No. 741,126 PATENTED OCT. 13, 1903.

H. E. GOLDBERG.

REGISTER.

APPLICATION FILED OCT. 25, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

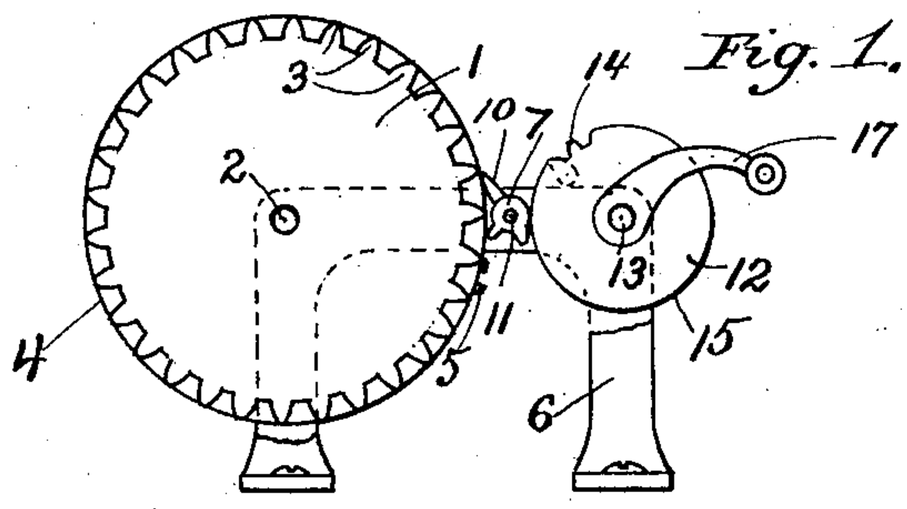


Fig. 7.

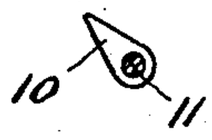


Fig. 6

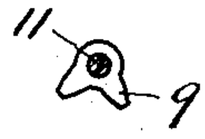


Fig. 2.

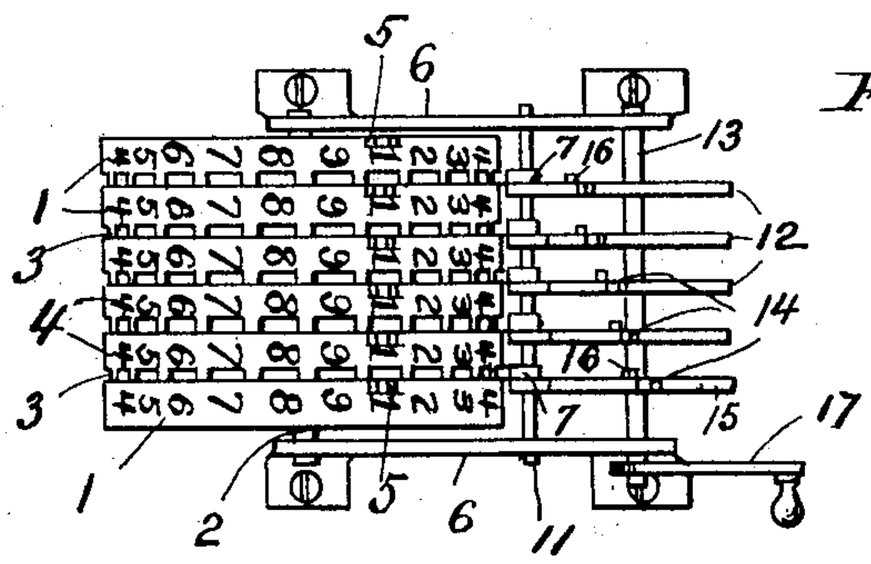


Fig. 5.

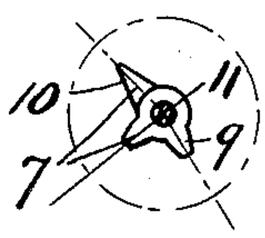


Fig. 3.

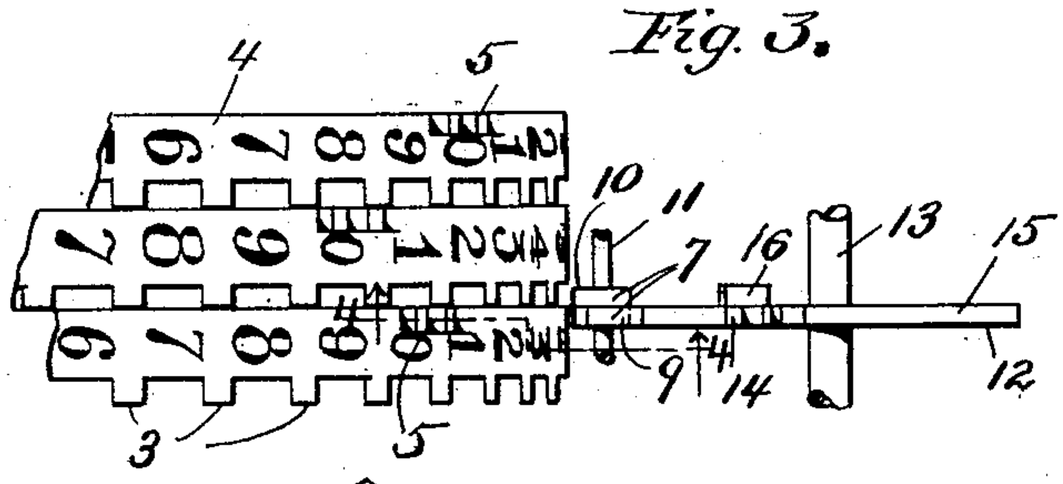
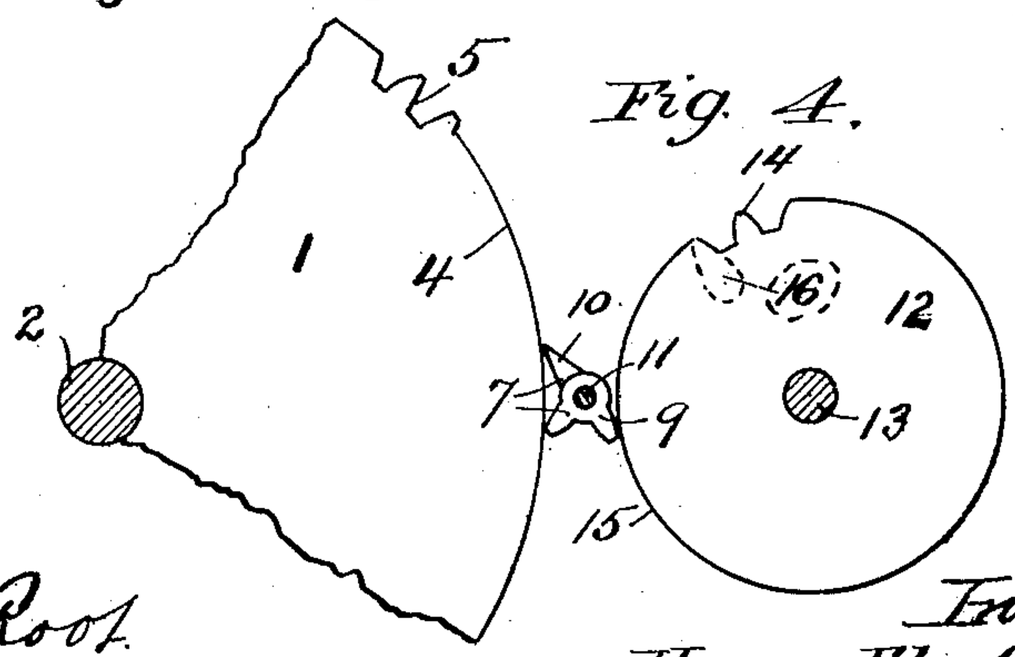


Fig. 4.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 8.

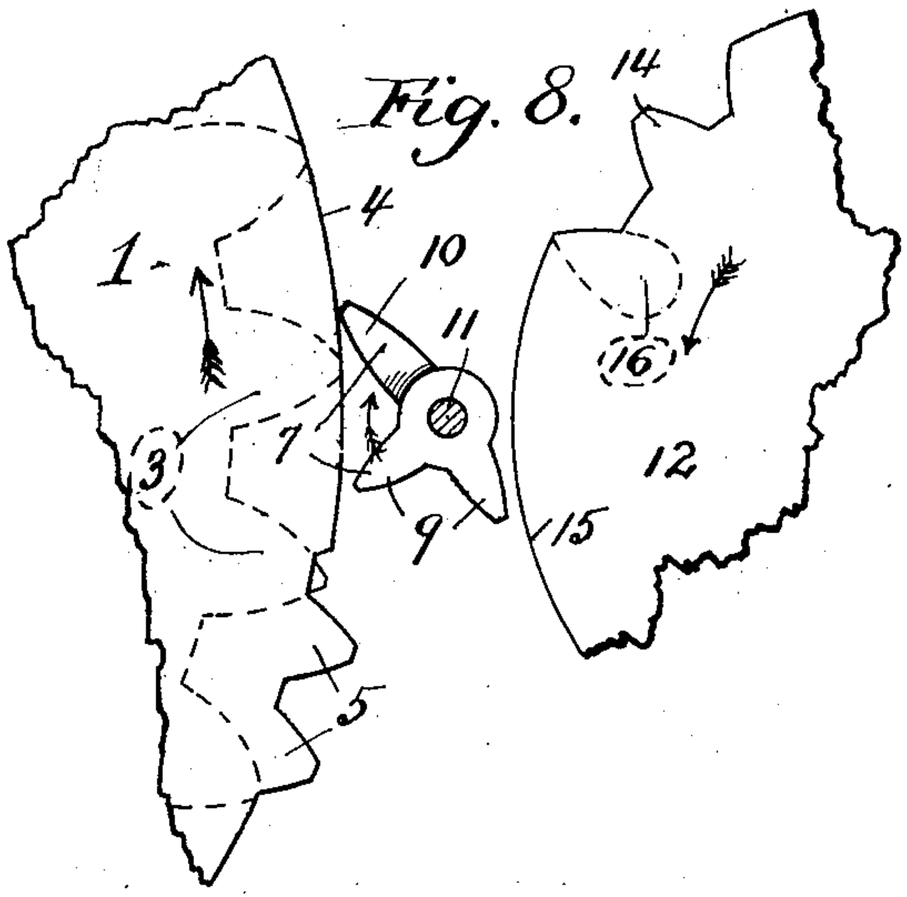


Fig. 9.

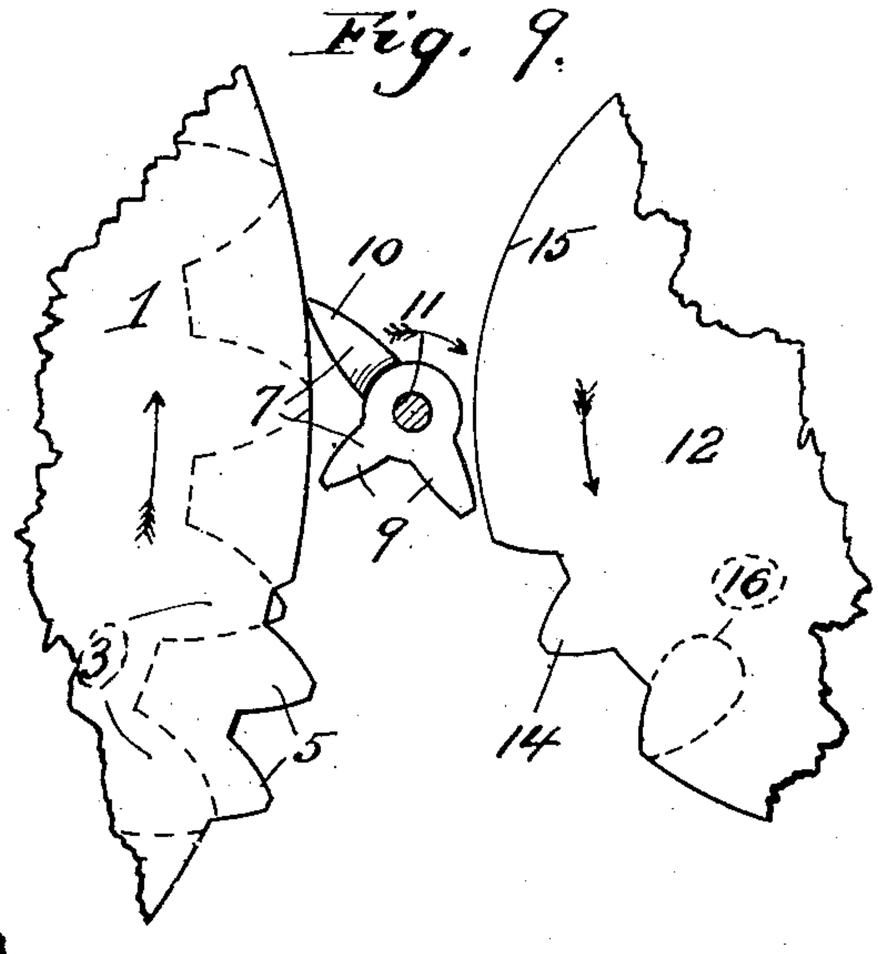


Fig. 10.

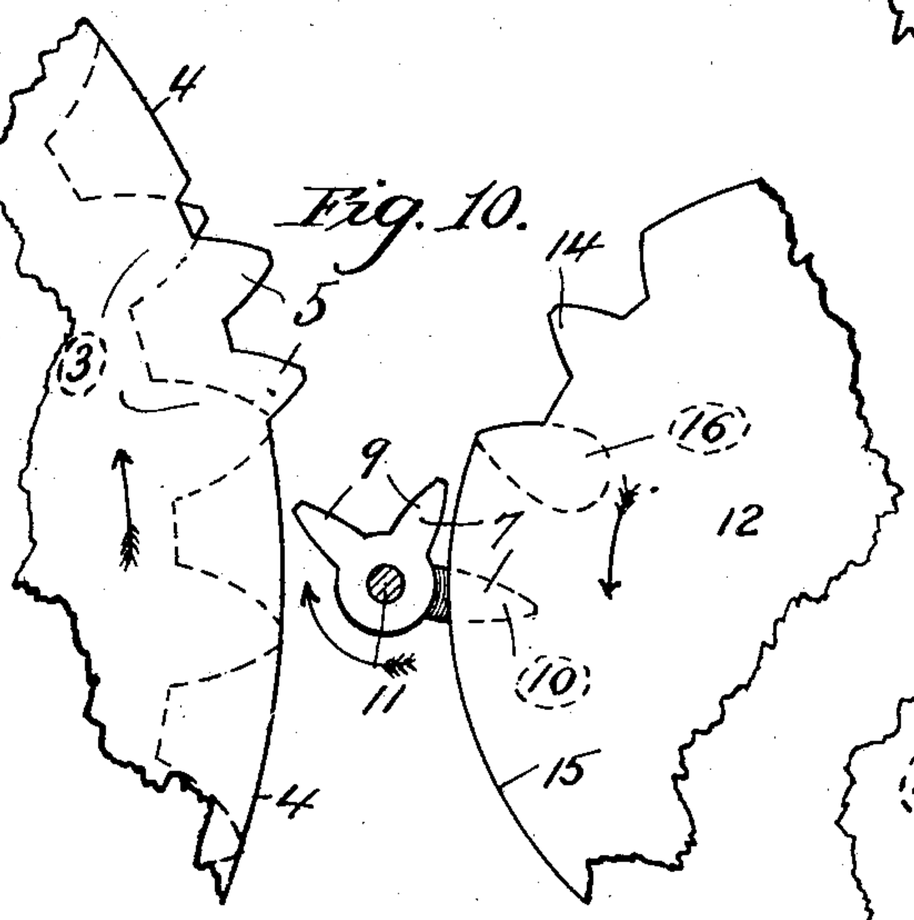
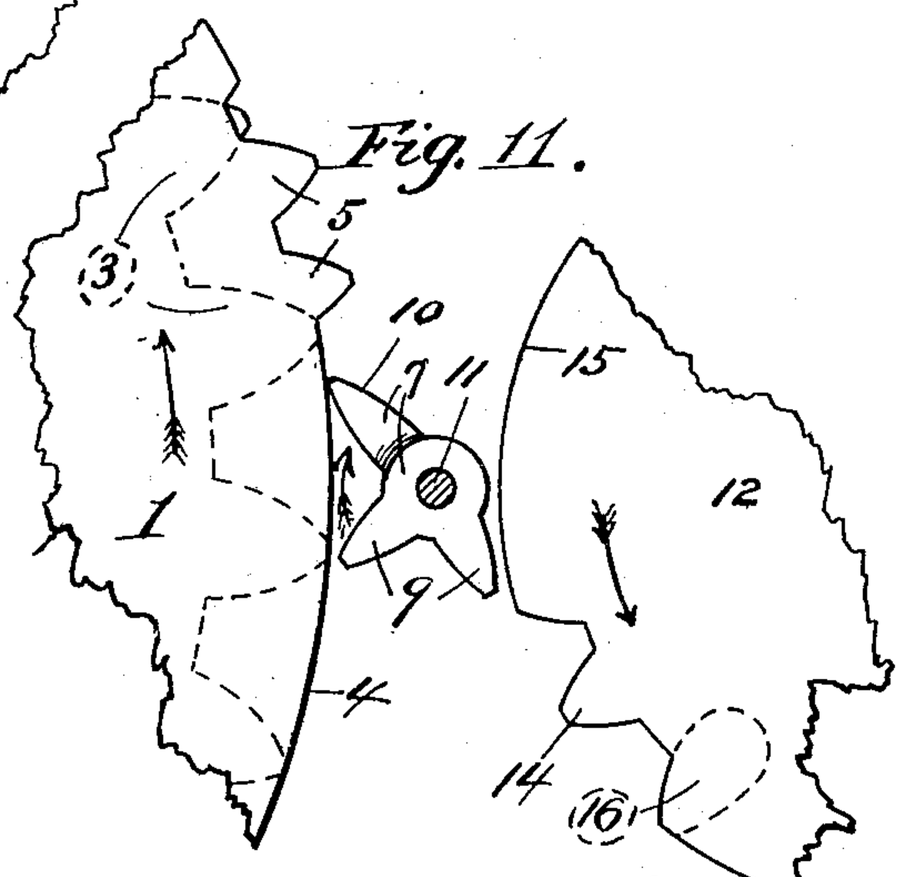


Fig. 11.



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No. 741,126. Patented October 13, 1903.

UNITED STATES PATENT OFFICE.

HYMAN ELI GOLDBERG, OF CHICAGO, ILLINOIS.

REGISTER.

SPECIFICATION forming part of Letters Patent No. 741,126, dated October 13, 1903.

Application filed October 25, 1902. Serial No. 128,716. (No model.)

To all whom it may concern:

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

My invention relates to registers, especially of the class used in calculating-machines, a register of this type being shown in a separate application for Letters Patent filed by me in the United States Patent Office on the 1st day of October, 1900, Serial No. 31,666.

The object of the present invention is to provide a simple and positive-acting tens-carrying device and is attained by the mechanism illustrated in the accompanying drawings, in which—

Figures 1 and 2 are top and side views, respectively, of the complete registering mechanism. Figs. 3 and 4 are fragmentary views drawn to an increased scale and showing the relative position of the registers, tens-storing wheels, and tens-carrying disks. Said Fig. 3 is a view taken from the top, and Fig. 4 is a view taken from the side on the line 4 4, Fig. 3. Fig. 5 is a side view of the complete tens-storing wheel, and Figs. 6 and 7 are views of the component parts thereof. Figs. 8, 9, 10, and 11 are diagrammatic views drawn to an increased scale, illustrating the mode of operation of the registers, tens-storing wheels, and tens-carrying disks.

Similar numerals refer to similar parts throughout the several views.

The registers 1 consist of disks of similar size mounted side by side on the shaft 2 so as to rotate independently of each other. Said registers are provided with the teeth 3, whereby they may be rotated. Said teeth occupy a portion only of the width of said registers, the remaining cylindrical portion 4 having, by preference, marked thereon the figures "0" to "9" in one or more series for registering totals in the manner usual in this class of machines. Said teeth are some multiple of ten in number and occupy a position upon the right of the register, so that the teeth 3 of one register are adjacent to the register corresponding to the next lower digital place. The points of the teeth 3 preferably do not project above the cylindrical portion 4 of the registers, but are substantially flush with the same. The tens-carrying teeth 5 are formed at one or more points in the cylindrical portion 4 of the registers for the purpose hereinafter described. The point at which said teeth are located corresponds to a zero-point on the register, there being as many sets of teeth 5 on each register as there are series of figures thereon. Said teeth 5 are formed at the left portion of the registers and preferably project slightly beyond the cylindrical face thereof. Said registers rotate independently, but always in the same direction, about the shaft 2, said shaft being fixed in the side plates 6, which form the framework of the device.

The first step in the operation of this mechanism is to set up a number on the registers by rotating them individually, each one the correct amount, without reference to the carrying of the tens. The second step is to impart a supplemental rotation to the registers to take into account any tens which may have to be carried. This supplemental rotation is accomplished by means of the tens-carrying device. In other words, by means of the tens-carrying device a ten upon any given register is at the proper time transferred, so as to register a unit on the next higher register. In the carrying of the tens the registers are actuated by the tens-storing wheels 7, and these in turn are actuated by the carrying-disks 12. Said tens-storing wheels consist, preferably, of two portions or parts 9 and 10, which may be formed separately and subsequently brazed or otherwise secured together or may be constructed of a single piece. Said parts 9 and 10 are shown separately in Figs. 6 and 7, respectively. The part 9 consists of a toothed wheel mutilated by having a number of teeth thereof cut away and the remaining teeth located adjacent to each other and preferably two in number. Part 10 consists of an arm projecting beyond the point-circle of the gear-wheel 9 and extending in a different direction from the teeth of said wheel.

A suitable construction of the tens-storing wheel as assembled is shown from the side in Fig. 5, said figure showing a mutilated five-toothed wheel having but two teeth remaining, and the arm 10 extending on a radius angularly in advance of the said teeth ap-

proximately three-tenths of a circumference. The tens-storing wheels are loosely mounted on the shaft 11, so as to rotate independently thereon, and the parts are so assembled that the teeth of the mutilated gear 9 may mesh with the register-teeth 5 and at other times contact the register-surface 4. The arm 10 is in a location to engage the teeth 3 on the next higher register, and the distance between the curved surface 4 of the register 1 and the axis of the tens-storing wheels 7 is less than the radius of the point-circle of the mutilated gear-wheel 9. By this construction the teeth of the said part 9 abut against said surface 4 and prevent the rotation of the said storing-wheel. The arm 10 extends in such a direction and is of such length as not to interfere with the registers 1 when the teeth of the part 10 are locked between the said registers and the carrying-disk 12, the location of the parts being best indicated in Fig. 3. The said shaft 11 is mounted in the side plates 6, and so, also, is the axle 13; but said axle is freely revoluble, and all of the disks 12 are rigidly secured thereto, so that all rotate as asingle piece.

One or more gear-teeth 14 are formed in the periphery of the disks 12, the number depending upon the construction of the mutilated gear-wheel 9. In the present case there is but one complete tooth 14, which is adapted to enter between the two teeth of said mutilated five-toothed wheel. The remaining portion 15 of the periphery of the disk 12 is preferably cylindrical. Said curved surface 15 approaches the axis of the tens-storing wheel 7 to within a distance less than the radius of the point-circle of the part 9 of the said wheel, thereby preventing the rotation of said wheel when said curved surface is in conjunction with the teeth thereof, but rotating said wheel when the teeth 14 are in mesh with the teeth upon the part 9.

Located, preferably, upon the side of the disk 12, but in such a position as to engage the arm 10 of the storing-wheel, is the arm or lug 16, so placed as to occupy a position in front of the teeth 14 with respect to the direction of rotation of said disk 12. The purpose of the arm 16 is to insure the engagement of the teeth 14 with the teeth of the part 9 of the storing-wheel.

The registers 1, tens-storing wheels 7, and the disks 12 are so constructed and placed that a wheel 7 is locked by the curved surfaces of the said adjacent members; but if the teeth 5 of the register engage the said storing-wheel the latter is rotated to such a position as to be engaged by the teeth 14 and arm 16 of said disk 12. Moreover, the rotation of said storing-wheel by said disk 12 causes the said arm 16 to rotate the next higher register one figure, thereby carrying the ten.

The carrying-disks 12 are arranged in a series upon the axle 13 and constitute the carrying-drum of the machine. The teeth 14 of one carrying-disk are one step in advance of the teeth 14 of the next higher carrying-disk, which arrangement produces upon the carrying-drum the resemblance of a helix or screw, and thereby causes the rotation of the tens-storing wheels 7 *seriatim*, so as to carry from units place first, highest place last. The rotation of said carrying-drum is accomplished by means of the crank 17 on the axle 13 or in any other suitable manner.

In operation the registers are first rotated individually by any suitable means, so that each register will have been turned the correct number of steps without reference to whether the next lower register has or has not completed a tens series and passed a zero-point; but to arrive at the right result in case any register has completed a ten the ten must be subsequently transferred or carried as a unit onto the next higher register. This carrying is accomplished by turning the crank 17, and thereby rotating the axle 13 and the tens-carrying drum fixed thereto. Suppose that the registers have been set up individually—that is to say, each has been rotated a definite amount from its prior position, but without reference to whether or not any tens have been completed upon any of the other of the registers. When such preliminary setting up has been accomplished, such of the registers as have completed a ten have by means of the teeth 5 rotated the tens-storing wheel 7 from the locked position shown in Fig. 8 to the locked position shown in Fig. 10. The last-mentioned position is such that the arm 10 of the tens-storing wheel will be engaged by the arm 16 of the disk 12 when the latter is rotated. In order now to complete the carrying of the tens, the axle 13 is rotated by means of the crank 17, the result being that the arm 16 and the tooth 14 on the disk 12 strike the arm 10 and then the teeth 9 of the storing-wheel 7, and thus complete its rotation, bringing it to the original position and locking it; but the arm 10 of this storing-wheel meshes during said rotation with the teeth 3 of the register, and this rotates said register one step. These last two steps are illustrated in Figs. 10 and 11. If during the first step in setting up a register has been rotated, but not far enough to carry a ten, such register will not have affected its storing-wheel, and therefore said storing-wheel will not be affected by any rotation of the disk 12. This is illustrated in Fig. 9. Although to assist in the understanding of this mechanism it has been referred to as part of a calculating-machine, it may be used in other connections, and therefore I do not limit myself to a mechanism for use in calculating-machines merely.

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

1. Tens-carrying mechanism comprising a register, a tens-storing wheel, and tens-carrying disks, said register having a cylindrical surface for preventing the rotation of said

tens-storing wheel, and a toothed portion for rotating said tens-storing wheel; said disks also having a cylindrical portion for preventing the rotation of said tens-storing wheel, and a toothed portion for rotating said tens-storing-wheel, said tens-storing wheel being locked against rotation in one direction by said register, and against rotation in the other direction by said tens-carrying disk.

2. Tens-carrying mechanism comprising a set of tens-carrying disks rotating as a single piece, mutilated tens-storing wheels, actuated by said disks, and registers actuated by said tens-storing wheels, said disks having cylindrical surfaces where are contained at intervals toothed portions for actuating said tens-storing wheels, and said cylindrical portions of said disks being adapted to prevent the rotation of said tens-storing wheels.

3. In a train of gears having fixed axes of rotation the combination of not less than three gears, the first of which is interposed between the other gears, said first gear having a portion of the teeth thereof removed, and each of the others of said gears having surfaces of revolution approaching said first gear to a point within the tooth point-circle thereof for locking said first gear between said surfaces of revolution, and each of the others of said gears having upon a portion of their peripheries, teeth for engaging the teeth upon said first gear.

4. In a train of gears having fixed axes of rotation, the combination of not less than three gears, the first of which is interposed between the other gears, said first gear having a portion of the teeth thereof removed, and each of the others of said gears having surfaces of revolution approaching said first gear to a point within the tooth point-circle thereof for locking said first gear between said surfaces of revolution, and each of the others of said gears having upon a portion of their peripheries, teeth for engaging the teeth upon said first gear, and means for causing the proper engagement of the teeth of the first gear with the teeth upon one of the other said gears when the teeth of the latter approach in the proper direction.

5. In a train of gears having fixed axes of rotation the combination of not less than three gears, the first of which is interposed between the other gears, said first gear having a portion of the teeth thereof removed, and each of the others of said gears having surfaces of revolution approaching said first gear to a point within the tooth point-circle thereof for locking said first gear between said surfaces of revolution, and each of the others of said gears having upon a portion of their peripheries, teeth for engaging the teeth upon said first gear; and an auxiliary arm upon said first gear and upon one of the other of said gears for insuring the intermeshing of said wheels, when the respective teeth approach in the proper direction.

6. In a carrying mechanism, the combination of registers, carrying-teeth on said registers and a cylindrical surface on said registers; a tens-carrying disk, a gear-tooth on said disk, and a cylindrical surface on said disk; a tens-storing wheel a part whereof consists of a mutilated gear-wheel, the point-circle portion whereof is greater in diameter than the distance between the curved surfaces on said registers and disk, whereby the gear-teeth on said storing-wheel are at times locked between said curved surfaces, the teeth of said storing-wheel intermeshing at times with the carrying-teeth on a register and at times with the tooth on the disk; and means for insuring the proper intermeshing of the gear-teeth on the storing-wheel with the carrying-teeth on the registers and disk.

7. In a carrying mechanism, the combination of registers, gear-teeth on said registers, carrying-teeth on said registers, and a cylindrical surface on said registers; a tens-carrying disk, a gear-tooth on said disk, an arm on said disk, and a cylindrical surface on said disk; a tens-storing wheel, gear-teeth on said wheel for intermeshing at times with the carrying-teeth on a register and at other times with the tooth on the carrying-disk, an arm on said storing-wheel for intermeshing at times with the gear-teeth on a register and for engaging at other times with the arm on said carrying-disk, the teeth and arm on said storing-wheel abutting at times against the cylindrical surface of a register to positively lock said storing-wheel; and the teeth on said storing-wheel also abutting at times against the cylindrical surface of said carrying-disk.

8. In combination, a tens-storing wheel interposed between a register and a tens-carrying disk, said tens-storing wheel being a toothed wheel mutilated by having a portion of the teeth thereof cut away, a register as aforesaid bearing teeth upon a portion of its periphery for engaging said tens-storing wheel, and said register having a cylindrical surface penetrating to within the point-circle of said storing-wheel; and the tens-carrying disk as aforesaid, also bearing teeth upon a portion of its periphery for engaging said tens-storing wheel and having a cylindrical surface penetrating to within the point-circle of said storing-wheel, said tens-storing wheel being thereby prevented from rotating when the said surfaces are adjacent thereto and said tens-storing wheel being rotated when the teeth of said register or of said carrying-disk approach said tens-storing wheel in the proper direction.

9. A train of mechanism for alternately rotating and preventing the rotation of one of the members thereof, said mechanism comprising a first member interposed between a second and third member, and said members being revoluble; said interposed member constituting a mutilated cog-wheel having cogs for engagement with cogs on said second and third members, and said second and third members having cylindrical sur-

faces approaching the axis of the first member to within a distance less than the radius of the point-circle thereof, said interposed member being thereby rotated when the teeth are engaged by the teeth upon either of the other members of the train, but prevented from rotating when the said cylindrical surfaces of said second and third members are in proximity to said interposed member.

10. In a carrying mechanism, tens-storing wheels each consisting of a mutilated toothed wheel and an auxiliary arm or tooth secured thereto; in combination with independently-movable registers; a series of tens-carrying disks moving as a single piece; and register-locking mechanism for coöperation with said tens-storing wheels.

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