No. 896,821.

PATENTED AUG. 25, 1908.

H. E. GOLDBERG.

CALCULATING MACHINE.

APPLICATION FILED JAN. 9, 1908.

4 SHEETS—SHEET 1.

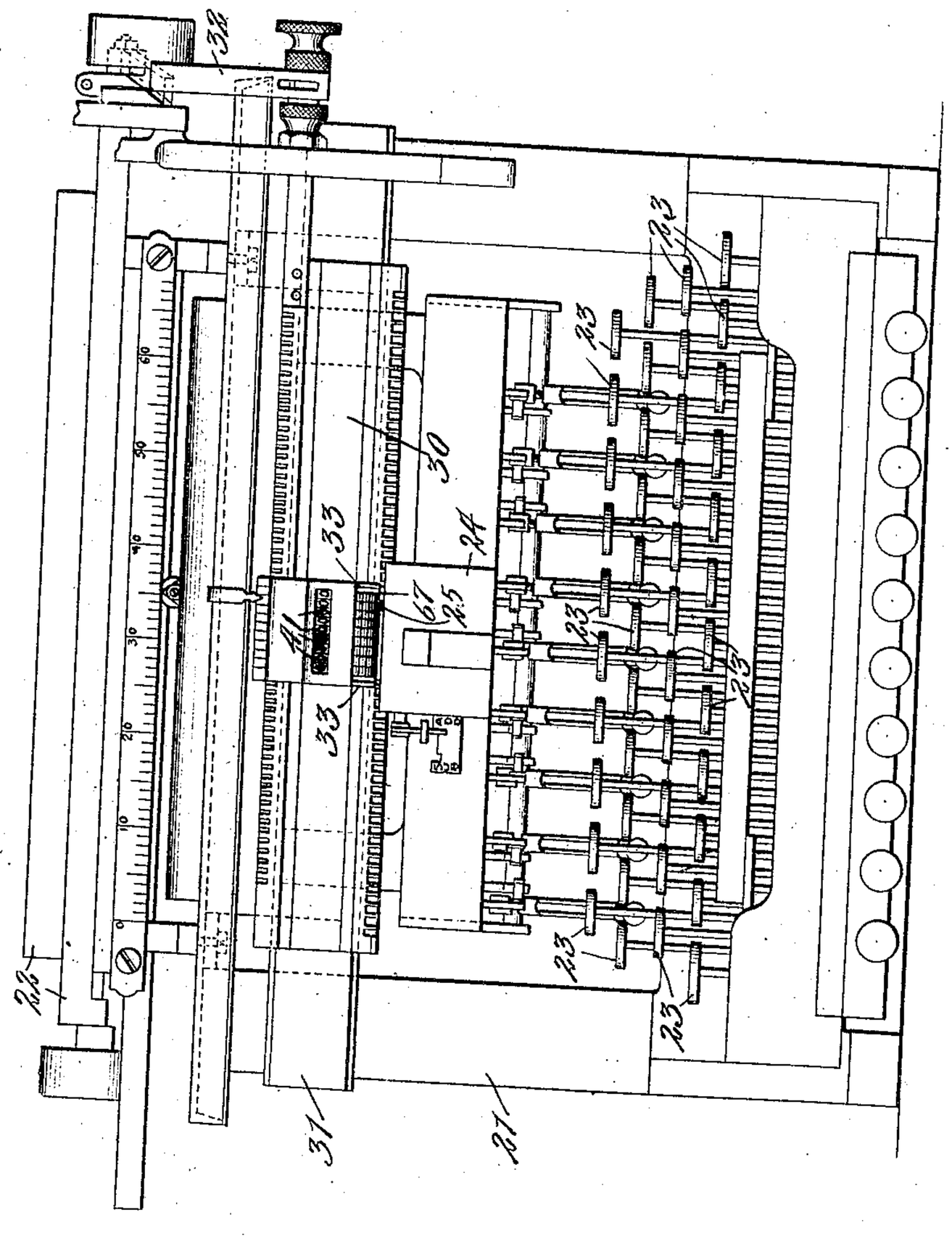

Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2.

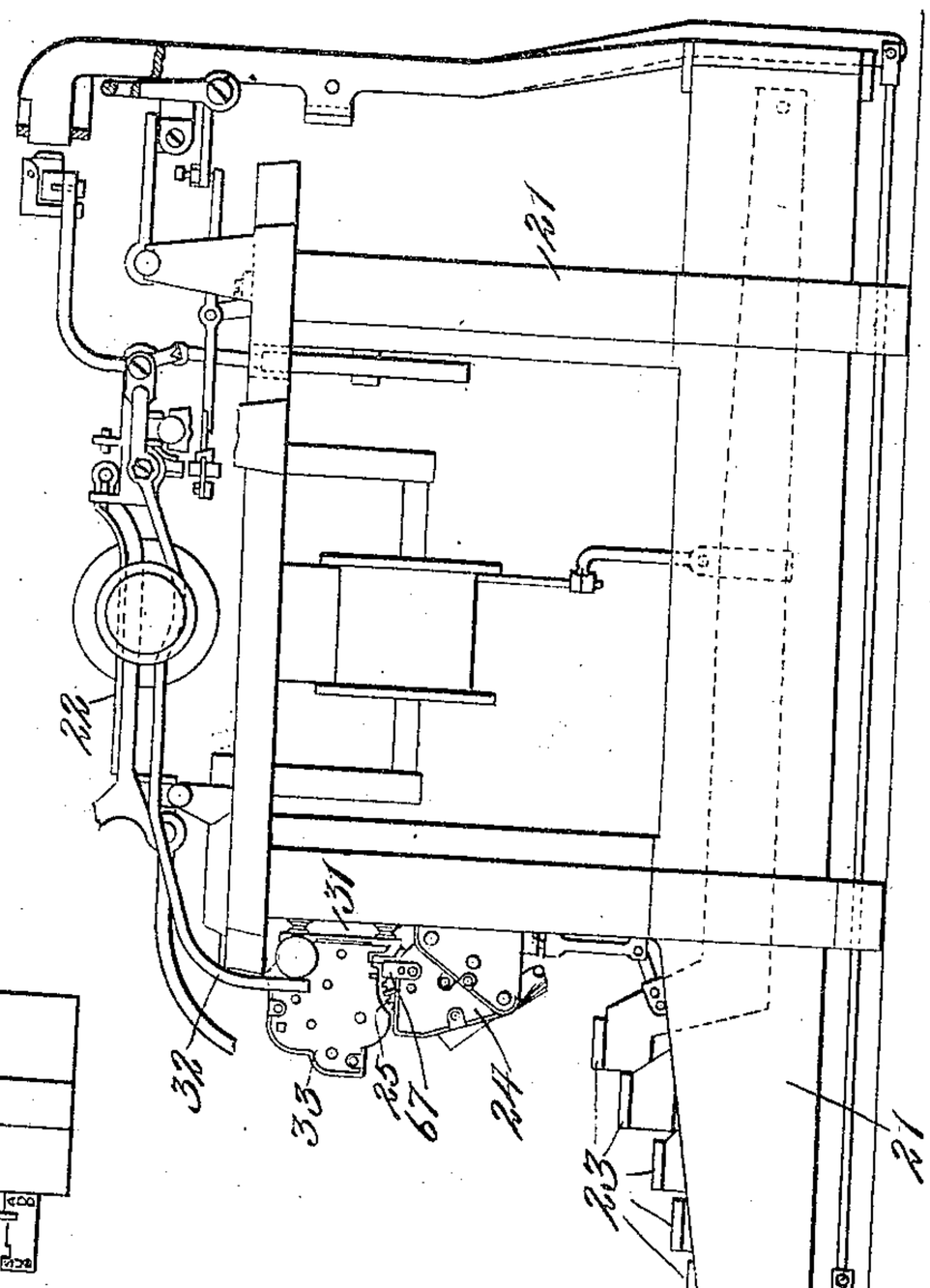


Fig. 3.

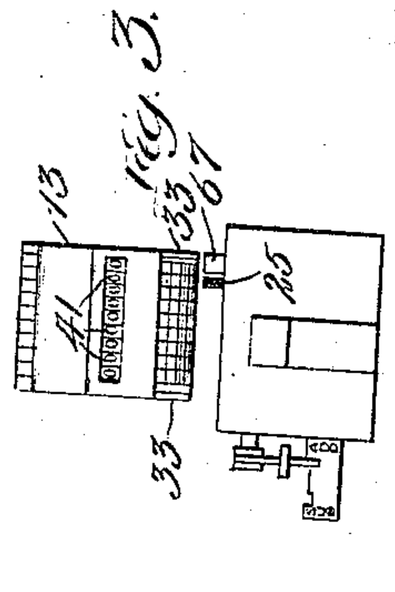


Fig. 5.

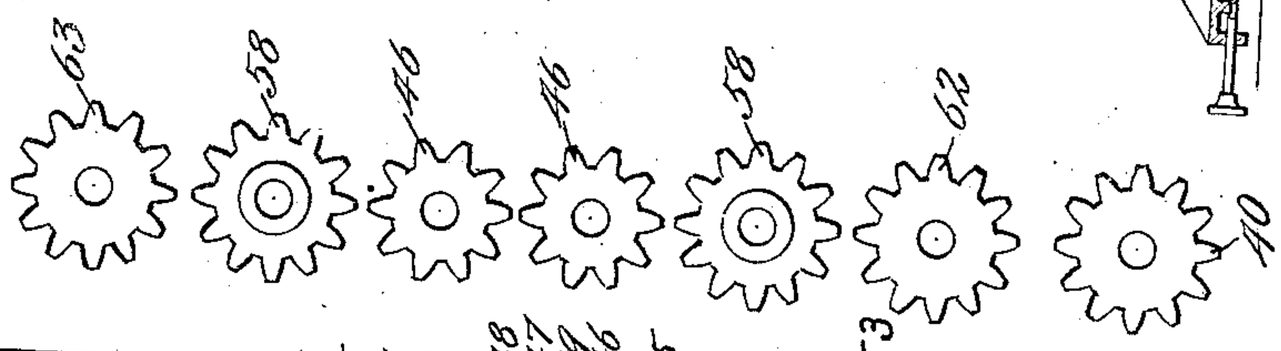
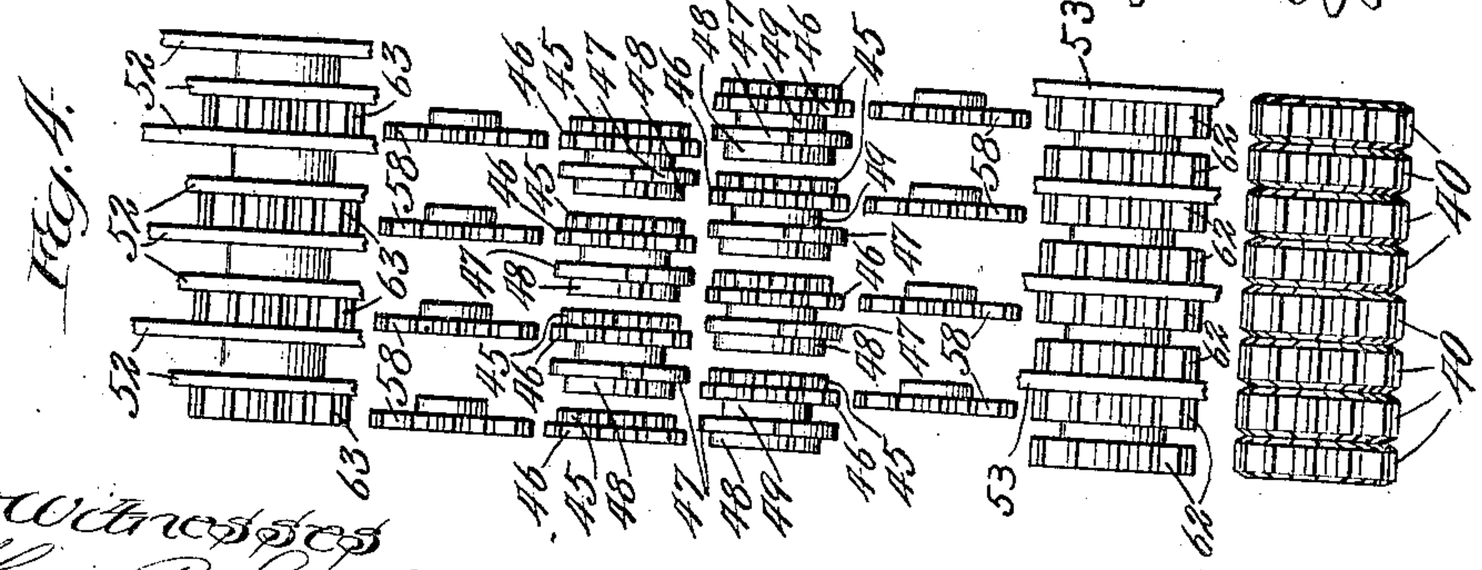


Fig. 4.



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4 SHEETS—SHEET 3.

Fig. 6.

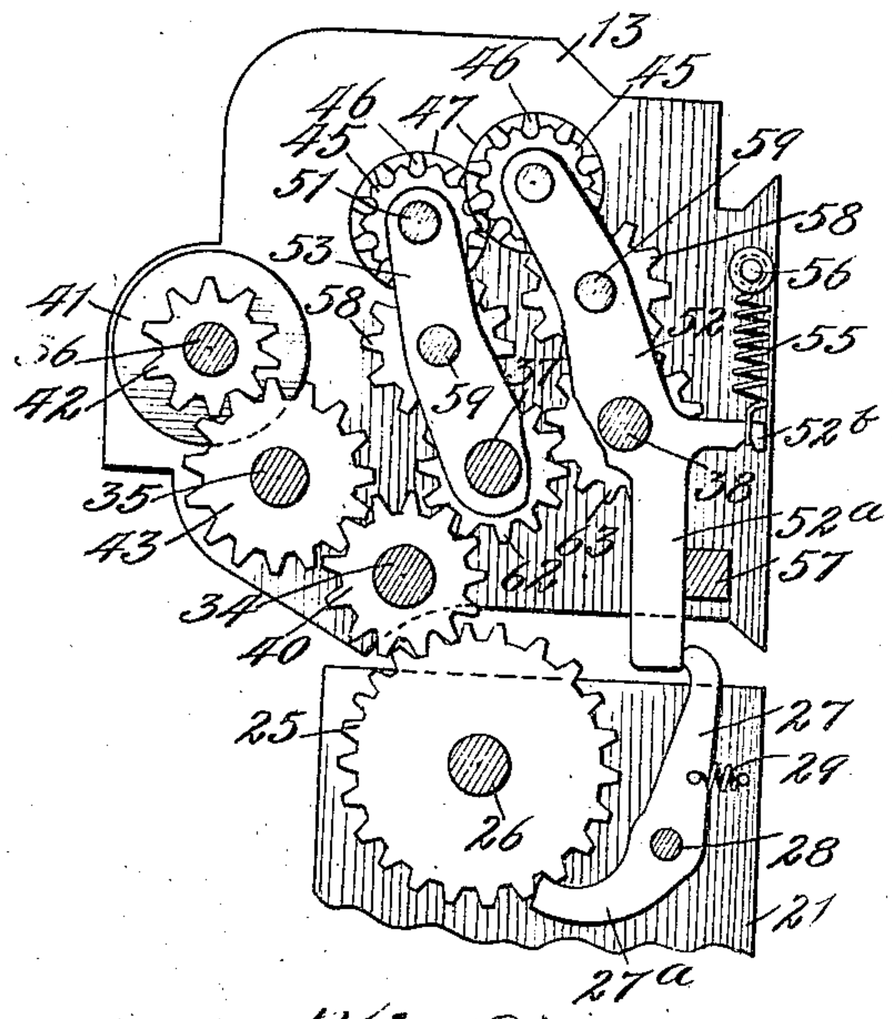


Fig. 7.

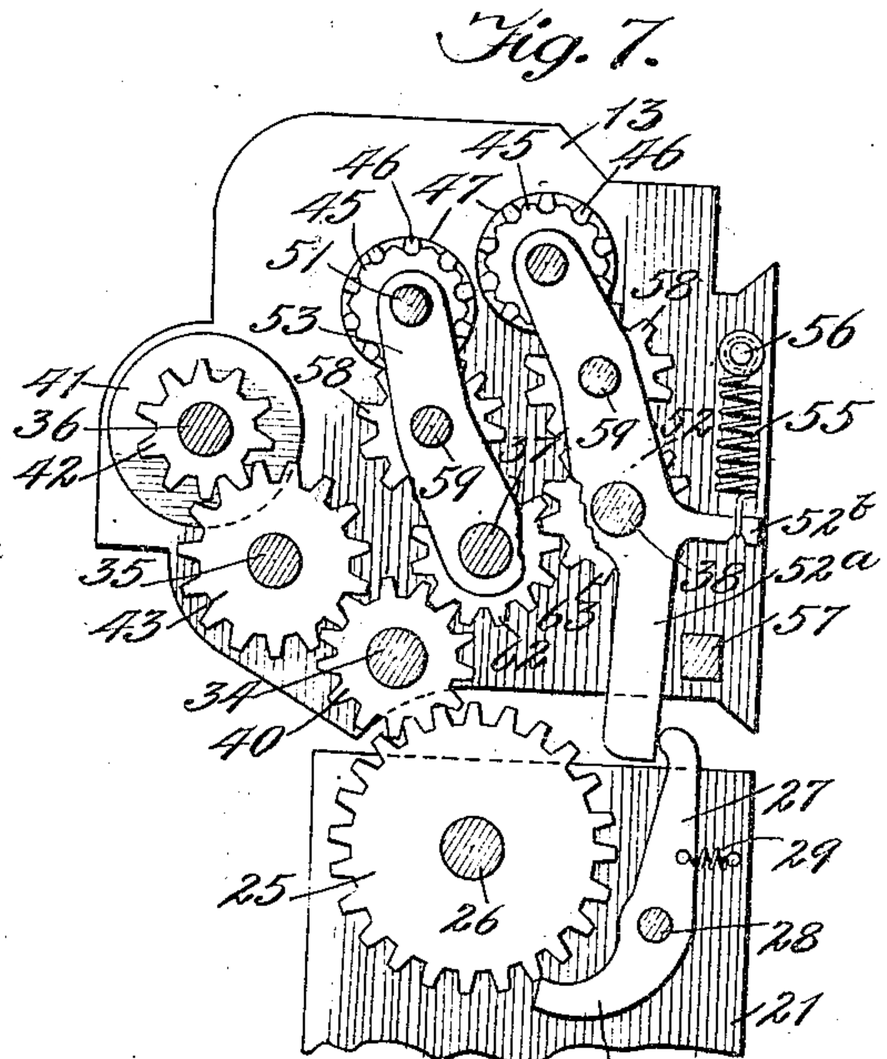


Fig. 8.

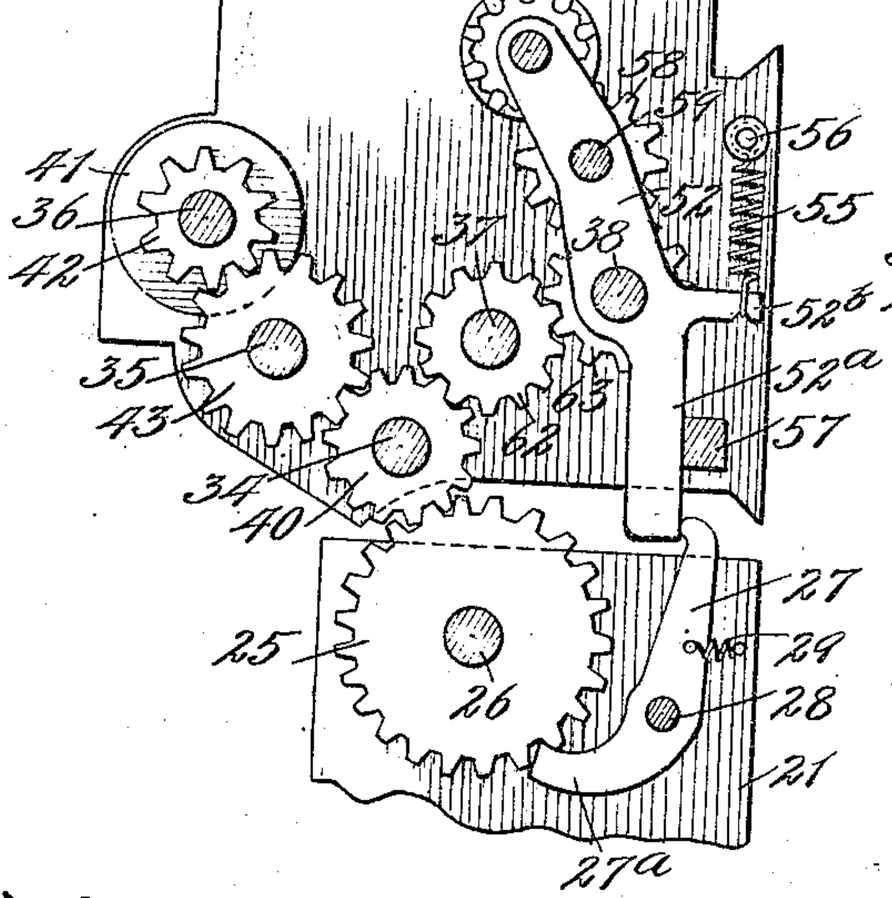
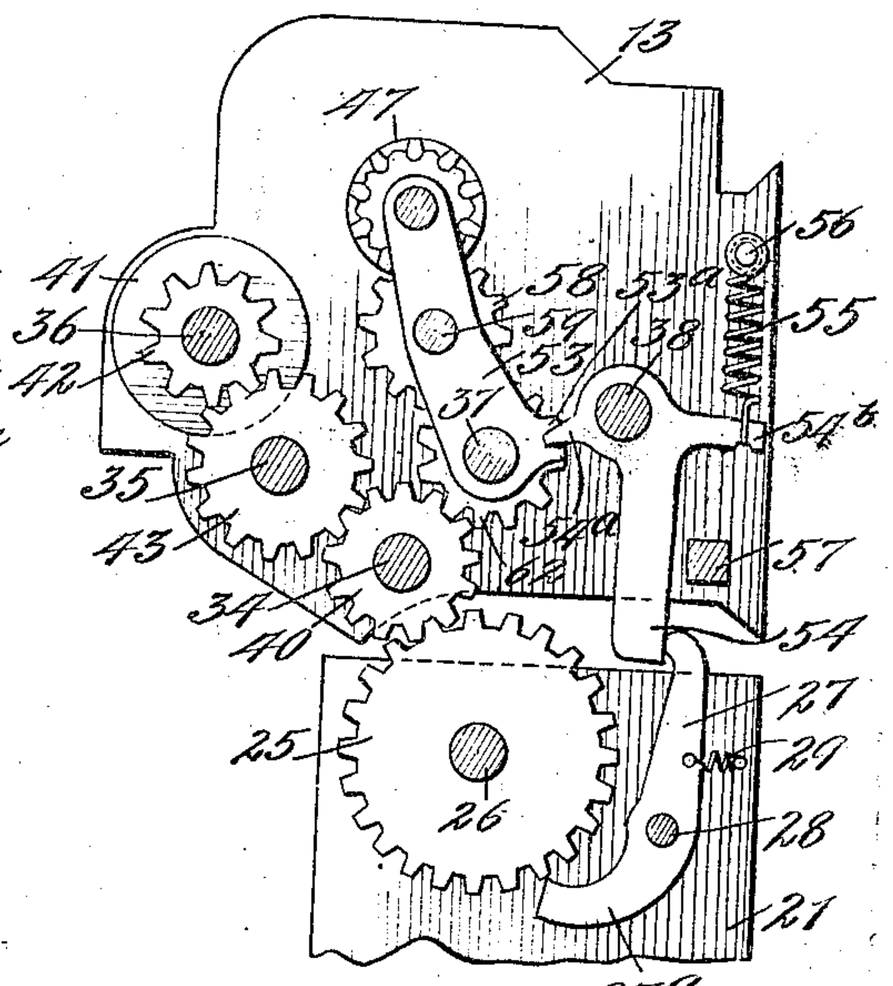


Fig. 9.



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CALCULATING MACHINE.

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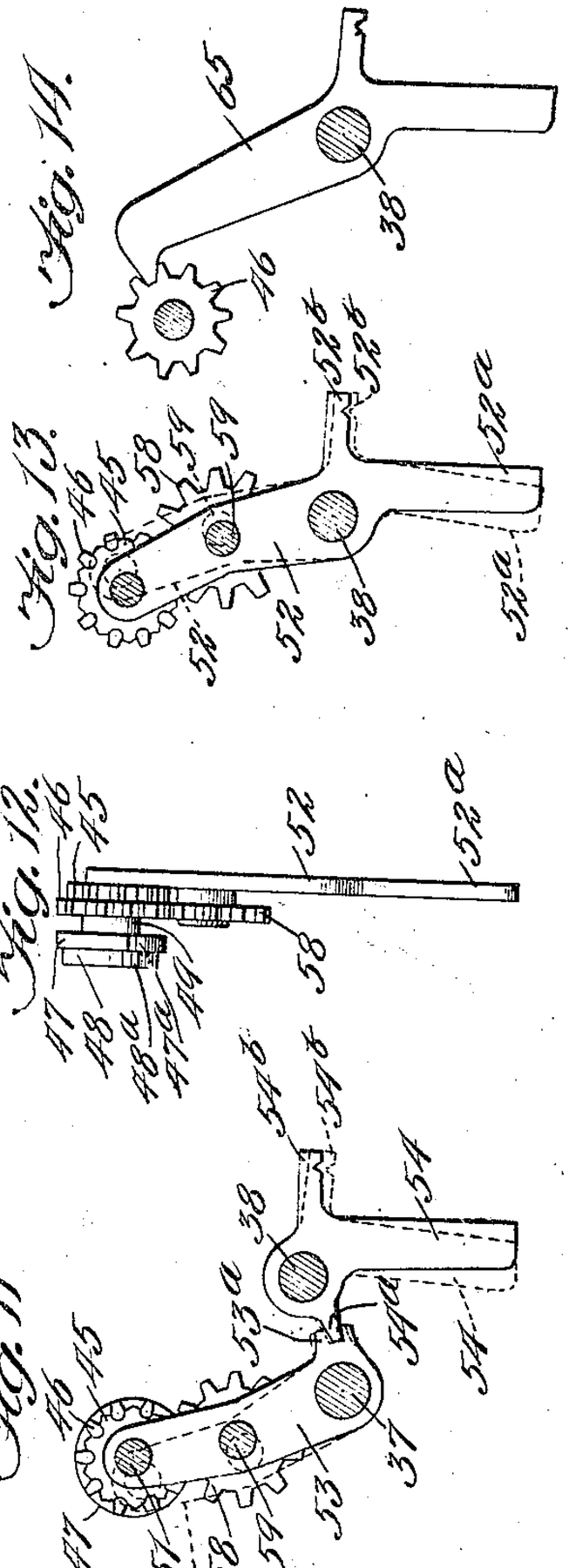
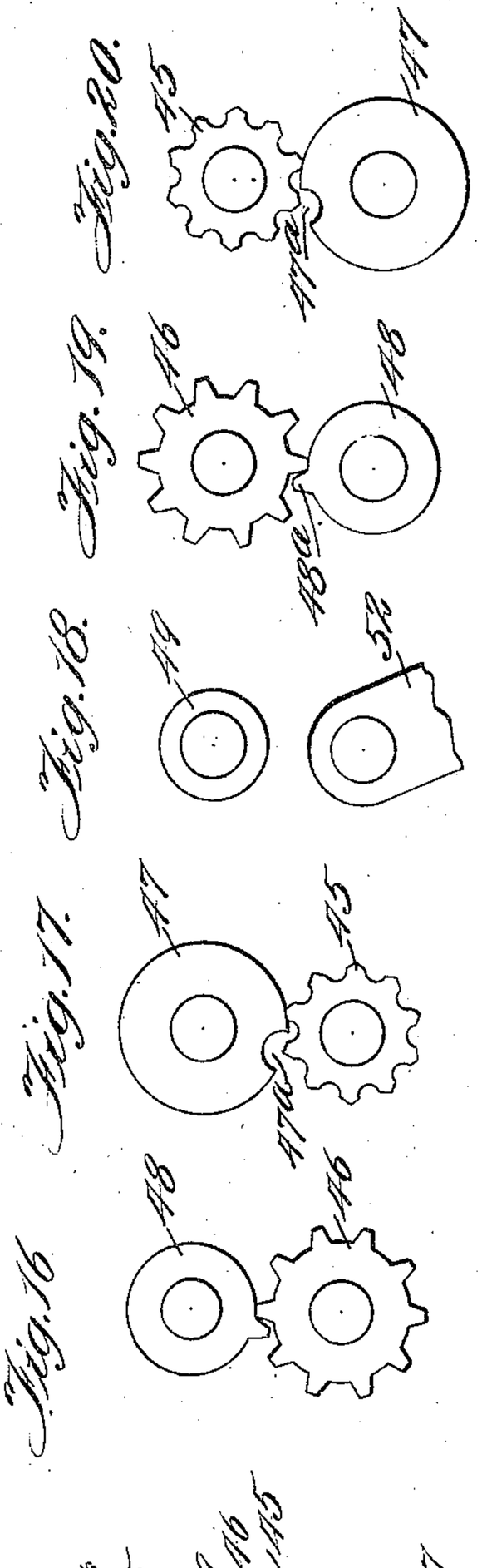
4 SHEETS—SHEET 4.





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UNITED STATES PATENT OFFICE.

HYMAN ELI GOLDBERG, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GOLDBERG CALCULATING MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CALCULATING-MACHINE.

No. 896,821. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed January 9, 1908. Serial No. 409,965.

To all whom it may concern:

Be it known that I, HYMAN ELI GOLDBERG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Calculating-Machines, of which the following is a specification.

My invention relates to improvements in calculating machines and more particularly the totalizers thereof, and has for its object the rendering of such totalizers more reliable in their work. This is accomplished chiefly, through the novel construction of the carrying wheels and the mountings thereof, as will hereinafter appear.

In some of the totalizers now known in the art, for example in the totalizers shown in my Patents 710,772, issued October 7, 1902, and 741,961, issued October 20, 1903, the carrying from one carrying wheel to another is done through the medium of a carrying pinion. In order to permit the operation of those totalizers it was necessary to release the carrying wheel at the operating point from the next lower one. This was accomplished by swinging the intermediate carrying pinion out of mesh with its two coöperating carrying wheels. In order to prevent this carrying pinion from being accidentally rotated while thus unmeshed, a locking bar or detent was provided so constructed and located as to engage the carrying pinion while the latter was in unmeshed position. But it was found in practice that if the parts were not carefully made, the carrying pinion would, in spite of said bar sometimes be rotated out of place so that when effort was made to have it remesh with the carrying wheels the teeth would jam and cause trouble. As the result of my present invention this difficulty is obviated, for in my new construction all of the wheels, swinging and stationary, are kept continuously under control so that there is no opportunity for them to turn out of their proper position.

In the totalizer shown and described in my above mentioned patents the train of gear wheels was so long, on account of the presence of both carrying wheels and carrying pinions, that considerable play or back lash was introduced, and an excessive amount of force was required to drive the train of wheels. These undesirable characteristics are now eliminated for in the totalizer here shown one carrying wheel acts directly upon the next without any intermediate piece.

In the accompanying drawings: Figure 1 is a front elevation and Fig. 2 an end elevation of a typewriter and calculating attachment including a totalizer embodying my invention. It will be understood however, that the invention is equally applicable to independent machines. Fig. 3 is a front elevation of the totalizer and the coöperating portion of the differential mechanism, the two being slightly separated to better illustrate their construction and relationship. Fig. 4 is a diagrammatic front view of some of the parts of the totalizer, the parts being developed, that is, arranged in a plane and slightly separated. Fig. 5 is an end view of the parts shown in Fig. 4. Figs. 6, 7, 8 and 9 are sectional elevations showing the totalizer and master wheel. Figs. 6, 7 and 8 illustrate more particularly the operation of what I shall term the "direct swingholders" and parts mounted therein and Fig. 9 the "indirect swingholders" and parts mounted therein. Figs. 8 and 9 are to a certain extent fragmentary as they omit, for the sake of clearness, some of the parts shown in Figs. 6 and 7. Figs. 10 and 11 are front and side views of the indirect swingholder and operating arm. Figs. 12 and 13 are front and side views of the direct swingholder and parts mounted thereon. Fig. 14 is a side view of the swinging detent located at the units end of the totalizer. Fig. 15 is a front view of three carrying wheels showing their relative positions when in gear with each other. Figs. 16 to 20 inclusive show the component parts of the carrying wheels. The views are taken respectively on the planes 16—16, 17—17, 18—18, 19—19 and 20—20, Fig. 15.

Referring to the drawings, the typewriter has a stationary framework 21, a carriage 22 adapted to travel thereon, and typewriter keys 23. The differential mechanism 24 is mounted upon the framework 21 and is connected to the numeral keys of the typewriter in any suitable manner. Said differential mechanism operates the setting or master wheel 25 mounted upon the shaft 26, secured to the stationary framework of the machine. The typewriter selected for illustration is a Remington, and the differential mechanism is similar to the one described in my Patent 710,772, issued October 7, 1902;

but as typewriters and differential mechanisms of this kind are well known in the art no detailed description of them is necessary here. It is sufficient to say that the construction is such that when a numeral key is depressed the master wheel will be rotated the proper amount, depending upon the value of the numeral, and the carriage will travel one letter space. In the present mechanism the depressing of a key produces another effect; to wit, the oscillatory movement of the operating arm 27, pivotally supported upon the stationary shaft 28. The construction and operation of the arm is such that normally, when the master wheel is at rest, the arm will occupy the position shown in Figs. 6 and 8, that is, out of engagement with the swingholders, but during the rotation of the master wheel the arm will occupy the position shown in Figs. 7 and 9 and will hold whichever swingholder happens to be in coöperative relation at the time, in the position shown in Figs. 7 and 9. Various means may be employed for producing this oscillatory movement of the operating arm 27 and an advantagous construction is described in detail in the above mentioned patent. A member bearing a similar relationship to the master wheel is also shown in each of my issued patents hereinabove mentioned. In the present construction however, the oscillatory movement of the operating arm 27 is produced by the master wheel itself coöperating with a tension spring 29 which tends to force the V shaped extremity of the extension 27^a of said arm toward said master wheel. On account of the V shaped configuration of said extremity the teeth of the wheel eject it whenever the wheel rotates, and thus move the arm to the position shown in Figs. 7 and 9. But as soon as the master wheel stops rotating said V shaped extremity tends to reënter between the teeth of the master wheel, which permits the spring 29 to retract the operating arm 27 and return it to the normal position shown in Figs. 6 and 8.

The totalizer, with which my present invention is more particularly concerned, is mounted upon a truck 30 which is adapted to slide upon a horizontal bar 31 secured to the stationary framework of the machine. An arm 32 extends from the typewriter carriage to the truck and thus causes the latter to travel in unison with said carriage. The plates 33 which constitute the side walls of the totalizer are fastened to the truck and support the shafts 34, 35, 36, 37 and 38. On the shaft 34 are loosely mounted a series of gear wheels 40, which are adapted to be engaged one after the other by the master wheel 25 as the totalizer travels past said master wheel. To facilitate description these wheels 40 may be termed "receiving wheels". The function of the receiving wheels is to transmit rotary motion from the master wheel 25 to the carrying wheels and to the figure wheels 41. The particular means by which this rotary motion is transmitted to the figure wheels is immaterial but in the present case each figure wheel is provided with a gear 42 fastened to its side which is driven by the transmission gear wheel 43 loosely mounted on shaft 35 and driven by its respective receiving wheel 40.

I will now describe the construction of the carrying wheels and will then describe the means by which they are supported and operated. These form important features of my invention.

The construction of the carrying wheels themselves is best shown in Figs. 15 to 20 inclusive. Each wheel comprises four principal portions 45, 46, 47 and 48. The locked portion 45 is adapted to coöperate with the locking portion 47 on the coöperating carrying wheel, and the carried portion 46 is adapted to coöperate with the carrying portion 48 on the coöperating carrying wheel. The portions 45 and 46 are connected to the portions 47 and 48, preferably by means of the spacing sleeve 49. By preference these parts are all integral although of course they may be made separately and afterwards brazed, pinned or otherwise rigidly fastened together. When the carrying wheels are in operative relation a carrying wheel of any given order will coöperate with the carrying wheel of next lower order and also with the carrying wheel of next higher order. The relationship is such that when the parts are in normal position the portions 45 and 46 of any given carrying wheel will coöperate with the portions 47 and 48 of the carrying wheel of next lower order and the portions 47 and 48 of said given wheel will coöperate with the portions 45 and 46 respectively of the carrying wheel of next higher order.

The construction of the locked and locking portions of the carrying wheels is best shown in Figs. 17 and 20. They are constructed upon the principle of the Geneva gear which is well known. The locking portion 47 consists of a disk having a recess 47^a at the carrying point. The teeth of the locked portion 45 are so shaped as to fit over said disk and prevent rotation of said locked portion except when recess 47^a comes around and allows one of said teeth to enter it. The construction of the carried and carrying portions 46 and 48 respectively, are best shown in Figs. 16 and 19. The carrying portion 48 has a carrying tooth 48^a adapted to engage the teeth of the carried portion 46 to rotate it and thus "carry".

As already mentioned each carrying wheel meshes directly with the carrying wheel of next higher order. When any given carrying wheel is about to be rotated it must first be released by the carrying wheel of next lower order but must remain in mesh with

the carrying wheel of next higher order in order that the tens may be carried. I release any given carrying wheel by withdrawing from it the carrying wheel of next lower order and means for doing this will now be described. Each of the carrying wheels is cylindrically bored so as to be freely rotatable upon a pin 51 extending laterally from each of the swingholders 52 and 53. In the particular construction selected for illustrating the invention, said swingholders are of two kinds which for convenience will be referred to as the "direct" swingholders 52, shown specially in Figs. 12 and 13, and the "indirect" swingholders 53 shown separately in Figs. 10 and 11. I thus name them because the direct swingholders are operated directly from the operating arm 27 which cooperates with the extension 52[a] of the direct swingholder while the indirect swingholders are operated indirectly from said arm 27 through the agency of the levers 54. The holders 52 and 53 are arranged in two groups mounted so as to swing through a limited arc about the shafts 38 and 37 respectively. The direct swingholders 52 have extensions 52[b] and the levers 54 have extensions 54[b] adapted to be fastened to springs 55 to be influenced by them to rotate (when viewed as in the drawings) in an anti clockwise direction. The springs 55 are fastened to the rod 56 secured to the side walls 13. The levers 54 which are pivotally supported on shaft 38 have teeth 54[a] engaging teeth 53[a] in the indirect swingholders so that when said levers swing in one direction the holders 53 will swing in the opposite direction about the shaft 37. The construction is such that the springs 55 tend to hold the swingholders in position to hold the carrying wheels in mesh with each other. A stop bar 57 which is secured in the side walls 13 is provided for engaging the extensions 52[a] and levers 54 to limit the movement of the carrying wheels toward each other. This prevents the springs 55 from exerting too much pressure in holding the carrying wheels in mesh. The direct and indirect swingholders alternate with each other laterally so that as the totalizer moves past the master wheel 25 first a direct and then an indirect swingholder will come into operative relation with the operating arm 27. The arrangement of the parts is such that when any figure wheel is in geared connection with the master wheel the swingholder supporting the carrying wheel of next lower order will be in position to be acted upon by the operating arm 27.

I will now describe the gearing by which motion is transmitted from the receiving wheels to the carrying wheels. The carried portion 46 of each carrying wheel is acted upon not only by the carrying portion 48 of the coöperating carrying wheel but by a gear wheel 58 loosely mounted upon a pin 59 in each of the swingholders 52 and 53. The gears 58 in the indirect swingholders are permanently in mesh with and are driven by the gear wheels 62 which are independently rotatable upon shaft 37. There is a wheel 62 for each of the receiving wheels 40 and they remain permanently in mesh therewith. The gear wheels 58 in the direct swingholders 52 are permanently in mesh both with the portions 46 of the carrying wheels in said direct swingholders and with the gear wheels 63 which are independently rotatable upon shaft 38. The wheels 63 are equal in number to the direct swingholders and are permanently in mesh with the wheels 62.

As best shown in Fig. 4, which is a development of the parts slightly separated for the sake of illustration, it will be seen that those particular wheels 62 which are in mesh with the wheels 63 are not in mesh with the wheels 58 of the indirect swingholders. Also that those wheels 62 which are in mesh with the wheels 58 in the indirect swingholders are not in mesh with the wheels 63. Wherefore the various trains of gearing associated with the direct and with the indirect swingholders and shown in Figs. 8 and 9 respectively are completely independent and consequently the carrying wheels mounted upon the direct and indirect swingholders are not in gear connection with each other through the train of gearing comprising the wheels 58, 63, 62 and 58. In other words, unless the carrying wheels are in actual direct mesh with each other there is no gear connection between them. Of course the carrying wheels are directly in mesh with each other when in operative position shown in Fig. 6. It will thus be seen that each carrying wheel whether mounted upon a direct swingholder or upon an indirect one is always in gear connection with its coöperating receiving wheel 40. Consequently, if said wheel 40 be held (as hereinafter explained) then the position of the coöperating carrying wheel will always be perfectly definite whether the swingholder in which it is mounted be in its approached position or in its retracted position or intermediate between the two. In order to hold the wheel 40 stationary there is mounted upon the framework 21 immediately to the right of the master wheel 25 a fixed plate 67 as best shown in Figs. 1 and 3. Whenever the master wheel engages any receiving wheel 40 the holding plate 67 engages and holds the wheel 40 of next lower order. The latter wheel is the one which is in mesh with the carrying wheel mounted upon that particular swingholder which is temporarily in engagement with the operating arm 27. Thus when the master wheel rotates, and the operating arm 27 operates the swingholder, the carrying wheel mounted upon said swingholder will be retracted from its coöperating carrying wheel of next higher order;

but while retracted will remain in mesh with its own "held" receiving wheel 40 and thus be prevented from any accidental rotation or displacement.

It will be noted that the carrying wheels are epicyclically connected with the wheels 62 and 63 mounted upon the axles 37 and 38 about which the swingholders swing. Moreover the number of teeth in portions 46 of the carrying wheels and wheels 62 or 63 are substantially equal. Consequently when the swingholders are swung about their respective axes 37 or 38 the carrying wheels will move straight toward or away from each other, and consequently will always come readily into mesh with each other. This is one of the important characteristics of this invention for as a result of it there is no possibility for the carrying wheels to jam tooth upon tooth when the withdrawn carrying wheel is approaching its mates.

Means is provided for normally holding the units wheel locked. This consists of a dog 65 pivotally supported on the shaft 38 and influenced by one of the springs 55. Said dog has a tooth for engaging the portion 46 of the units carrying wheel as shown in Fig. 14.

In operation, when a numeral key is depressed the master wheel 25 rotates and drives the figure wheel corresponding to the ordinal place which the numeral occupies in the number to be added. The rotation of the master wheel causes the ejection of extension 27^a and consequently movement of arm 27 to engage the swingholder supporting the carrying wheel of next lower order. As soon as the master wheel has completed its rotation the arm 27 is returned by its spring 29 to normal position shown in Figs. 6 and 8 and said swingholder is returned by its spring 55 to normal position, with its carrying wheel in mesh with its two mating or coöperating carrying wheels. If the amount of rotation of the master wheel has been such as to cause the operated figure wheel to rotate beyond the zero point the carrying tooth 48^a on the corresponding carrying wheel will have engaged one of the teeth of the carried portion 46 of the next higher carrying wheel and will consequently have rotated said next higher carrying wheel, which rotation will be transmitted to the figure wheel of next higher order through the intermediate connecting gear wheels.

It will be seen from the above description that in my totalizer the carrying wheels engage with each other directly without any intermediate wheels. As a result, not only is back lash avoided but the mechanism is correspondingly simplified. It will also be seen that a carrying wheel though it may be withdrawn from and be out of engagement with its coöperating carrying wheels, will be positively prevented from rotating because it will, through wheels 58, 63, 62 and 40 be locked by the locking plate 67.

What I claim as new and desire to secure by Letters Patent, is:

1. In a totalizer, a series of combined carrying and locking wheels each directly in mesh with its next higher carrying and locking wheel.

2. In a totalizer, a series of combined carrying and locking wheels each directly in mesh with the next higher carrying and locking wheel, said series being arranged in two groups, the carrying and locking wheels of one group being arranged, alternately to those in the other group.

3. In a totalizer, a series of combined carrying and locking wheels each directly in mesh with the next higher carrying and locking wheel, and means to disconnect any two of said wheels one from the other.

4. In a totalizer, carrying wheels each having four portions, a carrying portion, a locking portion, a carried portion and a locked portion, the carrying and locking portions of a given wheel being adapted to coöperate with the carried and locked portions respectively of the next higher wheel, and the carried and locked portions of said given wheel being adapted to coöperate with the carrying and locking portions respectively of the next lower wheel.

5. In a totalizer, carrying wheels each having four portions, a carrying portion having a carrying tooth, a locking portion consisting of a disk with a recess in it at the carrying point, a carried portion having ten teeth and a locked portion having ten recesses, the carrying and locking portions of a given wheel being adapted to coöperate with the carried and locked portions respectively of the next higher wheel, and the carried and locked portions of said given wheel being adapted to coöperate with the carrying and locking portions respectively of the next lower wheel.

6. In a totalizer, a series of carrying wheels each having a carrying portion and a carried portion, the carrying portion of a given carrying wheel being adapted to engage directly the carried portion of the carrying wheel of next higher order, and the carried portion of said given wheel being adapted to be engaged directly by the carrying portion of the carrying wheel of next lower order.

7. In a totalizer, a series of carrying wheels, each having a carrying portion and a carried portion, the carrying portion of a given carrying wheel being adapted to engage directly the carried portion of the carrying wheel of next higher order, and the carried portion of said given wheel being adapted to be engaged directly by the carrying portion of the carrying wheel of next lower order, means operated by said given carrying wheel for intermittently locking the carrying wheel of

next higher order, and means operated by the carrying wheel of next lower order than that of said given carrying wheel for intermittently locking said given carrying wheel.

8. In a totalizer, a series of carrying wheels each having a carrying portion and a carried portion, the carrying portion of a given carrying wheel being adapted to engage directly the carried portion of the carrying wheel of next higher order, and the carried portion of said given wheel being adapted to be engaged directly by the carrying portion of the carrying wheel of next lower order, means on said given carrying wheel for directly engaging the carrying wheel of next higher order for intermittently locking it and means on the carrying wheel of next lower order than that of said given carrying wheel for directly engaging said given carrying wheel for intermittently locking it.

9. In a totalizer, a series of combined carrying-and-locking wheels each directly in mesh with its next higher carrying and locking wheel, and a swingholder for each of said wheels for moving it into and out of mesh with its coöperating carrying-and-locking wheels.

10. In a totalizer, a series of carrying wheels, each mounted on a swingholder, said carrying wheels being arranged in two opposing groups, a carrying wheel in one group being in mesh with the two nearest carrying wheels in the other group.

11. In a totalizer, a series of carrying wheels directly in mesh with each other, two groups of swingholders for supporting said carrying wheels, and means for operating said swingholders to connect and disconnect the carrying wheels from each other.

12. In a totalizer, a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, and arranged in two opposing groups, the carrying wheels of one group alternating with those of the other group, and supporting members for said carrying wheels, said supporting members being adapted to move the wheels of one group in one direction and the wheels of the other group in substantially the opposite direction to withdraw them from engagement with the wheels in the opposite group.

13. In a totalizer, a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, and arranged in two opposing groups, the carrying wheels of one group alternating with those of the other group, and swingholders for supporting said carrying wheels, said swingholders being adapted to swing in opposite directions to withdraw the supported carrying wheel from engagement with the members of the opposite group.

14. In a totalizer, a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, swingholders for supporting said wheels, said swingholders being arranged in two groups and the parts being so arranged that the swingholders in one group swing in one direction to unmesh their carrying wheels and the swingholders in the other group swing in the opposite direction to unmesh their carrying wheels, and means for operating said swingholders.

15. In a totalizer, a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, swingholders for supporting said wheels, said swingholders being arranged in two groups and the parts being so arranged that the swingholders in one group swing in one direction to unmesh their carrying wheels and the swingholders in the other group swing in the opposite direction so unmesh their carrying wheels, and means including a member operative upon any one of said swingholders for operating them.

16. In a totalizer, a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, swingholders for supporting said wheels, said swingholders being arranged in two groups and the parts being so arranged that the swingholders in one group swing in one direction to unmesh their carrying wheels and the swingholders in the other group swing in the opposite direction to unmesh their carrying wheels, an arm operative upon any one of said swingholders for swinging them to the position where the supported carrying wheel is out of mesh with its coöperating carrying wheels, and means for returning the swingholders to normal position with their respective carrying wheels in mesh with the coöperating carrying wheels.

17. In a totalizer, a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, swingholders for supporting said wheels, said swingholders being arranged in two groups and the parts being so arranged that the swingholders in one group swing in one direction to unmesh their carrying wheels and the swingholders in the other group swing in the opposite direction to unmesh their carrying wheels, an arm operative upon any one of said swingholders for swinging them to the position where the supported carrying wheel is out of mesh with its coöperating carrying wheels, a spring for each swingholder tending to return the same to normal position with their respective carrying wheels in mesh with the coöperating carrying wheels.

18. In a totalizer, a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, two shafts fixed in said totalizer, a swingholder for each carrying wheel, for bringing it into and out of mesh with its coöperating carrying wheels, the swingholders being pivotally

supported upon said shafts in alternate order so as to form two groups, and the parts being so arranged that the swingholders of the different groups swing in opposite directions for disengaging the respective carrying wheels from their coöperating carrying wheels, and means for operating said swing holders.

19. In a calculating machine, a totalizer having a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, and arranged in two opposing groups, the carrying wheels of one group alternating with those of the other group, swingholders being adapted to swing in opposite directions to withdraw the supported carrying wheel from engagement with the members of the opposite group; a differential mechanism operative upon said carrying wheels to rotate them; and means operating in timed relation with said differential mechanism for operating said swingholders.

20. In a calculating machine, a totalizer having a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, and arranged in two opposing groups, the carrying wheels of one group alternating with those of the other group, swingholders for supporting said carrying wheels, said swingholders being adapted to swing in opposite directions to withdraw the supported carrying wheel from engagement with the members of the opposite group; a differential mechanism operative upon said carrying wheels to rotate them, and a number operating in timed relation to said differential mechanism and adapted to engage said swingholders *seriatim* for operating them.

21. In a calculating machine, a totalizer having a series of carrying wheels each adapted to engage directly the carrying wheel of next higher order, and arranged in two opposing groups, the carrying wheels of one group alternating with those of the other group, swingholders for supporting said carrying wheels, said swingholders being adapted to swing in opposite directions to withdraw the supported carrying wheel from engagement with the members of the opposite group; a differential mechanism operative upon said carrying wheels to rotate them, springs operative upon said swingholders to normally hold said carrying wheels in engagement with each other, and an operating arm operating in timed relation with said differential mechanism and adapted to operate upon said swingholders *seriatim* in opposition to the pressure of their springs, to withdraw a carrying wheel temporarily from the carrying wheels in engagement therewith.

22. In a calculating machine, a differential mechanism and a totalizer operable at any of its ordinal points by said differential mechanism, said totalizer comprising a train of carrying wheels each meshing directly with the carrying wheel of next higher order, means for breaking the connection of said train at the operating point in the totalizer by unmeshing a carrying wheel from the train of carrying wheels, and means including a held gear wheel for preventing the unmeshed carrying wheel from rotating.

23. In a calculating machine, a differential mechanism and a totalizer operable at any of its ordinal points by said differential mechanism, said totalizer comprising a train of carrying wheels each meshing directly with the carrying wheel of next higher order, means for breaking the connection of said train at the operating point in the totalizer by unmeshing a carrying wheel from the train of carrying wheels, a held gear wheel, and epicyclic connection between said held gear wheel, and said unmeshed gear wheel for preventing the latter from turning while unmeshed from the other carrying wheels.

24. In a calculating machine, a differential mechanism and a totalizer operable at any of its ordinal points by said differential mechanism, said totalizer comprising a train of carrying wheels each meshing directly with the carrying wheel of next higher order, means for breaking the connection of said train at the operating point in the totalizer by unmeshing a carrying wheel from the train of carrying wheels and an individual holding mechanism for each of said carrying wheels for holding them from rotation when in unmeshed position.

25. In a calculating machine, a differential mechanism and a totalizer operable at any of its ordinal points by said differential mechanism, said totalizer comprising a train of carrying wheels each meshing directly with the carrying wheel of next higher order, means for breaking the connection of said train at the operating point in the totalizer by unmeshing a carrying wheel from the train of carrying wheels and an individual holding mechanism for each of said carrying wheels for holding them from rotation when in unmeshed position, said holding mechanism consisting of a held gear wheel to which the respective carrying wheel is epicyclically connected.

26. In a totalizer, a series of carrying wheels each adapted to mesh directly with the carrying wheel of next higher order and a stationary gear wheel for each of said carrying wheels, each of said carrying wheels being epicyclically connected to one of said stationary gear wheels and adapted to swing about the axis of said stationary gear wheel for the purpose of being brought into and out of mesh with the coöperating carrying wheels without danger of accidental rotation while out of mesh.

27. In a totalizer, a series of carrying wheels each adapted to mesh directly with

the carrying wheel of next higher order, a pivotally supported swingholder for each carrying wheel for moving the same into and out of mesh with the coöperating carrying wheels, and a held gear wheel for each carrying wheel, said held wheel being concentric with the axis of its respective swingholder and epicyclically in gear with the carrying wheel thereon.

28. In a totalizer, a train of gear wheels which includes carrying wheels, means for bodily moving said carrying wheels to thereby make and break the connection of the train at the operating point in the totalizer, a held gear wheel for each carrying wheel, and epicyclic gear connection between each of said held gear wheels and its respective carrying wheel, whereby a carrying wheel may be moved bodily and yet be at all times under positive gear control.

29. In a calculating machine, the combination of a non traveling differential mechanism including a master member moving different amounts depending upon the value of the digit to be added, and a traveling totalizer including carrying wheels each adapted to mesh directly with the carrying wheels of next higher order, a swingholder for each carrying wheel for moving it bodily into and out of mesh with its coöperating carrying wheels, means including a member operating in timed relation with said master member for operating said swingholders, trains of gear wheels in said totalizer one train for each of said carrying wheels for rotating and at all times controlling them, said trains being adapted to be operated by said master member for rotating said carrying wheels and each carrying wheel being epicyclically connected to some one of the wheels of its train, and means operating in timed relation with said master member for operating said swingholders.

30. In a calculating machine, the combination with a master means, of a totalizer comprising a series of combined carrying and locking wheels, each directly in mesh with the next higher carrying and locking wheel, said combined carrying and locking wheels being adapted to be operated *seriatim* by said master means, the connection of the master means with any particular combined carrying and locking wheel determining the operating point in the totalizer, and means to disconnect the wheel at the operating point of the totalizer from the next lower wheel of the series.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

HYMAN ELI GOLDBERG.

Witnesses:

HOWARD M. COX,

C. J. CHRISTOFFEL.