June 2, 1936. R. HAASE 2,042,986

CALCULATING MACHINE

Filed June 8, 1932 3 Sheets-Sheet 1

Fig. 1

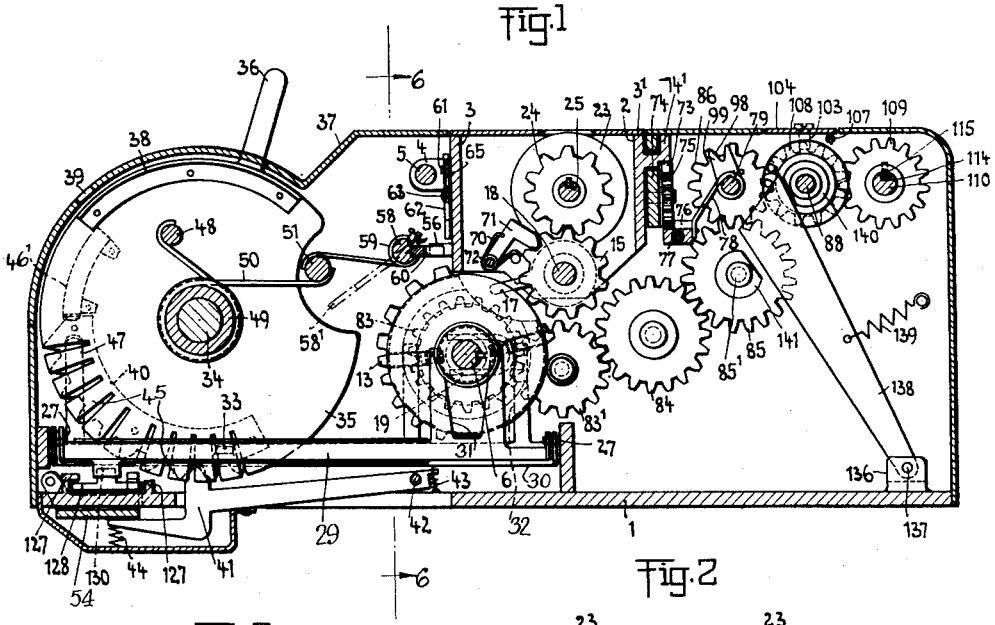


Fig. 2

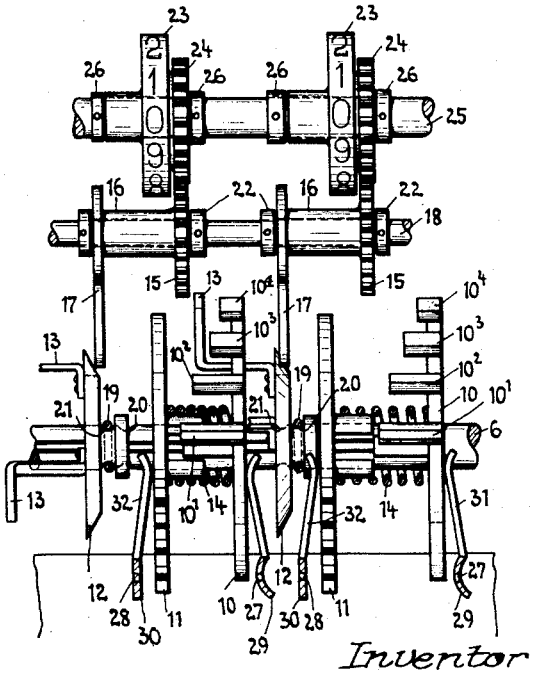
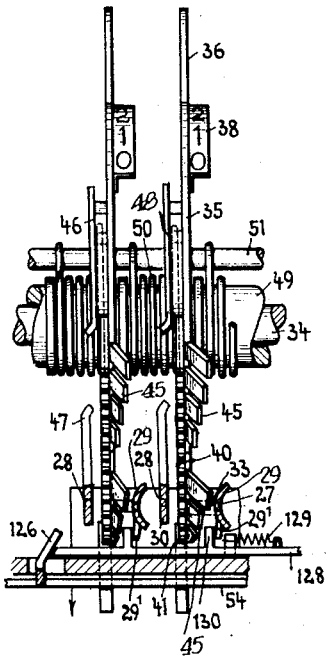


Fig. 3



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CALCULATING MACHINE

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Fig. 4

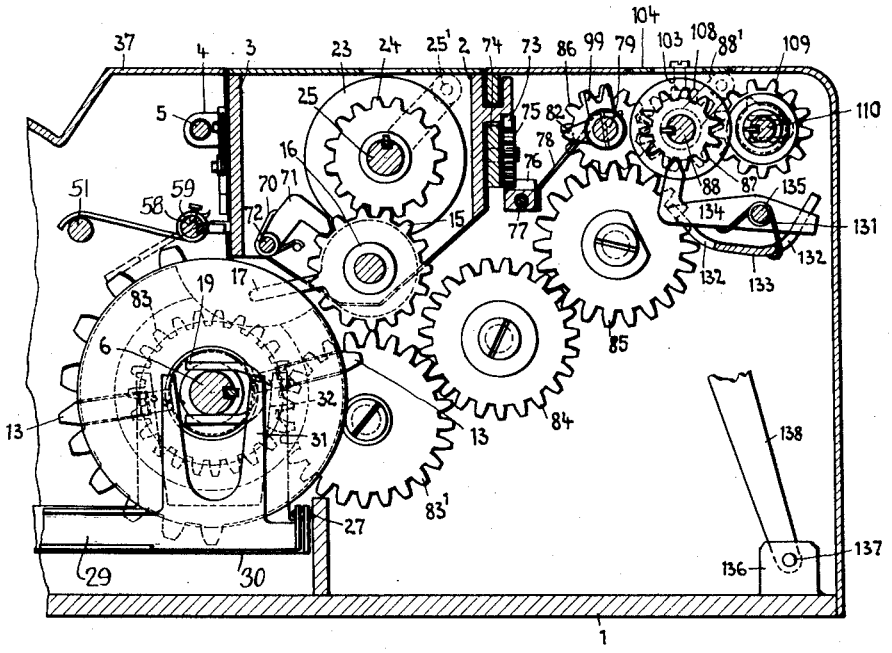
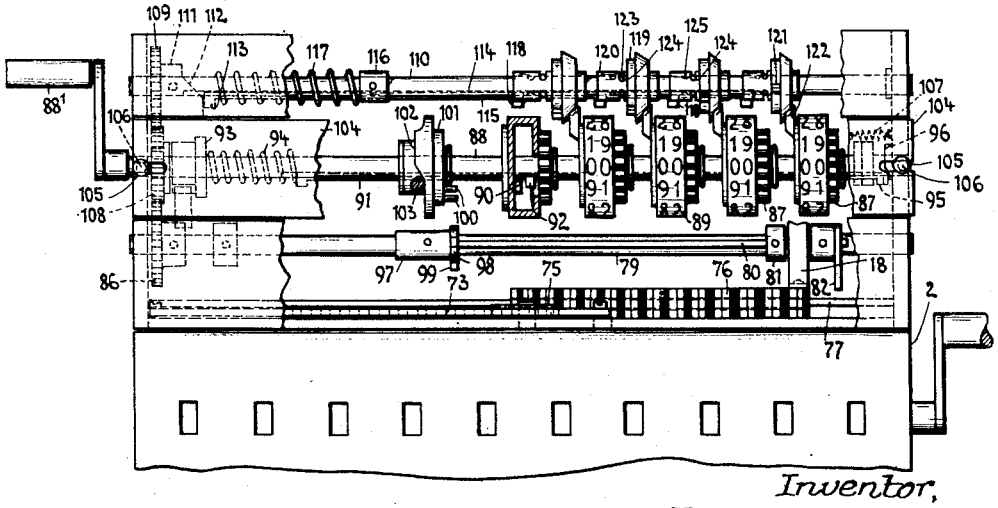


Fig. 5



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CALCULATING MACHINE

Filed June 8, 1932 3 Sheets-Sheet 3

Fig.6

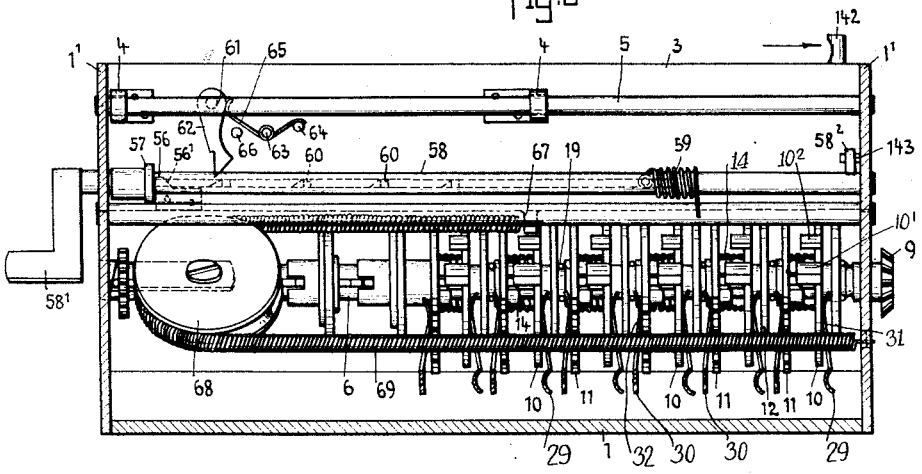


Fig.7

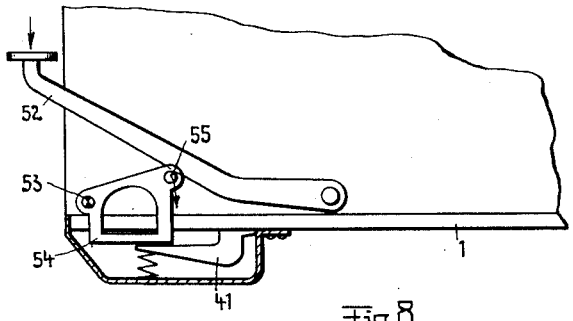
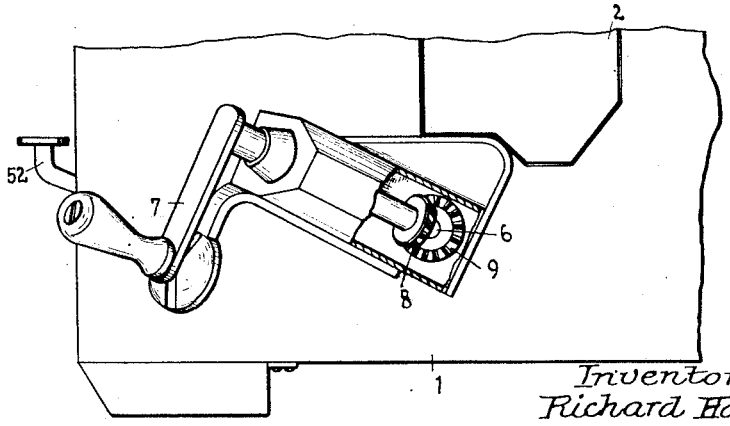


Fig.8



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Patented June 2, 1936 2,042,986

UNITED STATES PATENT OFFICE

2,042,986

CALCULATING MACHINE

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Application June 8, 1932, Serial No. 616,134
In Germany September 3, 1931

14 Claims. (Cl. 235—81)

My invention relates to improvements in calculating machines, and more particularly in calculating machines in which the calculating mechanism comprises operating disks cooperating with the registering mechanism and adapted to be shifted in axial direction for acting on the said registering mechanism. The object of the improvements is to provide a calculating machine of this type which has a high efficiency, which can be manufactured at low cost, and which requires little room. With this object in view my invention consists in providing setting mechanism for the said operating disks which is simple in construction, and which is adapted to be operated by means of levers or slides acting thereon. Thus, a keyboard for operating the said setting disks is dispensed with. In order that the setting disks or slides have an efficiency similar to that of key-controlled setting mechanisms, and yet a machine is provided which requires little room and which can be manufactured at low cost, the following improvements are provided: For convenience in operation the setting levers are provided at the front side of the machine, and during the calculating operation they are at rest, so that they may have the dimensions which are best suited for the operation thereof. The setting levers are reset in the manner usual in key-controlled setting mechanisms by means of a resetting key lever. The values set on the setting levers are transmitted to the operating disks in a similar way by means of cam members which project laterally from the setting levers. The said cam members may be riveted or otherwise secured to the setting levers. But preferably they are manufactured by bending the same from the bodies of the levers in lateral direction.

For the purpose of explaining the invention an example embodying the same has 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,

Fig. 1 is a sectional elevation showing the machine,

Fig. 2 is a front elevation showing a part of the registering mechanism and the operating mechanism thereof,

Fig. 3 is a front elevation showing a part of the setting mechanism,

Fig. 4 is a sectional elevation on an enlarged scale showing the operating mechanism, the registering mechanism and the revolutions counting mechanism,

Fig. 5 is a top plan view partly in section showing the revolutions counting mechanism,

Fig. 6 is a sectional elevation taken on the line 6—6 of Fig. 1 and showing the operating mechanism and the apparatus for locking the carriage in position,

Fig. 7 is a detail view showing the key lever and associated parts for setting the setting mechanism into initial position, and

Fig. 8 is a perspective view showing the crank shaft for driving the operating mechanism.

In the example shown in the figures the calculating machine comprises a casing 1 in which a carriage 2 is mounted. Within the casing the setting mechanism, the operating mechanism and the revolutions counting mechanism are mounted, and on the carriage 2 the registering mechanism is mounted. The carriage 2 comprises a front wall 3 and a rear wall 3'. The rear wall 3' is formed with lugs 14' guided in a rail 14 fixed to the side walls 1^1 of the casing 1, and to the front wall 3 of the carriage 2 eyes 4 are secured which are shiftable on a rod 5 secured to the said side walls 1^1.

The operating mechanism comprises a shaft 6 which is adapted to be rotated by means of a crank 7 (Fig. 8) or an electromotor through the intermediary of bevel gear wheels 8, 9. On the said shaft 6 operating disks 10 are mounted which are provided each with four teeth 10^1, 10^2, 10^3, 10^4 of different breadths, operating disks 11 each comprising five teeth of equal dimension, and carrying disks 12 each comprising two cranked teeth 13. For each order of the calculating machine one pair of operating disks 10 and 11 is provided, and for each order except the highest a carrying disk 12 is provided. The carrying teeth 13 are displaced with relation to one another in circumferential direction, and they are disposed along two oppositely directed helical lines, as is described for example in U. S. Patent 1,467,198. The hubs of the carrying disks 12 are provided each with two slots which are engaged by the shanks of a U-shaped spring 19, which shanks are adapted to engage circumferential grooves 20 and 21 made in the shaft 6, for locking the carrying disks in operative and inoperative positions. Between each pair of operating disks 10 and 11 a coiled spring 14 is located concentrically of the shaft 6, and the said spring is pressed together when the said disks are moved towards each other, and it tends to force the disks apart. The operating disks 10 and 11 and carrying disks of each order act successively on an intermediate gear wheel 15 rotatably mounted and non-shiftable

on a shaft 18 fixed to the carriage 2. The hub of the said intermediate gear wheel is made integral with a carrying tooth 17. The intermediate gear wheels 15 and the carrying teeth 17 connected therewith are held in position on the shaft 18 by means of rings 22 secured to the said shaft. The teeth of each intermediate gear wheel 15 are engaged by a pawl 71 acted upon by a spring 70, and all the said pawls 71 are rockingly mounted on a shaft 72. By the said pawls regular movement of the intermediate gear wheels 15 and the numeral wheels 23 cooperating therewith is insured. Each intermediate gear wheel 15 is in mesh with a gear wheel 24 connected each with one numeral wheel 23. The numeral wheels 23 are rotatable and non-shiftable on a shaft 25 fixed to the side walls of the carriage 2 and carrying a crank 25^1, and they are held in position by rings 26 secured to the shaft 25.

At opposite sides of the operating disks 10 and 11 of each order bails 29 and 30 are rockingly mounted on pivot bolts 27 and 28 secured to the side walls of the casing 1. At their rear ends the said bails carry upwardly directed arms 31 and 32 which engage the outer faces of the disks 10 and 11. At the sides facing the bails 30 the bails 29 carry wedge-shaped bevelled noses 33 which cooperate with laterally directed bevelled teeth 45 secured to or made integral with setting disks 35.

On a shaft 34 secured to the front parts of the side walls of the casing 1 setting disks 35 one for each order are rotatable and non-shiftable. Each setting disk 35 is provided with a finger piece 36 projecting outwardly through a slot of the cover 37 of the casing 1, and to the margin of each disk a segmental plate 38 having the numbers from 0 to 9 made thereon is secured, so that the numbers set by means of the disks can readily be seen through peep holes 39 made in the cover 37 one for each order. To the bottom part of each disk 35 a toothed segment 40 is secured, the teeth of which are at a distance corresponding to the distance between the numbers on the segmental plate 38. The said teeth are engaged by pawls 41 rockingly mounted on a shaft 42 and normally elevated by springs 43 and 44. The pawls 41 are adapted to be retracted from the teeth 40 by means of a key lever 52 mounted on the right hand side wall of the casing 1, which key lever acts on a pin 55 secured to a plate 54 rockingly mounted on a pivot bolt 53 and extending over all the pawls 41. When the plate 54 is depressed by the key lever 52 a bevelled finger 126 secured thereto shifts a slide 128 mounted in guide ways 127 secured to the base plate of the casing 1, which rail is acted upon by a spring 129 tending to shift the same to the left in Fig. 3 and towards the bevelled finger 126. At its top side the rail 128 carries lugs 130 one for each of the rockable bails 29, and each lug acts on a lug 29^1 of a bail 29. Therefore, when the slide 128 is shifted by the bevelled finger 126 the bails 29 are rocked about their longitudinal axes, so that the bevelled noses 33 carried thereby are brought out of the path of the teeth 45 of the disks 35. Each disk 35 carries nine teeth 45, and the said teeth are divided into two sets each comprising four teeth and helically projecting laterally from the plane of the disk, and a fifth tooth located between the said sets and in the plane of the disk. When a setting disk 35 is rocked by means of its finger 36 the teeth 45 thereof successively act on the nose 33 of the cooperating bail 29, thus rocking the said bail so that the arms 31 thereof move the cooperating disk 10 in opposition to the spring 14 into operative position. A segmental cam 46 is secured to the disk 35 at the side opposite to the bail 29, and when the said disk is rocked by means of the finger piece 36 the said cam acts on an arm 47 provided at the front end of the bail 30, so that the said arm is rocked and the cooperating disk 11 is shifted into operative position relatively to the intermediate gear wheel 15.

Thus the rotary setting movement of the disk 35 causes displacement of the disks 10 and 11 through the intermediary of the teeth 45, the bail 29, the segmental cam 46 and the bail 30, whereby the desired value is set in the calculating machine.

The setting disks 35 are provided each with a laterally directed pin 48 which is acted upon by one end of a spring 50 placed on a sleeve 49 disposed concentrically of the shaft 34 and holding the setting disks apart. The other end of the said spring bears on a rod 51 fixed to the side walls of the machine casing. The springs 50 tend to return the disks 35 into initial positions.

To the front wall 3 of the carriage 2 a lug 56 is secured which is formed with a bevelled face 56^1 (Fig. 6). In the position of the parts shown in the said figure the said lug 56 bears on a collar 57 of a shaft 58 mounted in the side walls of the casing 1 and having a key lever 58^1 secured to the end projecting from the casing. The said shaft 58 is acted upon by a spring 59 tending to turn the same in clockwise direction, as viewed in Fig. 1, until a pin 58^2 secured to the shaft 58 engages a fixed stop 143 provided on the right hand wall of the casing.

The shaft 58 carries a series of successively arranged noses 60 which are provided at one of their sides with bevelled faces, the distance between the said noses corresponding to the distance between the orders of the calculating machine.

On a pivot bolt 61 secured to the front wall 3 of the carriage 2 a pawl 62 is mounted which is formed with a bevelled bottom end, and which is acted upon by a spring 65 carried on a pin 63 secured to the wall 3 and bearing with its free end on a pin 64. The rocking movement of the pawl 62 in one direction is limited by a pin 66 secured to the wall 3.

On the bottom side of the carriage 2 there is a lug 67 to which one end of a coiled spring 69 is attached, which spring is trained on a roller 68 and attached with its opposite end to the right hand side wall of the machine casing 1.

To the rear wall of the carriage 2 a rack 73 is secured which is in engagement with a gear wheel 75 mounted on a rail 74 secured to the side walls of the machine casing 1. The said gear wheel 75 is in mesh with a second rack 76 shiftably mounted on a rod 77 supported at its ends on the side walls of the casing. The rack 76 is connected by an arm 78 with a sleeve 81 shiftable on a shaft 79, rotary movement of the said sleeve being prevented by a longitudinal groove 80 of the said shaft engaged by the sleeve, and the sleeve carries a single tooth 82. The shaft 79 is adapted to be rotated from the shaft 6 through the intermediary of gear wheels 83, 83^1, 84, 85, 86. By shifting the carriage 2 the single tooth 82 is successively brought into position for engagement with gear wheels 87 connected with numeral wheels 89 carrying two series of numbers. The said gear wheels and numeral wheels are rotat-

able and non-shiftable on a shaft 88 provided with a crank 88[1]. The said gear wheels 87 are engaged by pawls 134 mounted on a shaft 135 fixed to the side walls of the casing 1. The said pawls are acted upon by springs 131, and they are guided in slots 132 of a curved guide plate 133. By the said pawls regular movement of the wheels 87 and the numeral wheels 89 is insured. In a longitudinal groove of the shaft 88 a key 91 is longitudinally shiftable, and the said key carries lugs 92 which are adapted to engage lugs 90 provided internally of the numeral wheels 89 (Fig. 5). The lugs of the key 91 are normally held out of engagement with the lugs 90 of the numeral wheels by a spring 94 acting on the key 91 and bearing on a fixed shoulder 93 of the shaft 88. At the end opposite to the spring 94 the shaft 88 carries a cam 95 which is held by the spring 94 in engagement with a cam disk 96 fixed to the side wall of the casing. The shaft 79 is adapted to be rotated by gear wheels driven from the shaft 6. To the shaft 79 a sleeve 97 is secured which is formed with an arm 99 formed with a notch 98 (Fig. 1). By means of the said notch a slide 104 is shifted into position for opening or closing peep holes associated with the revolutions counting mechanism, and it is adapted to be brought into engagement with two teeth 100 of a disk 101 mounted on the shaft 88 (Fig. 5). At the side opposite to the teeth 100 the said disk 101 carries a cam 102 which is engaged by a pin 103 of a slide 104 provided with peep holes, which slide is guided by means of slots 105 provided at the ends thereof on pins 106 secured to the side walls of the casing. A spring 107 attached to one of the side walls of the casing and to the slide 104 holds the pin 103 in engagement with the cam disk 102.

On the shaft 88 of the revolutions counting mechanism a gear wheel 108 is loosely mounted which is in mesh with the gear wheel 86 mounted on the shaft 79. The gear wheel 108 is in driving engagement with a second gear wheel 109 fixed to a shaft 110 which is parallel to the shaft 88, and which forms a part of the carrying mechanism of the revolutions counting mechanism. The hub 111 of the gear wheel 109 is formed with a cam face 112 which is engaged by a lug 113 of a key 115 slidable in a longitudinal groove 114 of the shaft 110, a spring 117 bearing on a ring 116 fixed to the said shaft and holding the lug 113 in engagement with the cam face. The key 115 is formed with lugs 118 engaging each in a longitudinal slot of a hub 120 connected with a carrying disk 119. Each carrying disk 119 is provided with a tooth 121, and when the said carrying disk is shifted by a tooth 122 provided on the corresponding numeral wheel 89, the said tooth 121 is brought into position for engagement with the gear wheel 87 of the numeral wheel 89 of the next higher order. The carrying disks 119 are locked in operative and inoperative positions by springs 123 embedded in slots of the hubs 120 of the said disks and engaging in either one of two circumferential grooves 124 and 125 of the shaft 110. To a block 136 rising from the base plate of the casing 1 a pivot bolt 137 is secured on which a lever 138 is rockingly mounted, which is normally held by a spring 139 in engagement with a flat face on a collar 140 of the shaft 88. On the shaft 85[1] of the intermediate gear wheel 85 a similar collar 141 is mounted which has a flat face and so likewise provides a stop for limiting the movement of the lever 138.

The operation of the calculating machine is as follows:

If it is desired to set a value in the machine for making a calculation, the setting disks 35 corresponding to the places of the number are operated by means of the finger pieces 36 in opposition to the springs 50, until each disk displays its number through the corresponding peep hole 39. One of the numbers to be set by means of a disk 35 may be the figure "9", and when the said disk is operated at first the four helically displaced teeth 45 act on the corresponding nose 33 of the bail 29. Thereby the said bail is rocked, so that the arms 31 thereof shift the corresponding operating disk 10 with the teeth 10^1 to 10^4 into operative position relatively to the intermediate gear wheel 15. Upon further operation of the disk 35 to the fifth tooth which is located in the plane of the disk 35, the nose 33 and the bail 29 are released, and the previously compressed spring 14 returns the disk 10 to the right and into initial position. Simultaneously the cam face 46 of the setting disk 35 rocks the arm 47 and the bail 30 to the right, so that the arms 32 shift the disk 11 provided with five teeth into operative position relatively to the intermediate gear wheel 15. During the further rotary movement of the disk 35 to the end of the slot provided therefor in the cover 37 the cam face 46 holds the disk 11 in operative position, and simultaneously the upper set of four helically arranged teeth 45 of the disk 35 shifts the disk 10 to the left. Now both disks 10 and 11 are in the position for transmitting the number "9" to the registering mechanism.

After the desired value has been set in the setting mechanism the shaft 6 of the operating mechanism is turned by means of the crank 7, and the values set on the disks 10 and 11 are transmitted to the corresponding intermediate gear wheels 15 and through the intermediary of the gear wheels 24 to the numeral wheels 23. When a numeral wheel passes from nine to zero, the single tooth 17 of the intermediate gear wheel 15 cooperating therewith acts on the bevelled face of the carrying disk 12 of the next higher order and shifts the said disk to the left in Fig. 2, the spring 19 locking the disk in position being transmitted from the groove 20 of the shaft 6 into the adjacent groove 21. Upon the rotary movement of the shaft 6 the carrying pin 13 fixed to the disk 12 advances the intermediate gear wheel 15 of the next higher order one step, whereby the carrying operation is completed.

The rotary movement of the shaft 6 is transmitted by the intermediate gear wheels 83, 83^1, 84, 85 and 86 to the shaft 79 on which the single tooth 82 is shiftable, and after each complete rotation of the shaft 79 the said single tooth advances the gear wheel 87 and the numeral wheel 89 connected therewith one step.

When a numeral wheel 89 of the revolutions counting mechanism passes from nine to zero, the carrying pin 122 provided on the said disk shifts the bevelled carrying disk mounted on the shaft 110 and located in its path to the left in Fig. 5, so that the spring 123 thereof is shifted from the groove 124 into the adjacent groove 125, and the carrying tooth 121 gets into position for engagement with the gear wheel 87 of the next higher order for imparting carrying movement thereto.

At the beginning of the rotary movement of the shaft 6 in clockwise direction the arm 99 secured to the shaft 79 shifts the disk 101 on

the shaft 88. But when the revolutions counting mechanism has before been reset the cam 102 does not act on the pin 103 fixed to the slide 104. If however the shaft 6 is turned in the opposite direction, that is anti-clockwise, the disk 101 is rotated so that the cam 102 shifts the pin 103 to the left in Fig. 5 and in opposition to the spring 107. Therefore the peep holes of the slide 104 display the left hand series of figures made on the disks 89, which are preferably printed in red.

At the beginning of the rotary movement of the shaft 110 which is likewise rotated from the shaft 6 the lug 113 of the key 115 slides on the cam face 112, and the spring 117 shifts the said key to the left. Therefore the lugs of the said key are retracted from the notches of the hubs 120 so far that the tooth 122 of a numeral wheel 89 passing from nine to zero and thus starting a carrying operation is able to shift the said carrying disk to the left. Slightly before the end of a rotary movement of the shaft 110 the key 115 slides on a bevelled face of the sleeve 111, and it is shifted thereby to the right. Therefore all the carrying disks which have performed a carrying operation, and which therefore had been shifted on the shaft 110 to the left, are returned into initial position.

The setting disks 35 are returned into initial position by means of the key lever 52, which acts through the intermediary of the plate 54 on the free ends of all the pawls 41 and rocks the same, in opposition to the springs 43 and 44, out of engagement with the teeth of the segment 40. By the downward movement of the plate 54 also the slide 128 is shifted, and therefore the noses 130 rock the bails 29 and shift the noses 33 out of position for engagement with the teeth 45 of the disk 35, and the springs 50 acting on each disk 35 return the disks into their initial positions.

The numeral wheels 89 of the revolutions counting mechanism are returned into initial position by means of the key 91 carried by the shaft 88. When the said shaft is rotated the lug 95 slides on the projecting margin of the cam disk 96, and the key 91 is shifted so that the lugs 92 carried thereby get into position for acting on the lugs 90 provided internally of the numeral wheels 89, so that the said numeral wheels are carried along by the shaft 88 and returned into initial positions. During the said return movement of the wheels 89 the concentric portion of the collar 140 fixed to the shaft 88 acts on the lever 138 and rocks the same into engagement with the flat face of the collar 141, so that rotary movement of the wheel 85 and the driving members connected therewith is prevented.

The numeral wheels 23 of the registering mechanism are reset by means of the crank 25' fixed to the shaft 25.

The carriage 2 is adapted to be shifted from the left hand end position shown in the figures into a position corresponding to the next higher order by means of a finger piece 142 fixed thereto (Fig. 6). When the carriage is thus shifted to the right, the cam face 56^1 of the lug 56 fixed to the said carriage engages a nose 60 carried by the shaft 58. Thereby the said nose is lifted against the action of the spring 59 until the nose releases the lug 56 and the spring 59 returns the shaft 58 into initial position. The spring 69 fixed to the carriage holds the lug 56 in contact with the rear face of the said nose 60, so that the carriage 2 is locked in shifted position. For returning the carriage from the position of higher order into initial position or into the position or the next lower order the key lever 58^1 is depressed. Thereby the shaft 58 is rocked so that the noses 60 are retracted upwardly and out of the path of the lug 56, and the spring 69 is free to shift the carriage to the left. The pawl 62 which is rockingly mounted on the slide 2 permits only intermittent return movement, because the noses 60 which have been lifted by the rotary movement of the shaft 58 have been brought into position for engaging the bottom end of the pawl 62. Whenever the said pawl 62 is engaged by one of the noses 60, the pawl is rocked in opposition to the spring 65 acting thereon, until its rear face bears on the stop 66 and further movement of the slide is prevented. If thereafter the key lever 58^1 is released, the shaft 58 returns into initial position, and the nose 60 bearing on the pawl 62 releases the said pawl, so that the spring 69 can move the carriage a small length of way to the left, until the lug 56 bears on the rear side of the next nose located in its path. This operation is repeated whenever the key lever 58^1 is depressed, until the lug 56 is again in engagement with the collar 57.

I claim:

1. In a calculating machine having registering mechanism and calculating mechanism comprising a pair of operating disks adapted to be shifted in axial direction into position for cooperation with an element of the registering mechanism, the combination of a setting lever provided at its sides with setting members, said lever being mounted for oscillation on a horizontal axis in a plane parallel to those of the operating disks, and mechanism intermediate said setting lever and operating disks for transmitting setting movement from said setting lever to said operating disks.

2. In a calculating machine, having registering mechanism and calculating mechanism comprising a pair of operating disks adapted to be shifted in axial direction into position for cooperation with an element of the registering mechanism, the combination of a setting lever swingable about a horizontal axis and having setting members bent laterally from the body thereof said bent setting members corresponding to a series of numerals, and mechanism located between said setting lever and said operating disks including elements movable step-by-step laterally by said bent members for transmitting setting movement from said setting lever to said operating disks.

3. In a calculating machine having registering mechanism and a pair of rotary operating disks for actuating an element of the registering mechanism, the combination of a setting lever oscillatory about an axis parallel to that of the operating disks, said setting lever having a plurality of positions corresponding to a series of numerals, operating devices extending laterally from said lever, and means actuated by said operating devices for shifting the operating disks in the direction of their axes.

4. A device as in claim 3, said lever being made of sheet metal and said operating devices including integral laterally bent parts of said lever.

5. In a calculating machine having registering mechanism, a pair of rotary operating disks shiftable axially into operative engagement with an element of said registering mechanism, and rockable bails for shifting said disks, the combina-

tion of a horizontal shaft, and a manually operable lever on said shaft for rocking said bails.

6. In a calculating machine of the type having a pair of operating disks shiftable axially to engage an element driven by said disks, one of said operating disks having four laterally stepped teeth and the other having five radial teeth, springs holding said disks in inoperative position, and rockable bails having fingers for shifting said disks, the combination of an oscillatory setting lever located between a pair of bails, said setting lever having teeth stepped laterally from one face, an arm on an adjacent bail located for engagement by said teeth for rocking said bail to shift the four-toothed disk progressively, scale means for indicating the extent of movement of the setting lever, and means on the other face of the setting lever for rocking the bail adjacent thereto so as to shift the five-toothed disk.

7. A device as in claim 6, the teeth on the setting lever being divided into two sets of four each, said sets being spaced apart to permit release of the four-toothed disk from the element driven thereby, the means on the other face of the setting lever being positioned to shift the corresponding five-toothed disk into operative position at such time.

8. In a calculating machine of the type having a pair of operating disks shiftable to engage an element to be driven by said disks, one of said disks having four laterally stepped teeth and the other having five radial teeth, springs tending to move said disks into inoperative position, and a pair of rockable bails for shifting respectively, a four-toothed disk and a five-toothed disk, the combination of a setting lever between said bails, means on said setting lever for progressively shifting the four-toothed disk to vary the number of teeth so rendered operative, means on the lever for then shifting the five-toothed disk, means for returning the four-toothed disk to inoperative position, and means on the setting lever for again shifting the four-toothed disk progressively by further movement of said setting lever.

9. In a calculating machine having registering mechanism, a pair of coaxially mounted axially shiftable operating disks for actuating an element of said registering mechanism, and means normally holding said disks out of engagement with said element, the combination of a manually operable setting lever mounted for oscillation about an axis parallel to that of said operating disks to any one of a plurality of predetermined positions, and means controlled by the positions of the setting lever for determining the positions of the setting disks.

10. A device as in claim 9, including laterally offset teeth on said lever, said determining means including rocking bails for moving said shiftable disks, and an arm on one bail positioned for engagement by the lateral teeth of said setting lever for moving the corresponding shiftable disk to varying degrees.

11. In a calculating machine, a driven element, a rotary operating member for driving said element, and stepped lateral teeth on said operating member, the combination of means for shifting the operating member laterally including an oscillatory setting member on an axis parallel to that of the operating member, stepped lateral projections on said setting member, and means for shifting the operating member progressively in accordance with successive positions of the setting member.

12. In a calculating machine, a disk having on one face two spaced sets of teeth which are progressively stepped laterally thereof, and having on its other face a cam spaced from said face of said disk, said cam being spaced from said teeth in a direction circumferentially of said disk and having its forward end inclined away from said disk.

13. In a calculating machine including a gear and a pair of operating disks shiftable axially into position to rotate said gear, a setting lever mounted for oscillation in a plane parallel to the planes of rotation of the operating disks, setting members extending laterally from said setting lever, and means between said setting lever and said operating disks operable by said setting members to shift said operating disks axially upon oscillation of said setting lever.

14. In a calculating machine including a gear and a pair of operating disks shiftable axially into position to rotate said gear, a setting lever mounted for oscillation in a plane parallel to the planes of rotation of said operating disks, setting members extending laterally from said setting lever, and means between said setting lever and said operating disks operable by said setting members to shift said operating disks axially upon oscillation of said setting lever.

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