E. C. WALTER.

CALCULATOR.

APPLICATION FILED JUNE 8, 1908.

1,013,243.

Patented Jan. 2, 1912.

3 SHEETS—SHEET 1.

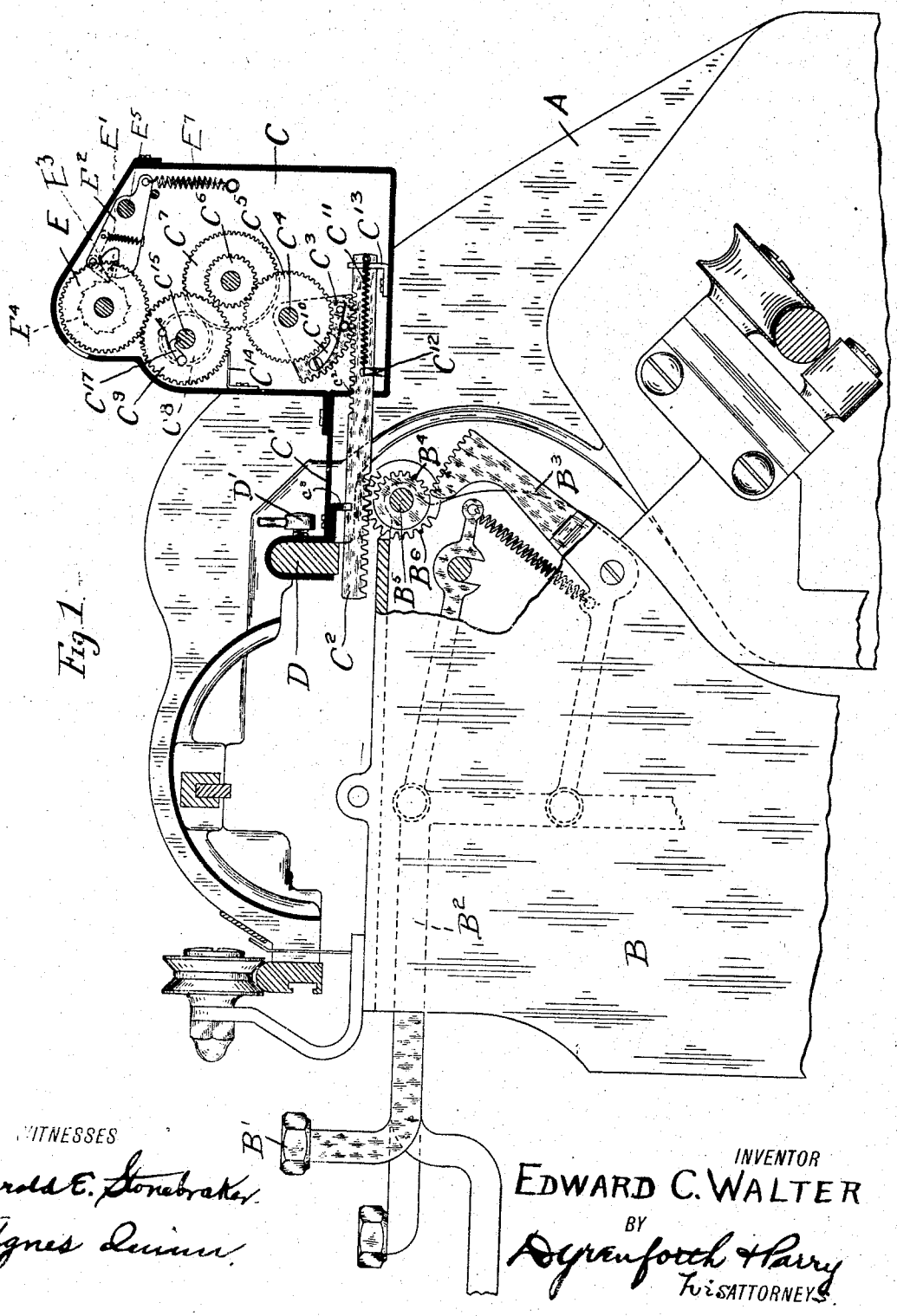

Fig. 1.

WITNESSES

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3 SHEETS—SHEET 2.

Fig. 3.

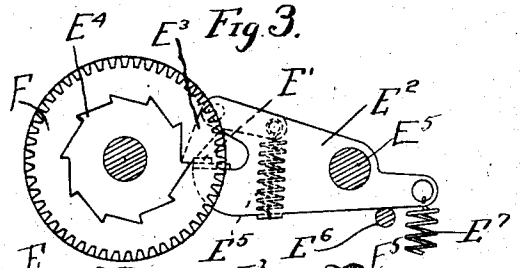


Fig. 4.

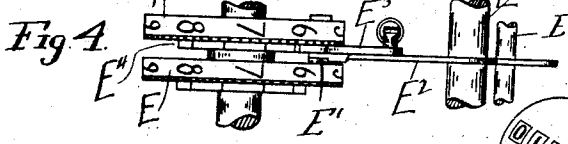


Fig. 2.

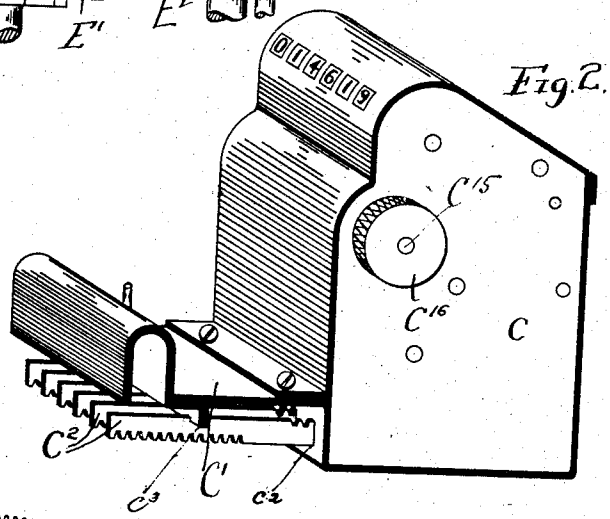


Fig. 5.

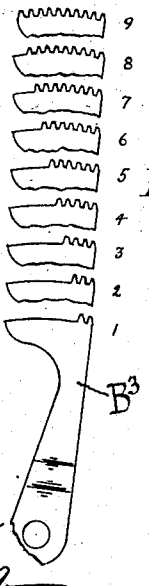
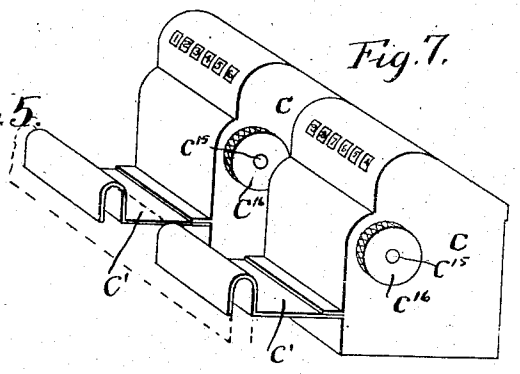


Fig. 7.



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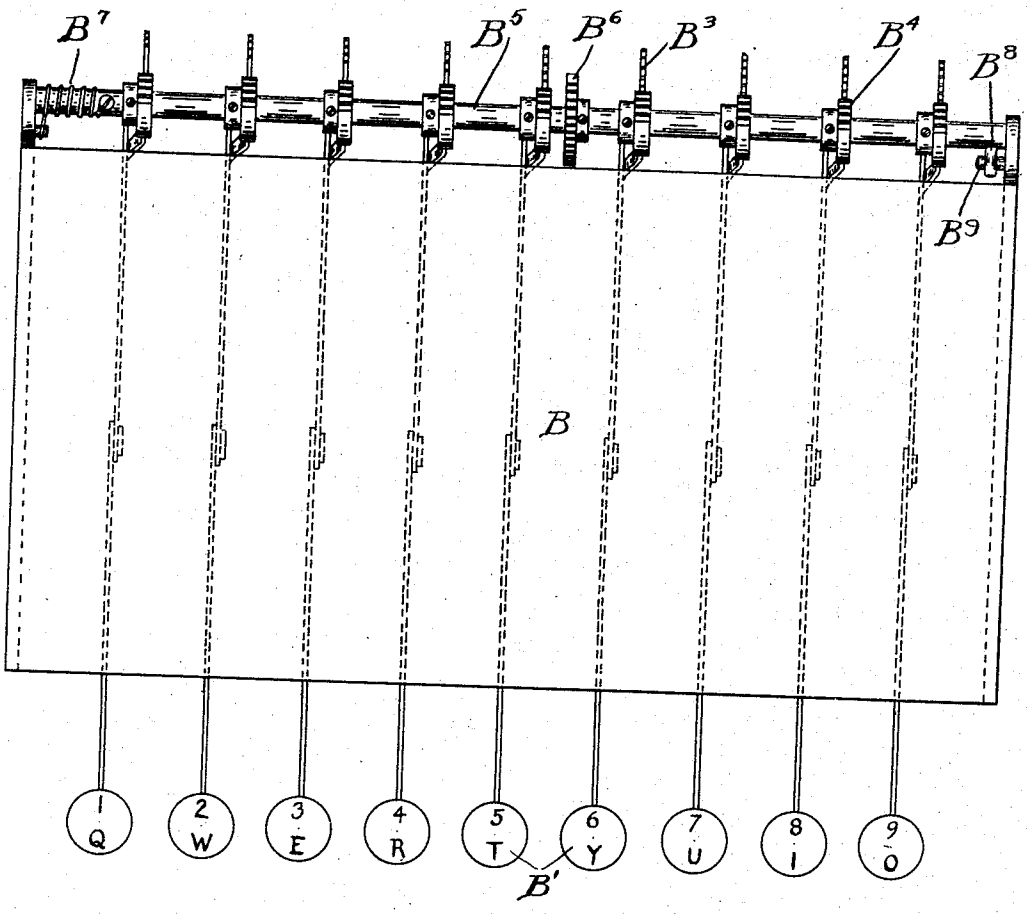
3 SHEETS—SHEET 3.

Fig. 6.



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UNITED STATES PATENT OFFICE.

EDWARD C. WALTER, OF NEW YORK, N. Y., ASSIGNOR TO HARRY T. AMBROSE, OF ORANGE, NEW JERSEY.

CALCULATOR.

1,013,243. Specification of Letters Patent. Patented Jan. 2, 1912.

Application filed June 8, 1908. Serial No. 437,355.

To all whom it may concern:

Be it known that I, EDWARD C. WALTER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Calculators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in calculators, and more particularly to calculating attachments for typewriting-machines, where it is frequently desired to tabulate a series of numbers and at the same time, obtain a total of the amount of such numbers.

One of the objects to be attained is a calculator, having such relation to the typewriter keys that the depression of the number keys of the typewriter effects operation of the number-wheels of the calculator.

An additional object is the provision of means whereby carrying from one number-wheel to the other is automatically effected during the operation of the number-wheels by the typewriter keys.

Another object of the invention is to obtain a simplified mechanism for resetting the number-wheels of the calculator to zero-position.

Still a further object is the provision of improved means for preventing reverse movement of the number-wheels of the calculator.

With these objects in view, my invention comprehends, briefly, a plurality of toothed, segmental arms connected to and adapted to be operated by the numeral-keys of the typewriter. The number of teeth on each arm corresponds to the number of that particular numeral-key, that for number one being provided with one tooth, number two with two teeth and so on up to nine. These arms mesh with pinions on a shaft, upon which shaft is fixedly mounted a master-wheel. As the carriage moves across, the parts become relatively positioned so that the master-wheel is positioned for successive operation upon a plurality of movable-bars included within the calculating attachment; which comprises a series of number-wheels, and instrumentalities between such number-wheels and the aforementioned movable-bars, whereby the movement of the bars, effected by the numeral keys, is communicated to the number-wheels and moves them a corresponding extent. Each number-wheel is provided with a suitable lug which engages a carrying-arm arranged to engage the next adjacent number-wheel and move the same one increment as the number-wheel of lower denomination completes its revolution. Suitable means are provided for returning the movable-bars and the carrying-arms to their normal positions after operation.

Other objects and advantages will appear presently as the following detailed description proceeds.

In the drawings, wherein I show a preferred embodiment of my invention, Figure 1 is a side elevation, with parts broken away, of the calculator as applied to a flat-platen typewriter. Fig. 2 is a perspective view of the calculator. Fig. 3 is a detail view in side elevation of a number-wheel with its coöperating carrying devices. Fig. 4 is an edge elevation of the same. Fig. 5 is a detail view showing the toothed segmental arms, and the arrangement of teeth thereon. Fig. 6 is a top plan view of a portion of the letter-spacing carriage, showing the numeral-keys, the master-wheel supported upon the rock-shaft. Fig. 7 is a view in perspective showing an agroupment of a plurality of calculators.

Referring more particularly to the drawings, in which like reference characters refer to corresponding parts in the several views, A designates the line-spacing carriage of the Donning typewriter, (as shown, for instance, in U. S. Patent No. 826,483, July 17, 1906) which I have shown as a convenient illustration of the usual form of flat-platen typewriting machine, it being understood that the invention is susceptible of application to round-platen machines as well. B is the letter-spacing carriage thereof.

Master-means and operating mechanism for the same.—B′ designates one of the numeral-keys on the letter-spacing carriage and B^2 the key-lever connected thereto. B^3 is an arm which may be integral with or connected to the key-lever to be operated therewith. Each arm B^3 is provided with a plurality of teeth, corresponding in number with the number on the respective numeral-key. The teeth of the arm B^3 are adapted

to mesh with a pinion B^4 mounted on the shaft B^5, which is supported on the letter-space carriage, there being one of these pinions for each toothed arm, as shown clearly in Fig. 6. B^6 is a master-wheel arranged centrally of the shaft B^5 and arranged to engage and operate the instrumentalities of the calculating-attachment. B^7 is a spring for returning the shaft B^5 to normal position after its operation, and B^8, B^9 are co-operating stops carried by the shaft and letter-space carriage respectively, said stops serving to properly limit the return movement of the shaft. Thus, it will be noticed, that when a particular numeral-key is depressed, its respective toothed arm is moved to engage the shaft upon which is mounted the master-wheel, and the shaft is thereby moved a distance corresponding to the numeral-key, that is, the arm having only one tooth will move through a great distance, or nearly the entire stroke before engaging its pinion, the arm having two teeth will move through a slightly less distance before engaging its pinion, and so on up to nine, in which case the arm engages the pinion immediately and imparts motion to the pinion throughout its entire movement.

The calculating-attachment.—The calculator is designated by C, the casing thereof being provided with an arm C′ by which it is positioned on the rear rail D of the line-space carriage, a set screw D′ being employed to secure it in position. Each number-wheel and its associated parts are similar in all respects, and a description of one will therefore suffice for all. C^2 is a bar having a series of rack teeth on its upper and lower sides and at opposite ends. The lower set of teeth are positioned to be engaged by the master-wheel B^6, whereas the teeth on the upper side mesh with a toothed segmental plate C^3, loosely mounted on shaft C^4. Also loosely mounted on the shaft C^4 is a gear C^5 which meshes with a pinion C^6 carried on the side of gear C^7. Gear C^7 in turn engages a pinion C^8 which is mounted on the side of gear C^9, and C^9 is positioned to mesh with the number-wheel E. C^{10} is a spring-pressed pawl which is mounted on the segmental plate C^3, and is in engagement with the gear C^5. Hence, as the bar C^2 moves inwardly, and thereby turns the segmental plate C^3, pawl C^{10} moves the gear C^5, and through the intermediate gearing, turns the number-wheel E an amount corresponding to the extent of movement of the master-wheel. A spring C^{11} is secured to a pin on the bar C^2 and to a post C^{12}, thereby causing a return of bar C^2 to normal position after its operation. An arm C^{13} is attached to the casing and lies in the path of the before-mentioned pin on bar C^2, serving to limit the return movement of the bar. There being no return movement of the gear, the pawl C^{10} will slide over the teeth of gear C^5 on the backward movement of the segmental plate. A spring C^{14} is attached to the side of the casing and is in engagement with the teeth of gear C^9, in order to prevent rearward movement of the gear and the number-wheel operated thereby. The bars C^2, preferably and as shown, slide through elongated apertures c^2 in the front portion of the casing C beneath the arm C′ and, moreover, are held in operative position by a comb-piece depending from the lower face of said arm C′. By these means, the rack-bars are maintained constantly in operative position and in constant engagement with the segmental plates C^3, and against any displacement from their longitudinal path of movement.

Carrying mechanism.—Mounted on the side of the number-wheel E is a lug or projection E′, which is arranged to engage the carrying arm E^2 as the number-wheel E completes a revolution. The carrying arm E^2 is provided with a spring-actuated pawl E^3, which is arranged to engage one of a series of ratchet teeth E^4 upon the side of the adjacent number-wheel F. The carrying-arm is pivoted on the shaft E^5 and held in normal position against stop-bar E^6 by a spring E^7. When the projection E′ engages the carrying-arm, it is moved downward and its pawl E^3 being in engagement with the ratchet teeth on the adjacent number-wheel, gives such number-wheel a movement of one degree, as the number-wheel of lower order completes one revolution. E^5 designates the spring which returns pawl E^3 to normal engaging position.

Zero-producing means.—In order to reset all the number-wheels to zero position, I employ the devices now about to be described. Gear C^9 is mounted loosely on a splined shaft C^{15}, which carries at one end a milled knob C^{16}. C^{17} is a spring actuated pawl carried by the gear C^9 and positioned to engage the spline in shaft C^{15}. When it is desired to reset the number-wheels to zero position, the knob C^{16} is turned, which causes the shaft C^{15} to rotate and to engage all of the pawls by means of the aforementioned spline, and as soon as all zeroes appear at the register openings, rotation of the shaft may be discontinued.

General operation.—Upon depressing, for instance, number eight numeral-key of the typewriter, the corresponding toothed arm (provided with eight teeth) is moved, and through its coöperating pinion, turns the rock-shaft and the master-wheel a similar distance. The master-wheel, being in engagement with one of the rack bars of the calculator, moves such rack bar inwardly, turning the segmental plate and its pawl, which in turn moves the gear C^5 and through the intermediate gearing actuates the num-

ber-wheel directly. If the adding of eight units carries the number-wheel beyond the nine position, then one unit will automatically be carried to the number-wheel of next higher order by the instrumentalities already described.

The calculator may be adjusted to any position along the rear rail D, to accommodate different parts of the tabulating sheet. I may also employ a plurality of such calculators, where it is desired to keep account of different columns of figures separately as shown in Fig. 7.

Although I have disclosed my invention in a particular form as hereinbefore set forth, I do not limit myself to the exact structure described and various changes and modifications may be employed without departing from the scope or spirit of my invention.

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

1. In a typewriting-machine, the combination with a calculating-attachment, of a letter-space carriage, printing keys carried thereby, toothed arms connected to said printing keys, a rock-shaft carrying a master-wheel coöperating with the aforesaid calculating-attachment, a plurality of pinions carried by the rock-shaft and arranged to be engaged by the aforesaid arms and a plurality of oscillating members supported by, and operable in, said calculating-attachment and with which said master-wheel cooperates successively.

2. In a typewriting-machine, the combination with a calculating-attachment, of a letter-space carriage, printing keys carried thereby, toothed arms connected to said printing keys, a rock-shaft carrying a master-wheel coöperating with the aforesaid calculating-attachment, means for turning said rock-shaft from the aforementioned arms, means for returning the rock-shaft to normal position and a plurality of oscillating members supported by, and operable in, said calculating-attachment and with which said master-wheel coöperates successively.

3. In a typewriting-machine, the combination with a calculating-attachment, of a letter-space carriage, printing keys carried thereby, a rock-shaft, a master-wheel upon said rock-shaft and coöperating with the calculating-attachment, toothed arms connected to said printing keys and effecting movement of the rock-shaft, means for returning said rock-shaft to normal position, means for limiting such return movement and a plurality of oscillating members supported by, and operable in, said calculating-attachment and with which said master-wheel coöperates successively.

4. In a typewriting-machine, the combination with an adjustable calculating-attachment, of a letter-space carriage, printing keys carried thereby, a rock-shaft carrying a master-wheel adapted to coöperate with the calculating-attachment, toothed arms connected to the printing keys and operable upon the rock-shaft and a plurality of oscillating members supported by, and operable in, said calculating-attachment and with which said master-wheel coöperates successively.

5. In a typewriting-machine, the combination with a letter-space carriage, of a calculating-attachment adjustably mounted on the rear rail thereof, printing keys supported on the letter-space carriage, a rock-shaft carrying a master-wheel coöperating with the calculating-attachment, toothed arms connected to the printing keys and serving to operate said rock-shaft and a plurality of oscillating members supported by, and operable in, said calculating-attachment and with which said master-wheel cooperates successively.

6. In a typewriting-machine, the combination with a letter-space carriage, of master-means carried by said letter-space carriage and having a horizontal traveling movement with said carriage, and a relatively-stationary calculating-attachment, including a plurality of horizontally-arranged and successively-actuated rack-bars, operable by said master-means.

7. In a typewriting-machine, the combination with a letter-space carriage, of a master-wheel carried by said letter-space carriage, and a calculating-attachment including a plurality of horizontally-arranged and successively-actuated rack-bars operable by the said master-wheel.

8. In a typewriting-machine, the combination with a letter-space carriage, of a rock-shaft supported thereon, a master-wheel fixed on the rock-shaft, a series of printing keys, toothed arms connected to the printing keys and operating to turn said rock-shaft, and a calculating-attachment including a plurality of rack-bars positioned for engagement with the aforementioned master-wheel.

9. In a typewriting-machine, the combination with a letter-space carriage, of a rock-shaft supported thereon, a master-wheel fixed upon the rock-shaft, a series of pinions also mounted on the rock-shaft, printing keys on the letter-space carriage, toothed arms connected to the printing keys and engaging with said pinions, and a calculating-attachment including a plurality of rack-bars positioned for engagement with the aforementioned master-wheel.

10. In a typewriting machine, the combination with a carriage, of a calculating-attachment including a plurality of rack-bars slidable in a plurality of directions and always in the same longitudinal path, and means supported on the carriage and travel-

ing in relation to the calculating-attachment for operating said rack-bars successively.

11. In a typewriting-machine, the combination with a letter-space carriage, of a calculating-attachment including a plurality of rack-bars, and a master-wheel supported on the letter-space carriage for operating said rack-bars successively.

2. In a typewriting-machine, the combination with a letter-space carriage, of an adjustable calculating-attachment including a plurality of rack-bars, and a master-wheel supported on the letter-space carriage for operating said rack-bars successively.

13. In a typewriting-machine, the combination with a letter-space carriage, of a line-spacing carriage, a rear rail on said line-spacing carriage, a calculating-attachment adjustably mounted on said rear rail of the line-spacing carriage, a plurality of rack-bars included within said calculating-attachment, and master-means supported on the letter-space carriage for operating said rack-bars successively.

14. In a typewriting-machine, the combination with a letter-space carriage, of a line-spacing carriage, a rear rail on said line-spacing carriage, a calculating-attachment adjustably mounted on said rear rail of the line-spacing carriage, a plurality of rack-bars included within said calculating-attachment, and a master-wheel supported on the letter-space carriage for operating said rack-bars successively.

15. In a typewriting machine including in combination, a spacing-carriage, a calculating-attachment arranged in juxtaposition thereto and including a plurality of successively-actuated rack-bars, each having a sliding movement in two directions and always in the same longitudinal path, means supported on said carriage and traveling therewith relatively to the calculating-attachment for operating said rack-bars, instrumentalities for returning the rack-bars to normal position, and means for limiting such return movement.

16. In a typewriting-machine, the combination with a letter-space carriage, of a calculating-attachment including a bar having teeth disposed on opposite sides thereof, a master-wheel carried by the letter-space carriage and arranged to engage the teeth on one side, and instrumentalities for actuating the calculating-attachment, said instrumentalities being arranged to be engaged by the teeth on the opposite side of said bar.

17. In a typewriting-machine, the combination with a letter-space carriage, of a calculating-attachment including a bar having teeth disposed at opposite ends thereof, master-means mounted on the letter-space carriage and arranged to engage the teeth at one end, and instrumentalities for actuating the calculating-attachment, said instrumentalities being positioned to be engaged by the teeth on the other end of said bar.

18. In a typewriting-machine, the combination with a letter-spacing carriage, of a relatively stationary calculating-attachment including a number-wheel, a horizontally-disposed and slidable rack-bar, intermediate gearing between the number-wheel and rack-bar, and a master-means on the letter-space carriage and traveling horizontally therewith relative to the calculating-attachment for engagement with the rack-bar.

19. In a typewriting-machine, the combination with a letter-space carriage, of a calculating-attachment including a number-wheel, a horizontally-disposed and slidable rack-bar, intermediate gearing between the number-wheel and rack-bar, and a master-wheel on the letter-space carriage for engagement with the rack-bar.

20. In a typewriting-machine, the combination with a letter-space carriage, of a calculating-attachment including a number-wheel, a horizontally-disposed and slidable rack-bar for operating said number-wheel, and a master-means having a horizontal traveling movement to be operatively associated with the rack-bar.

21. In combination, a typewriting machine including a support and a calculating attachment mounted on said support, a carriage disposed to travel in juxtaposition to said attachment, key-operated mechanism mounted to travel with said carriage, and a series of slidable bars reciprocable longitudinally and always in the same longitudinal path and adapted to be engaged by said key-operated mechanism as the carriage travels in juxtaposition to the same.

22. In a typewriting-machine, the combination with a letter-space carriage, of a calculating-attachment including a number-wheel, a horizontally-disposed and slidable rack-bar for moving said number-wheel, a master-means upon the letter-space carriage and having a horizontal traveling movement therewith and adapted to engage said rack-bar, and means for permitting movement of the rack-bar in one direction while the number-wheel is at rest.

23. In a typewriting-machine, the combination with a letter-space carriage, of a calculating-attachment including a series of number-wheels, a plurality of rack-bars horizontally-disposed and longitudinally shiftable successively for operating said number-wheels, and a master-means upon the letter-space carriage and having a horizontal traveling movement therewith and arranged to engage said rack-bars successively.

24. In a typewriting-machine, the combination with a letter-space carriage, of a cal-

culating-attachment including a series of number-wheels, a plurality of rack-bars horizontally-disposed and longitudinally shiftable successively for operating said number-wheels, and a master-wheel upon the letter-space carriage arranged to engage said rack-bars successively.

25. In a typewriting-machine, the combination with a calculating-attachment, of a carriage and printing keys, a rockshaft provided with a master-means for coöperation with the calculating-attachment, and connections between the rock-shaft and printing keys and a series of horizontally-disposed toothed members partly housed within the calculating attachment and coöperating with said master-means to actuate them successively.

26. In a typewriting-machine, the combination with a calculating-attachment, of a carriage and printing keys, a rock-shaft carrying a master-means coöperating with the said calculating-attachment, toothed arms connected to the printing keys, and a plurality of pinions carried by the rock-shaft and arranged to be engaged by the aforesaid arms and a series of horizontally-disposed toothed members partly housed within the calculating attachment and coöperating with said master-means to actuate them successively.

27. In a typewriting-machine, the combination with a calculating-attachment, of a carriage and printing keys, toothed arms connected to said printing keys, and a master-means coöperating with the calculating-attachment and actuated by said toothed arms and a series of horizontally-disposed toothed members partly housed within the calculating attachment and coöperating with said master-means to actuate them successively.

28. In a typewriting-machine, the combination with a stationary calculating-attachment, of a carriage and printing keys, a rock-shaft upon the carriage, master-means mounted on the shaft and coöperating with the calculating-attachment, toothed arms connected to the printing keys, and a plurality of pinions carried by the rock-shaft and adapted to be engaged by the aforesaid arms and a series of horizontally-disposed toothed members partly housed within the calculating attachment and coöperating with said master-means to actuate them successively.

29. In a typewriting machine, the combination with a stationary calculator-casing, a plurality of horizontally-slidable and successively-engaged bars normally extending outside of and having a movement into the casing, said bars having a sliding movement in a plurality of directions and always in the same longitudinal path, means for maintaining said bars against sidewise movement out of said path while sliding in any direction, a traveling carriage member supported on the typewriting machine, and means carried thereby and outside and independent of the casing for moving said bars.

30. The combination with a calculator including a plurality of bars, of a traveling support mounted outside and independently of said calculator, a shaft carried by said support and having means mounted thereon for moving the bars in a longitudinal path, and instrumentalities for operating said shaft.

31. The combination with a calculator, of a series of keys, toothed arms connected to the keys, a shaft provided with pinions for engagement with said arms, and means carried by the shaft for effecting operation of the beforementioned calculator and a horizontally-disposed successively-actuating series of toothed members supported partly within said calculator.

32. In a typewriting machine, a frame, a carriage supported thereon, a calculator, a plurality of successively-engaged bars normally extending outside of and having a horizontal movement into and out of the calculator, the reciprocatory movement of the bars being always in the same longitudinal path, means for controlling the actuation of the bars within said path of movement, and means movable with the carriage and successively engaging said bars to effect their inward movement.

33. The combination with a calculator, including a plurality of successively-actuated rack-bars, each movable in two directions in the same longitudinal path, and means for maintaining each bar constantly in said path during its movement, of a shaft, means movable thereby for actuating each of said rack-bars, and instrumentalities for operating said shaft.

34. The combination with a calculator, including a plurality of rack-bars, of a shaft, a wheel on said shaft arranged to engage the aforementioned rack-bars, and instrumentalities for turning the shaft.

35. The combination with a calculator, including a plurality of rack-bars, of a rock-shaft, a wheel on said shaft for engagement with the rack-bars, finger-keys, toothed arms connected to the finger-keys, and pinions on said rock-shaft adapted to be operated by the aforesaid arms.

36. The combination with a calculator, including a plurality of bars having teeth at opposite ends thereof, of a rock-shaft, a wheel on said rock-shaft for engagement with the teeth at one end of said bars, printing keys, toothed arms connected to the printing keys, and pinions on the aforementioned shaft arranged to be engaged by said toothed arms.

37. A machine of the class described in-

cluding in combination, a series of number-wheels, means for operating the number-wheels comprising a shaft and gears mounted thereon, toothed segments also mounted on said shaft and carrying spring-actuated pawls engaging with said gears, a series of rack-bars normally in engagement with the toothed segments and slidable in two directions in the same longitudinal path, carrying mechanism interposed between each of the number-wheels and controlled by the movement of the number-wheels when actuated by said rack-bars through said gears, a carriage adapted to travel in juxtaposition to said rack-bars, and means carried by the carriage and adapted to coöperate with said rack-bars to effect their movement.

38. In combination, a calculator including a casing and a number-wheel housed therein, means partly housed within the calculator-casing and extending to a point outside of said casing, said means adapted to operate the number-wheel and including a slidable-member, a gear housed within the casing and meshing with said slidable member, means also housed within the casing for preventing retrograde movement of said gear, and a traveling key-actuated mechanism adapted to be juxtaposed to said slidable member and operating to actuate it.

39. In combination, a calculator including a casing and a number-wheel housed therein, means partly housed within the calculator-casing and extending to a point outside of said casing, said means adapted to operate the number-wheel and including a slidable-member, a gear housed within the casing and meshing with said slidable member, means including a pawl also housed within the casing for preventing retrograde movement of said gear, and a traveling key-actuated mechanism adapted to be juxtaposed to said slidable member and operating to actuate it.

In testimony whereof, I affix my signature, in the presence of two subscribing witnesses.

EDWARD C. WALTER.

Witnesses:

EDMUND H. PARRY,

W. L. BILLMYER.