

May 3, 1960

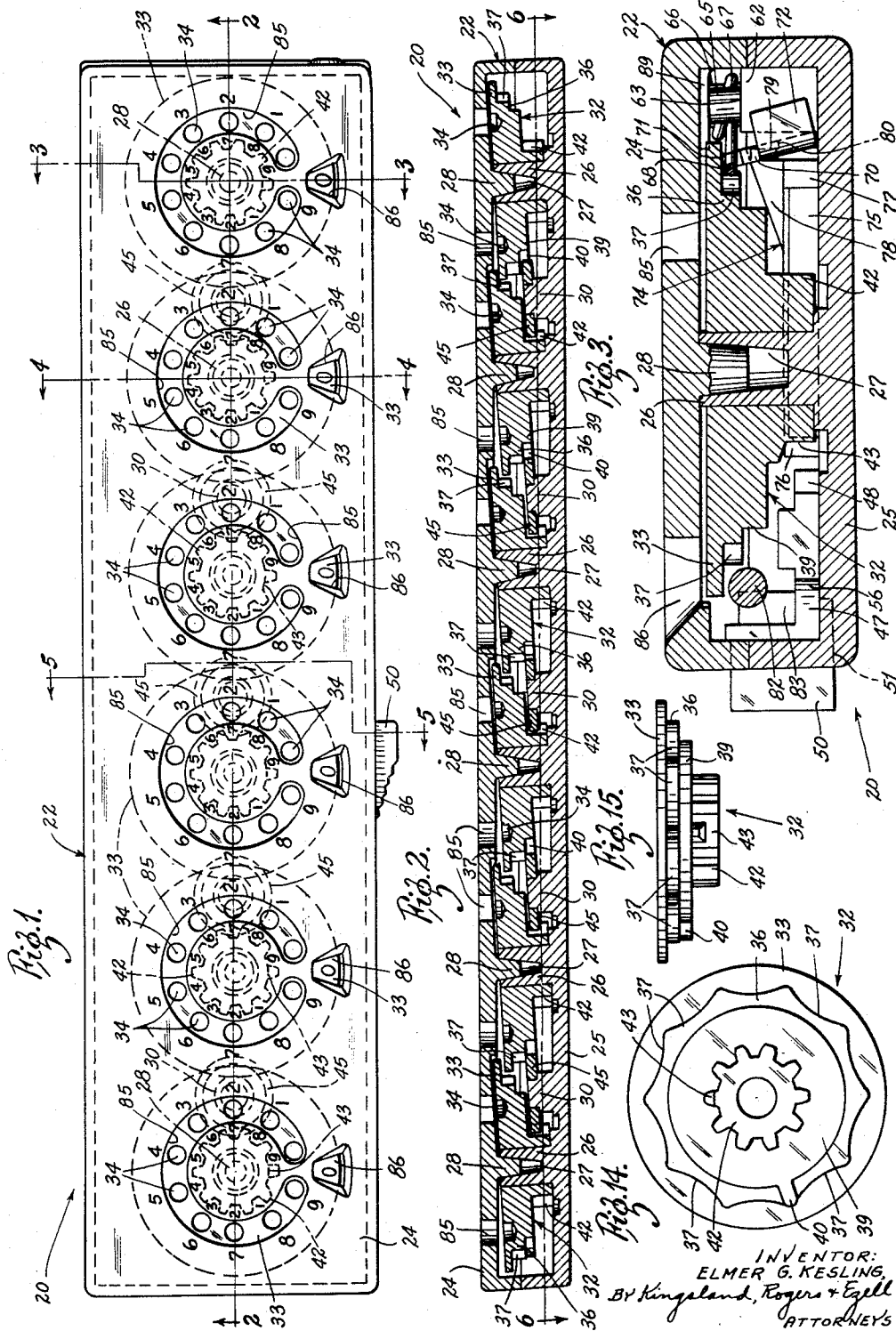
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RELEASABLE RESTRAINING DEVICE FOR ROTATABLE PARTS OF CALCULATORS

Filed Jan. 26, 1955

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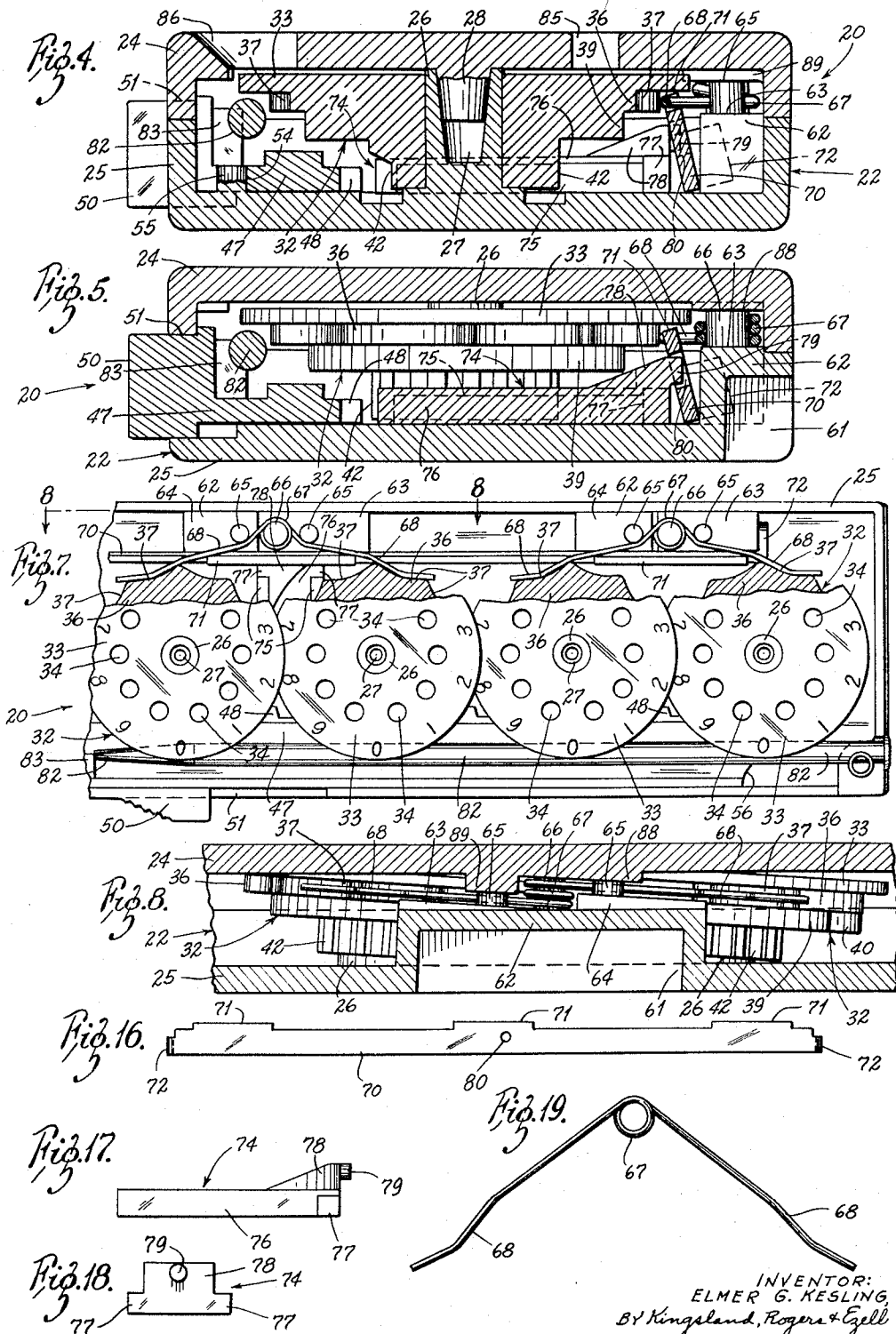
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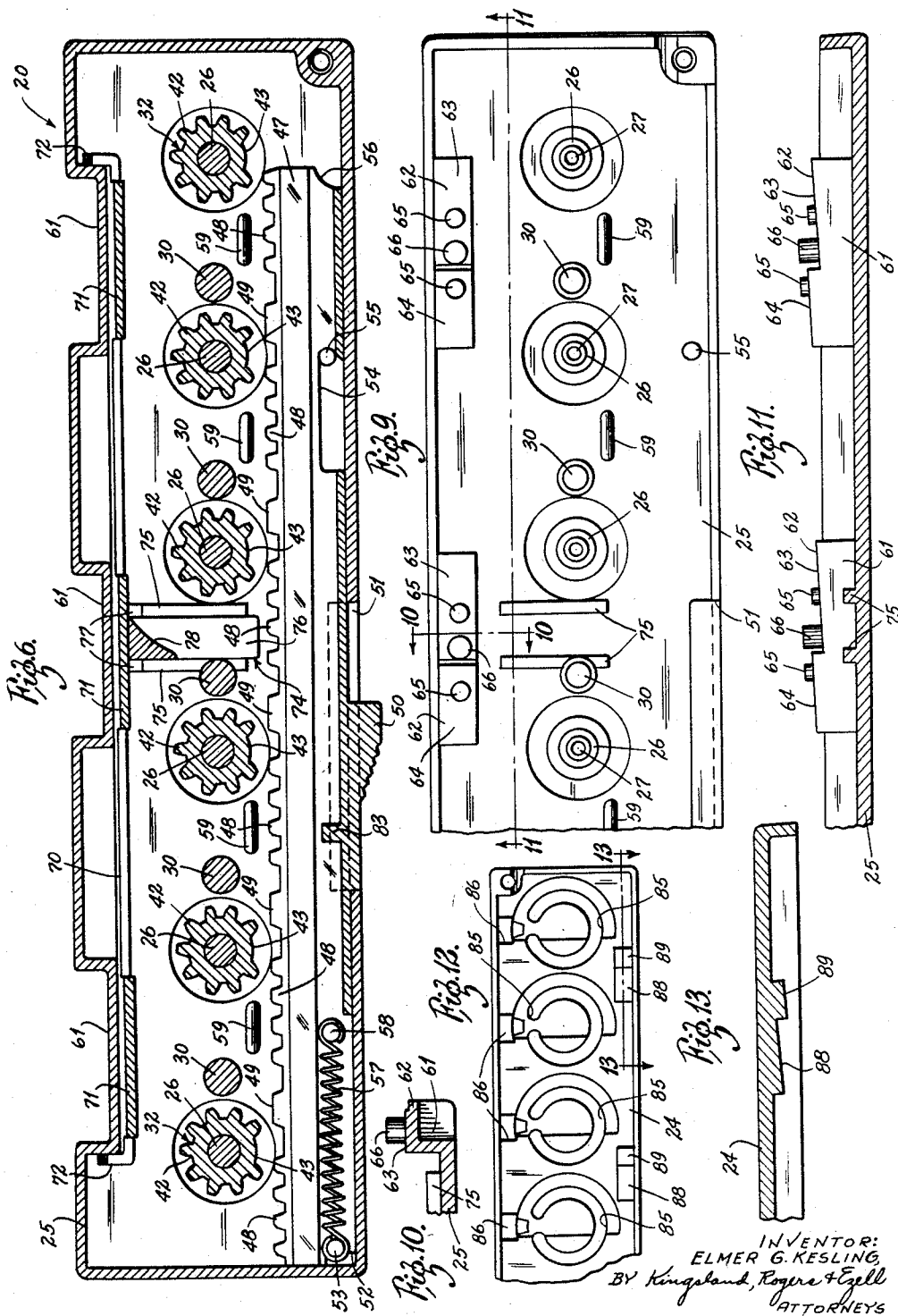
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## RELEASABLE RESTRAINING DEVICE FOR ROTATABLE PARTS OF CALCULATORS

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9 Claims. (Cl. 235—144)

The present invention relates generally to portable calculators, and more particularly to a novel means for restraining free rotation of the dial and gear members in such portable or pocket calculators incorporating means for release thereof during resetting or zeroing of the dial-gear members.

It is well known that pocket calculators of the type shown in my Patent No. 2,588,539, for example, include rotatable dial members which must be relatively freely rotatable in order that the calculator may be manipulated with a small stylus, pencil, or the like. On the other hand, means must be provided for preventing overrun of interconnected dials, or otherwise the addition or subtraction will be in error. Various devices have been employed for such purpose, such as detent springs mounted concentrically with the dial members and usually disposed in wells provided therefor. Such detent springs have not been found to be entirely satisfactory.

Therefore, an object of the present invention is to provide a novel restraining or detent device for calculator dials which will effectively prevent overrun thereof in the use of the calculator, and yet will not bind to such an extent that simultaneous rotation of all of the discs of the calculator becomes difficult or impossible.

Another object is to provide a novel restraining device for the dial members of pocket calculators which is automatically released during reset or zeroing of the dials to relieve stress on the gears during such action.

Another object is to provide a novel restraining device for the dial members of a pocket calculator which is adapted to serve its intended restraining purpose for the normal life of the calculator.

Another object is to provide a novel restraining device for the dial members of a pocket calculator which requires no adjustment and no maintenance in the normal use of the calculator once the device is installed and the calculator casing is sealed.

Other objects are to provide a novel restraining device for the dial members of a pocket calculator which is inexpensive, which is highly effective in accomplishing its intended purposes, which requires no attention from the user of the calculator, and which otherwise fulfills the objects and advantages sought therefor.

The foregoing and other objects and advantages are apparent from the following description taken with the accompanying drawings, in which:

Figure 1 is a plan view of a six dial pocket calculator incorporating the present invention;

Figure 2 is a longitudinal, vertical, cross-sectional view on substantially the line 2—2 of Figure 1;

Figure 3 is an enlarged vertical, transverse, cross-sectional view taken on substantially the line 3—3 of Figure 1;

Figure 4 is an enlarged vertical, transverse, cross-sectional view taken on substantially the line 4—4 of Figure 1;

Figure 5 is an enlarged vertical, transverse, cross-

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sectional view taken on substantially the line 5—5 of Figure 1;

Figure 6 is a horizontal, cross-sectional view taken on substantially the line 6—6 of Figure 2;

Figure 7 is a fragmentary plan view partly in section with the top portion of the casing removed;

Figure 8 is a vertical, cross-sectional view taken on substantially the line 8—8 of Figure 7;

Figure 9 is a fragmentary plan view of the lower portion of the casing illustrating details thereof;

Figure 10 is a vertical, transverse, cross-sectional view taken on substantially the line 10—10 of Figure 9;

Figure 11 is a vertical, longitudinal, cross-sectional view taken on substantially the line 11—11 of Figure 9;

Figure 12 is a fragmentary view of the inside of the top portion of the casing illustrating details thereof;

Figure 13 is a vertical, longitudinal, cross-sectional view taken on substantially the line 13—13 of Figure 12;

Figure 14 is an enlarged bottom plan view of one of the dial-gear members;

Figure 15 is a side elevational view of said dial-gear member;

Figure 16 is a side elevational view of the detent spring releasing member;

Figure 17 is a side elevational view of an actuating member for moving the detent spring releasing member;

Figure 18 is a front elevational view of said actuating member; and

Figure 19 is a plan elevational view of a detent spring member.

Referring to the drawings more particularly by reference numbers, 20 indicates generally a calculator incorporating the present invention, which is of the type disclosed in my pending application Serial No. 414,279, filed March 5, 1954, and now Patent No. 2,879,939, and my above-mentioned patent.

The calculator 20 comprises a casing 22 including a top portion 24 and a bottom portion 25 sealed at opposed abutting edges. Longitudinally aligned posts 26 are formed integral with the bottom portion 25, each including a frusto-conical well 27 receiving a post 28 formed integral with the top portion 24. Near each post 26, except the one on the right, is a stub post 30 formed integral with the bottom portion 25. The posts 26 and 30 are disposed at an angle to the plane of the bottom of the bottom post 25.

On each post 26 is a composite integral dial and gear member 32 including from top to bottom a disc dial 33 having numerals one through nine and zero about the edge between each pair of which is a dialing well 34, a disc 36 having ten scallops 37 in the periphery, a disc 39 having a transfer finger 40 extending from the periphery thereof (Fig. 15), and a gear 42 having the lower portion of one tooth cut away at 43. The members 32 are at an angle and overlap as is clearly shown in Figure 2.

On each post 30 is a gear 45 which is in mesh with the adjacent gear 42 and which is engageable by the transfer finger 40 of the disc 39 to the right thereof, as is clear from Figure 2.

Adjacent the gears 42 and slidable diagonally and longitudinally along the bottom of the bottom portion 25 is a reset member 47 having six sets of four teeth 48 each separated by elongated teeth 49. An integral actuating thumb piece 50 extends through a suitable opening 51 in the casing 22 (Figs. 1 and 6). A notch 52 is formed in the left end of the reset member 47 for biased positioning engagement thereof with a post 53, and an elongated notch 54 having a hooked right end similarly receives a post 55, the posts 53 and 55 being formed integral with the bottom portion 25. A notch 56 is formed at the right end of the reset member 47 to clear the internal corner construction of the casing 22. A tension spring 57 is

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secured at one end to the post 53 and at the other end to a post 58 integral with the reset member 47. Stop members 59 formed integral with the bottom portion 25 limit lateral movement of the reset member 47.

The bottom portion 25 is formed along the upper edge with three spaced bays 61, defined at the top by a horizontal wall segment 62 (Figs. 4-11). Within the casing 22 and on each segment 62 are two integral wedges 63 and 64. Formed integral with each wedge 63 and 64 is a vertically disposed stub post 65, and between the stub posts 65 and integral with the wedge 63 is a post 66. The posts 65 and 66 are at the same angle as the posts 26. A detent spring 67 is mounted on each post 66 with a leg 68 engaging each stub post 65 (Figs. 7 and 19). The legs 68 are in parallel vertically spaced planes. Each leg 68 normally rides in a scallop 37 of a disc 36, rather than on the teeth of the gears 42, thereby saving wear on the gears 42, an important feature.

An elongated detent spring release member 70 rests on edge on the bottom of the bottom portion 25, and includes an upwardly extending segment 71 disposed between each pair of legs 68 and end flanges 72 adjacent the outer ends of the two outer wall segments 63 (Figs. 4-7 and 16). An actuating member 74 is disposed on the bottom of the bottom portion 25 between the two innermost dial and gear members 32 and is movable laterally of the casing 22 between two guide rails 75 formed integral with the bottom of the bottom portion 25 (Fig. 6, 9, 11, 17 and 18). The actuating member 74 includes a main body 76, projections 77 which engage the ends of the guide rails 75 to limit movement of the actuating member 74, and an upstanding portion 78 having a boss 79 mounted thereon for centering disposition in an opening 80 in the central portion of the detent spring release member 70 (Figs. 4, 5 and 16). The free end of the actuating member 74 is engageable by the reset member 47 (Fig. 6).

A stylus 82 is disposed in the casing 22, being insertable through an opening in the end thereof and having the head flush against the outer wall (Fig. 7). An upstanding abutment 83 integral with the reset member 47 is engageable with the end of the stylus 82 for starting removal thereof from the casing 22 upon movement of the reset member 47.

The top portion 24 includes an arcuate opening 85 for each dial 33 through which the wells 33 appear (Figs. 1 and 12). Also provided for each dial 33 is an opening 86 through which the numbers thereon appear. Depending from the top portion 24 are ramp-shaped bosses 88 and 89 which abut the posts 65 and 66 when the casing 22 is sealed to prevent accidental dislodgement of the detent springs 67 and legs 68 (Figs. 4, 5, 12 and 13).

#### Operation

The use of the present calculator to add, subtract, and the like, is conventional. The stylus 82, or a pencil, is inserted in a well 34 of the proper dial 33 and the dial 33 is then rotated in the required direction. Sums or subtractions are transferred to the respective adjacent dial and gear member 32 by the transfer finger 40 and the gear 45, as is obvious from the foregoing description.

The legs 68 of the detent spring members 67 remain in engagement with the scallops 37 of the discs 36 during the normal use of the calculator 20 in adding, subtracting, and the like. The detent spring members 67 are quite light and impress only a very slight drag on the discs 36, so that the total of the six pressures does not result in a heavy drag in the rotation of the dial and gear members 32 even with each transfer finger 40 in operative engagement with the adjacent gear 45. However, the light engagement of the legs 68 with the scallops 37 is sufficient to prevent overrunning of the dial and gear members 32 even when the same are rapidly rotated.

As is clear from the description above, the legs 68 are freed from the scallops 37 during reset or zeroing of the dial and gear members 32 in order to eliminate even the

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small total drag during this operation and to thereby lengthen the life of the gears 42. When the reset member 47 is moved into engagement with the gears 42, the actuating member 74 is moved transversely and toward the spring release member 70 to pivot the same clockwise, viewing Figures 4 and 5, which, through the medium of the upwardly extending segments 71, extends the legs 68 of all three detent spring members 67 and thereby releases the restraining pressure on the members 32.

It is manifest that there has been provided a releasable restraining device for the dial and gear members of pocket calculators which fulfills the objects and advantages sought therefor. Preferably, the component parts of the calculator 20 are of plastic material.

It is to be understood that the foregoing description and the accompanying drawings have been given by way of illustration and example. It is also to be understood that changes in form of the elements, rearrangement of parts, and substitution of equivalent elements, which will be obvious to those skilled in the art, are contemplated as within the scope of the present invention which is limited only by the claims which follow.

What is claimed is:

1. In a calculator including a casing, manually rotatable composite dial members and a reciprocable reset member, in combination, individual spring members mounted in said casing including portions in continuous engagement with said composite dial members during computing operation to prevent overrun, and movable engaging members engaging said spring members for disengaging said spring members from said dial members when moved, said reset member being engageable with one of said movable members during reset movement to maintain said spring members disengaged from said dial members during the reset operation, said spring member portions automatically returning to engagement with said dial members upon release by said reset member.

2. In a calculator including a casing, manually rotatable composite dial members, and a reset member, in combination, spring members mounted in said casing each including two diverging legs, each leg continuously engaging a composite dial member during use of said calculator, a movable spring release member in said casing in engagement with said legs, and actuating means in said casing for moving said spring release member energizable by the reset member to release said legs.

3. In a calculator including a casing, manually rotatable composite dial members and a reset member, in combination, spring means mounted in said casing in continuous engagement with said composite dial members during computing rotation thereof to prevent overrun including for each two composite dial members a spring having two legs, one leg for each composite dial member, and means for automatically releasing said spring means during use of said reset member including a first movable member engageable with said spring legs and a second movable member engageable with said first movable member, said second movable member being operatively movable by said reset member as the latter is moved into reset relation to said dial members to move the first movable member and to release said spring legs; said reset member maintaining said releasing engagement with said second movable member during the reset operation.

4. In a calculator including a casing, manually rotatable composite dial members and a reset member, in combination, spring means mounted in said casing normally in continuous engagement with said composite dial members to prevent overrun including for each two composite dial members a spring having two legs, one leg for each composite dial member, and means for automatically releasing said spring means during use of said reset member including an elongated member pivotally mounted in said casing and having spaced portions in engagement with said legs, and a slidable member in engagement with said pivotally mounted member.

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5. In a calculator including a casing, manually rotatable tilted overlapping composite dial members, and a reset member, in combination, spring members mounted in said casing each including two diverging legs, said legs being in substantially parallel vertically spaced planes, each leg continuously engaging a composite dial member during use of said calculator, a movable spring release member in said casing in engagement with said legs, and actuating means in said casing for moving said spring release member energizable by the reset member to release said legs.

6. In a calculator including a casing, manually rotatable composite dial members and a reset member, in combination, spring means mounted in said casing normally in continuous engagement with said composite dial members to prevent overrun including for each two composite dial members a spring having two legs, one leg for each composite dial member, and means for automatically releasing said spring means during use of said reset member including an elongated member pivotally mounted in said casing and having spaced portions in engagement with said legs, and a slidable member in engagement with said pivotally mounted member adapted to pivot said latter member to release all of said spring legs upon movement thereof in one direction, said reset member being engageable with said slidable member to pivot said pivotally mounted members in its reset movement.

7. In a calculator including a casing, manually rotatable composite dial members, and a reset member, in combination, spring members mounted in said casing each including two diverging legs, each leg continuously engaging a composite dial member during use of said calculator, a movable spring release member in said casing in engagement with said legs, and actuating means in said casing for moving said spring release member energizable by the reset member to release said legs, said legs being automatically returnable into engagement with said dial members upon return to rest position of said reset member.

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8. In a calculator including a casing, manually rotatable composite dial members and a reset member, in combination, spring means mounted in said casing in continuous engagement with said composite dial members during computing rotation thereof to prevent overrun including for each two composite dial members a spring having two legs, one leg for each composite dial member, and means for automatically releasing said spring means during use of said reset member, said spring legs being automatically returnable into engagement with said dial members upon return to rest position of said reset member.

9. In a calculator including a casing, manually rotatable composite dial members, and a reset member, in combination, spring members mounted in said casing each including two diverging legs, each leg continuously engaging a composite dial member during use of said calculator, a movable spring release member in said casing in engagement with said legs, and actuating means in said casing for moving said spring release member energizable by the reset member to release said legs, said reset member being mounted for diagonal and longitudinal movements, a diagonal movement of said reset member energizing said actuating means, said reset member remaining in engagement with said actuating means during reset longitudinal movement to maintain said spring legs released during reset movement.

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