

H. SUGDEN & C. F. PIDGIN.
 CALCULATING MECHANISM FOR TYPE WRITERS.
 APPLICATION FILED NOV. 27, 1903. RENEWED JUNE 11, 1909.

1,044,597.

Patented Nov. 19, 1912.

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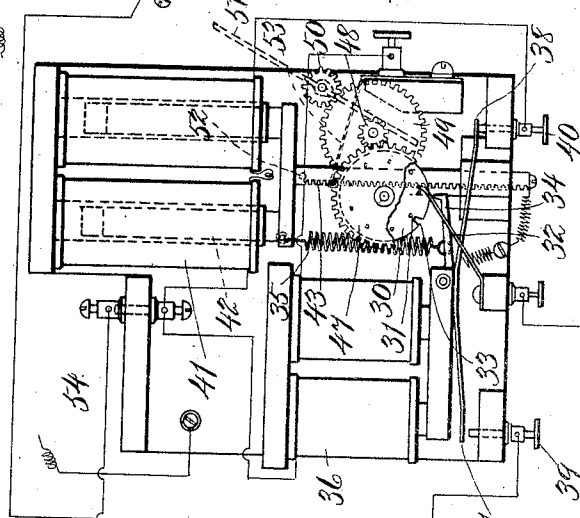
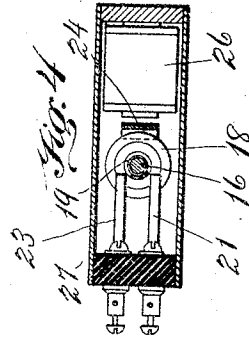
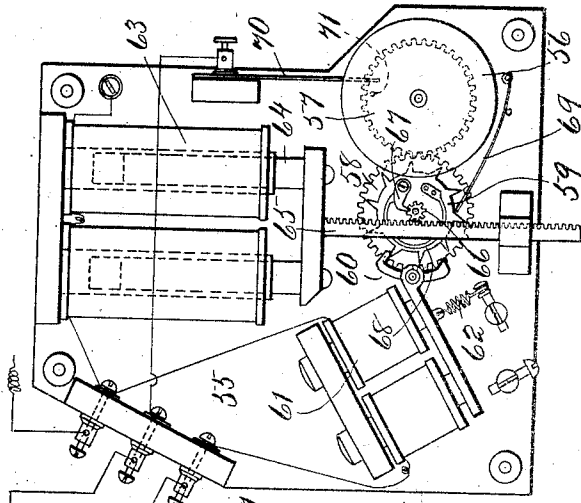
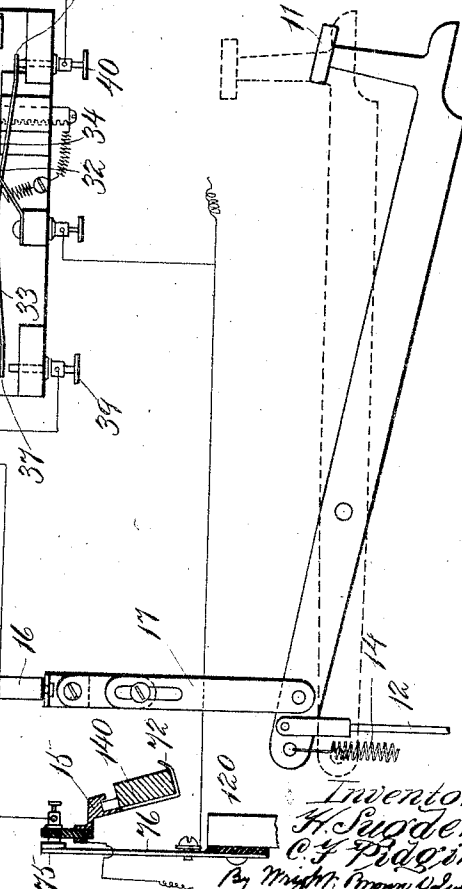
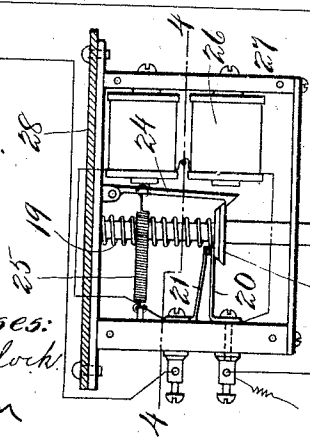


Fig. 3

Witnesses:
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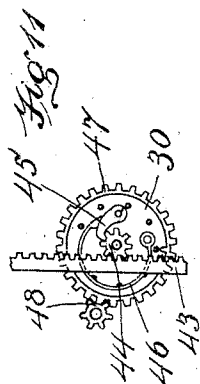
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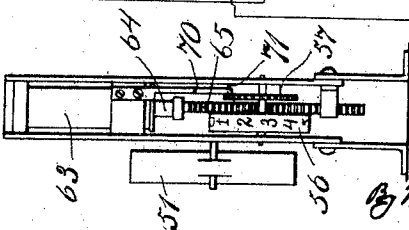
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4 SHEETS—SHEET 3.



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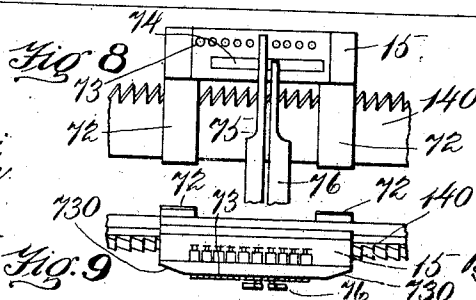
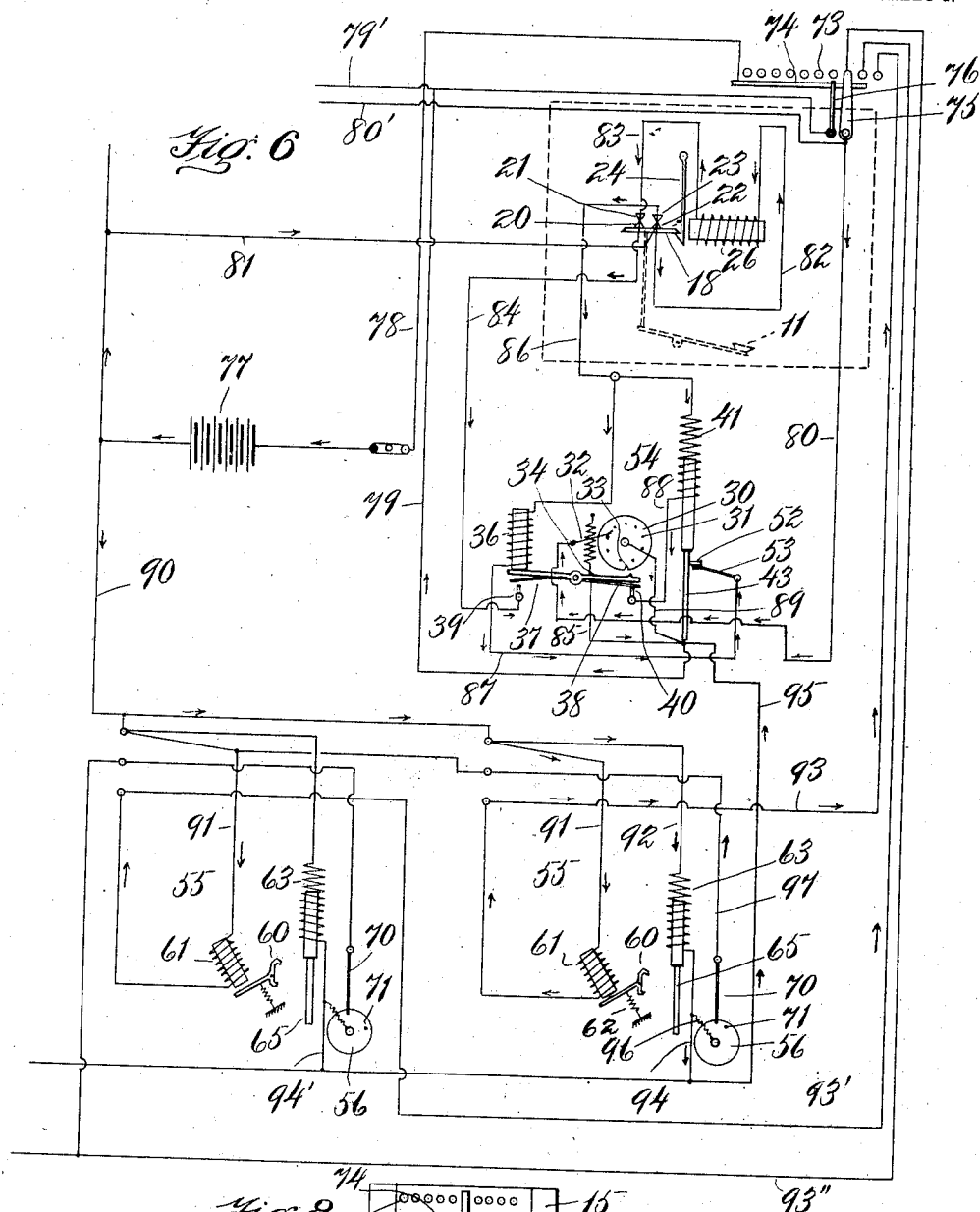


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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

HENRY SUGDEN AND CHARLES F. PIDGIN, OF BOSTON, MASSACHUSETTS, ASSIGNORS
TO THE NATIONAL CASH REGISTER COMPANY, OF DAYTON, OHIO, A CORPORATION
OF OHIO, (INCORPORATED IN 1906.)

CALCULATING MECHANISM FOR TYPE-WRITERS.

1,044,597.

Specification of Letters Patent.

Patented Nov. 19, 1912.

Application filed November 27, 1903, Serial No. 182,715. Renewed June 11, 1909. Serial No. 501,652.

To all whom it may concern:

Be it known that we, HENRY SUGDEN and CHARLES F. PIDGIN, of Boston, in the county of Suffolk and State of Massachusetts, have
5 invented certain new and useful Improvements in Calculating Mechanism for Type-Writers, of which the following is a specification.

This invention has for its object to provide calculating mechanism to be operated in conjunction with the keys of a typewriter to render the latter particularly adapted for tabulating, as in the compilation of census statistics.

15 The invention contemplates the employment of counting mechanism with devices by which it is actuated by any one of the keys of a typewriter from 1 to 9 inclusive, with additional provisions whereby said
20 keys cause the actuation of said counting mechanism only when the typewriter carriage has reached a predetermined point in its travel.

One of the principal aims of the invention is to avoid any considerable variation in the "touch" of the instrument over what is ordinarily found in typewriters, that is, we seek to do away with the extra pressure required on the numeral keys when these keys
30 are required to transmit the power which operates the counting disks, as has been the case in all prior machines of this class, so far as we have knowledge, such extra pressure being particularly noticeable when the
35 counting mechanism "carries over" the motion of one numeral disk to that expressing the next denomination, and being such as to seriously interfere with the securing of a proper and uniform impression by the numeral type, besides tiring the operator because of the heaviness of the touch. These difficulties are overcome in our invention by employing a source of motive power independent of the operator for actuating the
45 calculating mechanism, together with suitable means whereby the actuation of a key effects the connection of the desired counter with the said source of power, the power and the controlling connections being preferably electrical, as more fully hereinafter described.

According to this invention the type-

writer may be employed for printing upon a sheet statistical data, including the figures used in the compilation, without interference with the counting mechanism, but said
55 mechanism may be actuated in proper time to effect the addition of the various sums as they are printed by the machine. For instance, assuming that the typewriter be
60 employed for printing the inventory of a manufactory, the various items may be printed in one column, as usual, while the values are printed in another column, the sums representing the different values being in line
65 with the particular items. As the values are printed upon the sheet, they are automatically added by the counting mechanism.

With these and incidental objects in view, the invention consists in certain novel features of construction and combination of parts, the essential elements of which are set forth in appended claims and a preferred form of embodiment of which is hereinafter described with reference to the drawings
75 which accompany and form part of this specification.

Of the accompanying drawings, which illustrate one embodiment of the invention,—Figure 1 shows in plan view a book
80 typewriting machine, so called, in connection with which the present invention may be employed. Fig. 2 represents a plan view of the counting mechanism with the cover detached. Fig. 3 represents a view, partially diagrammatic, of the counting mechanism, a typewriter key, and the controlling mechanism employed in connection therewith. Fig. 4 represents a section on the line 4—4 of Fig. 3 of the controlling mechanism. Fig. 5 represents a section through the typewriter and illustrates diagrammatically the connections between the typewriter and the counting mechanism. Fig. 6 represents one of the circuits, the others being
95 duplicates thereof. Fig. 7 represents an end view of one of the transmitters. Figs. 8 and 9 represent respectively an elevation and a plan of the circuit-distributive switch. Fig. 10 represents the return ratchet of one
100 of the transmitters. Fig. 11 is a detail view of parts of the solenoid-operated portions of the transmitter, taken from the side opposite to that shown in Fig. 3.

The same reference characters indicate the same parts in all the figures.

Referring to the drawings, particularly to Fig. 1, it will be observed that a book-type-writer is thereon illustrated in plan view. It is unnecessary to give a description of this machine as it is well known commercially. To the sides of the machine are secured standards 10 which support nine separate controlling mechanisms of which one is illustrated at the left hand in Fig. 3. Each controlling mechanism is operated by one of the keys in number from 1 to 9, inclusive. These keys are indicated at 11. Each one is connected by a link 12 with type-bars 13 and held in raised position by a spring 14. The entire carriage 120 carrying with it the keys, type-bars, transmitters and counters is moved to the right by suitable escapement mechanism, upon the depression of a key. Extending across the entire framework of the machine is the scale bar 140, which is adapted to receive the usual stops. Upon this scale bar is adjustably placed a contact support 15, as shown in Figs. 8 and 9, which will be subsequently described in detail.

Each numeral-key 11 has pertaining to it a controller shown at the left of Fig. 3 and a transmitter shown at the middle of Fig. 3. At the right of Fig. 3 is shown a counter of which there may be any number, nine being shown in the drawings, each counter having a numbered index wheel whereby numbers or sums to as many places as there are counters may be registered.

The controller for each key 11 includes a rod 16 connected by a link 17 with the key 11, a boss 18 on said rod, a spring 19 to depress the rod, two pairs of spring-contacts 20 21 22 23 actuated by said boss, and a latch 24 to engage said boss and lock the key lever in actuated position, said latch being projected by a spring 25 and retracted by an electro-magnet 26. Each controller is inclosed in a casing and represented as a whole by the numeral 27. The several controllers 27 are mounted on the under side of the transverse frame 28 supported by standards 10 10.

The transmitters and counters are located on a base 29 which may be carried by the carriage or placed in any convenient location and connected with the controllers on the moving typewriter carriage 120 by a cable. Each transmitter includes a pair of contact members of which one is a wheel 30 carrying contact-pins 31 in number corresponding to the numeral representing the key with whose controller that transmitter is connected, the other member being a brush or contact-finger 32. Wheel 30 has a notch 33 for engaging a pivoted latch 34, said latch being projected by a spring 35 and retracted by a magnet 36. The latch also

carries yielding contact-fingers 37 38 co-operating with fixed contacts 39 40.

Motive power to rotate the contact-wheel 30 is furnished by a solenoid 41 having its armature 42 connected with a vertically-moving straight gear or rack 43. Rack 43 (see Figs. 3 and 11) engages a pinion 44 loose with respect to the wheel 30 and connected therewith through a one-way-acting clutch comprising the teeth of said pinion and a pawl 45 pivoted to wheel 30 and having spring 46. This connects pinion 44 with wheel 30 on the upward movement of rack 43 but permits free descent of said rack by its weight and the pull of spring 35. The rotation of wheel 30 is retarded by a gear-train 47 48 49 50 and fly 51. In Figs. 3 and 6 it will be noted that a contact-pin 52 on rack 43 coöperates with a spring contact-finger 53, the purpose of which is to make and break the circuit of latch-magnet 26, as hereinafter more fully described. The transmitters are each represented as a whole by the numeral 54.

Each counter, represented as a whole by the numeral 55, includes a counter-wheel 56 with periphery numbered from 0 to 9, a gear 57 attached thereto; an equal-sized intermeshing gear 58, a toothed escape-wheel 59 attached thereto, an escape pallet 60 operated by electro-magnet 61 and spring 62, a motor-solenoid 63 having armature 64 connected with vertically-moving straight gear or rack 65, a coöperating pinion 66, and a return clutch including pawl 67 pivoted to escape-wheel 59 and engaging pinion 66, and spring 68 for said pawl. There is also a check-pawl 69 for the escape-wheel 59. Each counter excepting the highest one also includes a carrying-over device comprising a stationary spring contact-finger 70 and a revolving contact-pin 71 on counter-wheel 56.

Figs. 1, 3, 6, 9, and 10 show the distributive switching device whose object is to connect the transmitters 54 to some particular counter 55 determined by the position of the typewriter carriage and corresponding to a predetermined place or value in the tabular column, as the tens, hundreds or thousands place, etc. Said distributing switch device includes the base 15 connected with the toothed feeding and scale bar 140 by spring-clips 72 72 enabling the base 15 to be detached from the scale bar 140 and moved to a new position thereon according to the place on the sheet or writing page at which it is desired to perform the tabulation. The base or support 15 carries a series of contacts 73 73 connected with the several counters 55 and an elongated contact 74 below the same. The typewriter carriage 120 carries a brush 75 coöperating with the contacts 73 and a brush 76 coöperating with the elongated contact 74. It will be noted that

the support 15 is beveled at 730 on its ends to permit the brushes to slide easily on and off of their contacts.

The connections are best shown in Fig. 6, in which some of the parts are represented symbolically. 77 indicates a battery or source of power having one side connected by a return or ground wire 78 with the long contact 74. Brush 76 has a wire 79 connected with several return wires, and the brush 75 has a wire 80 connected with the contact-finger 32. The several transmitters 54 are connected in parallel with the brushes 75 76, the wires 79' 80' in Fig. 6 representing the connections to the next transmitter. The outgoing side of battery 77 is connected by wire 81 with the key-controlled contact 22 and by wire 82 with the magnet 26. The return from magnet 26 is by wire 83, key-contacts 21 20, wire 84, contact 39, finger 37, and wire 85 to the return wire 79. A circuit wire 86 passes from the key-contact 23 and branches in parallel through the magnet 36 and solenoid 41. The return wire 87 from magnet 36 connects with contact-finger 53 and the circuit passes through pin 52 and rack 43 to the return wire 79. The return wire 88 from solenoid 41 connects with contact 40 and the circuit returns through finger 38 and wire 85 to return wire 79. The contact-wheel 30 connects by wire 89 with the return wire 79.

The outgoing side of battery 77 is further connected by wire 90 with the several counters, the circuit at each counter branching by wires 91 92 to the magnet 61 and solenoid 63. The return wire 93 from the escape-magnet of each counter connects with one of the contacts 73 of the distributor. The solenoids 63 all have a return through the branches 94 94', etc., and the common return wires 95 and 79. The escape-magnet return of the first counter 55 seen at the right of Fig. 6, is numbered 93, that of the second counter is numbered 93', and that of the third counter (not shown) 93''. The carrying-over pin 71 of the first counter is connected by a branch 96 with the wire 94 and finger 70 is connected by wire 97 with the escape-magnet of the next counter.

The operation is as follows: Supposing it is desired to tabulate certain values at the end of a line of writing. The typewriter carriage is moved or fed until the brushes 75 76 ride onto their contacts 73 74 in the distributor. Previous to this the numeral-keys may be used for printing without any effect on the counting mechanism because the electrical connections are broken, the return brush 76 controlling all branch circuits returning to the battery 77. When the carriage is in tabulating position all of the transmitters 54 are connected through brush 75 with one of the counters and this counter will register upon the depression of

the corresponding key. When a numeral-key 11 is depressed as seen in Fig. 3, it is immediately locked by the detent 24 and is held in actuated position until the corresponding counter has had time to register. While said key is locked it is held in printing position and no other key on the typewriter can be made to print. The actuation of the key brings the two pairs of contact points 20 21 22 23 together and thereupon circuits are completed from the battery 77 through the latch-magnet 36 and solenoid 41, the current going by way of 81 22 23 86 and 36 and returning by 87 53 52 43 79 76 74 and 78 and in parallel when magnet 36 attracts its armature, through 41, returning by 88 40 38 85 79, etc. The actuation of latch 34 by magnet 36 releases contact-wheel 30 and the circuit of the motor-solenoid 41 is immediately completed through 38 40. The rising of rack 43 rotates wheel 30 and the contact of pins 31 with brush 32 sends a predetermined number of impulses to the particular counter 55 whose wire 93 93', etc., the brush 75 is connected with, said number of impulses depending upon the number of pins in the wheel 30 of that transmitter.

Early in the upward travel of rack 43 the circuit of magnet 36 is broken by separation of 52 53 so that latch 34 returns to the circular part of the periphery of wheel 30. This position of the latch (while its tip remains on said circular part) does not permit completion of the circuit of key-releasing magnet 26 which was broken at 37 39 upon the first actuation of the latch and does not permit the breaking of the circuit of solenoid 41 at 38 40, because the yielding contact fingers 37, 38 are carried by the latch and must remain in the position shown in Fig. 3. The intermittent impulses created by rotation of wheel 30 in the transmitter pass through the selected counter 55 from the battery 77 by way of 90 91 through the escape-magnet 61 of that counter and return by the wire 93 (or 93', etc.) selected contact 73, brush 75, wire 80, finger 32, contact-wheel 30, wire 89 and through 79, etc., to the opposite side of the battery. As the motor solenoid 63 is put under power by the contact of brush 76 with 74 through 77 90 92 63 94 95 79 76 74 and 78, the counter-wheel 56 is rotated step by step a predetermined distance under control of the pallet 60. When 30 has completed one rotation, the latch 34 enters notch 33 and stops the wheel. At the same time 41 loses power through the separation of 38 and 40 and the releasing magnet is energized by the contact of 37 39. The latch 24 is retracted and the key members 18 11 released, whereby all circuits through the transmitter are broken. The return of rack 43 by gravity to initial position brings contacts 52 53 together and re-

stores the circuit of latch-magnet 36 into condition to be operated. The racks 65 of those counters which have been operated return to initial position when the brush 76
5 passes off of the contact 74.

It will be seen that by the above described organization of parts, the sum of the numbers represented by the actuation of different numeral-keys in particular positions of
10 the typewriter carriage are registered on the several counter-wheels 56. Should the starting position of any counter-wheel which is in motion from the impulses of a transmitter be such that the number of impulses will
15 carry it over zero position, the next counter will be given one impulse by the contact of pin 71 with brush 70 of the carrying-over device.

It is not intended to wholly limit the invention to those typewriters employing a bank of independent keys, as there are many forms of these instruments using a "master" key to which the invention is applicable, and the terms "key" and "key-board"
20 in the claims will cover such construction.

While the form of mechanism herein shown and described is admirably adapted to fulfil the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form of embodiment herein disclosed for it is susceptible of embodiment in various forms all coming within the scope of the claims which follow.

35 What is claimed is—

1. In a calculating typewriter, the combination of a carriage, a series of type-bars, a series of numeral keys connected to said type-bars, a corresponding number of transmitters having provisions for causing respectively different predetermined numbers of impulses corresponding to the numerals from 1 to 9 inclusive, a plurality of counters, and means for connecting said transmitters
40 to different ones of said counters according to the position of the carriage.

2. In a calculating typewriter, the combination of a carriage, a series of type-bars, a series of keys connected to said type-bars, a series of transmitters arranged for predetermined numbers of impulses from 1 to 9 inclusive each adapted to be controlled by any one of said keys, a series of circuits having counters, and a distributive switch-device controlled by movement of the carriage for connecting said transmitters successively with the different counter-circuits.

3. In a calculating typewriter, the combination of a stationary series of switch-points or contacts and a stationary elongated contact, a movable carriage, two brushes mounted on said carriage and arranged to operate with the respective contacts, a transmitter-circuit connected with said brushes, a series
65 of counter-circuits connected with said

switch-points, and means for moving said carriage to effect a coöperation of said brushes and contacts to establish a continuous circuit through said transmitter and circuit and one of said counter-circuits.

4. In a typewriter, the combination of a printing type, a key controlling the same, a calculator controlled by said key and whose operation succeeds that of the type, and automatic means for locking said type in printing position until the calculator has completed its operation.

5. In a typewriter, the combination of a printing type, a key controlling the same, a calculator, electromagnetic means controlled by said key for operating said calculator, means for locking said type in printing position, and electromagnetic means for automatically releasing said type when the calculator has completed its operation.

6. In a calculating typewriter, the combination of a typewriter key, automatic calculating mechanism adapted to be set in motion by the actuation of said key, and means released by said calculating mechanism for locking said key in actuated position until said mechanism has accomplished its function.

7. In a calculating typewriter, the combination of a typewriter key, a locking device therefor, an electro-magnet controlling said device, and calculating mechanism controlled by said key and controlling the circuit of the electro-magnet.

8. In a calculating typewriter, the combination of a series of types, a keyboard controlling the same, a transmitter including a contact-wheel, an electromagnet for rotating the same, and a second electromagnet for releasing said wheel and controlled by the keyboard, and calculating mechanism controlled by said transmitter.

9. In a calculating typewriter, the combination of a series of types, a keyboard controlling the same, a calculator, an electromagnet for operating said calculator, an escapement controlling such operation, and means independent of said electromagnet and controlled by the keyboard for actuating said escapement.

10. In a calculating typewriter, the combination of a typewriter key, and calculating mechanism controlled thereby and including a circuit having a counter, a contact-wheel controlling said circuit, a pinion and reciprocating gear for rotating said wheel, an electro-magnet for actuating said gear, and a one-way-acting clutch connecting said pinion and wheel to permit the return of said gear.

11. In a calculating typewriter, the combination of a typewriter numeral-key, a transmitter controlled thereby and including a contact-wheel having contacts corresponding in number to the numeral repre-
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5 sented by the key, an electro-magnetic motor for rotating the wheel, a latch for the wheel controlled by the numeral-key, and a switch operated by the latch and controlling the circuit of said motor, and counting mechanism controlled by said wheel.

10 12. In a calculating typewriter, the combination of a printing type, a key controlling the same, a contact-wheel, an electro-magnet having its armature connected to rotate said wheel, a latch for the wheel, and a latch-operating second electro-magnet controlled by said key and by the traverse of the armature of the first-said magnet.

15 13. In a calculating typewriter, the combination of a printing type, a key controlling the same, a carriage, a plurality of counting mechanisms corresponding to different positions in the writing line of the typewriter, a counter and its controlling electro-magnet included in one of said counting mechanisms, a carrying-over device included in another counting mechanism and controlling the circuit of said electro-magnet, and electrical switching means whereby movement of the carriage associates said key with the different counting mechanisms.

20 14. In a calculating typewriter, the combination with a typewriter key, of a locking device therefor, and calculating mechanism controlled by said key and controlling said locking device.

25 15. In a calculating typewriter, the combination with a movable carriage, a series of numeral keys, a series of transmitters each appropriated to one of said numeral keys, a calculating mechanism comprising a series of denominational elements, means automatically controlled by the movement of the carriage for establishing a coöperative relation between any one of said elements and said series of transmitters and locking devices for said keys controlled by the calculating mechanism.

30 16. In a calculating typewriter, the combination with a movable carriage, a series of numeral keys controlling the movement of said carriage, a series of transmitters, each appropriated to one of said numeral keys and capable of giving electric impulses corresponding in number to the value of its appropriate key, a calculating mechanism comprising a series of denominational elements adapted to be actuated by electric impulses, and means automatically controlled by the carriage for successively establishing a coöperative relation between each of said elements and said series of transmitters during a predetermined period of movement of the carriage.

35 17. In a machine of the class described, the combination with a series of keys, of a series of transmitters, each appropriated and connected to one of the keys, a set of totalizer elements, and means controlled by

the keys for connecting each of the totalizer elements in succession to all of the transmitters.

18. In a machine of the class described, the combination with a series of keys, of a series of transmitters each connected to one of the keys and having contact devices graded according to the value of the connected key, a set of totalizer elements, and means controlled by the keys connecting all of the transmitters to each totalizer element in succession.

19. In a machine of the class described, the combination with a series of keys, of a series of transmitters, each permanently connected to one of the keys and having contact devices graded according to the value of the keys, a series of totalizer elements and shiftable electric connections with means controlled by the keys for positioning same to connect all of the transmitters to each totalizer element in succession.

20. In a machine of the class described, the combination with a series of keys, of a series of transmitters each appropriated and permanently connected to one of the keys and including graded contact disks and driving devices therefor, a set of totalizer elements, and shiftable electric connections with means for positioning same to connect all of the transmitters to each totalizer element in succession.

21. In a machine of the class described, the combination with a movable carriage, of a series of numeral keys, a calculating mechanism comprising a series of denominational elements, differentially movable means for moving said elements differentially, electrically actuated transmitting mechanism for operating and controlling the differential movement of said differentially movable means, a normally open circuit for said electrically actuated transmitting mechanism, and contacts for closing said circuit controlled by the carriage and the keys.

22. In a machine of the class described, the combination with a calculating mechanism comprising a series of differentially movable denominational elements, differentially movable means for operating said elements differentially, electrically actuated transmitting mechanism for operating and controlling the differential movement of the differentially movable means, a circuit for electrically actuated transmitting mechanism including a plurality of open contacts, a movable carriage for closing one of the contacts and thereby selecting the denominational element to be actuated, and a series of keys for closing the other contact and thereby controlling through the transmitting mechanism and the differentially movable means the differential movement of the selected element.

23. In a machine of the class described,

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the combination with a calculating mechanism comprising a series of differentially movable denominational elements, a movable carriage, a plurality of contacts cooperating with the carriage for selecting the elements to be actuated, differentially movable means for actuating said element differentially, electrically actuated transmitting mechanism and connections including the contacts and a normally open circuit for operating and controlling the differential movement of said differentially movable means and thereby the selected element, and a series of keys for closing the circuit and operating the differentially movable means and the selected element through the electrically actuated transmitting mechanism.

24. In a machine of the class described, the combination with a calculating mechanism comprising a series of differentially movable denominational elements, a movable carriage, contacts successively closed by the carriage for selecting the elements to be actuated, differentially movable means for actuating said elements differentially, transmitting mechanism for operating and controlling the differential movement of the differentially movable means, a series of keys, and circuits, including said contacts and controlled by the keys for operating through the transmitting mechanism the actuating means and thereby the selected element.

25. In a machine of the class described, the combination with a calculating mechanism comprising a series of differentially movable denominational elements, of a movable carriage, contacts successively closed by the carriage for selecting the elements to be actuated, a transmitting mechanism, means actuated thereby for operating the selected denominational element, a series of keys, and circuits including the contacts, transmitting mechanism and operating means, closed by the keys.

26. In a machine of the class described, the combination with a calculating mechanism

comprising a series of differentially movable denominational elements, of a movable carriage, contacts successively closed by the carriage for selecting the elements to be actuated, an escapement mechanism for actuating the selected elements, a series of keys, and circuits including the contacts and escapement mechanism closed by the keys.

27. In a machine of the class described, the combination with a calculating mechanism comprising a series of differentially movable denominational elements, of a movable carriage, contacts successively closed by the carriage for selecting the elements to be actuated, means for actuating said elements, a series of keys for determining the extent of movement to be imparted to the elements by the actuating means, circuits, including said contacts and closed by the keys, for operating the actuating means, and means for holding the circuits closed until the selected element has been operated to the extent determined by the operated key.

28. In a machine of the class described, the combination with a calculating mechanism comprising a series of differentially movable denominational elements, a movable carriage, contacts successively closed by the carriage for selecting the elements to be actuated, an escapement mechanism for actuating said elements, a series of keys for determining the extent of movement to be imparted to the elements by the escapement mechanism, circuits, including said contacts and closed by the keys, for operating the escapement means, and means for holding the circuits closed until the selected element has been operated by the extent determined by the operated keys.

In testimony whereof we have affixed our signatures, in presence of two witnesses.

HENRY SUGDEN.
CHARLES F. PIDGIN.

Witnesses:

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