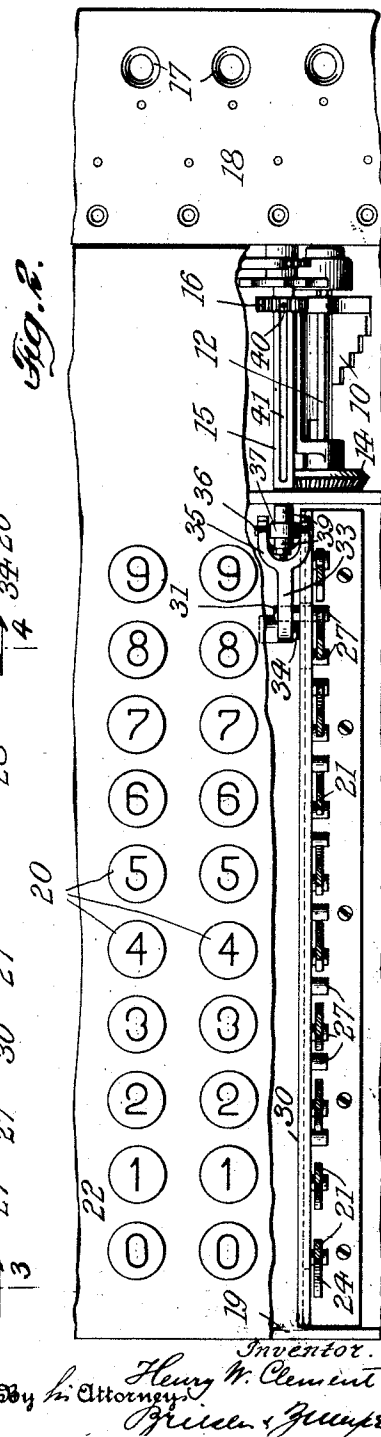
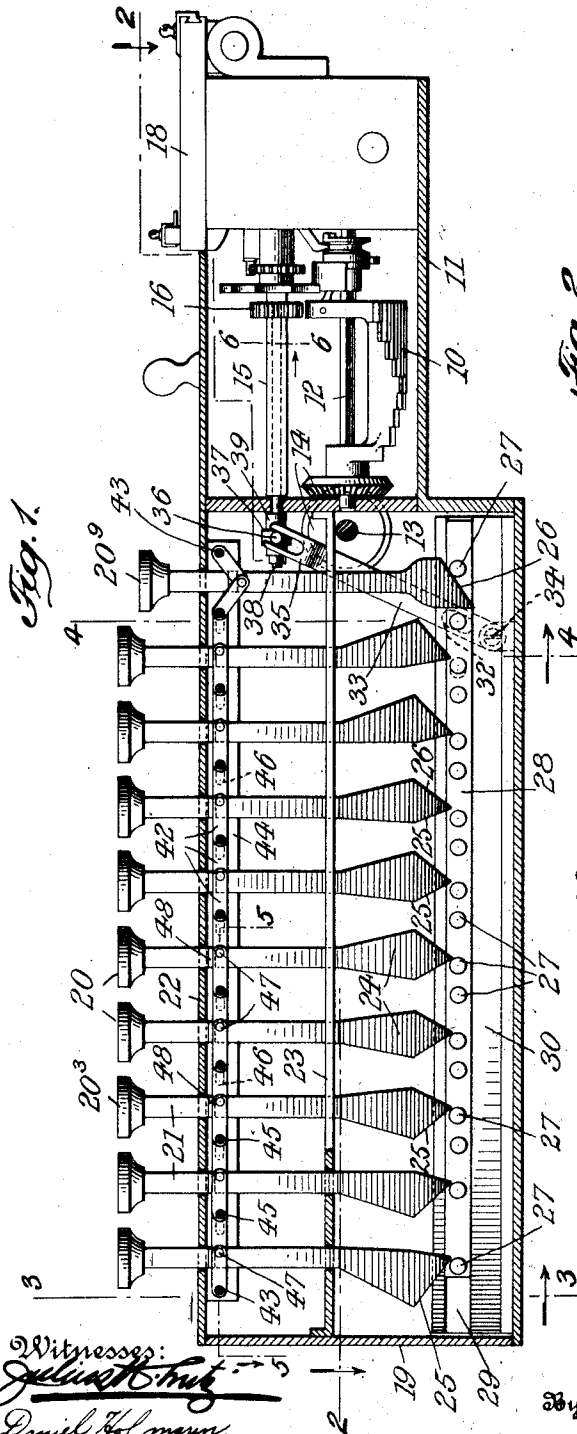


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KEY MECHANISM FOR CALCULATING MACHINES.  
APPLICATION FILED DEC. 18, 1911.

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Patented Nov. 12, 1912.

2 SHEETS-SHEET 1.

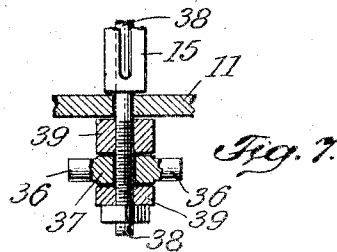
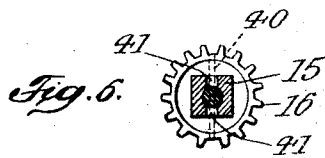
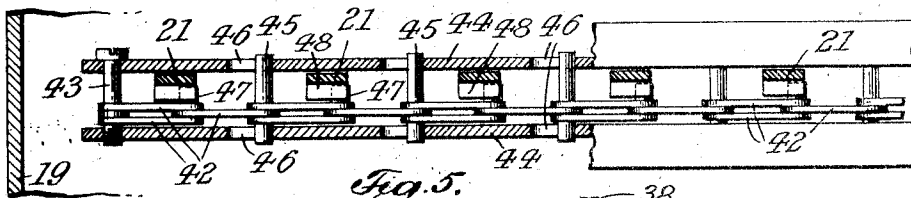
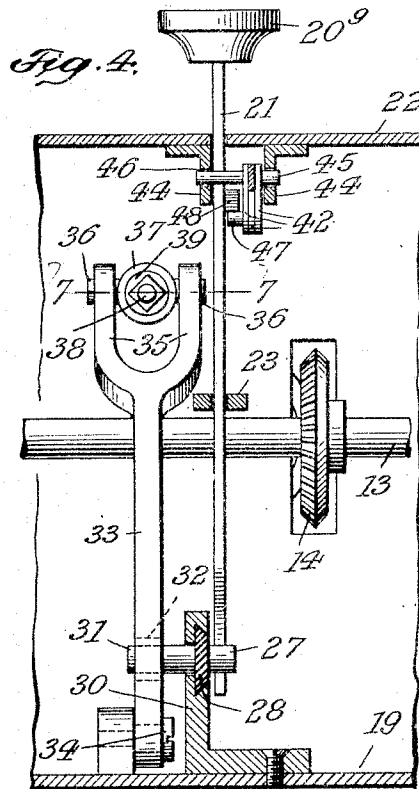
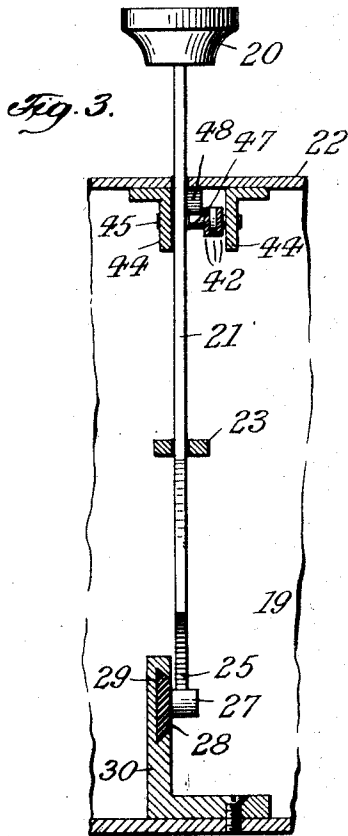


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Witnesses:  
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# UNITED STATES PATENT OFFICE.

HENRY W. CLEMENT, OF RUTLAND, VERMONT.

## KEY MECHANISM FOR CALCULATING-MACHINES.

1.044,020.

Specification of Letters Patent.

Patented Nov. 12, 1912.

Application filed December 18, 1911. Serial No. 666,365.

*To all whom it may concern:*

Be it known that I, HENRY W. CLEMENT, a citizen of the United States, residing at Rutland, county of Rutland, and State of Vermont, have invented a new and Improved Key Mechanism for Calculating-Machines, of which the following is a specification.

This invention relates to a novel key mechanism for calculating machines which operates in such a manner that the depression of any one key will automatically raise any previously depressed key without the use of springs or similar lifting means.

The invention is well applicable to calculating machines of various constructions, an example of a machine to which the invention may be applied being illustrated in Patent No. 972,360 issued to Julius Graber October 11th, 1910.

In the accompanying drawing: Figure 1 is a vertical transverse section showing my improved key mechanism connected to a calculating machine; Fig. 2 a horizontal section on line 2—2, Fig. 1; Fig. 3 an enlarged vertical section on line 3—3, Fig. 1; Fig. 4 a similar section on line 4—4, Fig. 1; Fig. 5 an enlarged horizontal section on line 5—5, Fig. 1; Fig. 6 an enlarged cross section on line 6—6, Fig. 1, and Fig. 7 a cross section on line 7—7, Fig. 4 with the forked lever omitted.

The calculating machine in conjunction with which my improved key mechanism is intended to be operated comprises essentially a series of toothed sectors 10 inclosed in a casing 11, each sector being provided with nine teeth that gradually decrease in length. Sectors 10 are rigidly mounted on shafts 12 which are driven from a manually operated shaft 13 by miter wheels 14. Above each sector 10 there is rotatably supported within casing 11 a squared shaft 15 upon which is slidable a pinion 16 adapted to be engaged by said sector. Shaft 15 in turn is operatively connected to the ciphering mechanism proper, the result of the calculations performed being displayed through the windows 17 of a carriage 18, all as fully described in the above cited patent.

The key mechanism which constitutes the subject matter of this invention is arranged within a casing 19 which is either made integral with casing 11 or may be attached thereto in suitable manner. Cooperating with each pinion there is a row of keys 20 containing ten keys which are labeled from 0 to 9 as illustrated in Fig. 2. Keys 20 are

provided with shanks 21 that slidably engage corresponding apertures of cover 22 and of a horizontal guide rail 23 rigidly mounted within casing 11. At their lower extremities, key shanks 21 are provided with wedge-shaped enlargements 24, the tapering edges 25, 26 of which are adapted to engage pins 27 projecting laterally from a slide 28, two of such pins being provided for each key excepting for the zero key which co-operates with but one pin. Slide 28 is shown to be made dovetailed in cross section and is guided within a correspondingly shaped way 29 of a rib 30 secured to the bottom of casing 19. The edges 25, 26 of key shanks 21 are so shaped that each key when depressed engages either of its cooperating pins 27 and thereby sets slide 28 to a different position, the corresponding movement of the slide being transmitted to pinion 16 in the following manner: One of the pins 27 is prolonged as at 31 to be received within a corresponding slot 32 of a lever 33 pivoted to casing 19 at 34. At its free end lever 33 is made integral with a fork 35, the slotted prongs of which accommodate the studs 36 extending in diametrically opposite directions from a ring 37. The latter is loosely mounted upon a spindle 38 between a pair of collars 39 screwed on said spindle, as illustrated in Figs. 1, 2 and 7. Spindle 38 is slidably received within a corresponding axial bore of squared shaft 15 and is connected to pinion 16 by a pin 40 passing through slots 41 of shaft 15.

The keys 20 are so connected with each other, that but one key may be depressed at a time, while the depression of another key automatically raises the previously lowered key. In this way all springs for raising depressed keys are dispensed with, thereby increasing the reliability of the mechanism to a substantial degree.

The means for operatively connecting the keys are shown to consist of a chain having a plurality of links 42, one pair of such links being provided for each key as illustrated in Figs. 1 and 5. The terminal links 42 are pivoted at 43 to webs 44 depending from cover 22 while the pins 45 connecting the links of adjoining pairs are prolonged beyond both sides of said links and are slidably guided in horizontal slots 46 of webs 44 (Figs. 1 and 5). The pivots 47 connecting the links of each pair extend in but one direction beyond said links and here engage the lower side of abutments 48 extending

laterally from the key-shanks 21. The combined length of all links 42 exceeds somewhat the distance between pivots 43, so that always one link-pair is partly collapsed, while the remaining link-pairs extend in a rectilinear direction. Thus in Fig. 1, the link-pair co-operating with the nine-key 20<sup>a</sup> is partly collapsed, whereas all other links are straightened out. While being brought into this position, the incline 26 of key 20<sup>a</sup> in engaging its pin 27 has moved slide 28 to the extreme right, so that pinion 16 has become aligned with that section of sector 10 which has the corresponding number of teeth. If now another key, say the three-key 20<sup>b</sup> is depressed, the co-operating pair of links 42 will be collapsed thereby straightening out the previously collapsed links co-operating with the nine-key 20<sup>a</sup>. During the descent of key 20<sup>b</sup> its beveled edge 25 will engage the corresponding pin 27 thereby shifting slide 28 toward the left (Fig. 1) to such an extent that pinion 16 will be brought into alinement with that section of sector 10 which comprises three teeth. It will be seen from Fig. 1 that the lower extremities of the key-shanks 21 are differently configured, the inclination of the converging edges 25, 26 being so calculated that upon the depression of the several keys, the pinion 16 is so set, as to co-operate with the corresponding sections of sector 10.

It will be seen that by the construction described, novel and effective key actuated means are provided for setting pinion 16 relatively to sector 10, said means being so constructed that all springs are obviated and that the previously depressed key is automatically raised upon the depression of another key in the same row, so that a reliable working is insured.

I claim:

1. In a device of the character described, a plurality of keys arranged in rows, a chain having links arranged in pairs, pivots connecting the links of each pair and engaged by the keys, pins connecting the links of adjoining link-pairs, guides for said pins, and fixed pivots for the terminal links of the chain, the distance between said pivots being less than the aggregate length of the chain-links.

2. In a device of the character described, a plurality of keys arranged in rows, a chain having links arranged in pairs, slotted webs flanking said chain, pivots connecting the links of each pair and engaged by the keys, pins engaging the web-slots and connecting the links of adjoining link-pairs, and fixed pivots for the terminal links of the chain, the distance between said fixed pivots being less than the aggregate length of the chain-links.

3. In a device of the character described, a plurality of keys arranged in rows, stems depending from said keys, abutments on the stems, a chain having links arranged in pairs, pivots connecting the links of each pair and engaged by the abutments, pins connecting the links of adjoining link-pairs, guides for said pins, and fixed pivots for the terminal links of the chain, the distance between said fixed pivots being less than the aggregate length of the chain-links.

4. In a device of the character described, a plurality of keys arranged in rows, stems depending from said keys and having inclined lower edges, a slide co-operating with said edges, a slidable pinion, and means for operatively connecting said slide and pinion.

5. In a device of the character described, a plurality of keys arranged in rows, stems depending from said keys and having inclined lower edges, a slide co-operating with said edges, a lever actuated by said slide and a pinion operatively connected to said lever.

6. In a device of the character described, a plurality of keys arranged in rows, stems depending from said keys and having inclined lower edges, a slide co-operating with said edges, a lever actuated by said slide, a hollow slotted shaft, a pinion slidable thereon, a spindle encompassed by the shaft and operatively connected to the lever, and means passing through the shaft-slot for connecting said pinion and spindle.

7. In a device of the character described, a plurality of keys arranged in rows, stems depending from said keys and having inclined lower edges, a slide co-operating with said edges, a lever actuated by said slide and having a forked end, a studded ring engaged by said end, a spindle to which said ring is rotatably and non-slidably secured, a hollow slotted shaft accommodating the spindle, a pinion slidable on the shaft, and means passing through the shaft-slot for connecting said pinion and spindle.

8. In a device of the character described, a plurality of keys arranged in rows, stems depending from said keys and having inclined lower edges, a slide having pins that are adapted to be engaged by said edges, a pinion, and means for operatively connecting said slide and pinion.

9. In a device of the character described, a plurality of keys arranged in rows, stems depending from said keys and having differently inclined lower edges, a slide having pins that are adapted to be engaged by said edges, a pinion, and means for operatively connecting said slide and pinion.

HENRY W. CLEMENT.

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