks 6 has nine radial grooves 9 which afford a sliding support for small teeth 11 having noses 10. The latter project laterally beyond the setting disk 6 and into a cam groove 12 of the cam disk 7. By turning the cam disk 7 by means of a handle 15 the teeth 11 can be thrown outward beyond the periphery of the setting disk. The teeth represent the values to be used in a calculation. To secure the proper adjustment of the said teeth a spring actuated pin 13 is provided for each of the disks 7, which is adapted to engage one of the plurality of notches 14 corresponding to each of the said teeth. The said pin is constructed with a wedge shaped front end, and the notches 14 are shaped accordingly. Thereby the disk 6 can be set only in predetermined positions, in which none of the teeth is but partly projected. Upon rotation of the setting disk 6 from the machine crank 18 by means of gears 16 and 17 the values set on the setting disks—in the example shown the value 4—are transmitted, through gears 20 mounted on a stationary shaft 19, to gears 21 of the registering mechanism. The said gears 21 are loosely mounted on a shaft 23, and they are rigidly connected with disks 22 having the numbers from 1 to 9 and the zero sign printed about their peripheries.

The tens carrying mechanism consists of a pin 24 secured to the disk 22 which is adapted to rock a lever 26 loosely supported on a shaft 25 and locked in one of its end positions by a spring actuated pin 27.

On each of the setting disks 6 two teeth 28 and 29 are provided which project beyond the periphery of the said disks and are normally forced out of the plane of the adjustable teeth 11 by means of springs 30. If the carrying lever 26 is rocked, and the setting disk 6 is rotated, the tooth 28 engages the cam face 71 of the lever, so that it is rocked into the plane of the adjusted

teeth and acts on the adjacent registering wheel 21 of the next higher order through the intermediate gear 20. Each of the registering disks coöperates with a carrying lever 26 which is adapted to engage the setting disk of the next higher order. Therefore, if a registering wheel passes from nine to zero, the counting disk of the next higher order is advanced into its "1" position, so that the number 10 appears on the registering mechanism. The tooth 28 is used for the carrying operation in case of additions or multiplications, in which the crank 18 is turned to the right, while a tooth 29 comes into operation in case of subtractions and divisions in which the crank is turned to the left. As soon as the carrying tooth 28 or 29 has operated, the lever 26 must be rocked backward into its normal position shown in Fig. 2. To effect this a rocking cam 31 is provided on the setting disks 6 between the teeth 28 and 29, which cam rocks the lever 26 after each operation of the carrying teeth 28 and 29.

The invention may also be embodied in a calculating machine in which a mechanism for counting the revolutions of the crank is provided, which mechanism in the example shown is arranged coaxially with the registering mechanism. The said mechanism consists of a single tooth wheel 33 mounted on the shaft 4 of the setting disks and acting on counting wheels 35 loosely mounted on a shaft 36. On the periphery of each of the counting wheels 35 the numbers from 1 to 9 and the zero sign are printed, whereby the number of the revolutions of the crank is indicated, if the latter is turned either to the right or to the left. At the end of a calculating operation the registering and the revolutions counting mechanisms must be set to zero, for which purpose zero setting mechanisms of the same construction are provided.

All the registering disks 22 and counting wheels 35 are made in the form of rings, and within the latter rigid abutments 37 are provided which can be carried along by pins 38 secured to the shafts 23 and 36 respectively. By turning the handles 39 and 40 the shafts are shifted laterally by means of cam faces 41 and 42, and in their shifted positions they can engage the abutment 37. The said abutment is thus carried along when the shafts are shifted laterally. As soon as the mechanisms are brought into their zero positions, the shafts 23 and 36 are shifted backward so that the pins 38 are disengaged from the abutments 37 of the counting wheels 22 and 35.

The registering mechanism with its intermediate gears 20 and the carrying levers 26, and the revolutions counting mechanism with the intermediate gears 34 are disposed with their vertical side walls 43 and 44 or a separate plate or carriage 32. The said plate 32 is guided within a groove of the base plate 1 and it is slidable therein, so that the registering disks and the revolutions counting wheels can be brought into engagement with any of the setting disks. When operating the machine, the carriage of the counting mechanism is locked in its adjusted position relatively to the setting disks, and it must be unlocked before it can be shifted, while it must automatically be locked again at the end of its shifting movement.

When performing multiplications or divisions on the calculating machine, the carriage of the registering mechanism must first be unlocked, whereupon it must several times be shifted the distance of two consecutive setting disks. Therefore, each shifting movement requires two independent motions, that is to say a vertical pressure for unlocking the carriage and a horizontal shifting movement. One of the objects of my invention is to provide a mechanism, whereby the unlocking and shifting operations of the carriage are effected by actuating a single lever in the same or substantially the same direction. Thereby the two aforesaid independent movements are combined into a single operation, so that less time is required. A further object of the improvements is to provide a mechanism, whereby the step by step movement of the carriage is insured, if required, and whereby on the other hand the carriage can be unlocked and shifted over any desired number of setting wheels. With these objects in view, my invention consists in providing a locking mechanism for the carriage which carries two shift key levers which are so connected with the locking mechanism, that upon operation of one of the said key levers the locking mechanism is thrown out of operation and the carriage is simultaneously shifted one step to the right, while upon operation of the other one of the said levers the locking mechanism is likewise thrown out of operation and the carriage is simultaneously shifted one step to the left. If however both levers are operated, the carriage is unlocked and the locking mechanism is released as before, but the carriage is now free to be shifted to any desired point to the right or to the left.

As shown the carriage for the registering mechanism is slidably supported in grooves 46 and 47 of the base plate 1 of the machine. It is locked in its position by means of a spring actuated rocking plate 49 mounted on a shaft 48 and engaging in either one of a plurality of notches 50 of the base plate 1. When lifting the said plate out of its notch, the carriage can be shifted either to the right or to the left. The locking mechanism is mounted on a plate 51 secured with a flange 51^1 to the carriage.

It consists of levers 52 and 53, and pawls 54 and 55 mounted respectively on pivots 56, 57, 58 and 59 secured to the lower side of the plate 51. The pivots 57 and 59 extend through longitudinal slots 60 and 60^1 of the pawls 54 and 55 respectively, so that the latter have rectilinear movements on said pivots apart from their rocking movements. A spring 61 has the tendency to pull the pawls 54 and 55 toward each other. With noses 62 and 62^1 the pawls 54 and 55 bear against abutments 63, 63^1 of the levers 52, 53 respectively. By springs 64, 64^1 the levers 52, 53 are normally held in engagement with pins 51^3, 51^4 of the plate 51 or another stationary part of the carriage.

The operation of the levers 52 and 53 and their pawls 54 and 55 is as follows: If lever 52 is pushed to the right, it lifts the locking plate 49 out of its notch by means of a cam 65. Simultaneously an abutment 63 depending from the lever 52 releases the nose 62 of the pawl 54, so that the latter is free to rock, under the action of the spring 61, into position between two consecutive abutments 66 secured to the base plate 1. If now the lever 52 is further pressed in the same direction, the whole carriage is shifted to the right, until the pawl 54 strikes against the pin 66. Hereafter the carriage can be further shifted until the pin 57 arrives at the left hand end of the slot 60. In this position of the parts, the locking plate 49 is above the next notch 50, and it engages the same, as soon as lever 52 is again released. The latter is now rocked backward by its spring 64, and it forces the nose 62 to the left by means of its abutment 63 and thereby retracts the pawl 54 from its position between the pins 66. Under the action of its spring 61 the pawl 54 is shifted to the right until the pivot 57 engages again the left end of the slot of the pawl 54. In this position of the parts the pawl 54 is again in front of a space between two consecutive pins 66. The operation of the lever 53 and its pawl 55 is the same as that of the corresponding lever 52 and pawl 54. If the levers 52 and 53 are simultaneously rocked, they both act to lift the locking plate 49 out of its notch. Now in the construction so far described, the carriage would still be locked against movement in either direction by the pawls 54 and 55, which both are projected between two successive pins 66. To enable the carriage to be shifted in either direction, means are provided, whereby, upon operation of both levers 52 and 53, the pawls 54 and 55 are prevented from being rocked into locking position, and to hold the same in their normal positions shown in full lines in Fig. 4. For this purpose slide bars 68 and 69 are respectively provided between the lever 52 and pawl 55 and between the lever 53 and pawl 54. The said slide bars are guided within a block 67 secured to the plate 51. If now the levers 52 and 53 are rocked, the said slide bars are forced against the noses 62 and 62^1 of the pawls 54 and 55 respectively, so as to hold the same in their positions of rest. If therefore both levers 52 and 53 are rocked, the pawls 54 and 55 can not be rocked between the pins 66. Therefore the carriage can freely be shifted either to the right or to the left.

As stated before, the lever 52 performs two independent functions. It rocks the lever 52 so as to unlock the carriage, and it shifts the carriage. It is a considerable advantage in my improved machine, that both functions are performed by the same movement of the said lever 52, so that one of the said functions is performed in direct succession to the other one.

In Figs. 6 and 7 I have shown a modification of my improved apparatus, in which the carriage lock is controlled by a single handle. The latter can be shifted in both directions so as to rock either one of the levers 52 and 53. As shown in the said figures, the handle 70 is shifted in the direction of the travel of the carriage.

While I have shown a machine in which the setting mechanism is stationary, while the registering mechanism is mounted on a carriage, I wish it to be understood, that my invention is not limited to such construction of the machine. Evidently the invention can also be embodied in a machine in which the registering mechanism is stationary, while the setting mechanism is mounted on a shiftable carriage, in which case the locking mechanism would be mounted on the carriage for the setting mechanism.

I claim:

1. In a calculating machine, the combination with the setting mechanism, the registering mechanism, and a shiftable carriage supporting one of said mechanisms, of a spring actuated rocking device for locking said carriage, a handle on said carriage for shifting the same, and a connection consisting of levers and pawls between said handle and locking means adapted to throw the latter out of operation when the handle is acted upon for shifting the carriage.

2. In a calculating machine, the combination with the setting mechanism, the registering mechanism, and a carriage supporting one of said mechanisms, of means to lock said carriage, a handle on said carriage for shifting the same, a connection between said handle and locking means adapted to throw the latter out of operation when the handle is acted upon for shifting the carriage, and mechanism operative upon actuation of said handle to permit only step-by-step movement of said carriage.

3. In a calculating machine, the combina-

tion with the setting mechanism, the registering mechanism, and a carriage supporting one of said mechanisms, of means to lock said carriage, a handle on said carriage for shifting the same, a connection between said handle and locking means adapted to throw the latter out of operation when the handle is acted upon for shifting the carriage, mechanism operative upon actuation of said handle to permit only step-by-step movement of said carriage, and means to throw said last named mechanism out of operation.

4. In a calculating machine, the combination with the setting mechanism, the registering mechanism, and a carriage supporting one of said mechanisms, of means to lock said carriage, two handles on said carriage for shifting the same in opposite directions, connections between said handles and locking means adapted to throw the latter out of operation when the handle is acted upon in the direction of the travel of the carriage, mechanisms operative upon actuation of either one of said handles to permit only step-by-step movement of the carriage, and means to render said mechanisms inoperative upon simultaneous actuation of both handles.

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

ERWIN JAHNZ.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.