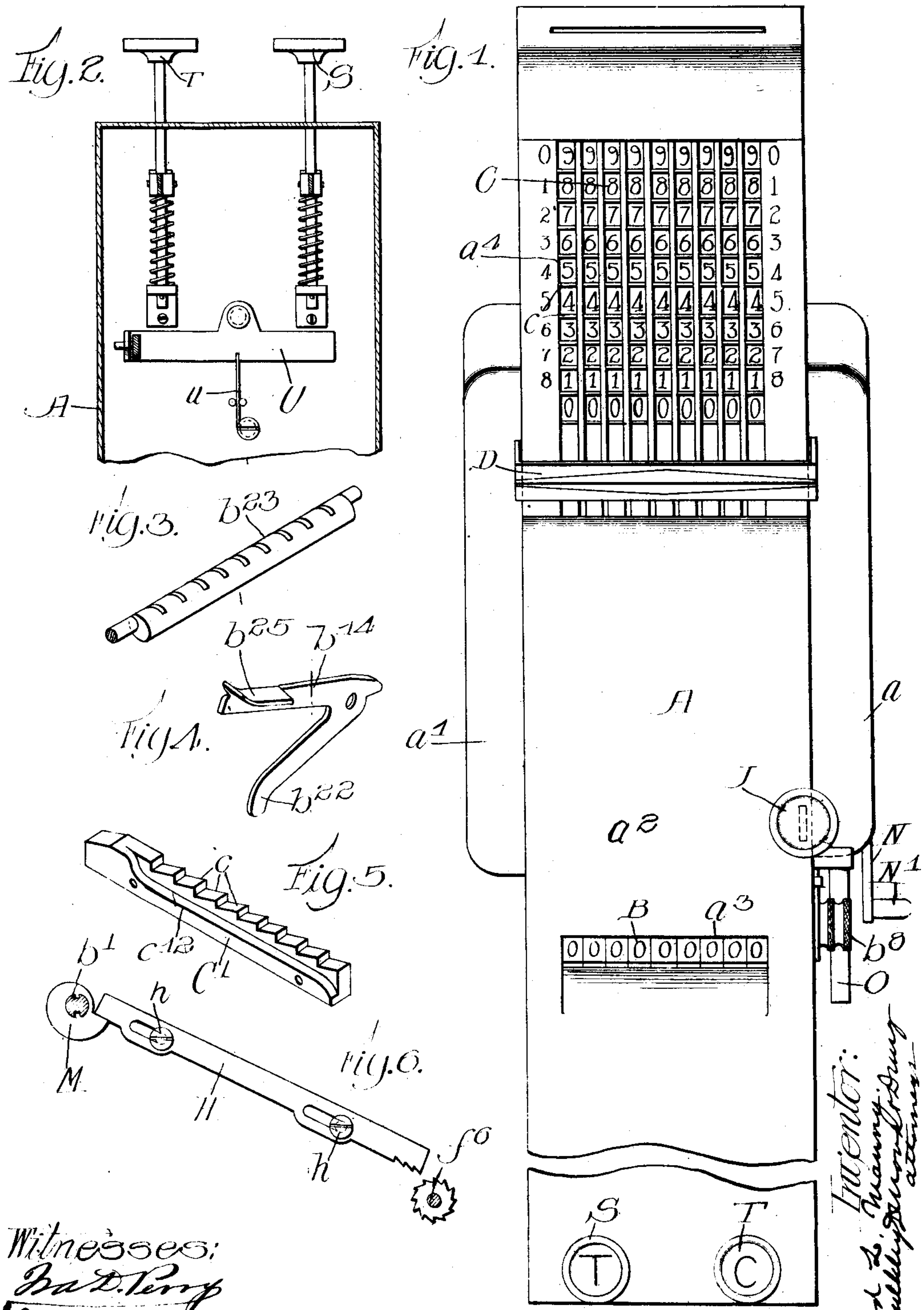
F. L. MANNY.

COMPUTING MACHINE.

APPLICATION FILED JAN. 28, 1909.

1,038,774. Patented Sept. 17, 1912.

7 SHEETS—SHEET 1.



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7 SHEETS—SHEET 2

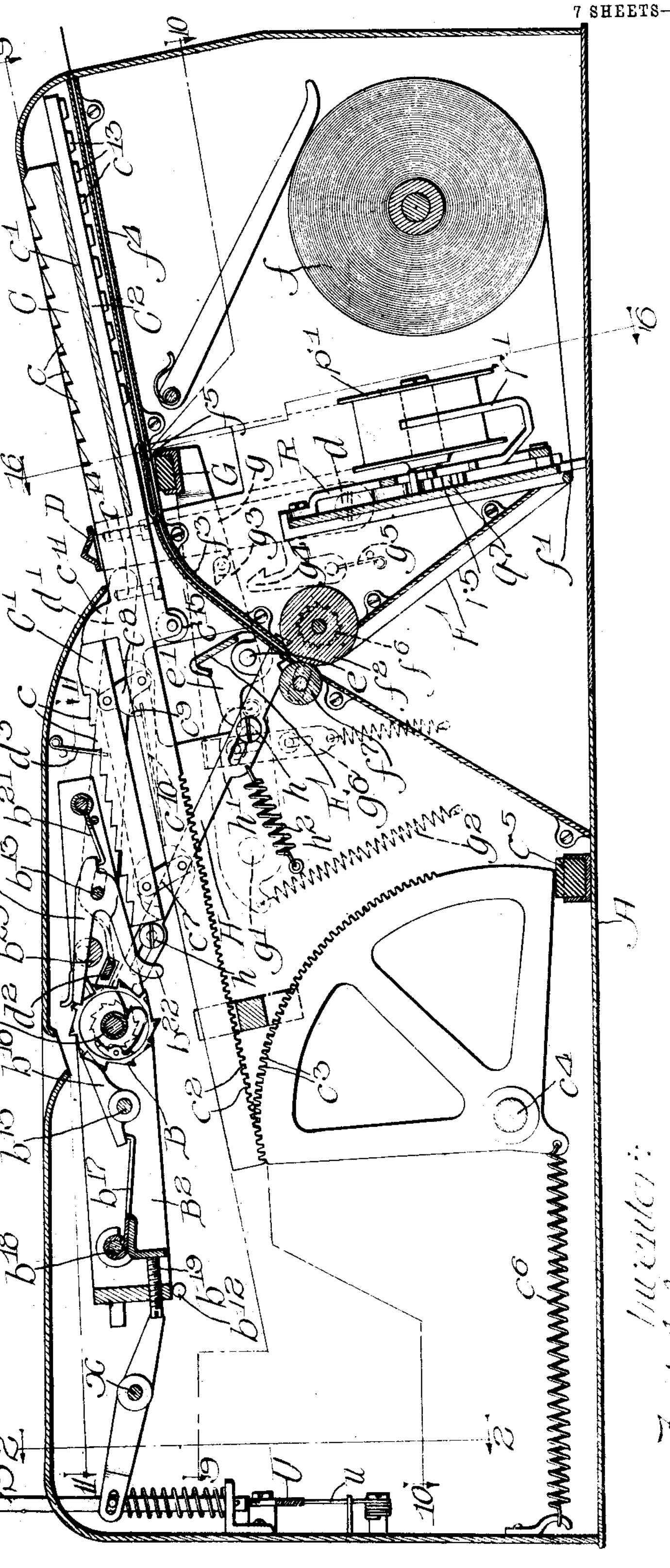

Fig. 2

Witnesses:

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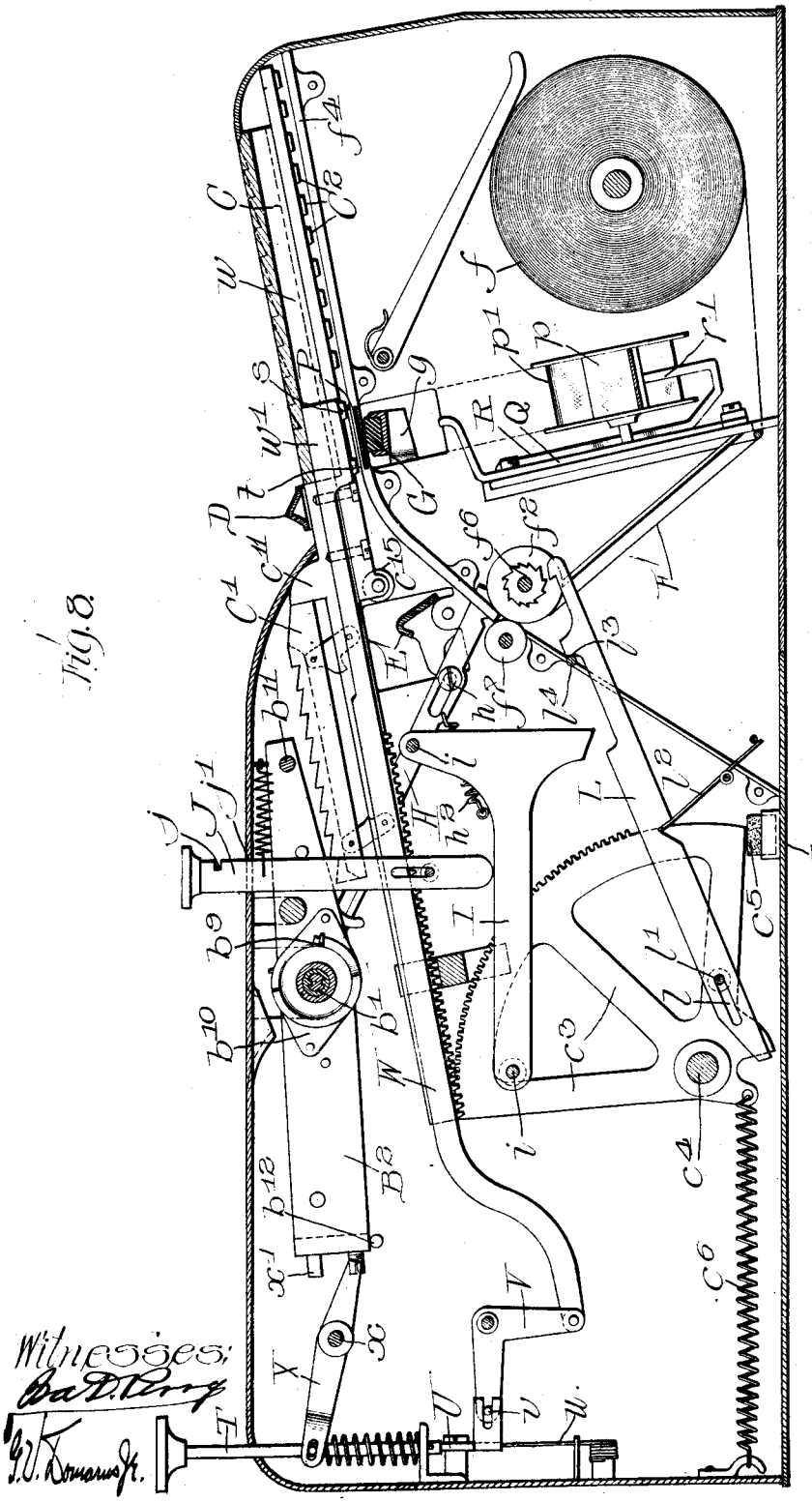
7 SHEETS—SHEET 3.

Fig. 8.



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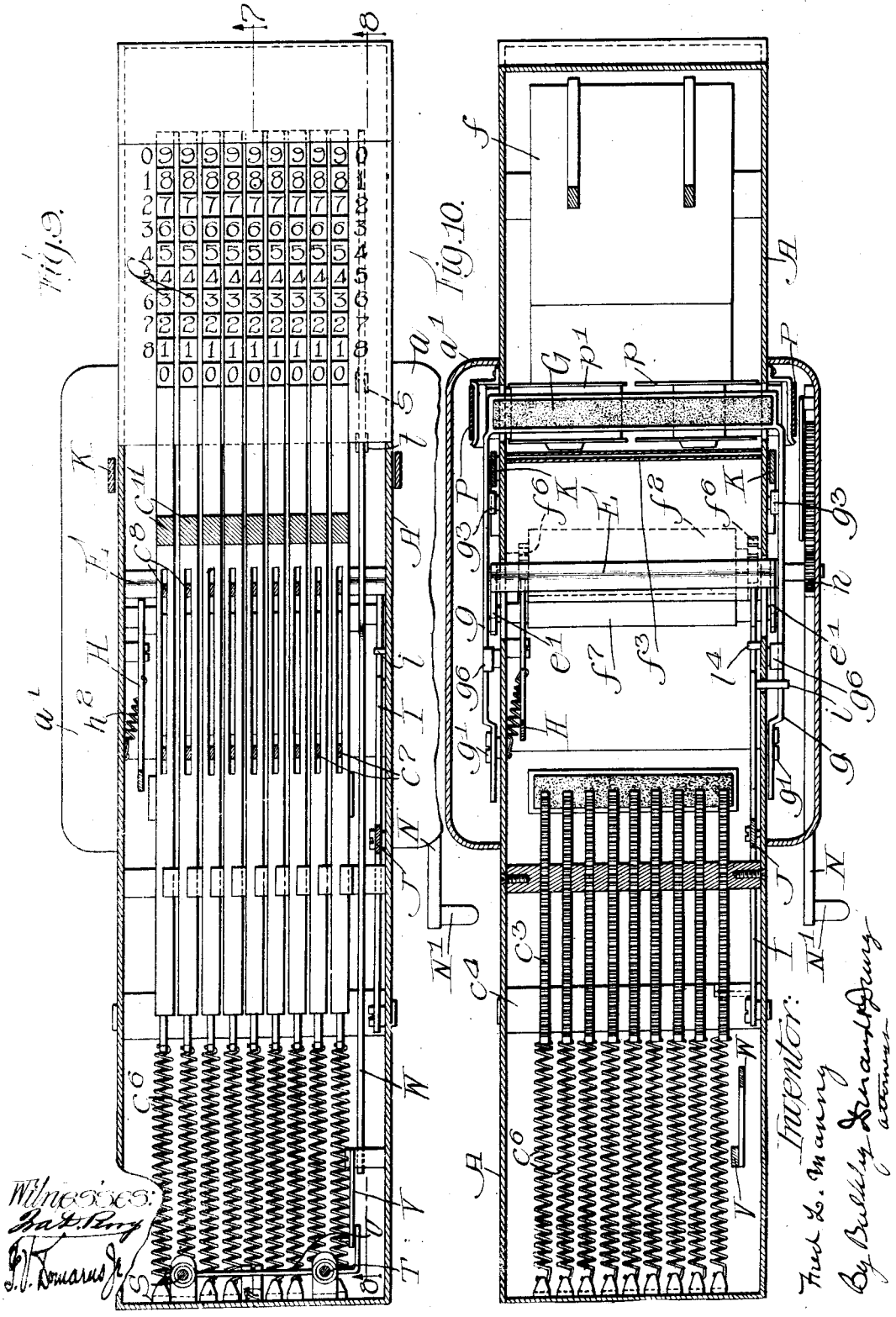

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7 SHEETS—SHEET 5.

Fig. 11.

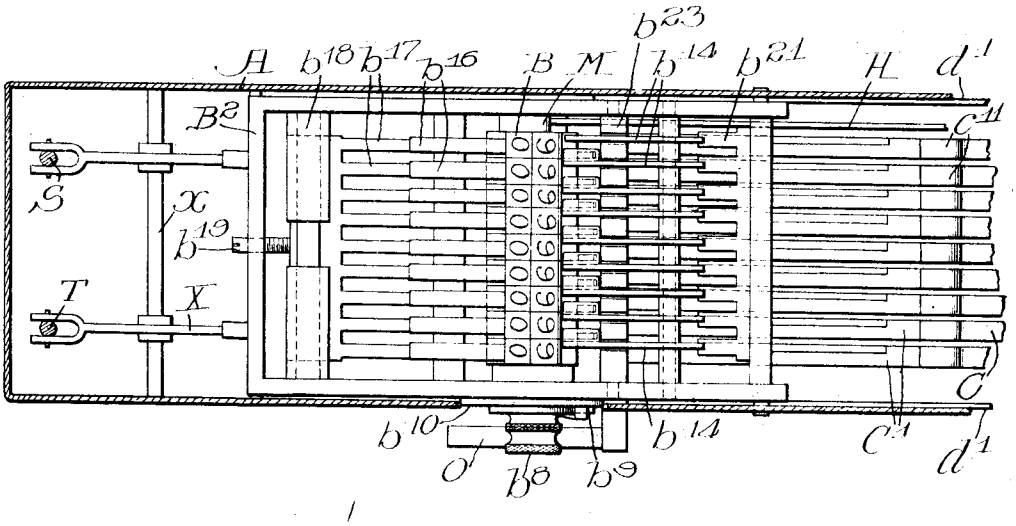


Fig. 12.

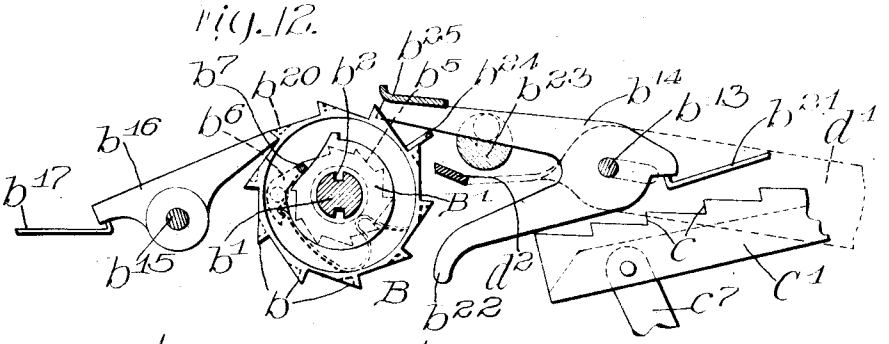


Fig. 13.

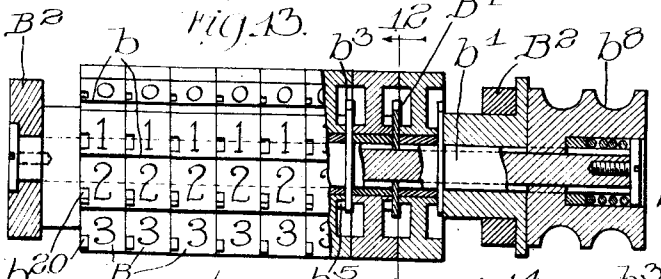


Fig. 14.

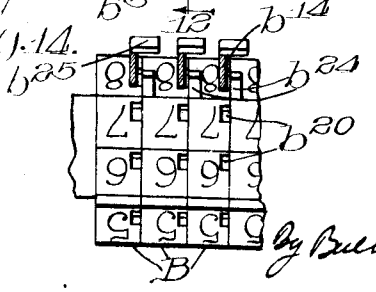
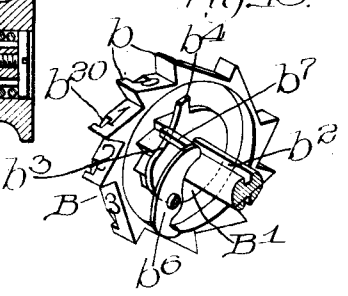


Fig. 15.



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7 SHEETS—SHEET 6.

Fig. 16.

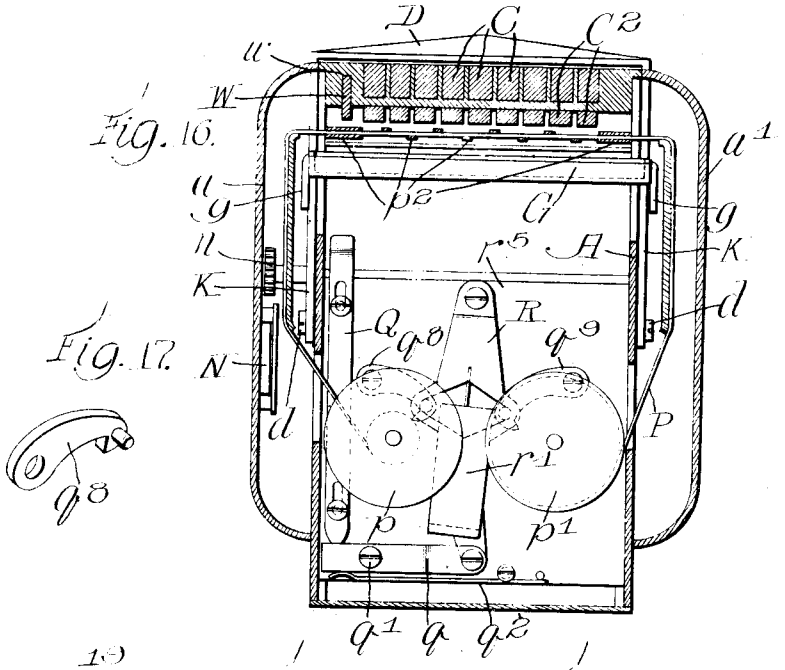


Fig. 17.

Fig. 18.

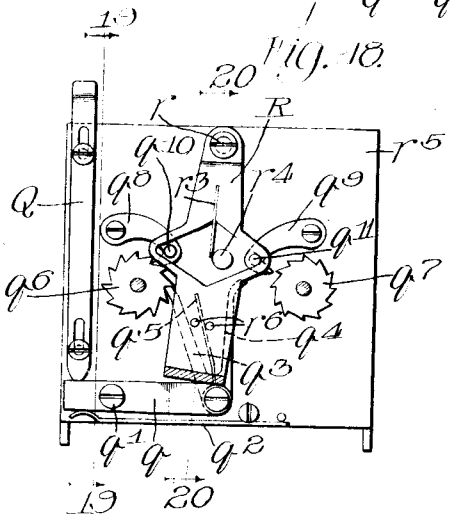


Fig. 19.

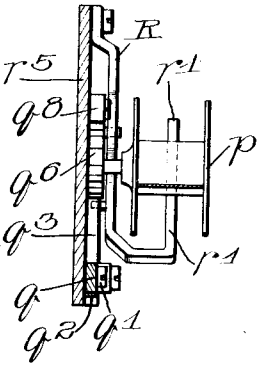


Fig. 20.

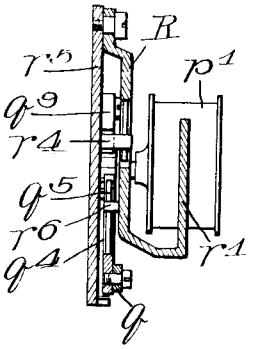
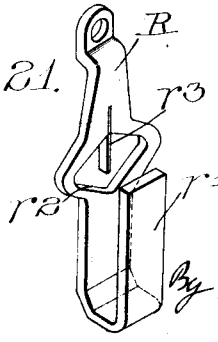


Fig. 21.



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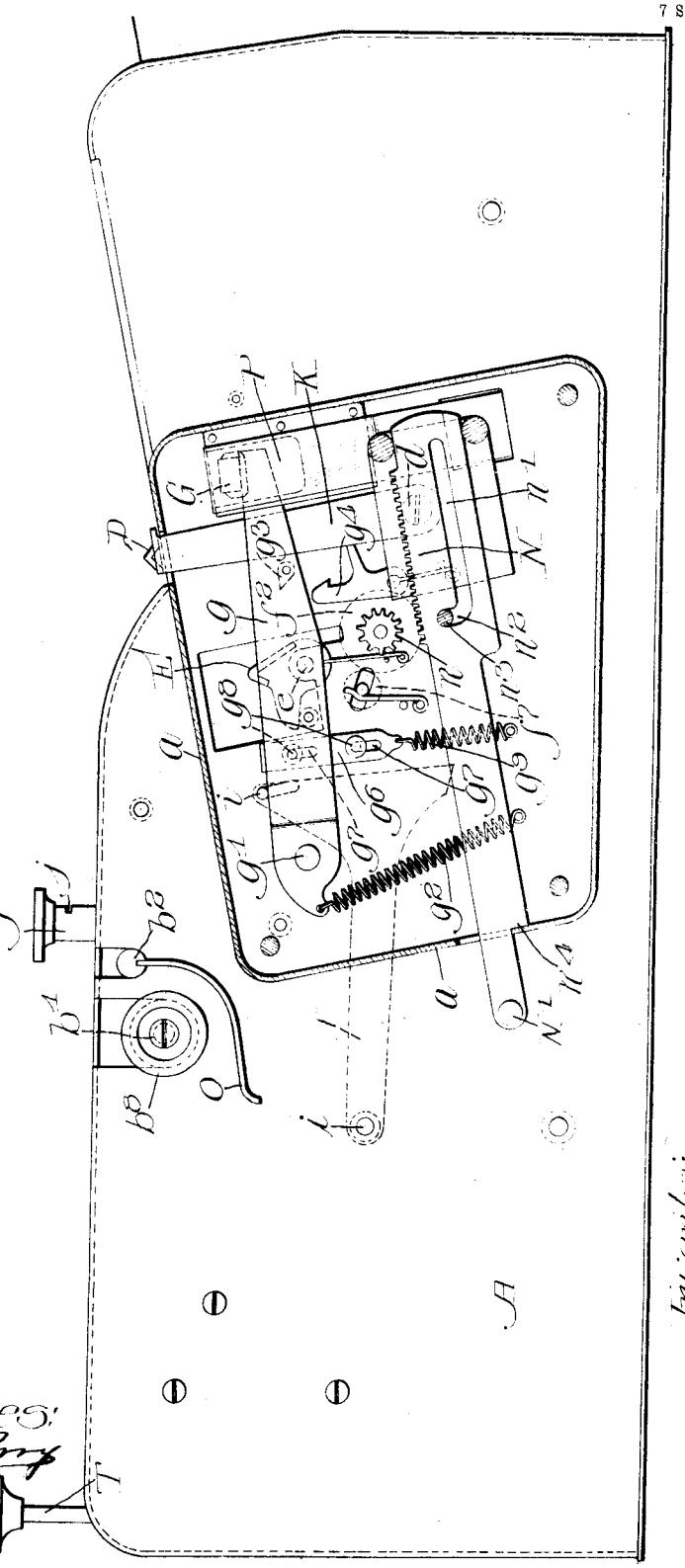
7 SHEETS—SHEET 7.

Fig. 22.



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UNITED STATES PATENT OFFICE.

FRED L. MANNY, OF BENTON HARBOR, MICHIGAN, ASSIGNOR OF ONE-HALF TO CHARLES W. HAAS, OF CHICAGO, ILLINOIS.

COMPUTING-MACHINE.

1,038,774. Specification of Letters Patent. Patented Sept. 17, 1912.

Application filed January 28, 1909. Serial No. 474,747.

To all whom it may concern:

Be it known that I, FRED L. MANNY, a citizen of the United States of America, and resident of Benton Harbor, Berrien county, Michigan, have invented a certain new and useful Improvement in Computing-Machines, of which the following is a specification.

My invention relates to adding or computing machines in general, but more particularly to that type in which a series of slides or push-bars, each provided with a series of teeth adapted to be engaged by the point of a pencil or stylus, are employed for operating a similar number of numeral wheels, each numeral wheel having a series of teeth numbered from naught to nine, in the usual manner. In a computing machine of this particular character, the said slides or push-bars are arranged side by side in a horizontal plane, with the teeth of each slide or bar held normally in alinement with those of the others; and with this arrangement each bar has nine teeth, the ninth tooth of each bar being at the extreme end thereof, and there being ordinarily nine of said slides or bars, whereby the machine is capable of handling numbers involving as high as nine digits. Each bar actuates its allotted numeral or ratchet wheel in accordance with the numeral selected on the slide or bar—that is to say, depending upon the particular tooth of the bar or slide engaged by the pencil or stylus of the operator. When released, each slide or push-bar returns to normal position, the forward actuation of the bars being made variable by a stop which engages the pencil or stylus of the operator. This machine is simple, and has always been satisfactory for certain purposes, but its range of usefulness has always been more or less circumscribed and limited.

The object of my invention is, therefore, the provision of an adding or computing machine of this character having a wider range of utility than heretofore; to provide a computing machine of this general character in which provision is made for printing a list of the numbers to be added, and for printing totals and credits; to provide a machine of this character by which addition, division, subtraction, multiplication, etc., may be carried on, and in which the said provision for printing may be disconnected and thrown out of use whenever such is desirable; to provide a machine of this character in which provision is made for automatically feeding both the paper and the ink ribbon employed in printing a list of the numbers to be added, or in printing the totals and credits; and to provide certain details and features of improvement and combinations tending to increase the general efficiency of a computing machine of this particular character.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings:—Figure 1 is a plan of an adding or computing machine embodying the principles of my invention. Fig. 2 is a section on line 2—2 in Fig. 7. Fig. 3 is a perspective of the cam shaft for raising the dogs of the register wheels out of engagement therewith. Fig. 4 is a perspective of one of said dogs. Fig. 5 is a perspective of one of the ratchet tooth racks on the push-bars. Fig. 6 is a detail view showing the mechanism for resetting the paper. Fig. 7 is a longitudinal section on line 7—7 in Fig. 9. Fig. 8 is a similar section on line 8—8 in Fig. 9. Fig. 9 is a horizontal section on line 9—9 in Fig. 7. Fig. 10 is a section on line 10—10 in Fig. 7. Fig. 11 is a section on line 11—11 in Fig. 7. Fig. 12 is an enlarged detail section on line 12—12 in Fig. 13. Fig. 13 is an enlarged front elevation of the register wheel mechanism, showing part of the same in longitudinal section. Fig. 14 is a rear elevation of a portion of the said mechanism. Fig. 15 is a perspective of one of the said register wheels. Fig. 16 is a cross section on line 16—16 in Fig. 7. Fig. 17 is a perspective of one of the locking dogs on the register wheels. Fig. 18 is a detail view of the ink ribbon feeding and reversing mechanism. Fig. 19 is a section on line 19—19 in Fig. 18. Fig. 20 is a section on line 20—20 in Fig. 18. Fig. 21 is a perspective of the reverser for the ribbon feed mechanism. Fig. 22 is a side elevation of the machine, with a portion of the casing thereof broken away or in section to bring into view certain of the operative parts.

As thus illustrated, my invention com-

prises a box or casing A for inclosing the greater portion of the mechanism, and having side chambers a and a' for inclosing certain operative elements at the sides of the machine. Said casing has a top wall a^2 provided with a slot a^3 for exposing the register wheels B, and a larger rectangular opening a^4 for exposing the numeral teeth of the computing members or push-bars C. The wheels B each have ten ratchet teeth b with numerals from naught to nine on the beveled faces thereof. Said wheels are all arranged side by side on the shaft b', which latter has longitudinal slots b^2. The said wheels turn on the shaft b', but the disks B′ have projections that extend into the slots b^2, and can only turn with the shaft. Each disk has a cam portion b^3 and a finger b^4. (See Fig. 15.)

Each register wheel has a ratchet wheel b^5 on the right hand side thereof, and a spring pressed dog b^6 on the other side thereof, said dog having a finger b^7 (see Figs. 12 and 15). It will be seen that the ratchet wheel of the hundreds register wheel is on the side toward the tens register wheel, and that the dog b^6 of the said hundreds register wheel is on the side toward the thousands register wheel. The ratchet wheels b^5 all face in the same direction—that is to say, toward the knob b^8 at the end of the cylinder shaft b', and the fingers b^7 of the dogs all extend in the other direction. Thus the dog b^6 of the units wheel rides on the periphery of the adjacent disk B′, and its finger b^7 extends beyond said disk and overhangs the teeth of the ratchet wheel b^5 on the tens register wheel. This arrangement is uniform throughout the series of register wheels, so that whenever a finger b^7 drops into the cam portion b^3 of a disk it engages a tooth of the ratchet wheel on the next register wheel and gives the latter a single step or rotation forward a distance equal to one tooth, thereby giving a different reading. Each register wheel, therefore, is capable, upon being given more than a complete rotation by any two or more successive operations, to add one to the reading on the next wheel, as is usual in addition. This, however, will hereinafter more fully appear. By the knob b^8, (see Fig. 13) which is slidable on the cylinder shaft and held in normal position by a spring, the said shaft can be rotated to bring all the register wheels to zero—that is to say, for the purpose of bringing all such wheels back to starting point. This is by reason of the fact that said shaft when rotated causes the finger b^4 to swing around until it strikes the finger b^7, and when the shaft stops with the pin b^9 on the knob, and in engagement with a notch on the bearing b^{10}, the disks B′, are then all locked in position with their fingers b^4 all pointing directly upward, and with the fingers b^7 all resting in position just in front of the fingers b^4. When rotated or while it rotates, therefore, each finger b^7 leaves the finger b^4 and continues to ride around upon the circular periphery of the adjacent disk B′, and does so until the cam portion b^3 is reached, when engagement is had with the next wheel and one added to the reading of such wheel. As stated, however, all this will hereinafter more fully appear.

The cylinder shaft b' is mounted in bearings carried by the yoke-like frame B^2, which latter has its forward end pivoted to the casing at b^{11}. The free or swinging end of said yoke normally rests upon a pin b^{12} on the inner side of the casing. The said yoke also carries a transverse rod or pivot b^{13} upon which are mounted the dogs b^{14}, at one side of the axis of the register wheels. At the other side of the axis of the register wheels, and between the same and the free or movable end of the yoke, the latter is provided with a transverse rod or pivot b^{15} upon which are mounted the dogs b^{16}. It will be seen that the dogs b^{16} are subject to the tension of their springs b^{17} which are carried on a cross rod b^{18} on the yoke. The tension of these springs can be regulated by screws b^{19} extending through the rear transverse portion of the yoke. These dogs b^{16} engage the faces of the teeth b to prevent backward rotation of the register wheels. The dogs b^{14} engage small recesses b^{20} in the backs or beveled sides of the said teeth b, and thus normally lock the register wheels against forward rotation. (See Fig. 12.) These dogs b^{14} are subject to the pressure of springs b^{21}. It will also be seen that these dogs b^{14} are provided with fingers b^{22} by which they are raised out of engagement with the register wheels when it is desired that one or more of the latter shall rotate. The dogs b^{14} may all be raised out of engagement with the register wheels by means of a rotatable cam shaft b^{23} mounted transversely on the yoke B^2.

The stop bar D extends transversely of the machine between the register wheels and the faces of the computing bars C, and has upright side portions pivoted at d to the sides of the casing. Longitudinally extending bars d' have their ends held normally in engagement with the upright side portions of the stop bar D, and are mounted to slide on the rod b^{13}, by reason of slots therein, as shown more clearly in Fig. 7. At their other ends these bars d' are connected by a locking bar d^2, which latter is normally held out of engagement with the register wheels, by a spring or springs d^3.

Each register wheel has one of its teeth b provided with a finger b^{24}, and the dogs b^{14} have cam portions b^{25} adapted to be engaged by said fingers. Thus when a ratchet wheel

is given a complete rotation, its finger b^{24} engages the cam portion b^{25} on the wheel ahead, and thus the latter wheel is permitted to rotate one step. The cam portions b^{25} all point toward the units wheel. For example, the cam portion b^{25} on the tens wheel is operated by the finger b^{24} on the units wheel; the cam portion b^{25} on the dog of the hundreds wheel is operated by the finger b^{24} on the tens wheel; and this arrangement is preserved throughout the series of register wheels.

The computing bars C are provided with numeral teeth c, adapted to be engaged by the point of a lead pencil or stylus, in the usual and well known manner. These bars are all arranged side by side in a substantially horizontal plane, and are slidable upon a plate or table c' extending transversely of the machine, and supported on the casing thereof. The under sides of the forward ends of said bars are provided with racks c^2 adapted to engage segment gears c^3 mounted on a transverse shaft c^4. These segment gears are adapted to rest normally upon a bumper c^5, and are operated by springs c^6, whereby the rack and pinion connections thus provided cause the computing or push-bars C to return to normal position when released. Each computing or push-bar is provided with a ratchet tooth rack C′ having ratchet teeth c on the upper surface thereof, there being one of these bars for each of the register wheels. The bars C and C′ are connected by links c^7 and c^8, the latter provided with lugs c^9 adapted to be engaged by springs c^{10}, whereby the rear ends of the bars C′ are held normally in engagement with the stops c^{11} on the computing bars. With this arrangement the ratchet tooth rack bar C′ normally occupies the position shown in Fig. 7 relatively to the computing bars. The teeth c are adapted to engage the teeth b of the register wheels, whereby the latter are rotated in accordance with the actuation of the computing bars—that is to say, in accordance with the numerals selected on the computing bars when the latter are actuated. The pencil or the stylus of the operator, when it strikes the stop bar D, moves the locking bar d^2 into engagement with all the register wheels, thus preventing undue rotation of said wheels at this time. Each bar C′ carries a cam track c^{12} adapted to engage the corresponding finger b^{22}, whereby the corresponding dog b^{14} is raised out of engagement with the corresponding register wheel when the computing bar corresponding thereto is actuated. Each computing bar carries on its under side a type bar C^2, which latter is provided on its under surface with type c^{13}, consisting of numerals ranging from naught to nine, corresponding to the teeth c on the upper surface of the computing bars. These type bars C^2 bear upon the under surface of the plate or table c', and are secured at their forward ends to the computing bars by screws c^{14}. Each type bar carries at its forward end a wheel or roller c^{15} adapted to engage a cam lever E carried on a transverse pivot e. The paper F for printing is fed from a roll f around a transverse rod f', thence upwardly and around a wheel f^2, then through a narrow slot or channel f^3, and then outwardly through a continuation of said slot or channel f^4, it being observed that by an opening f^5 the said paper is exposed for the full width thereof at a point directly above the hammer G. The paper feed roll f^2 has a ratchet wheel f^6 adapted to be engaged by a dog or feed bar H, which latter is slotted and mounted to slide upon screws or pins h, in the manner shown more clearly in Fig. 7. The paper is held in contact with the roll f^2 by a second roll f^7. The wheels c^{15}, which are on the type bars, engage the upper edge of the transversely extending plate of the lever E. The finger e' engages the roll h', which latter is on the bar g and causes the hammer to be depressed. With the arrangement shown, the paper is fed forward each time the units bar C is operated. In putting down numbers, the operator works from left to right, so that the units bar is always the last one to be operated for any number consisting of more than one digit.

The hammer G is mounted upon parallel side bars g which are pivoted at g', said hammer being controlled by a spring g^2 connected between the casing and the rear end of the bar g. Normally, therefore, the hammer G, which may be faced with rubber, occupies an elevated position, as shown in Fig. 7. The bar g has a lug g^3 adapted to be engaged by a hook g^4 pivoted on the side of the casing. This hook is controlled by a spring g^5, causing it to press normally against the upright side bar or portion of the stop bar D (see Fig. 7). A spring h^2 keeps the bar H normally retracted and out of engagement with the ratchet wheel f^6. The bars g are provided with depending bars g^6 which take over the upper edges of the bar g and which have slots g^7 that slide on pins g^8 on the casing. These bars g^6 are held normally down by springs g^9 which connect their lower ends with the casing. In this way the hammer G is held normally in the desired position—that is to say, just out of engagement with the paper, as shown in Figs. 7 and 22.

A lever I pivoted to the inside of the casing at i is provided with a pin i' for engaging one of the side bars g, as shown more clearly in Fig. 8. A vertically disposed key J, mounted to slide up and down, has its lower end adapted to engage the said lever I, as shown in Fig. 8. When this key is de-

pressed, it causes the pin i to depress the bar g and thereby depress the hammer G. When this is done, the lug g^3 engages the hook g^4, and the hammer becomes locked in a depressed position. When the side members K of the stop bar D swings forward, it causes the hook or dog g^4 to disengage itself from the lug g^3, thereby allowing the hammer G to fly upwardly under the tension of the spring g^2, providing the same is not locked down by the key J. The key J is provided with a notch j adapted to engage the edge j' of the casing, whereby the said key and the lever I, and thereby the hammer G, can be locked in a depressed position. When this is done, the actuation of the hook or dog g^4 does not release the hammer and no printing is done, as will be explained. It is possible, therefore, to actuate the register wheels without operating the hammer, which does the printing. The units computing bar does the printing, as stated, by reason of the fact that a bar or dog L is arranged to engage the ratchet wheel f^6 at one end, and carried on the segment gear c^3 corresponding to the units bar. This bar or feed pawl L has a slot l adapted to engage a pin l' on the said segment c^3 of the units computing bar. A spring l^2 controls the operation of the said feed pawl L, and the latter is provided with a cam portion l^3 adapted to engage a pin l^4 to throw it out of engagement with the ratchet wheel f^6. When the units computing bar is moved forward, the feed pawl L is pushed forward, and when the said units bar is released and allowed to fly back to its normal position, then the pawl L engages the ratchet wheel f^6 and moves the paper ahead one step. The cam portion l^3 and the rod l^4 coöperate to throw the feed pawl L out of engagement with the ratchet wheel f^6, as shown in Fig. 8. It will be seen, therefore, that the hammer G is tripped and operated each time a computing bar is operated and that the paper feed mechanism is operated each time the units computing bar is operated. The actuation of any computing bar causes the lever E to depress the hammer, and the same becomes locked in such depressed position by the hook or dog g^4. When the operator's pencil or stylus reaches the stop bar D, and when the latter is moved forward, the hammer is then released, in the manner explained, and allowed to fly upwardly against the paper. Every time the hammer flies upwardly, its blow is received by a type on the lower surface of the corresponding computing bar, so that a correct record is kept of each actuation of each bar. If it is not desired to use the printing mechanism, then the key J is pressed downward to lock the hammer in an inoperative position, as previously explained. When the register wheels are reset by the rotation of the cylinder shaft b', the cam M thereon is rotated, which cam engages and actuates the end of the bar H, as shown in Fig. 6. This causes a readjustment of the paper into position for printing. After the numbers are all set down and printed, the paper is then run out by means of the rack N adapted to engage the pinion n on the end of the feed roller f^2. Normally this rack occupies the position shown in Fig. 22, being provided with a longitudinal slot n' having an upturned portion n^2 adapted to normally engage a pin or guide rod n^3. The outer end of the rack has a handle N', and is also provided with a shoulder n^4 adapted to rest normally against the edge of the casing, as illustrated. Thus when it is desired to run the paper out of the machine, so that the printed portion thereof may be torn off, it is necessary to raise the handle n' for the purpose of disengaging the shoulder n^4 and causing the rack N to engage the pinion n. When this rack N is reversed and moved in the opposite direction, then the paper is run back into the machine. In such position, however, it is back of the opening f^5, and it is necessary at this time, therefore, to actuate the paper forward again and into position for printing. This is done, as stated, by means of the cam M when the register wheels are reset or returned to zero. In resetting the register wheels, it is necessary to raise the handle O, which is secured to the cam shaft b^{23}, whereby all of the dogs b^{14} are raised out of engagement with the register wheels.

The ink ribbon P is carried on two rolls p and p' and travels through guides p^2, thus bringing it directly between the paper and the type on the type bars, and directly over the opening f^5. Whenever the hammer is actuated, therefore, it presses the paper against the ink ribbon, and presses the latter against the type, much after the fashion of an ordinary typewriter. It will be seen, however, that the hammer serves the function of a platen, and is movable, whereas the type remains stationary during the printing. Each time the bar g descends it strikes the upper end of the bar Q. The lower end of the latter operates a lever q, which is pivoted at q' and controlled by a spring q^2. The other end of this lever q carries a pair of feed pawls q^3, q^4 controlled by a spring q^5. The pawl q^3 is adapted to engage a ratchet wheel q^6 on the roll p, while the feed pawl q^4 is adapted to engage a ratchet wheel q^7 on the roll p'. A pair of pivoted dogs q^8, q^9 are adapted respectively to engage the ratchet wheels q^6, q^7 to prevent backward rotation thereof. As shown in Fig. 18, the vibration of the hammer G will cause the bar Q to actuate the feed pawl q^3 against the teeth of the ratchet wheel q^6,

thus winding the ribbon on the roll p, and unwinding it from the roll p'. An automatic shifter R is, however, provided for reversing this motion. This shifter has its upper end pivoted at r, and is provided with a lower upturned portion r' adapted to play between the two rolls, and to be engaged by the ribbon thereon. The said shifter is also provided with a diamond-shaped opening r^2 having a flat spring r^3 adapted to engage a pin r^4 on the stationary plate r^5 of the frame or casing of the machine. The pins q^{10} and q^{11}, mounted respectively on the dogs q^8 and q^9, are carried in and engaged by the opposite ends of the diamond-shaped opening r^2, (see Fig. 18.) The shifter R has a pair of pins r^6 which embrace the upper portion of the spring q^5, as illustrated. Now, assume that the roll p is gradually increasing in size, and therefore gradually pushing the shifter R over toward the other roll. The movement of the shifter in this direction is opposed by the spring r^3 until the same has been bent sufficiently to snap over the pin r^4. When this is done, the dog q^8 is disengaged from the ratchet wheel q^6, and the dog q^9 is caused to engage the ratchet wheel q^7. Also the feed pawl q^3 is disengaged from the ratchet wheel q^6, and the feed pawl q^4 is brought into engagement with the ratchet wheel q^7. The spring r^3 is, of course, stronger than the spring q^5, whereby the latter is placed under tension to hold the feed pawls to their work until the roll, either one, is full and ready to reverse. When this is done, the continued operation of the hammer G causes the bar q to operate the roll p', causing the ribbon to wind thereon, and causing the said ribbon to unwind from the roll p. Thus the hammer works the ribbon feed mechanism, and the latter is automatically reversed in its operation as soon as either ribbon roll becomes wound or loaded to a certain extent, namely to an extent sufficient to push against the portion r', and thereby snap the shifter R over to the other position.

It is often desirable to print without operating the registering mechanism, as in putting down totals, or as in putting down credits which are not to be added with the other numbers. For this purpose I provide a pair of keys S and T, the first being the total key and the second the credit key, as will be seen by the indications on the upper surfaces thereof. Referring to Fig. 2, it will be seen that the key S engages one end of a pivoted lever U, and that the key T engages the other end of said lever, each key being held normally in elevated position by a suitable spring, in the manner illustrated. The lever U is held in a normally horizontal position by a spring u. A bell crank V is pivoted on the side of the casing and provided with a pin v adapted to engage one end of the lever U. This bell crank operates a slide or bar W which moves in a slot w in the frame or casing of the machine (see Fig. 16.) At its forward end the said bar W has an enlarged portion w' provided on its lower surface with a credit type t and a total type s, adapted to alternate above the hammer and the ink ribbon, whereby one or the other may be used for making an impression on the paper. If it is desired to set down a credit, then the key T is pressed and the type t is thereby brought into position for printing at the right of the number put down. If a total is to be indicated, then the key S is pressed, thereby bringing the type s into position to print on the paper. When the key S is pressed, the bar W moves toward the said key; but when the key T is pressed, then the bar moves away from said key. Each key is provided with a lever X for lifting the rear end of the yoke B^2, said levers being pivoted at x upon the frame or casing of the machine. These levers engage pins x' on the said yoke, and thus lift the latter sufficiently to bring the register wheels out of engagement with the ratchet teeth c. In this way printing can be accomplished without registering. Also, by raising the knob b^8 the register wheels will be lifted out of engagement with the computing bars, and thus any of the latter can be operated without causing the computing mechanism to operate. In other words, the computing bars can be used for printing without operating the computing mechanism—that is to say, without operating the wheels B. On the other hand, as explained, these wheels can be operated without operating the printing mechanism, by simply setting the key J into position to hold the hammer against upward movement. When one of the keys S and T is pressed, it throws the register wheels B out of operative relation to the computing bars, and throws the bar W into position to print either the character C or T, to indicate either a credit or a total. When this is done, and when one of the computing bars is then operated, or each time a computing bar is then operated, the hammer prints both the numeral or numerals on said computing bar or bars, and also the character C or T, as the case may be. Thus the operator can set down a credit without registering the same on the computing mechanism, and may set down a total in the same manner. Obviously, therefore, I provide an improved machine in which addition, subtraction, multiplication and division and other problems may be carried on in a new and improved manner. I also make provision, as explained, for listing, and for using the listing mechanism without using the computing mechanism, and vice versa.

All of this is of particular advantage, and so far as I know, this is the first time that listing has been carried on in a machine of this particular character. I claim my invention broadly, therefore, and do not limit myself to the particular details of construction shown, as modifications and various changes may be employed without departing from the spirit of my invention.

What I claim as my invention is:

1. In a computing machine, a series of endwise movable bars, registering mechanism operated by the variable movements of said bars, means for printing automatically operated by the actuation of said bars, a stop, the movements of the bars being limited by said stop.

2. In a computing machine, a series of push bars, type on the under side of said bars, and a hammer automatically actuated by the operation of any bar and coöperating with said type to print.

3. In a computing machine, a series of push bars, type on said bars, a paper feed mechanism operated by the units bar, and a hammer operated by any bar and coöperating with said type to print in accordance with the actuation of said bars.

4. In a computing machine, the combination of slide-bars, slide-bar-operated adding mechanism, and slide-bar-operated listing mechanism, adapted to list the numbers by the actuation of the bars, the adding mechanism being separate from the listing mechanism.

5. In a computing machine, the combination of push-bar-operated computing mechanism, slide-bar-operated listing and printing mechanism, and means for permitting the operation of the computing mechanism without printing, each slide-bar having a plurality of numbered positions thereon for the actuation thereof by a stylus.

6. In a computing machine, the combination of slide-bar-operated computing mechanism, push-bar-operated printing mechanism, and means for permitting the operation of the printing mechanism without computing, each slide-bar having a plurality of numbered positions thereon for the actuation thereof by a stylus.

7. In a computing machine, a series of slide bars having exposed numeral teeth on one side thereof, by which teeth the bars are operated by a stylus, type on another side thereof, computing mechanism coöperating with said bars in accordance with the numeral teeth selected thereon, means for holding paper to receive the impression of said type to list the numbers put down, and means automatically actuated in the operation of any bar for causing the said impression.

8. In a computing machine, a series of slide-bars, a like number of register wheels, means on said bars for operating the wheels, numerals on the upper edges of the bars, numerals on the wheels, and means for raising all the wheels out of operative relation to the bars.

9. In a computing machine, an endwise reciprocating type bar, a plurality of keys, such as S and T, for giving said bar different degrees of endwise actuation, according to the type desired, and means coöperating with said type to print, said means being disposed in position and operative to lift the paper into contact with the type.

10. In a computing machine, a series of slide-bars, register wheels operated thereby, numerals on the upper edges of the bars, numerals on the wheels, printing mechanism operated by the said bars, and a key for rendering the printing mechanism inoperative.

11. In a computing machine, a series of type bars, register wheels operated thereby, printing mechanism operated by the bar, a paper feeding device therefor, a key for running the paper out and in, means for resetting the register wheels, and means for automatically resetting the paper at the same time.

12. In a computing machine, a series of register wheels, a series of slide bars for operating said wheels, a movable stop for variably limiting the motion of said means, and bars actuated by said stop to engage all of said wheels.

13. In a computing machine, a series of slide bars having exposed teeth on the upper surface thereof, by means of which teeth said bars are actuated by a stylus, numerals for said teeth, type bars carried on said slide bars, and a plate disposed between the slide bars and the type bars, forming a support for the same.

14. In a computing machine, a series of slide bars, register wheels operated thereby, numerals for the bars, numerals on the wheels, an ink ribbon feed mechanism operated by said bars, and means for automatically reversing the feed of said ribbon.

15. In a computing machine, a series of register wheels having numbered ratchet teeth, dogs engaging said wheels, push bars for lifting said dogs and operating said wheels, one or more of said wheels provided with means at one point in the circumference thereof for lifting the dog of the next wheel.

16. A computing machine comprising a series of slide bars having numeral teeth thereon, register wheels operated by said bars, a movable stop bar for variably limiting the motion of said bars, and mechanism operated by the movement of said stop-bar.

17. In a computing machine, a series of slide bars, register wheels operated thereby, numerals for the bars, numerals on the wheels, racks on said bars, gear wheels en-

gaging said racks, and springs applied to said gear wheels to restore the bars to normal position.

18. In a computing machine, registering mechanism, a plurality of independently movable members for actuating said mechanism, each member having an individual connection with said mechanism and listing mechanism operative to print automatically each time one of said members is actuated.

19. In a computing machine, registering mechanism, a plurality of independently movable members for actuating said mechanism, listing mechanism operative to print automatically each time one of said members is actuated, and means for varying the degree of actuation of said members.

20. In a computing machine, the combination of stylus-actuated registering mechanism, listing mechanism, a stop for the stylus, and mechanism operated by said stop for causing said listing mechanism to print automatically each time the registering mechanism is actuated.

21. In a computing machine, the combination of registering mechanism, means for actuating the said mechanism, comprising a movable member having a series of numbered positions thereon for the point of a stylus, and listing mechanism operative to print automatically by the actuation of said member.

22. In a computing machine, registering mechanism, and listing mechanism operative to print automatically and simultaneously with each registration, said mechanism comprising a plurality of movable type members.

23. In a computing machine, a movable actuating member having a series of positions thereon for a stylus, and printing mechanism comprising a set of type carried by said member, each type being opposite a different position on the member.

24. In a computing machine, a series of independently movable actuating elements, each having a series of positions thereon for a stylus, and printing mechanism operative to print operated by the actuation of any one of said elements, comprising type carried by and corresponding to the said positions on said elements, and a hammer for striking the paper against said type.

25. In a computing machine, a movable member having a series of positions thereon, a stop for variably limiting the actuation of said member, in accordance with the position selected thereon, means operated by said stop for automatically printing each time said member is actuated, and means for feeding the paper.

26. In a computing machine, a printing device, a movable stop connected for operating the printing device, and means variably limited in its operation by said stop.

Signed by me at Benton Harbor, Michigan, this 23rd day of January, 1909.

FRED L. MANN

Witnesses:
PERCY F. ROLFE,
JAMES H. ARMITAGE.