G. C. CHASE.

REGISTERING MECHANISM FOR CALCULATING MACHINES.

APPLICATION FILED JUNE 29, 1911.

1,011,156.

Patented Dec. 12, 1911.

2 SHEETS—SHEET 1.

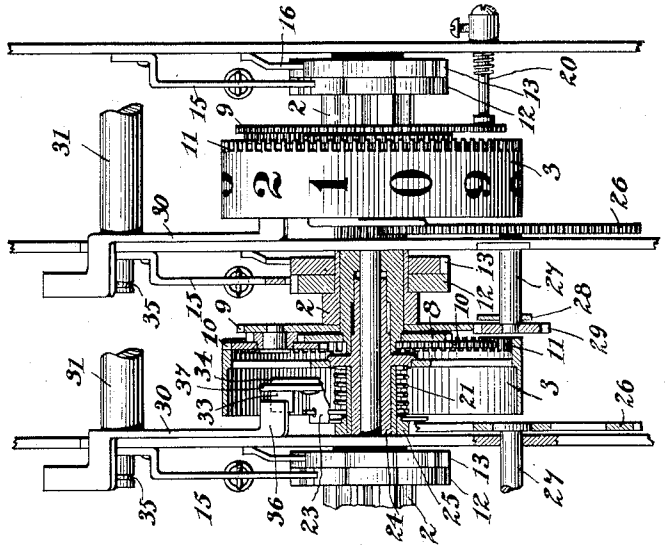


Fig. 2.

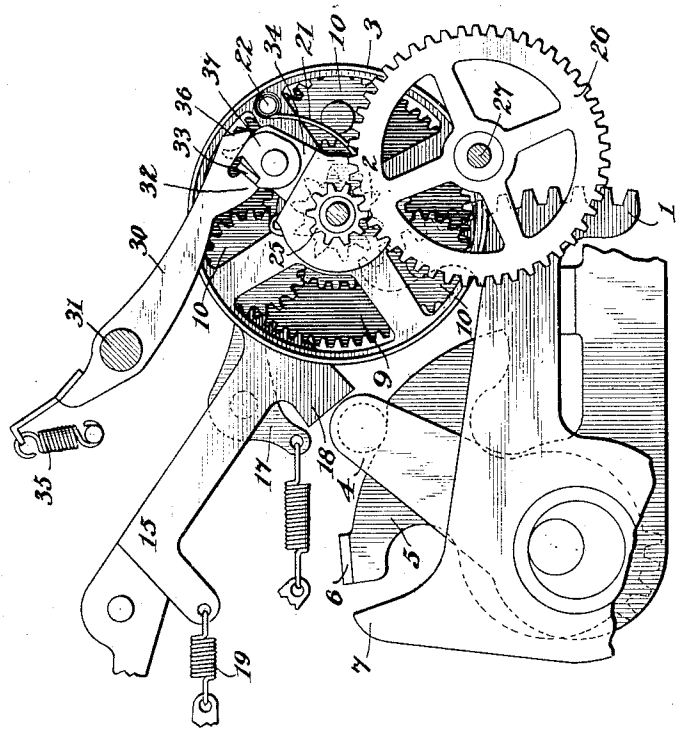


Fig. 1.

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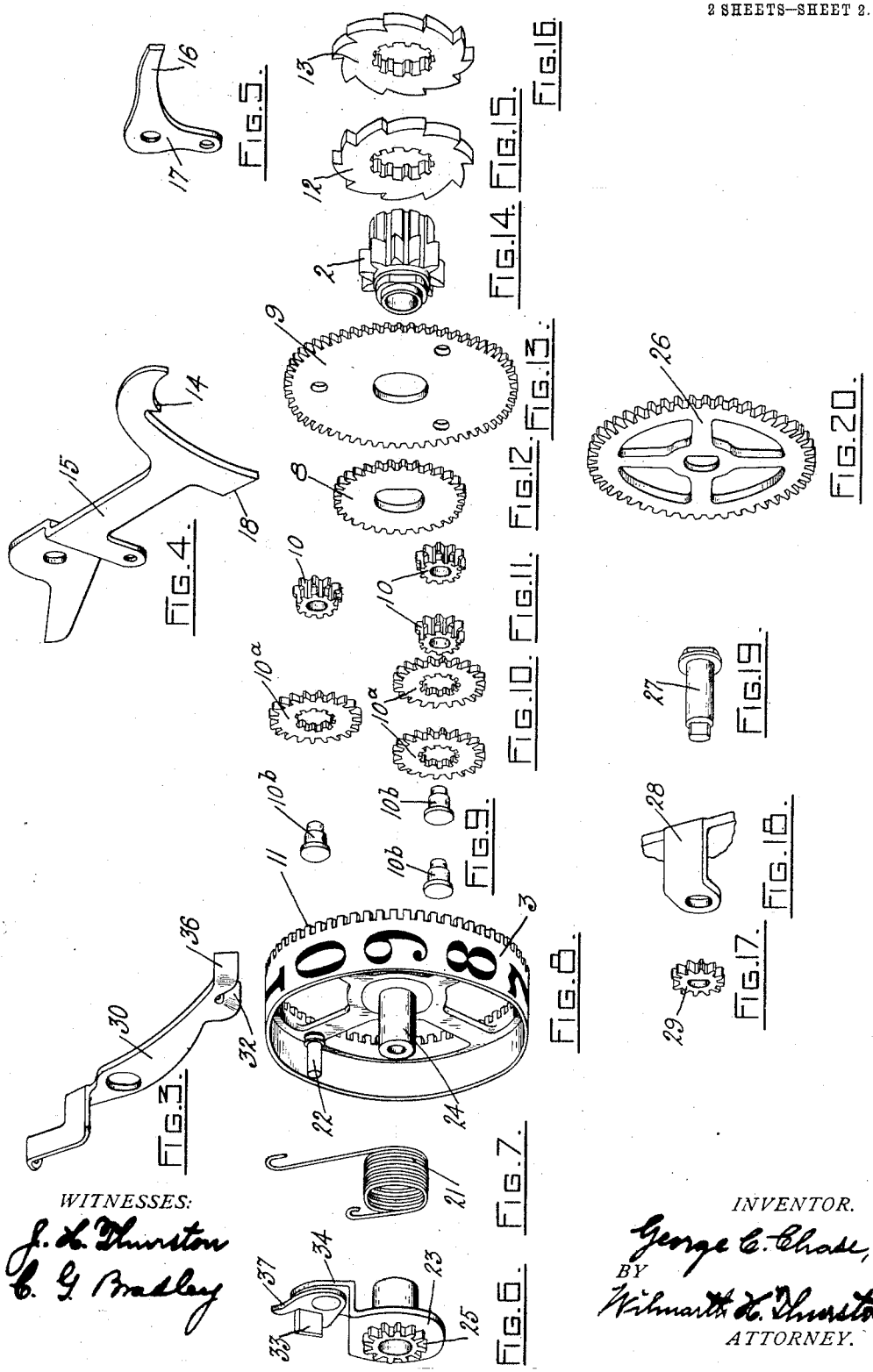


Fig. 5. Fig. 16. Fig. 15. Fig. 14. Fig. 13. Fig. 12. Fig. 11. Fig. 10. Fig. 9. Fig. 8. Fig. 7. Fig. 6. Fig. 4. Fig. 20. Fig. 19. Fig. 18. Fig. 17. Fig. 3.

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REGISTERING MECHANISM FOR CALCULATING-MACHINES.

1,011,156. Specification of Letters Patent. Patented Dec. 12, 1911.

Application filed June 29, 1911. Serial No. 635,936.

To all whom it may concern:

Be it known that I, GEORGE C. CHASE, of the city and county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Registering Mechanisms for Calculating-Machines; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

The present invention relates to a registering mechanism which is specially adapted for use in calculating machines, but which may also be employed in other types of registering machines.

The invention may be applied both to key-actuated machines and to key-set machines and to the various forms of each of these types of machines.

The primary object of the invention is to provide a registering mechanism which will permit two or more of the dials or numeral wheels to be rotated simultaneously by their actuators, and which will also permit one or more of said dials or numeral wheels to be actuated by the carrying mechanism simultaneously with the rotation thereof by their actuators and without the carrying movement becoming merged or lost in the movement imparted by said actuators.

The invention consists primarily in the combination, with the numeral wheels, of planetary gearing for actuating the same, one part of said planetary gearing being adapted to be operated by the actuator for the numeral wheel and the other part being adapted to be operated by a carrying mechanism embodying a spring for actuating the same.

The invention consists in the combination, with a numeral wheel, of a gear for rotating said numeral wheel, said gear being adapted to be rotated about its own axis and also about an axis not coincident with its own axis, and means embodying a spring for actuating said gear.

The construction further consists in the combination, with the numeral wheel, of a gear for rotating said numeral wheel, said gear being adapted to be rotated about its own axis and also about an axis not coincident with its own axis, and means embodying a spring for rotating said gear about one of said axes.

The invention further consists in the combination, with the numeral wheel, of a gear for rotating said numeral wheel, said gear being adapted to be rotated about its own axis and also about an axis not coincident with its own axis, an actuator for rotating said gear about one of said axes, and a carrying mechanism embodying a spring for rotating said gear about the other of said axes.

The invention further consists in certain constructions and combinations of parts hereinafter described and set forth in the claims.

Referring to the drawings, Figure 1 is a side view of a registering mechanism embodying the invention. Fig. 2 is a front view of the same, one of the numeral wheels and its adjunctive devices being shown in section. Figs. 3 to 20, inclusive, are detail views showing the several parts, Figs. 6 to 16, inclusive, being arranged in such relation to each other that if the parts therein shown were brought together along the center line, said parts would be assembled in proper relation to constitute the organized combination embodying the same.

In the drawing the registering mechanism is shown as applied to a calculating machine having the general construction and organization of that shown and described in the patent to J. A. Turck, No. 720,086, dated February 10, 1903. As the present invention relates to the registering mechanism, only such parts of the mechanism for actuating the numeral wheels by the column actuators as are adjacent to the numeral wheels are shown in the drawings, reference being made to said patent to Turck for an understanding of how the parts referred to are actuated.

Referring to the drawings, 1 is the segmental gear which is normally out of engagement with the gear 2 through which the numeral-wheel 3 is rotated. The segmental gear 1 is carried by a vertically movable bracket 4 carrying a roll adapted to be acted upon by a cam surface on the cam-gear 5. The cam-gear 5 is provided with a projection 6 adapted to engage an arm 7 formed integral with the segmental gear 1. As will be understood, when the cam-gear 6 is turned it will first operate through the cam surface thereon to raise the bracket 4, thereby moving the segmental gear 1 into

engagement with the pinion 2, and then by the further turning of the cam-gear the projection 6 is brought into engagement with the arm 7 and the segmental gear turned the proper distance.

In the present construction the pinion 2, instead of being rigidly connected to the numeral wheel 3, is connected therewith through a system of gearing in the form of sun and planet gears. The sun-gear 8 is mounted on the hub of the pinion 2 so as to rotate therewith.

9 is what may be termed a sustaining gear upon which the planet-gears are mounted, said sustaining gear being rotatably mounted on the hub of the pinion 2. In the drawings three planet-gears are shown, but a greater or less number may be employed, as desired. Each of these planet-gears is a double gear, that is, each comprises two sets of gear-teeth, one set being adapted to be engaged by the sun-gear and the other set being adapted to engage gear-teeth on the numeral-wheel. As shown in the drawings, each planet-gear is made in two parts 10, 10^a, said parts being adapted to be secured together and each part being provided with a set of gear-teeth. If desired, however, the parts 10 and 10^a may be formed integral. These planet-gears are rotatable upon studs 10^b secured to the sustaining gear 9. The numeral-wheel 3 is provided with gear-teeth 11 adapted to be engaged by the gear-teeth on the part 10^a of the planet-gears, said teeth 11 constituting in effect an internal gear.

Secured to the opposite end of the hub of the pinion 2 are two ratchet-wheels 12 and 13, the teeth of which are oppositely arranged. The ratchet-wheel 12 is adapted to be engaged by the tooth 14 of a pawl 15, to prevent forward rotation of the numeral wheel, while the ratchet-wheel 13 is adapted to be engaged by the tooth 16 of a pawl 17 to prevent backward rotation of said numeral-wheel. The pawl 15 is also provided with a projection 18 which, as shown in Fig. 1, is arranged in line with the upper end of the movable bracket 4, the construction being such that when said bracket 4 is raised by the action of the cam-gear 5 the pawl 15 will be turned about its pivot so as to disengage the tooth 14 from its ratchet-wheel and thereby release the numeral-wheel so that it may be free to turn.

When the bracket 5 is again lowered the pawl 14 will be returned to engaging position by the action of a spring 19 shown in Fig. 1.

With the construction described, when the segmental gear 1 is brought into engagement with the pinion 2 and is turned about its axis to rotate said pinion, the sun-gear will be rotated with said pinion. The rotation of said sun-gear will serve to rotate the planet-gears about their own axes, and through such rotation of the planet-gears the numeral-wheel 3 will be turned, it being understood that at this time the sustaining gear 9 is to be held against rotation.

As there is never any carrying to the wheel of lowest order, the sustaining gear for that wheel may be, and preferably is, permanently held against rotation. In the construction shown a pin 20 projecting from the frame is arranged to enter a recess formed in a boss projecting from one side of the sustaining gear, as shown in Fig. 2.

In the present construction the carrying from a wheel of lower order to the wheel of next higher order is effected by the rotation of the sustaining gear 9, and consequently when carrying is to be performed said sustaining gear, which at other times is to be held against rotation, is to be released and rotated for the performance of such carrying operation, and the rotation of said sustaining gear for this purpose is effected by means of a spring which is gradually wound up by the rotation of the lower wheel from 0 to 9 and is then released as the lower wheel passes from 9 to 0.

Referring to Figs. 1 and 2, the carrying spring 21 is connected at one end to a stud 22 secured to the numeral wheel 3 and has its other end connected to a disk 23 rotatably mounted on the hub 24 of said numeral wheel. Secured to the disk 23 is a pinion 25 which meshes with a gear 26 secured to a short shaft 27 mounted to rotate in a bracket 28 secured to the frame. Secured to said shaft 27 is a pinion 29 which meshes with the sustaining gear 9.

In order that the carrying spring 21 may be wound up by the rotation of the numeral wheel of lower order it is necessary that the disk 23 to which the opposite end of said carrying gear is connected shall be held against rotation while said wheel of lower order is passing from 0 to 9. For this purpose a detent-lever 30 pivoted at 31 is provided, said detent-lever being provided with a projection or detent-finger 32 adapted to engage a projection 33 on an arm 34 carried by the disk 23. Said detent-lever 30 is normally held in engaging position by a spring 35, one end of which is connected to the outer or upper end of said detent-lever. The downward movement of the outer end of the detent-lever 30 under the action of said spring 35 is limited by the engagement of said detent-lever with the frame, the position in which said detent-lever 30 is thus normally held by the spring 35 being such as to hold the detent-finger 32 in line with the projection 33, as shown in Fig. 1.

For the performance of the carrying operation it is necessary that the carrying spring 21 after being wound up by the ro-

tation of the numeral-wheel of lower order from 0 to 9 shall be released as said numeral-wheel passes from 9 to 0. For this purpose the detent-lever 30 is provided with a second projection in the form of a cam-face 36 which normally lies in the path of the stud 22 carried by the numeral-wheel The arrangement of these parts is such that as the numeral-wheel passes from 9 to 0 the stud 22 will ride up the cam-face 36, thereby depressing the lower or inner end of the detent-lever and moving the detent-finger 32 out of engagement with the projection 33 and thus releasing the disk 23, which then becomes free to be rotated under the action of the carrying spring 21.

The rotation of the disk 23 is accompanied by a corresponding rotation of the pinion 25, which serves through the gears 26 and 29 to impart rotation to the sustaining gear 9. The rotation of said sustaining gear has the effect to carry the planet-gears about the axis of the sun-gear and in so doing to impart a small amount of rotation to said planet-gears about their own axes, thereby turning the numeral-wheel of next higher order with which said planet-gears are in engagement one step and thus effecting the carrying operation from the numeral-wheel of lower order to said higher numeral-wheel.

When the detent-lever 30 is depressed by the engagement of the stud 22 with the cam-face 36 said stud, as the numeral-wheel to which it is connected continues to rotate, passes over the top of said cam-projection 36. When the disk 23 is released to be rotated by the action of the carrying-spring 21, the projection 33 likewise passes over the top of the detent-finger 32. When both of these things have happened the detent-lever 30 will, under the action of the spring 35, be returned to its normal position, and so that when the disk 23 has completed one revolution, the projection 33 will again come into engagement with the detent-finger 32, and the further rotation of said disk 23 be thereby prevented.

If for any reason the carrying spring 21 should at any time become sluggish in its action, and so that it should fail to move the projection 33 past the detent-finger 32 and to the far side thereof before the spring 35 acts to return the detent-lever 30 to its normal position, the disk 23, and thus the pinion 25, would be again blocked against rotation and the carrying operation would fail to be performed. To guard against this possibility means are provided whereby the numeral-wheel of higher order will be advanced one step and the carrying operation be performed by the direct action of the numeral-wheel of lower order. For this purpose a guard 37 is mounted on the arm 34 in position to have the free end thereof engaged by the stud 22. The arrangement of the parts is such that the stud 22 engages said guard 34 before said stud passes over the top of the cam projection 36 and before the numeral wheel has moved to 0, the engagement of said stud 22 with the guard 34 taking place, however, immediately after the detent-finger 32 has been moved out of engagement with the projection 33. With this construction during the latter part of the movement of the numeral-wheel from 9 to 0, the engagement of the stud 22 with the guard 34 serves to positively move the projection 33 past and beyond the detent-finger 32, and so that when the detent-lever 30 is returned to its normal position under the action of the spring 35 it will be certain that the projection 33 is on the far side of the detent-finger 32, and so that the disk 23 and pinion 25 will thus be sure to be free to be rotated by the action of the carrying spring 21. If now for any reason said carrying spring, by reason of its becoming broken or otherwise, should fail to act, the stud 22 will remain in engagement with the guard 34, and as the numeral-wheel of lower order is again moved from 0 to 9, the disk 23 and pinion 25 will be positively turned by the rotation of said numeral-wheel, and so as thus to positively effect the carrying to the wheel of higher order. It is also desirable to guard against any possible sluggishness or failure to act on the part of the spring 35 in returning the detent 30 to its normal position. Thus if said detent-lever 30 should not be promptly returned to its normal position it might not occupy said position when the disk 23 and pinion 25 had completed one revolution, with the result that the further rotation of said parts would not be arrested as they should be. With the construction shown, if said detent-lever should not have been returned to its normal position by the action of the spring 35 at the time the disk 23 is about completing its revolution, the upper edge of the projection 33 will come in contact with the lower edge of the cam projection 36 and acting thereon, will serve to positively raise the inner end of the detent-lever 30 and thus return the same to normal position.

With the sun and planet gear construction above described rotation of the planet-gears about their axes, and thus rotation of the numeral-wheel with which said planet-gears are in engagement, may be effected in either one of two ways. Thus said planet-gears may be directly turned about their axes by the rotation of the sun-gear, while said planet-gears may be indirectly turned about their axes by being carried about the axis of the sun-gear by the rotation of the sustaining gear upon which said planet-gears are mounted. As will be understood, the rotation of the planet-gears effected by

carrying said gears around the axis of the sun-gear may take place at the same time that said planet gears are rotated by the rotation of said sun-gear, and further that any rotation of the planet-gears resulting from the carrying of the same around the axis of the sun-gear will become effective to impart a carrying movement to the numeral wheel of higher order, even though said numeral wheel is at the same time being rotated by the rotation of the planet-gears produced by the rotation of the sun-gear. With this construction, therefore, two or more numeral wheels may be simultaneously actuated and at the same time the carrying from one wheel to the other will be properly effected and without the carrying operation becoming lost or merged in the movement imparted to the higher numeral wheel by its own actuator.

In the construction shown the sun-gear is arranged to be rotated by the actuator for the numeral-wheel, while the sustaining gear for the planet-gears is arranged to be rotated by the carrying mechanism. If desired, however, the arrangement may be reversed and the sustaining gear arranged to be rotated by the actuator for the numeral-wheel and the sun-gear arranged to be rotated by the carrying mechanism.

What I claim as my invention and desire to secure by Letters Patent is:

1. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, said gear being adapted to be rotated about its own axis and also about an axis not coincident with its own axis, and means embodying a spring for actuating said gear.

2. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, said gear being adapted to be rotated about is own axis and also about an axis not coincident with its own axis, and means embodying a spring for rotating said gear about one of said axes.

3. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, said gear being adapted to be rotated about its own axis and also about an axis not coincident with its own axis, means for rotating said gear about one of said axes, and means embodying a spring for rotating said gear about the other of said axes.

4. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, said gear being adapted to be rotated about its own axis and also about an axis not coincident with its own axis, an actuator for rotating said gear about one of said axes, and a carrying mechanism embodying a spring for rotating said gear about the other of said axes.

5. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, means for rotating said gear about its own axis, and means embodying a spring for rotating said gear about an axis not coincident with its own axis.

6. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, an actuator for rotating said gear about its own axis, and a carrying mechanism embodying a spring for rotating said gear about an axis not coincident with its own axis.

7. The combination, with a numeral wheel, of sun and planet gears for rotating said numeral wheel, an actuator for rotating the sun-gear, and a carrying mechanism embodying a spring for rotating the planet-gear about the axis of said sun-gear.

8. The combination, with a numeral-wheel, of a sun-gear for rotating said numeral wheel, an actuator for rotating said sun-gear, a sustaining gear carrying a planet-gear for rotating said numeral wheel, and a carrying mechanism embodying a spring for rotating said sustaining gear to carry said planet-gear about the axis of said sun gear.

9. The combination, with a numeral wheel, of a sun-gear for rotating said numeral wheel, an actuator for rotating said sun-gear, a sustaining gear carrying a series of planet gears engaging said numeral wheel, and a carrying mechanism embodying a spring for rotating said sustaining gear to carry said planet gears about the axis of said sun-gear.

10. The combination, with numeral wheels, of gears for rotating said numeral wheels, each of said gears being adapted to be rotated about its own axis and also about an axis not coincident with its own axis, and means embodying a spring for actuating said gear, one end of said spring being connected to the numeral wheel of lower order.

11. The combination, with numeral wheels, of gears for rotating said numeral wheels, each of said gears being adapted to be rotated about its own axis and also about an axis not coincident with its own axis, means embodying a spring for actuating said gear, one end of said spring being connected to the numeral wheel of lower order, and means for holding and releasing the opposite end of said spring.

12. The combination, with numeral wheels, of sun and planet gears for rotating each of said numeral wheels, an actuator for rotating one of said gears, and a carrying mechanism embodying a spring for rotating the other gear, one end of said spring being connected to the numeral wheel of lower order.

13. The combination, with numeral wheels, of sun and planet gears for rotating each of said numeral wheels, an actuator for rotating one of said gears, a carrying mechanism embodying a spring for rotating the other

gear, one end of said spring being connected to the numeral wheel of lower order, and means for holding and releasing the opposite end of said spring.

14. The combination, with numeral wheels, of sun and planet gears for rotating each of said numeral wheels, an actuator for rotating one of said gears, a carrying mechanism embodying a spring for rotating the other gear, one end of said spring being connected to the numeral wheel of lower order, a detent for holding the opposite end of said spring, and means for releasing said detent.

15. The combination, with numeral wheels, of sun and planet gears for rotating each of said numeral wheels, an actuator for rotating one of said gears, a carrying mechanism embodying a spring for rotating the other gear, one end of said spring being connected to the numeral wheel of lower order, a detent for holding the other end of said spring, and means carried by said numeral wheel of lower order for releasing said detent.

16. The combination, with numeral wheels, of a gear for rotating the numeral wheel of higher order, means embodying a spring for rotating said gear, one end of said spring being connected to the wheel of lower order and the other end to said gear, and means for holding said gear and releasing the same to be acted upon by said spring.

17. The combination, with numeral wheels, of a gear for rotating the numeral wheel of higher order, means embodying a spring for rotating said gear, one end of said spring being connected to the wheel of lower order and the other end to said gear, a detent for holding said gear against the action of said spring, and means carried by said wheel of lower order for releasing said detent.

18. The combination, with numeral wheels, of a gear for rotating the numeral wheel of higher order, means embodying a spring for rotating said gear, a two-pronged detent-lever, one prong being adapted to hold said gear against the action of said spring, and the other prong being adapted to be engaged by the numeral wheel of lower order to release said gear.

19. The combination, with numeral wheels, of a gear for rotating the numeral wheel of higher order, means embodying a spring for rotating said gear, an arm carried by said gear, a detent-lever having a projection adapted to engage said arm and provided with a cam-surface adapted to be engaged by a projection on the numeral wheel of lower order.

20. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, means embodying a spring for rotating said gear, means for holding said gear against the action of said spring, means for releasing said gear, and means for arresting the rotation of said gear.

21. The combination, with a numeral wheel of a gear for rotating said numeral wheel, means embodying a spring for rotating said gear, an arm carried by said gear, a detent adapted to engage said arm, means for disengaging said detent, and means for positively rotating said gear in case said spring fails to operate.

22. The combination, with numeral wheels, of a gear for rotating the numeral wheel of higher order, means embodying a spring for rotating said gear, an arm embodying a spring for rotating said gear, an arm carried by said gear, a detent adapted to engage said arm, means for disengaging said detent, and a guard carried by said arm and adapted to be engaged by a projection on the numeral wheel of lower order.

23. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, means embodying a spring for rotating said gear, an arm carried by said gear, a detent adapted to engage said arm, means for disengaging said detent, and means carried by said arm for resetting said detent.

24. The combination, with a numeral wheel, of a gear for rotating said numeral wheel, means embodying a spring for rotating said gear, an arm carried by said gear, a detent adapted to engage said arm, means for disengaging said detent and releasing said gear, means for arresting the rotation of said gear, and means carried by said arm for resetting said detent.

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