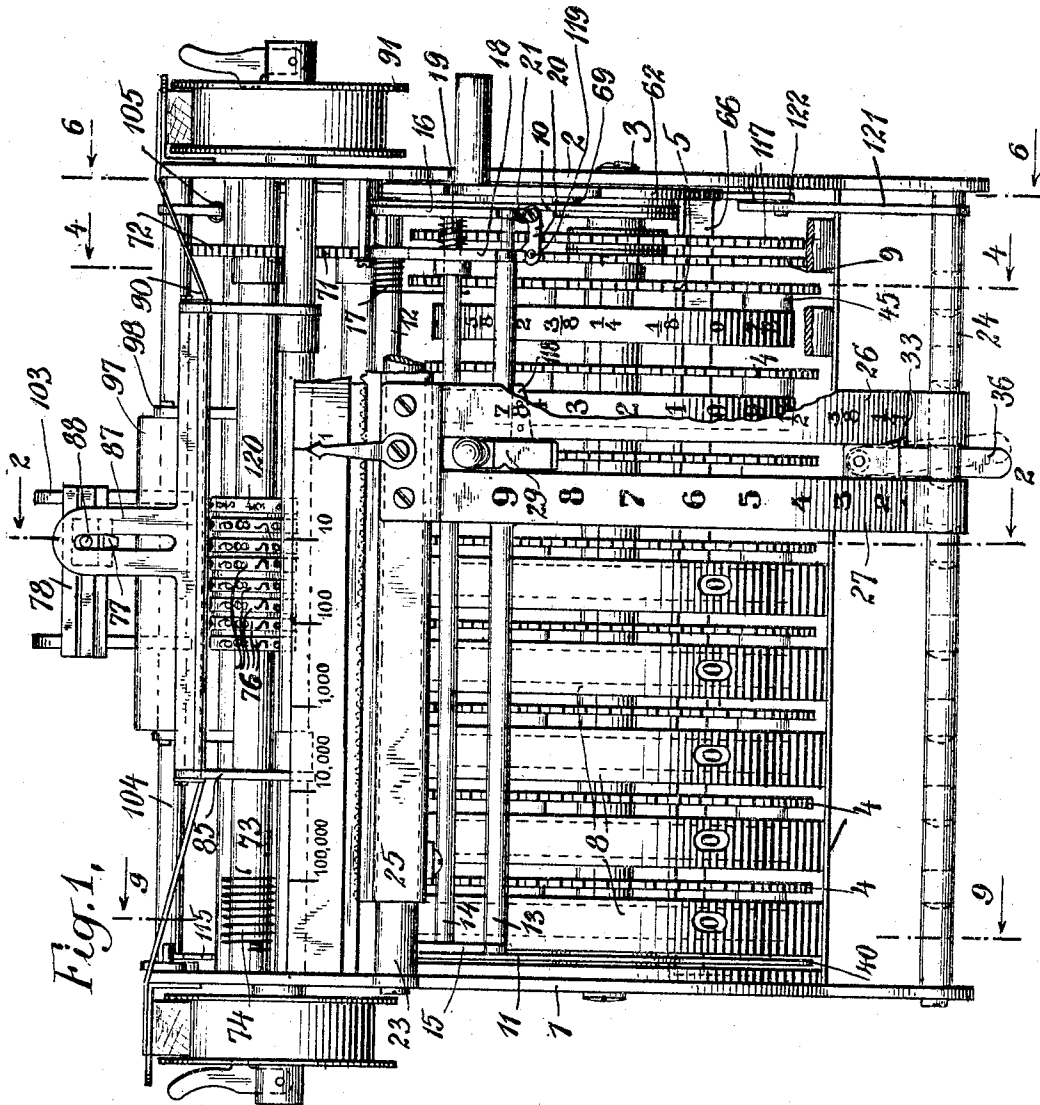


992,592.

W. P. QUENTELL.
CALCULATING MACHINE.
APPLICATION FILED AUG. 19, 1910.

Patented May 16, 1911.

5 SHEETS—SHEET 1.



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6 SHEETS—SHEET 2.

Fig. 2,

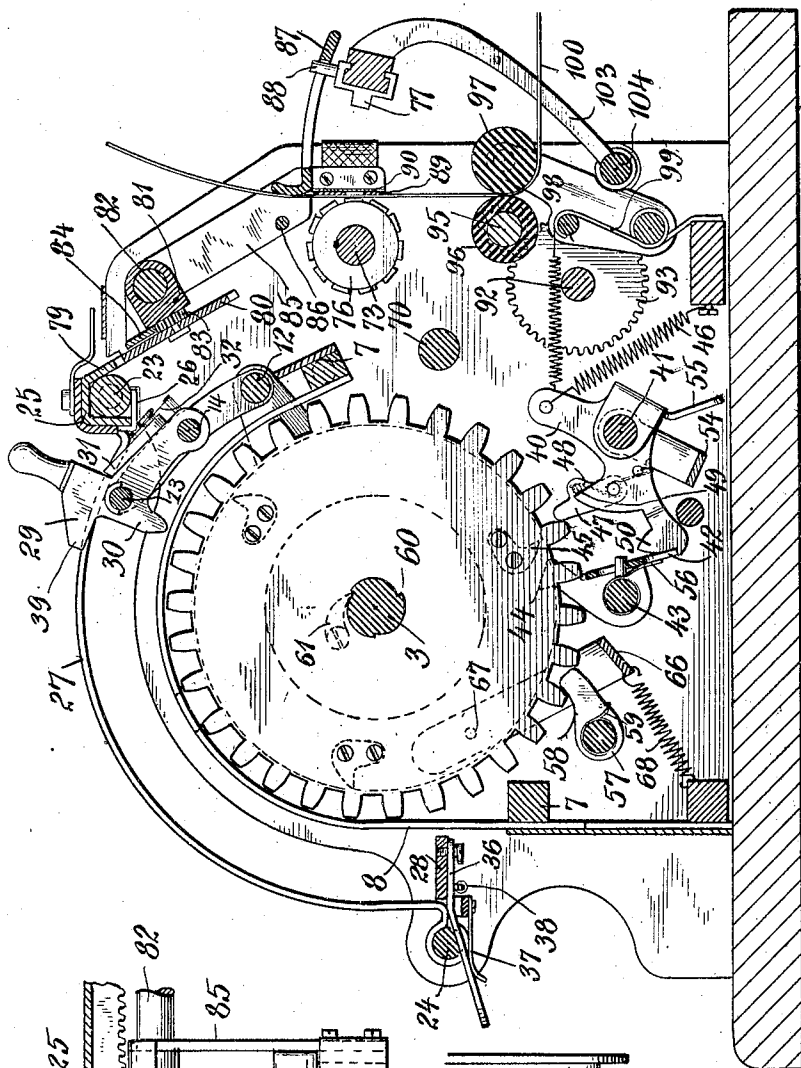


Fig. 3,

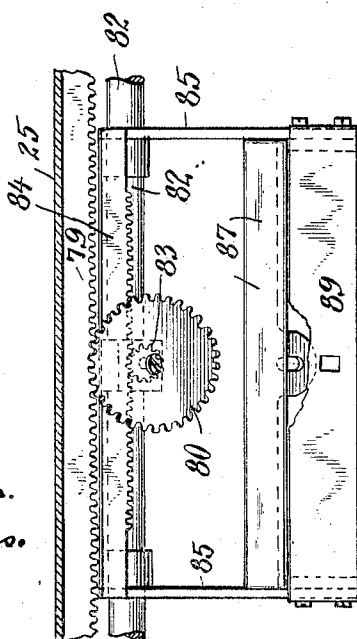
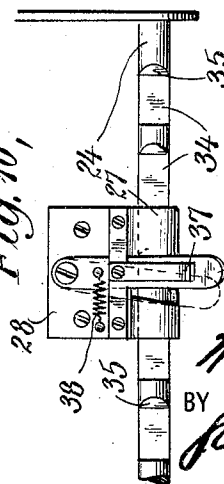


Fig. 10,



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5 SHEETS—SHEET 3.

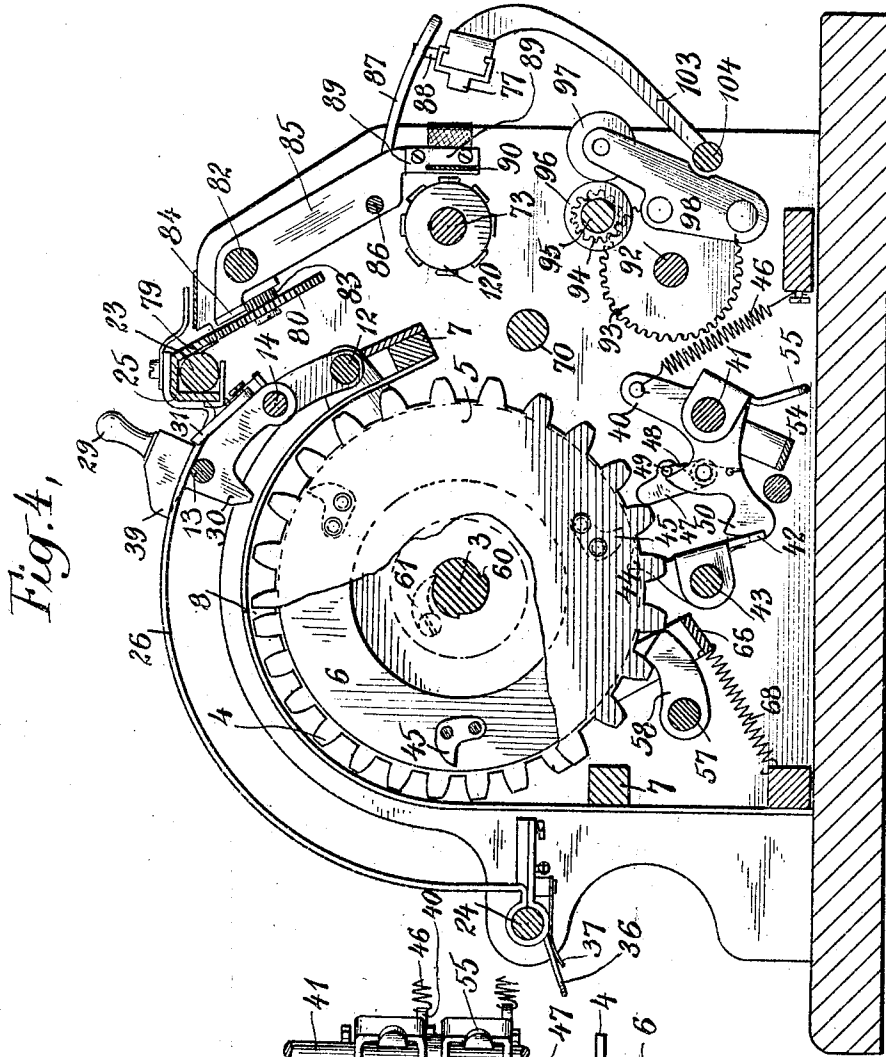
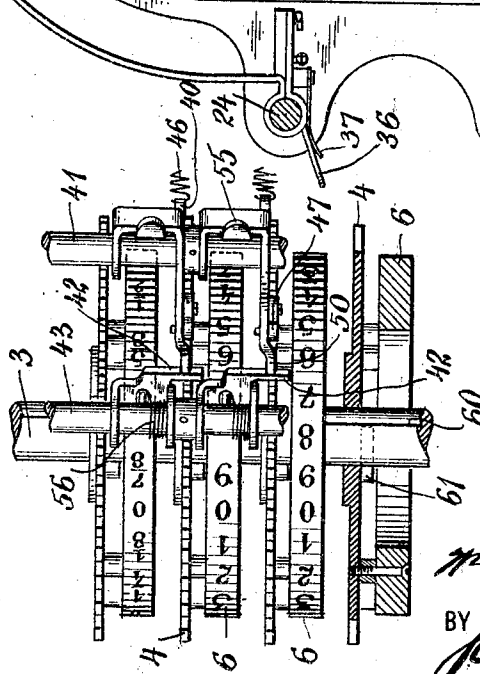


Fig. 4,

Fig. 5,



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Patented May 16, 1911.

6 SHEETS—SHEET 4.

Fig. 6,

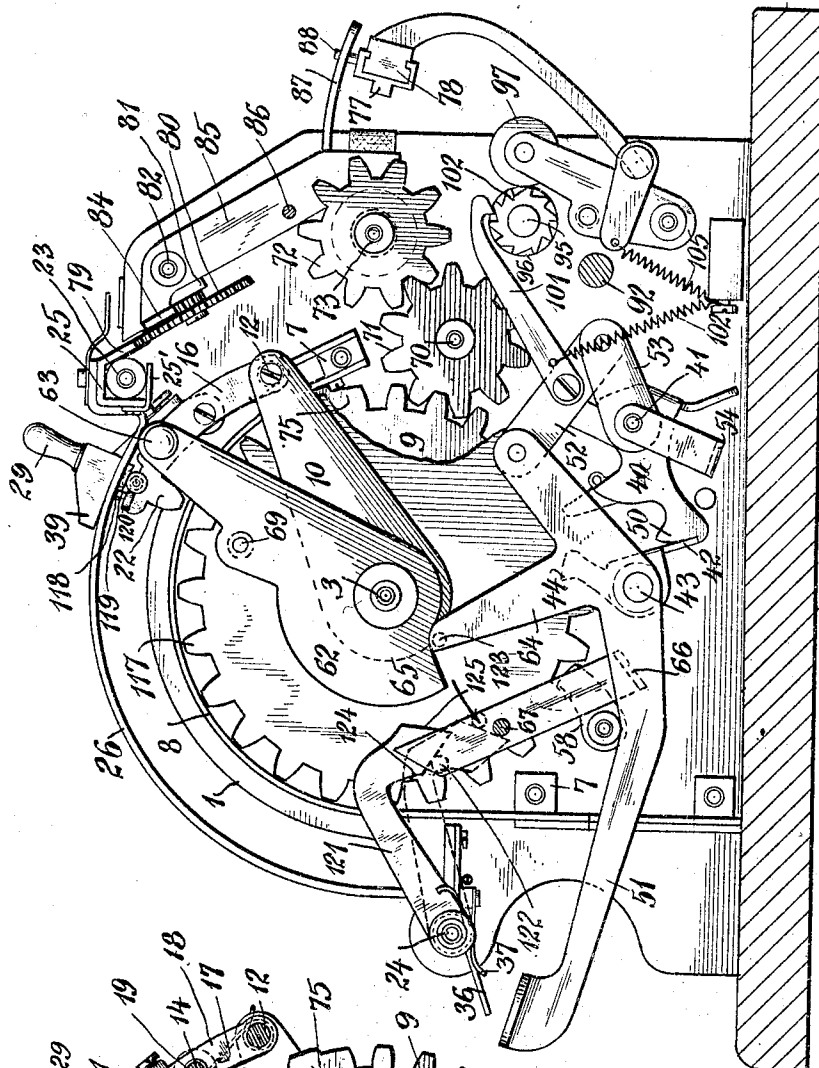
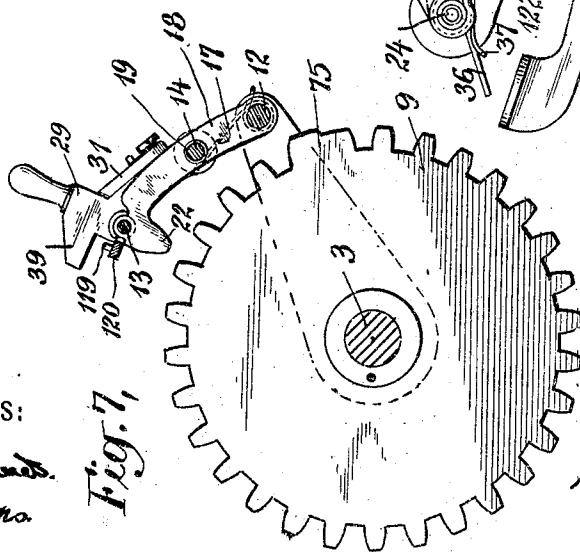


Fig. 7,



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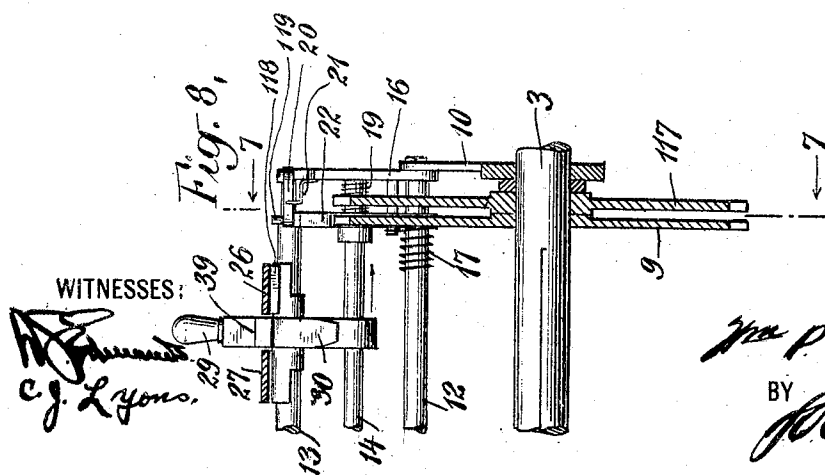
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APPLICATION FILED AUG. 19, 1910.

5 SHEETS--SHEET 5.



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UNITED STATES PATENT OFFICE.

WILLIAM P. QUENTELL, OF NEW YORK, N. Y.

CALCULATING-MACHINE.

992,592.

Specification of Letters Patent.

Patented May 16, 1911.

Application filed August 19, 1910. Serial No. 577,910.

To all whom it may concern:

Be it known that I, WILLIAM P. QUENTELL, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Calculating-Machines, of which the following is a specification.

This invention relates to calculating machines for performing mathematical operations mechanically and printing the results obtained.

The invention has reference more particularly to machines of the type disclosed in Patent Number 950,114 granted to me February 22, 1910.

The object of the invention is to effect various improvements in the construction of calculating machines whereby compactness and simplicity are secured, the operation of the machine is made more convenient and reliable and the cost of production reduced.

In a machine constructed in accordance with the invention, a plurality of number-wheels are employed and in combination with them an operating arm movable in one direction into coaction with any one of the wheels and in another direction to operate the wheel; also, printing members are arranged to be positioned in operating the wheels and to be actuated so as to print the result of the operation on a suitable strip. A single type-wheel moved both laterally and rotationally while operating the number-wheels may be employed to perform the printing or a plurality of rotatable number-wheels may be employed and in connection therewith a laterally movable platen which determines by its position which of the several number-wheels will print.

The invention may be utilized in a machine for calculating in the decimal system, as for instance in dollars and cents, and also in other fractional systems, as for instance in calculating in the British currency system; the invention will be described herein as embodied in a fractional adding machine such as may be employed in calculating in both decimal and non-decimal fractions.

The preferred embodiment of the invention is illustrated in the accompanying drawings in which—

Figure 1 is a top view of the machine. Fig. 2 is a transverse section on line 2—2 of Fig. 1. Fig. 3 is a longitudinal sectional view showing the gearing for positioning

the printing devices. Fig. 4 is a transverse section on line 4—4 of Fig. 1. Fig. 5 is a detail view partly in transverse section showing the carrying mechanism. Fig. 6 is a transverse sectional view on line 6—6 of Fig. 1. Fig. 7 is a detail view in section on line 7—7 in Fig. 8. Fig. 8 is a detail view showing a portion of the fractional adding mechanism. Fig. 9 is a transverse section of the machine on line 9—9 of Fig. 1; and Fig. 10 is a detail view of the column-locking mechanism.

Referring to these drawings, the machine consists of two side frames 1 and 2 and a shaft 3 extending between them upon which a plurality of number-wheels 4 are mounted for rotation one parallel to another. Each of these wheels 4 is provided with regularly spaced teeth in the form of a gear. In the machine for calculating in the decimal system each wheel has ten teeth or a multiple of ten teeth. In the machine illustrated all of the wheels are arranged for calculating in the decimal system except the number-wheel 5 at the right of the machine, which is adapted for adding non-decimal fractions. For this reason all of the number-wheels 4 are provided with ten or a multiple of ten teeth, and I have found it most convenient to provide these wheels with thirty teeth. Each wheel 4 and the wheel 5 has a drum 6 secured to one side thereof; the periphery of the drum for each wheel 4 is provided with numerals from 0 to 9 corresponding to the spaces between adjacent teeth on the wheel to which the drum is secured, there being three series of such numerals on each drum. Extending between the side frames are a plurality of bars 7 and a casing 8 is secured to these bars, this casing being curved so as to extend closely around the upper portions of the wheels 4 and 5 as best shown in Fig. 2. This casing is cut to provide therein a plurality of parallel slots one overlying each of the number-wheels 4 and 5, and in each of the portions of the casing between adjacent slots is an opening through which the numerals upon the drums 6 may be seen one at a time. The number-wheels 4 and 5 are loose upon the shaft 3 so that they may rotate in one direction free of the shaft, but the wheels are adapted to be locked to the shaft temporarily when resetting the wheels at zero, as hereinafter described.

At one side of the series of numeral

wheels and parallel thereto is an operating wheel 9 provided with teeth similar in number and spacing to the teeth on wheel 4. This wheel 9 rotates loosely upon shaft 3 at all times. Loosely mounted upon the shaft 3 near the ends thereof are two arms 10 and 11, between which extends a rod 12. This rod forms a pivot for a rectangular frame consisting of rods 13 and 14 and side pieces 15 and 16, the latter being secured to the ends of the rods 13 and 14 and having openings therein at their ends through which the rod 12 extends. Springs 17 coiled on rod 12 engage the rod 14 at one end and the adjacent arm 10 or 11 at the other, these springs acting to turn the frame about the rod 12 as a pivot in a direction to carry rod 13 away from the number-wheels 4. Parallel and adjacent to the side piece 16 is a similar piece 18 adapted to slide laterally upon the rods 12, 13 and 14. A spring 19 coiled on rod 14 between the pieces 16 and 18 tends to move piece 18 away from piece 16 and hold it in the position in which it is shown in Fig. 1. In this position the piece 18 directly overlies the operating wheel 9 and the piece is held in this position by a latch 20 actuated by a spring 21 to carry a tooth on the latch into coaction with the piece 18, as shown in Fig. 1. The piece 18 has a tooth 22 on its under side which when the frame 13, 14 is depressed is adapted to enter between adjacent teeth on the operating wheel 9. Extending between the said frames of the machine are two rods 23 and 24 which form a support for a laterally movable carriage. This carriage includes a strip 25 folded about the rod 23 and having arms 25' secured thereto and projecting under the rod so as to retain the strip 25 upon the rod. Secured to the strip 25 are two parallel strips 26 and 27, curved to overlie the casing 8, the ends of these strips being coiled about the rod 24 so as to slide thereon. These ends of the strips are connected by a crossbar 28. An operating arm 29 provided with a handle as shown is mounted upon the rods 13 and 14 so as to slide laterally thereon, and is disposed between the two strips 26 and 27, so that as this arm is moved laterally it moves the carriage consisting of the strips 26 and 27, and the strip 25 laterally with it. On the under side of the arm 29 is a projection 30 which may be caused to enter the spaces between adjacent teeth on any one of the number-wheels 4 and 5 by depressing the frame, including the rods 13 and 14, against the tension of the springs 17. Pivotaly mounted upon the top of the handle 29 is a latch 31 acted upon by a spring 32 in such a direction that when the handle 29 is depressed to carry projection 30 into engagement with a number-wheel the end of latch 31 will be moved under the edge of the strip 26 so that the operating arm cannot be raised

up to its normal position until it has been rotated about shaft 3 to the end of its forward stroke, at which time the end of latch 31 comes under a notch 33 formed in the edge of strip 26, whereupon the operating handle may be raised. During the backward stroke of the operating arm the latch engages the straight edge of the strip 26 and is pressed back against the tension of the spring 32. The under side of the rod 24 is provided with a series of notches 34 as shown in Figs. 2 and 10, one notch corresponding to each number-wheel 4 and 5. Each notch has a straight wall at one end thereof but at the other end is provided with an inclined wall 35. Pivotaly mounted upon the under side of strip 28 is a lever 36 and a leaf spring 37 presses upon this lever to normally hold it up in one of the notches 34. A coiled spring 38 is connected to the lever 36 and to the support for that lever, and acts upon the lever to move it toward the right of Fig. 1. When the carriage consisting of the strips 25, 26, 27 and 28, the operating arm 29 and the lever 36 moves to the right, the lever 36 is raised into one of the notches 34 by spring 37 and then abuts against the straight wall at the right of the notch, thus locking the carriage against further movement to the right, and at this time the operating arm 29 will be directly over one of the number-wheels. When the arm is moved forwardly a projection 39 thereon strikes the lever 36 moving the latter downwardly out of the notch 34 and immediately spring 38 moves the lever 36 laterally to the position in which it is shown in dotted lines in Fig. 10, so that when the operating arm is retracted the lever 36 will bear upon the unnotched portion of rod 24 and the carriage may then be moved to the right again until such movement is again arrested by the lever 36 coming into contact with the straight wall of the next adjacent notch 34.

The operation of these parts of the machine will now be described.

The operating arm 29 may be moved laterally to a position overlying any one of the number-wheels 4 and 5, may then be depressed into engagement with that wheel and may then be rotated about shaft 3 so as to cause rotation of the number-wheel with which the operating arm is in engagement; also by rotating the operating arm more or less before depressing it into engagement with the underlying number-wheel, and then rotating the arm through the remaining portion of its stroke in engagement with the number-wheel, the number-wheel can be actuated the desired amount. To facilitate this, the strip 27 of the carriage may be provided with numerals from nine to one so that a mark on the operating handle may be positioned opposite the desired numeral on

strip 27 before the handle is depressed. To register a number the carriage is moved to the left until the operating arm passes slightly beyond the wheel corresponding to the numerical order of the first digit of the number to be listed and the carriage is then moved slightly to the right until it is arrested in the proper position by the lever 36. The operating arm and the frame to which it is attached will then be moved forwardly until the mark in the arm is opposite the number on the strip 27 corresponding to the first digit of the number to be listed and the arm is then depressed rocking the frame on which it is mounted until the projection 30 enters between two adjacent teeth on the underlying number-wheel, and this depression of the arm will carry the tooth 22 on the piece 18 into one of the spaces between adjacent teeth on the operating wheel 9. The operating arm and the frame to which it is attached are then moved forwardly to the end of their stroke and the number-wheel engaged by the operating arm, together with the operating wheel 9, will be correspondingly rotated. At the end of this stroke the operating arm engages lever 36 and forces it from its notch 34, whereupon the operating arm may be raised and retracted and the carriage moved to the right until it is arrested by lever 36 with the operating arm overlying the next adjacent number-wheel. The operation may be repeated in this way until the entire number is listed, and it will be seen that each number-wheel will be rotated a distance corresponding to the digit in the numerical order or column to which that wheel corresponds, and that each time a number-wheel is rotated the operating wheel 9 will be correspondingly rotated.

The carrying mechanism consists of a spring actuated lever and a latch therefor for each number-wheel, the latch being adapted to be released by one number-wheel so as to permit the lever to be actuated by its spring so as to operate the next adjacent number-wheel a distance equal to one tooth thereof. The spring actuated levers 40 (Figs. 4 and 6) are mounted side by side upon a shaft 41 extending between the side frames and the latches 42 are mounted upon a similar shaft 43. Each latch 42 is provided with an extension or tooth 44 adapted to be engaged by any one of teeth 45 secured to the side of the number-wheel corresponding to the latch 42. As many teeth 45 are provided upon each number-wheel as there are multiples of ten teeth on that wheel, in the present instance three such teeth being provided. Each lever 40 has a spring 46 connected thereto and adapted to turn the lever in a clock-wise direction as shown in Fig. 2. Pivottally mounted on each lever 40 is a tooth 47 adapted to engage with the teeth of the number-wheel next adjacent to

that number-wheel whose tooth 45 operates the latch 42 of the lever 40 on which tooth 47 is mounted. Tooth 47 is provided with a spring 48 which holds it normally in the position in which it is shown in Fig. 2 with a pin 49 on the tooth in engagement with a wall of the lever 40. Each lever 40 is also provided with a tooth 50. When the latch 42 is actuated, the lever 40 is turned by its spring 46 and the tooth 47 engages a tooth on the corresponding number-wheel to advance that number-wheel a distance equal to one tooth thereon, whereupon the tooth 50 on the lever 40 enters between two teeth of the number-wheel and arrests further rotation thereof. After a number has been registered all of the levers 40 which have been actuated are reset in their initial positions by means of a lever 51 pivottally mounted upon the shaft 43. The rear end of this lever is connected by a link 52 with a crank 53 secured to shaft 41, and this shaft has a bail 54 secured thereto. Each lever 40 is provided with a tail-piece 55 so that when the forward end of lever 51 is depressed the bail 54 will be turned about the axis of shaft 41 and will engage the tail-pieces 55 of all of the levers 40 which have been actuated and will restore those levers to their initial positions against the tension of their springs 46. When this has been done the latches 42 will be pressed by springs 56 bearing thereon into coaction with shoulders on the levers 40 so as to hold those levers in position. When the levers 40 are so held they do not obstruct movement of the number-wheels as such movement is accomplished by turning the teeth 47 upon their pivots against the tension of their springs 48.

Extending between the side frames is a rod 57 on which a plurality of detents 58 are mounted each pressed by a spring 59 into engagement with the teeth of a numberwheel. This detent 58 serves to center the numberwheel accurately and to prevent backward rotation thereof.

In order to permit of resetting the numberwheels at the zero position the shaft 3 on which the numberwheels are loosely mounted is provided with three lengthwise grooves 60, as shown in Fig. 2, and each numberwheel is provided with a spring-pressed detent 61 bearing upon the periphery of shaft 3. At one side of the machine shaft 3 has a lever 62 secured thereto and provided with an operating handle 63. By turning this handle through substantially 120° one of the lengthwise notches 60 on shaft 3 will be brought into engagement with the detent 61 on each of the numberwheels and will move the number-wheels far enough to bring the zeros on the drums 6 thereof under the sight openings in the casing 8 as shown in Fig. 1. An interlock is provided between the lever 62 and the lever

51 whereby it will be impossible to reset the wheels at the zero position until the lever 51 has been depressed so as to reset all of the levers 40; for if any one of the levers 40 were not in its initial position it would hold the corresponding number-wheel against rotation. This interlock is provided by means of an arm 64 formed on the lever 51 and coacting with a projection 65 on the lever 62. When lever 51 is depressed arm 64 thereon will be carried away from the projection 65 so that arm 62 may then be freely operated. In order to prevent overthrow of the number-wheels when moved to the resetting position by lever 62, a lock for the number-wheels is provided which arrests further movement thereof at the conclusion of the movement effected by lever 62. This lock consists of a bail 66 pivotally mounted at 67 upon the side frames of the machine and held in a retracted position by the spring 68 (Fig. 2). When lever 62 is moved forwardly a stud 69 thereon engages the upper end of one of the arms supporting the bail 66 at the end of the stroke of lever 62 and turns bail 66 on its pivot against the tension of spring 68 until the bail enters between the teeth of all of the number-wheels so as to preclude excessive movement of the number-wheels under momentum.

The printing mechanism will now be described.

Extending between the side frames of the machine is a rotatable shaft 70 (Fig. 6) carrying a pinion 71 which meshes with the operating wheel 9 and also with a pinion 72 secured upon a type-wheel shaft 73 mounted for rotation in the side frames of the machine. This shaft 73 has a spring 74 (Fig. 1) coiled thereon and secured at one end to the shaft and at the other to a pin projecting from the side frame 1 so that the shaft, the pinion 71 and the wheel 9 which is loose on shaft 3, will be turned backwardly by spring 74 as soon as the operating wheel 9 is released by the tooth 22 on the piece 18 due to the raising of the operating arm 29 and the frame to which it is secured. This backward rotation of the wheel 9, the pinion 71 and the type-wheel shaft 73 is arrested with the type-wheel on the shaft 73 in the zero position by an untoothed portion 75 (Fig. 6) on the wheel 9 engaging with pinion 71. The printing mechanism consists of one or more type-wheels as one member of the printing couple and a platen as the other; one of these two members is moved laterally when the operating device 29 is moved laterally to select the number-wheel corresponding to the desired numerical order, and also, one of these two members is moved when the operating device is moved to rotate a number-wheel and an operating-wheel a distance corresponding to the value of the number to be listed. The

machine illustrated being adapted for calculating in both decimal and non-decimal systems a plurality of type-wheels are employed and in connection therewith a laterally movable platen which may be moved so as to coact with any one of the several type-wheels. The type-wheels are shown at 76 secured upon the shaft 73 so that each time a number-wheel and the operating wheel 9 are rotated the type-wheel will be correspondingly rotated, and as soon as the operating wheel is released the type-wheel will be rotated backwardly by spring 74 until the zeros thereof are opposite the platen. The platen is shown at 77 mounted for lateral movement upon a support 78. This movement is effected when the carriage including the operating device 29 is moved laterally, and corresponds to the lateral movement of the carriage, but is preferably less than that movement.

The strip 25 forming the upper support for the carriage has a rack 79 formed on the edge thereof, which meshes with a gear 80 pivotally mounted upon a support 81 secured upon a rod 82 extending between the side frames of the machine. Secured to the gear 80 is a pinion 83 which meshes with rack 84 carried by a frame 85 arranged to slide laterally upon the rod 82, and a rod 86 also extending between the side frames. Secured to this frame is an arm 87 having a slot formed therein which receives a pin 88 projecting upwardly from the platen 77. A strip 89 is secured to the frame 85 in position to form a paper support but has an opening therein as shown in Fig. 3 through which the platen 77 may project. The ends of this strip 89 are slotted as shown in Fig. 4 to form a guide for an ink ribbon 90. The ends of this ribbon are carried by spools 91, locked upon the ends of a shaft 92. This shaft 92 is provided with a gear 93 meshing with a pinion 94 carried by the shaft 95 of a paper feeding roll 96, the shaft 95 being mounted for rotation on the side frames of the machine. A roll 97 coacts with the roll 96, the former being mounted on pivotally supported arms 98 actuated by a spring 99 to press the roll 97 forward the roll 96. The paper strip 100 passes between the rolls 96 and 97 and then upwardly between the type-wheels and the strip 89. The paper feeding rolls are actuated intermittently by means of a toothed arm 101 pivotally mounted upon link 52 (Fig. 6). A spring 102 is connected at one end to the arm 101 and at the other to a part of the frame of the machine and tends to hold the lever 51 in the position in which it is shown in Fig. 6. This spring holds the free end of arm 101 upon the periphery of a ratchet wheel 102 secured to the shaft 95 on which the paper feeding roll 96 is mounted. When the forward end of lever 51 is

depressed the tooth on the end of arm 101 will engage a tooth of the ratchet 102 and will feed the paper strip 100 upwardly a predetermined amount, and the shaft 92 carrying supports for the ink ribbon will be rotated slightly so as to feed the ink ribbon in the direction of its length. This depression of the forward end of the lever 51 operates simultaneously to reset the carrying mechanism, to advance the paper strip and to feed the ink ribbon.

The platen 77 (Figs. 4 and 6) is operated to print automatically at the end of the movement of the operating device 29 to rotate a number-wheel. The support 78 for the platen 77 is carried by arms 103 secured upon a shaft 104 extending between the side frames of the machine and rotatable in bearings formed in the side frames. A spring 105 acts upon this shaft to turn it in a direction to carry the platen into coaction with a type-wheel. The platen is normally held in its retracted position by a latch lever 106 pivotally mounted at 107 (Fig. 9) and acted upon by a spring 108 to engage lever 109 secured on shaft 104 so as to hold the platen support in a retracted position. The arm 11 forming one of the side supports for the operating device 29 is provided with a projection 110 which, when the operating device 29 reaches the end of its forward stroke, engages the end of lever 106 and rocks that lever against the tension of spring 108 to cause the lever to release lever 109 and allow the platen 77 to be moved forwardly by its spring 105 so as to effect the printing. On the arm 11 is a pivotally mounted tooth 111 actuated by a spring 112 and which during the forward movement of the lever 11 and the operating device rides over a projection 113 upon a lever 114 pivotally mounted upon the side frame 1. When the operating device is returned to its initial position the tooth 111 engages the projection 113 thus rocking lever 114 on its pivot and when this lever is so rocked it reciprocates a strip 115 against the tension of the spring 116 connecting that strip with a stud on the side frame 1. Strip 115 when so reciprocated engages the lever 109 and turns it, together with the shaft 104 upon which it is secured, so as to carry the platen to its rearward position, whereupon the lever 109 will be again latched by lever 106.

In order to prevent listing one row of figures over another row upon the paper strip proper means may be provided for enforcing feeding of the paper strip before another line of figures can be listed. This means is shown in Fig. 6 and operates in connection with the bail for locking the type-wheels. Pivotally mounted upon the rod 24 is a lever 121 the end of which is provided with two cam surfaces, one of which is adapted to engage a pin 122 upon the support for the

bail 66. The lever 121 is in position to be engaged by the operating device when the latter is operated to rotate the last number-wheel at the right of the machine, and when so operated this cam surface will act to move the bail into position for locking all the number-wheels. The cam surface of one edge of lever 121 is undercut slightly as shown at 124 so that the lever will remain in engagement with pin 122 and hold the bail in locking position. In order to release the number-wheel it is necessary to depress the lever 51 which feeds the paper strip. When this lever is depressed, a pin 123 on the arm 64 thereof engages the cam surface 125 at the end of the lever 121 and raises the lever out of coaction with pin 122 thus allowing the bail to be returned to its normal position by its spring, thus actuating the last wheel to the right of the machine enforces feeding of the paper strip before operations may be resumed to list another number.

The construction above described is suitable for use in calculating in the decimal or any other one system but it is sometimes desirable to have in a single machine mechanism for calculating in two or more fractional systems, as for instance, in calculating in British currency. The invention may be readily employed in a machine for calculating in two or more fractional systems. Thus in the machine illustrated I have shown one number-wheel for calculating in fractions of one-eighth. For this purpose number-wheel 5 at the right of the machine is provided with three series of eight teeth or twenty-four teeth, and the drum secured to that number-wheel is suitably marked in eighths as shown in Fig. 1. It will be seen that the spacing of the teeth on the number-wheel 5 will be different from the spacing of the teeth on the number-wheels 4, and therefore different from that of the operating wheel 9 so that when the projection 30 on the operating device is moved into coaction with the teeth on the wheel 5 the projection 22 on the frame carrying the operating device cannot be moved into engagement with the teeth of the operating wheel 9. I have therefore provided a second operating wheel 117 (Figs. 1 and 8) close beside the operating wheel 9 and secured thereto. Secured to the strip 26 or any other suitable portion of the carriage is a cam 118 which when the carriage is moved laterally to the right engages pin 119 on the lever 20 and raises that lever from the position in which it locks the piece 18. When the carriage is moved over to the right so as to carry the operating device into coaction with number-wheel 5 the side of the carriage will engage the piece 18 and move it laterally against the tension of the spring 19 until the projection 22 on the piece 18 overlies the operating wheel 117. The projection 30 on

the operating device may then be moved into engagement with the teeth of the number-wheel 5 and the projection 22 on the frame carrying the operating device will then be moved into engagement with the teeth of the operating wheel 117. The operating device may then be rotated so as to move the number-wheel 5 the required distance and at the same time it will move the operating wheel 117 and with it the wheel 9 and the type-wheel shaft 73. This will cause rotation of the type-wheel 120 corresponding to the number-wheel 5 a distance commensurate with the rotation of the number-wheel 5, and this type-wheel 120 will be used in printing at the end of the forward movement of the operating device, since the lateral movement of the operating device to bring it into coaction with number-wheel 5 will have moved platen 77 laterally to a point opposite the type-wheel 120. On the lateral movement of the carriage to the left again to bring the operating device into coaction with any one of the number wheels 4 the spring 19 will press the piece 18 back to its initial position overlying the operating wheel 9 in which position the piece will be locked by the tooth of lever 20.

The operation of the machine has been described in connection with the foregoing description. It will be seen that a manual operating device is provided which may be moved into coaction with any one of a plurality of number wheels, and may then be operated to rotate the number-wheel a distance corresponding to the number it is desired to list; that when the operating device is moved into coaction with a number-wheel one member of the printing couple is correspondingly moved to cause printing in a column corresponding to the number-wheel selected; that rotation of the number-wheel causes corresponding rotation of a type-wheel and that at the end of the movement of the operating device the printing couple will be operated to print the number upon the paper strip. The operation may be repeated with respect to each of the several numerical orders and thereafter the paper strip may be fed forward so that a new number may be listed thereon. When such new number is so listed it will be added to the number previously listed and the total will be exhibited through the sight openings provided in the casing of the machine, and after a column of figures has been listed the total may also be listed and the several number-wheels may be returned to the zero position.

Having thus described my invention, what I claim as new therein and desire to secure by Letters Patent is:

1. In a calculating machine, the combination of a plurality of number-wheels arranged parallel one to another and in line,

an operating device movable into coaction with any one of said wheels and movable to operate the wheel, a printer-operating wheel parallel and in line with the number-wheels and common to all of them, means actuated by said operating device for rotating the printer-operating wheel when operating any one of the number-wheels, and printing members one of which is positioned by the rotation of said printer-operating wheel, substantially as set forth.

2. In a calculating machine, the combination of a plurality of number-wheels, an operating device movable into coaction with any one of said wheels and movable to operate the wheel, a printer-operating wheel common to all said number-wheels and movable by said device when the latter moves any one of the number-wheels and a printing member positioned by said printer-operating wheel, substantially as set forth.

3. In a calculating machine, the combination of a plurality of number-wheels, a printer-operating wheel, means for simultaneously engaging any selected number-wheel and said printer-operating wheel, said means being movable to operate the wheels with which it is in engagement, and a printing-member positioned by said printer-operating wheel, substantially as set forth.

4. In a calculating machine, the combination of a plurality of number-wheels, a printer-operating wheel, a carriage movable relatively to said wheels, an operating device movable with said carriage and into engagement with any one of said number-wheels, a member moved into engagement with said printer-operating wheel when said device is moved into engagement with a number-wheel and a printing member positioned by said printer-operating wheel, substantially as set forth.

5. In a calculating machine, the combination of a plurality of number-wheels, a printer-operating wheel, a frame, an operating device movable on said frame into coaction with any one of said wheels, said frame being movable to carry said device into engagement with a number-wheel, a part movable with said frame into engagement with said printer-operating wheel, and a printing member positioned by said printer-operating wheel, substantially as set forth.

6. In a calculating machine, the combination of a plurality of number-wheels and a printer-operating wheel rotatable about an axis, a frame rotatable about said axis, an operating device movable parallel to said axis into coaction with any one of said wheels, said frame being movable to carry said device into engagement with a number-wheel, a part movable with said frame into engagement with said printer-operating wheel, and a printing member positioned

by said printer-operating wheel, substantially as set forth.

7. In a calculating machine, the combination of a plurality of rotatable number-wheels, a pivotally mounted support, a frame pivoted on said support, and an operating device mounted on said frame and movable therewith into engagement with a number-wheel, substantially as set forth.

10 8. In a calculating machine, the combination of a plurality of rotatable number-wheels and a printer-operating wheel, a pivotally mounted support, a frame pivoted on said support, an operating device mounted
15 on said frame and movable therewith into engagement with a number-wheel, a part on said frame movable into engagement with said printer-operating wheel, and a printing member positioned by said printer-
20 operating wheel, substantially as set forth.

9. In a calculating machine, the combination of a plurality of number-wheels rotatable about an axis, a support movable about said axis, a frame pivotally mounted
25 on said support, and an operating device mounted on said frame, said device being movable with said frame into engagement with a number-wheel and with said support about said axis to rotate a number-wheel,
30 substantially as set forth.

10. In a calculating machine, the combination of a plurality of number-wheels rotatable about an axis, an operating device movable in the direction of said axis to
35 carry it into coöperative relation to any one of the number-wheels, movable toward the selected wheel to engage the latter and rotatable about said axis to operate the selected number-wheel, and means for arresting
40 the movement of said device in the direction of said axis when the device is in position to coact with a number-wheel, substantially as set forth.

11. In a calculating machine, the combination of a plurality of number-wheels, an operating device movable into coaction with
45 a number-wheel and movable to operate the wheel, means for arresting the movement of said device when in position to coact with a number-wheel, and means operated by the
50 movement of said device to operate a wheel for releasing said arresting means, substantially as set forth.

12. In a calculating machine, the combination of a plurality of number-wheels arranged parallel in line, an operating device
55 movable laterally into coaction with any one of said wheels and movable to operate the wheel, means for arresting the movement of said device when in position to coact with
60 a number wheel, means operated by the movement of said device to operate a wheel for releasing said arresting means and means whereby, when said arm is moved
65 laterally, said arresting means will auto-

matically arrest its movement when in position to coact with the next adjacent wheel, substantially as set forth.

13. In a calculating machine, the combination of a plurality of number wheels, a
70 printer-operating wheel, a movable frame, a part thereon adapted to engage said printer-operating wheel, an operating device movable laterally on said frame into coaction
75 with any one of said number-wheels and movable with the frame into engagement with a number-wheel, means for arresting the lateral movement of said device when in
80 position to coact with a number-wheel, and a printing member positioned by said printer-operating wheel, substantially as set forth.

14. In a calculating machine, the combination of a plurality of number-wheels, an operating device movable into coaction with
85 any one of said wheels and movable to operate the wheel, a rod having a plurality of notches therein one for each number-wheel, and a member movable with said device
90 when the latter is moved into coaction with a wheel and adapted to enter one of said notches to arrest movement of said device, substantially as set forth.

15. In a calculating machine, the combination of a plurality of number-wheels, an
95 operating device movable into coaction with any one of said wheels and movable to operate the wheel, a rod having a plurality of notches therein one for each number-wheel, a member movable with said device when the
100 latter is moved into coaction with a wheel and adapted to enter one of said notches to arrest movement of said device, and means operated when said member is moved
105 to operate a wheel for removing said member from its notch, substantially as set forth.

16. In a calculating machine, the combination of a plurality of number-wheels, an operating device movable into coaction with
110 any one of said wheels and movable to operate the wheel, a rod having a plurality of notches therein one for each number-wheel, a member movable with said device when the latter is moved into coaction with a
115 wheel, springs for moving said member into the notches in said rod and in the direction of the length of said rod and means movable with said device for removing said
120 member from a notch, substantially as set forth.

17. In a calculating machine, the combination of a plurality of number-wheels arranged in line, a carriage movable laterally
125 with respect to said wheels, an operating device movable with said carriage into coaction with any one of said wheels and movable to operate a wheel and mechanism mounted on said operating device and engaging
130 said carriage for requiring a full

stroke of said device to be made when operating a wheel, substantially as set forth.

18. In a calculating machine, the combination of a plurality of number-wheels, an operating device movable into coöperative relation to any one of said wheels, movable into engagement with a wheel and movable to operate the wheel engaged thereby, and a latch moved to latching position when said device is moved into engagement with a wheel and serving to hold the device in engagement with the wheel, said latch being movable to unlatching position only at the end of the range of movement of said device, substantially as set forth.

19. In a calculating machine, the combination of a plurality of number-wheels, a frame pivotally mounted and movable toward and away from said wheels, an operating device movable upon said frame into coöperative relation to any one of said wheels, movable with the frame into engagement with a wheel and movable with the frame about the pivot of the frame to operate a wheel, substantially as set forth.

20. In a calculating machine, the combination of a plurality of number-wheels and carrying mechanism therefor comprising a spring-actuated lever for each wheel, a latch for each lever, means on each wheel for operating the corresponding latch to release the lever held thereby, said lever when so released actuating the next adjacent wheel, a yielding tooth on each lever adapted to engage and actuate the wheel, and a projection on each lever adapted when the lever is released to engage the wheel and prevent overthrow thereof, substantially as set forth.

21. In a calculating machine, the combination of a plurality of number-wheels, means for operating the same, a printing mechanism positioned in operating said wheels, a paper-feeding mechanism, means for resetting the number-wheels, means for actuating the paper-feeding mechanism, and means for preventing resetting of the number-wheels until the paper-feeding mechanism has been actuated, substantially as set forth.

22. In a calculating machine, the combination of a plurality of number-wheels for calculating in different fractional systems, an operating device movable to operate any one of said wheels, a plurality of operating wheels, one for the number-wheels of each fractional system, and means for operating one of said operating wheels whenever a number-wheel of the corresponding fractional system is operated, substantially as set forth.

23. In a calculating machine, the combination of a plurality of number-wheels for calculating in different fractional systems, an operating device movable to operate any one of said wheels, a plurality of operating

wheels, one for the number-wheels of each fractional system, means for operating one of said operating wheels whenever a number-wheel of the corresponding fractional system is operated, a printing mechanism including a type-wheel, and means for causing said operating wheels to rotate said type-wheels, substantially as set forth.

24. The combination of a plurality of number-wheels rotatable about an axis, an operating device rotatable about said axis and movable laterally into coaction with any one of said number-wheels, a plurality of operating wheels, means on said operating device for engaging and operating one of said operating wheels when operating certain of said number-wheels and for engaging and operating another of said operating wheels when operating other of said number-wheels, and printing mechanism positioned by said operating wheels, substantially as set forth.

25. The combination of a plurality of number-wheels having differently spaced teeth, a plurality of operating wheels having teeth spaced to correspond with the teeth of the number wheels, means for operating any number-wheel and the operating wheel having the correspondingly spaced teeth, and printing mechanism positioned by said operating wheels, substantially as set forth.

26. The combination of a plurality of number-wheels having differently spaced teeth, a plurality of operating wheels having teeth spaced to correspond with the teeth of the number-wheels, an operating device movable into engagement with any number-wheel, a part moved with said device into engagement with the operating wheel having teeth spaced to correspond with the spacing of the teeth of the wheel engaged by said device, said device being movable to operate the wheels engaged thereby, and printing mechanism positioned by said operating wheel, substantially as set forth.

27. The combination of a plurality of number-wheels having differently spaced teeth, a plurality of operating wheels having teeth spaced to correspond with the teeth of the number-wheels, means for operating any number-wheel and the operating wheel having the correspondingly spaced teeth, a shaft rotated by said operating wheels, and a plurality of type-wheels on said shaft, one corresponding to each of said operating-wheels, substantially as set forth.

28. The combination of a plurality of number-wheels and operating wheels rotatable about an axis, an operating device movable laterally into coaction with any one of the number-wheels and rotatable about said axis, a member adapted to engage an

operating wheel moved into and out of coaction with an operating wheel in moving said operating device laterally, and printing mechanism positioned by said operating wheel, substantially as set forth.

29. The combination of a plurality of number-wheels for calculating in different fractional systems, an operating device movable into coaction with any one of said wheels and movable to operate a wheel, a shaft rotated when any one of said number-wheels is rotated, a plurality of type-wheels on said shaft, one for each of said fractional systems, a platen movable with said operating device when the latter is moved into coaction with a number-wheel and means for operating said platen, substantially as set forth.

30. The combination of a plurality of number-wheels, means for operating the number-wheels one after another, printing mechanism, means for actuating the printing mechanism to print a number each time a number-wheel is operated, paper-feeding devices, and means for enforcing operation of said paper-feeding devices before operating the several number-wheels a second time, substantially as set forth.

31. The combination of a plurality of number-wheels, an operating device for operating said wheels, printing mechanism, means for actuating the printing mechanism to print a number each time a number-wheel is operated, and means actuated by said operating device when the latter operates a predetermined one of said number-

wheels for locking all of the number-wheels against operation, substantially as set forth.

32. The combination of a plurality of number-wheels, an operating device for operating any one of said wheels, printing mechanism, means for actuating the printing mechanism to print a number each time a number-wheel is operated, paper-feeding devices, means actuated by said operating device when the latter is actuated to operate a predetermined one of said number-wheels for locking all of the number-wheels against rotation, and means actuated in operating said paper-feeding devices for releasing said lock for the number-wheels, substantially as set forth.

33. In a calculating machine, the combination of a plurality of number-wheels, an operating device movable in one direction into cooperative relation to any one of said wheels, movable into engagement with a wheel and movable bodily in another direction to operate the wheel engaged thereby, and means actuated when the operating device is moved into engagement with the wheel to hold the device in engagement with the wheel until the device has reached the end of its range of movement in operating the wheel engaged thereby, substantially as set forth.

This specification signed and witnessed this 17th day of August, 1910.

WILLIAM P. QUENTELL.

Witnesses:

D. S. EDMONDS,
C. J. LYONS.