

989,353.

J. P. HARRISON, JR.
 ADDING AND LISTING MACHINE.
 APPLICATION FILED JULY 28, 1909.

Patented Apr. 11, 1911.

3 SHEETS—SHEET 1.

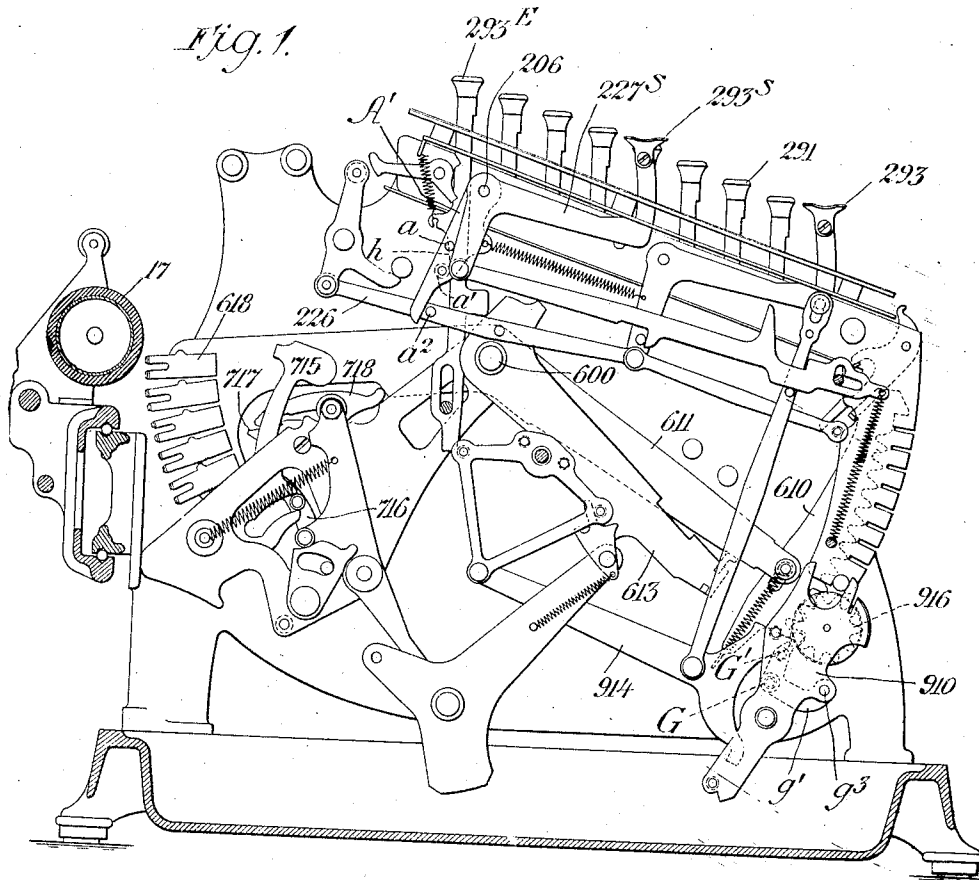


Fig. 2.

7	8	6	5	3	2	1	0	C
3	6	2	0	1	3	2	0	
2	3	5	5	3	4	7	8	*
4	3	2	1	0	2	2	0	
2	3	4	4	3	3	0	1	
2	3	4	5	6	7	8	9	
9	8	6	5	4	3	2	1	
3 0 3 6 1 9 1 6 1 S								
2 3 4 7 8 7 6								
1 2 3 4 5 6 7 8								
6 7 9 0 0 1 2 3								
3 4 5 6 7 9 0 1								
4 2 0 7 8 0 7 3 9 *								

Witnesses:
 E. R. Bauett
 Louis B. Ewing

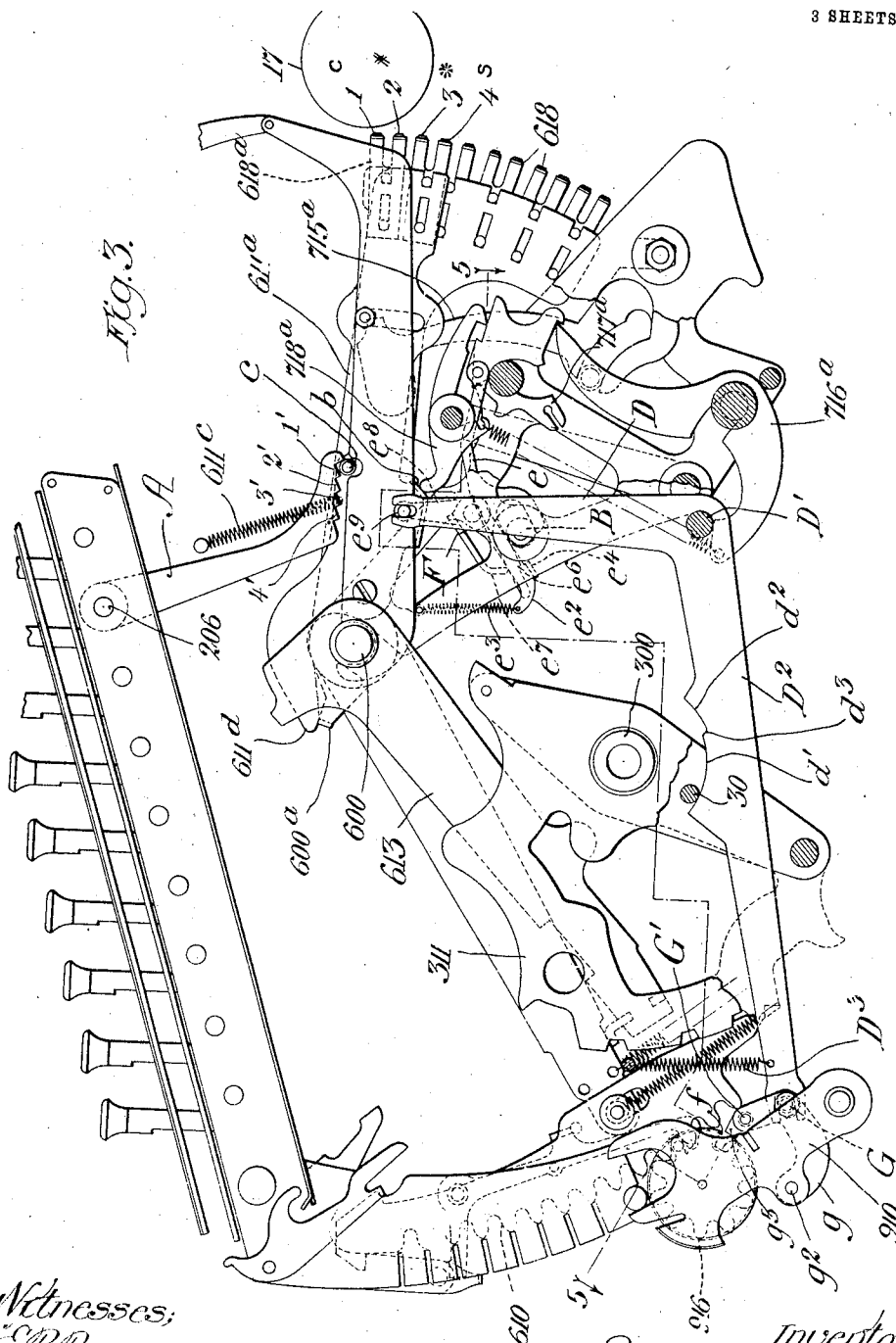
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3 SHEETS—SHEET 2.



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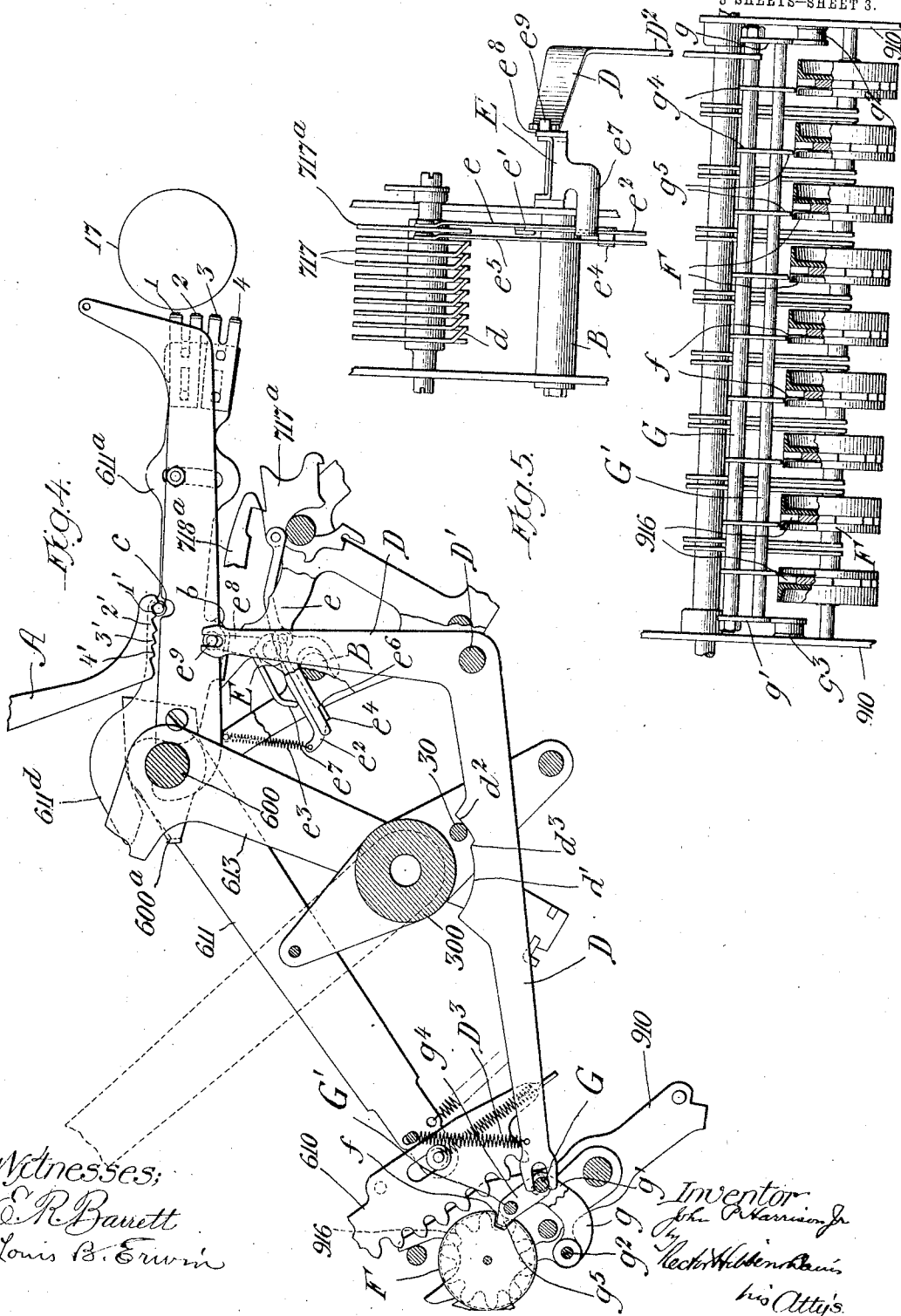
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

JOHN P. HARRISON, JR., OF DETROIT, MICHIGAN, ASSIGNOR TO BURROUGHS ADDING MACHINE COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ADDING AND LISTING MACHINE.

989,353.

Specification of Letters Patent.

Patented Apr. 11, 1911.

Application filed July 28, 1909. Serial No. 510,090.

To all whom it may concern:

Be it known that I, JOHN P. HARRISON, Jr., a citizen of the United States, residing at Detroit, Wayne county, Michigan, have invented certain new and useful Improvements in Adding and Listing Machines, of which the following is a specification.

The present invention relates more particularly to the characterizing of the first item or amount added after a clearing operation for the purpose of denoting that the accumulator of the machine stood at zero when the adding began. For prior exemplifications of means by which such result may be accomplished reference may be had to British Patents Nos. 18,516 of 1907 and 6114 of 1908. Characteristics of the present manner of accomplishing the result are the employment of devices such as found in "split and normal" adding and listing machines, to control the printing of the so-called "clear sign;" and the use of the accumulator itself, *i. e.* the set of adding wheels, to exercise control over the special printing devices. Thus, a detent or latch which normally restrains a hammer for the special type is coöperatively related to similar detents or latches normally restraining the hammers which operate the amount printing types, though this coöperative relationship is normally suspended and can only be established when all of the adding wheels stand at zero and the operating handle of the machine has been drawn forward, or, in the case of a power driven machine, the driving shaft given its initial turning. Then with reference to the second mentioned characteristic the adding wheels are constructed or equipped so as to permit effective movement of a coöperating element (especially provided) when said wheels all stand at zero, said specially provided element by such movement effecting the establishment of coöperative relationship between the special detent or latch and the other detents or latches. Such manner of arriving at the desired result has the advantage of putting the special printing devices under the direct control of the adding wheels themselves and the main operating element or prime mover of the machine, thereby avoiding complication with the controlling devices through whose manipulation the clearing operation is brought about.

In connection with such operations of the

machine as those which strike totals and subtotals, or print amounts without adding them, though the adding wheels would be at zero positions in the middle of the operation, of course the clear sign should not be printed. In any such case, under the arrangement provided by the present invention, there would be the same effect as when the clear sign should be printed in so far as concerns the establishment of coöperative relationship between the special detent or latch and the other detents or latches. But the clear sign will not be printed, for the reason that the type which carries it is not at the printing line when the special hammer is released in any such operation. It is desirable to characterize totals, subtotals and eliminated amounts, *i. e.* amounts or numbers printed but not added, and so a special carrier on which the clear sign type is mounted also carries types for characterizing totals, subtotals and eliminated numbers. In any adding operation the clear sign type will be at the printing line when the printing of the amount is done but will only be operated when the adding wheels stand at zero. In other operations, such as totaling, subtotalling and eliminating, the special type carrier will have been shifted to bring one or another of the other special types to the printing line. Consequently the release of the special hammer in the latter case results in the printing of the appropriate character. In a blank operation, with the adding wheels at zero, though the coöperative relationship above referred to will be established, yet there will be no release of the special hammer since no one of the regular detents or latches is operated and furthermore the pawl, which in some instances would operate the special detent or latch, will be disabled by encounter with the special type carrier.

In the drawings which accompany and form part of this specification Figure 1 represents in left side elevation an adding and listing machine of the well-known Burroughs type having applied thereto the present invention (the customary inclosing casing is omitted, as also the near side frame piece, and the supporting base and paper carriage attachment are shown in section). Fig. 2 shows an example of printing done by the machine; Fig. 3 is a right side elevation on the order of the left side elevation

in Fig. 1, though not including quite so much of the machine; Fig. 4 is a view similar to Fig. 3 in representing parts in right side elevation to some extent, other parts appearing in section and the view differing further from Fig. 3 in that a different relative positioning of parts is illustrated, to wit that which obtains when the handle of the machine has been drawn forward in an adding operation first ensuing after a clearing operation; and Fig. 5 is a sectional plan view of certain portions of the machine taken substantially on the line 5—5 of Fig. 3.

The general construction is the same as that of the familiar Burroughs machine shown in the above mentioned prior patents and in numerous other patents not necessary to enumerate. It comprises the usual amount keys 291 controlling the extent of movement of racks 610 carried by levers 611 loose on a rock shaft 600 to which is secured a restoring frame or bail 613, such shaft being oscillated through connection with a handle shaft 300, Fig. 3. The adding wheels or pinions 916 are carried as usual in a rocking frame 910 worked by a pitman 914 variously controlled by total key 293, subtotal key 293S and elimination key 293E and familiar connections. The levers 611 carry at their rear ends the usual series of type plates 618 adapted to be driven against the platen 17 by hammers 715. The latter are operated as usual by spring-actuated driving levers 716 normally restrained by latches 717 and the usual pawls 718 individually tripping said latches, said pawls being disabled by contact of their tails against inclined shoulders of the levers 611 but the latches being coöperatively related through the medium of overlapping tails *d*, Fig. 5, to provide for cipher printing.

In carrying out the present invention an additional printing hammer 715^a is provided (Fig. 3), also an additional hammer driver 716^a and an additional restraining latch 717^a and an additional latch tripping pawl 718^a. A special type carrier is provided in the form of a plate or arm 611^a loosely mounted on the shaft 600 just to the right of the group of levers 611 and at its rear end this arm carries type plates 618^a, two in the present instance, each having two type faces and that designated 1, in the present instance the uppermost type, bearing the clear sign (*c*). The next lower type, designated 2, bears the elimination sign (*#*). The third type, designated 3, bears the sign indicating a grand total (***). The fourth and last special type, designated 4, bears the sign indicating a subtotal (*S*). This special type carrier has an inclined shoulder *b* like the inclined shoulders of the levers 611, for disabling the special pawl 718^a whenever the machine is operated with the special type

carrier moved no higher than the position where the number sign type 1 is at the printing line. There projects from one side of the special type carrying arm 611^a a stud *c*, Fig. 3, for coacting with an index arm *A* which is formed along the under edge of its broadened lower extremity with a series of steps or shoulders 1', 2', 3' and 4' allotted to the several special types respectively. A spiral spring 611^c tends to draw the special type carrier upward and carry its stud *c* against the said indexing arm *A*, but normally the spring is restrained by reason of the fact that an arm 600^a secured to the shaft 600 bears with a lateral lip against a forward projection 611^d of the special type carrier as shown in Fig. 3, depressing the rear portion of the latter. The before-mentioned stud *c* normally stands opposite the shoulder 1' slightly separated therefrom as shown in Fig. 3, and in any operation of the machine without depression of total, subtotal or elimination key the stud moves up against said shoulder bringing the clear sign type 1 squarely to the printing line, but unless the adding wheels already stand at zero and one or more amount keys 291 have been depressed this clear sign type will not be driven against the platen because the inclined shoulder *b* of the special type carrier still lies in the path of the special pawl 718^a and other means presently to be described, by which the special latch 717^a may be tripped, will not come into play. Referring next to such other means for tripping the special latch 717^a, there is pivoted to the same a bar or pitman *e* which extends forward, having a bifurcated portion guided in the groove of a supporting rod *B*, and this bar or pitman has pivoted to it at the point *e'* (Figs. 3 and 5) a catch piece *e*² connected by a spiral spring *e*³ to an overhead portion of the framework. A laterally projecting lip *e*⁴ of said catch piece extends to the left under a bar or pitman *e*⁵ which is pivoted at its rear end to the units latch 717 and has a shoulder *e*⁶, Fig. 3, in front of which the lip *e*⁴ is adapted to engage so that a tripping movement of said units latch will be communicated to the latch 717. However, said catch piece is normally depressed so that said lip is out of line with said shoulder. Said catch piece is constrained to occupy this position against the stress of the spring *e*³ by a finger *e*⁷ which normally presses down upon the upper edge of the catch piece, as illustrated in Fig. 3. Said finger *e*⁷ is integral with a yoke *E* pivotally mounted upon a stud on the framework. An upstanding arm *e*⁸ secured to said yoke has a stud *e*⁹ which is engaged by the bifurcated upper end of the upwardly extending arm *D* of a bell crank lever pivoted at *D'* to the framework and whose other arm *D*² extends forward to a point adjacent the adding wheels 916. A

spiral spring D^3 applied to the arm D^2 of said bell crank lever tends to raise said arm and throw the arm D rearward, rocking the yoke E and permitting the catch piece e^2 to rise and couple the latch 717^a to the adjacent or units latch. Said bell crank lever is normally restrained, however, by reason of the engagement of a stud 30 with a curved edge d' of the arm D^2 , said stud being carried by the full stroke sector 311 which is secured to the operating shaft 300. This curved edge d' is normally concentric with said shaft as shown in Fig. 3, so that during the greater portion of the turning of said shaft, due to the forward pull of the operating handle, the stud travels along such edge without permitting the bell crank lever to move. In rear of the curved edge d' there is a lower shorter curved edge d^2 and between the two curved edges there is a short and somewhat abrupt cam edge d^3 .

In the movement of the full stroke sector 311 beyond that accompanied by any downward travel of the racks 610 the stud 30 passes the cam edge d^2 so as to permit sufficient movement of the bell crank lever to rock the yoke E and allow the coupling to be effected between the special latch and the units latch, as illustrated in Fig. 4, such movement of the bell crank lever bringing the edge d^2 into concentricity with the shaft 300. However, such movement of the bell crank lever cannot take place unless all of the adding wheels 916 stand at zero. There is secured to each one of these wheels a disk F , Fig. 5, and at a corresponding point in each of these disks there is a peripheral notch f . The forward end of the bell crank arm D^2 is bifurcated to embrace a cross rod G of a rocking frame comprising side pieces g and g' of angular outline (see Fig. 3) and a second cross rod G' extending between the same, said side pieces being pivoted at their forward ends to the side pieces of the accumulator frame 910 as indicated at g^2 and g'^2 . Mounted upon the cross rods G and G' are a series of plates g^3 having squared projecting ends or fingers g^5 adapted to engage the notches f respectively. The cross rod G is securely clamped to the side pieces g and g' and it will be seen that when the bell crank arm D^2 moves this rocking frame must move with it. The peripheries of the disks F lie close to the ends of the plates g^3 and unless all of the notches f have been brought opposite the projections g^5 of said plates the rocking frame will be obstructed by one or more of the disks and the bell crank lever cannot be rocked by its spring D^3 notwithstanding the stud 30 has passed the cam edge d^3 . Said notches are so located as to come exactly opposite the projections g^5 respectively when the wheels all stand at zero. At the conclusion of a clearing operation of course the wheels are left

at zero and then the next pull of the operating handle, when it carries the stud 30 past the cam edge d^3 will result in rocking of the bell crank lever and a coupling together of the special latch and the units latch. If one or more amount keys have been depressed without depression of the elimination key then the tripping of the special latch by reason of the tripping of the units latch will cause the special hammer 715^a to drive the clear sign type 1 against the platen and characterize the printed amount as the first added after the clearing operation. It will of course be understood that the timing of the parts is such that the stud 30 in the return of the operating handle rides over the cam edge d^3 withdrawing the projection d^5 from the notches f before any of the racks 610 are started upward.

It will be seen that in a totaling or subtotaling operation the adding wheels will stand at zero when the stud 30 passes the cam edge d^3 and consequently the bell crank lever can rock so as to couple together the special latch and the units latch and the same thing would be true if after a clearing operation the elimination key was depressed in connection with the next subsequent operation. However, in any such case the clear sign type will not be at the printing line and the release of the special hammer by reason of the cooperative action due to such coupling of latches or in some other way would be desirable, as this same hammer is to effect the printing of total, subtotal and elimination signs. In case of characterizing a total or subtotal it might be sufficient to rely upon this cooperative action, but of course an eliminated amount or number may occur when the accumulator is not clear. Then the special pawl 718^a would be relied upon to trip the special latch, it being understood of course that said pawl is carried by the regular bail which swings back and forth in every operation of the machine.

The indexing arm A is secured to a rock shaft 203 which extends below the keyboard of the machine to the left-hand side thereof, where there is secured to it an arm A' (Fig. 1) carrying studs a and a' projecting from opposite sides, the former acted upon by the subtotal key bell crank lever 227 S and the stud a' acted upon by a cam edge h on the stem of the elimination key 293 E . The total key bell crank lever 227 is as usual connected by a link 226 with the amount key releasing bail. In the present instance said link has a stud a^2 adapted to act upon said arm A' . The arm is moved different distances, according to which of the keys 293, 293 S or 293 E is depressed. As here shown, the latter, or elimination key, moves said arm the least distance but sufficient to swing the indexing arm A so as to bring the step or shoulder 2' above the stud c , with the result

that in an ensuing operation of the machine the special type carrier swings up so as to locate the elimination sign type 2 at the printing line. Depression of the total key 5 293 swings the arm A and indexing arm A' a greater distance, bringing the shoulder 3' above the stud c and causing the special type carrier to be swung upwardly so as to locate the total sign type 3 at the printing line. Depression of the subtotal key 10 swings the arms A, A' still farther, locating the shoulder 4' above the stud c and in the ensuing operation of the machine permitting the special type carrier to swing upwardly, 15 bringing the subtotal sign type 4 to the printing line.

What is claimed is:

1. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related restraining means for the latter; of a special type carrier, hammer and restraining device, the latter coöperatively related to the first mentioned hammers with provisions for suspension of such relationship; and means for suspending same under control of the accumulating mechanism.
2. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related restraining means for the latter; of a special type carrier, hammer and restraining device; a coupler for connecting the latter with the restraining means for the first-mentioned hammers; and means for rendering said coupler effective under control of the accumulating mechanism.
3. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related detents for the latter; of a special type-carrier, hammer, and detent, the latter and the adjacent one of the first-mentioned detents having companion pitmen one of which carries a coupler engageable with and disengageable from the other; and means for operating said coupler under control of the accumulating mechanism.
4. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related detents for the latter; of a special type-carrier, hammer and detent, the latter and the adjacent one of the first-mentioned detents having companion pitmen one of which carries a coupler engageable with and disengageable from the other; a member normally holding the coupler disengaged from the latter; and means for displacing said member under control of the accumulating mechanism.

5. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related detents for the latter; of a special type-carrier, hammer, and detent, the latter and the adjacent one of the first-mentioned detents having companion pitmen one of which carries a pivoted coupler to engage the other under spring pressure; a rocking member normally restraining said coupler; and means for displacing said rocking member under control of the accumulating mechanism.

6. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related restraining means for the latter; of a special type carrier, hammer and restraining device, the latter coöperatively related to the first-mentioned hammers with provisions for suspension of such relationship; and a prime mover normally effecting suspension of same but adapted to permit establishment of the relationship under control of the accumulating mechanism.

7. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related restraining means for the latter; of a special type carrier, hammer and restraining device; a coupler for connecting the latter with the restraining means for the first-mentioned hammers; and a prime mover normally displacing the coupler but adapted to permit the same to become effective under control of the accumulating mechanism.

8. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related detents for the latter; of a special type-carrier, hammer, and detent, the latter and the adjacent one of the first-mentioned detents having companion pitmen one of which carries a coupler engageable with and disengageable from the other; and a prime mover normally holding said coupler disengaged from the latter, but adapted to permit its engagement therewith under control of the accumulating mechanism.

9. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and coöperatively related detents for the latter; of a special type-carrier, hammer, and detent, the latter and the adjacent one of the first-mentioned detents having companion pitmen one of which carries a coupler engageable with and disengageable from the other; a movable member engaging said coupler; and a prime mover normally holding said mem-

ber to position for disabling the coupler, but adapted to permit displacement of said member under control of the accumulating mechanism.

10. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and co-operatively related detents for the latter; of a special type-carrier, hammer, and detent, the latter and the adjacent one of the first-mentioned detents having companion pitmen one of which carries a pivoted coupler to engage the other under spring pressure; a rocking member normally restraining said coupler; and a prime mover normally holding said member to effective position, but adapted to permit displacement of said member under control of the accumulating mechanism.

11. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and co-operatively related detents for the latter; of a special type-carrier, hammer, and detent, the latter and the adjacent one of the first-mentioned detents having companion pitmen one of which carries a pivoted coupler to engage the other under spring pressure; a rocking member normally restraining said coupler; a lever connected to said member; a prime mover normally holding said lever and said member to effective position; and means for controlling the lever by the accumulating mechanism.

12. In a machine of the character described, the combination with accumulating and printing mechanism, the latter including amount type carriers, hammers, and co-operatively related detents for the latter; of a special type-carrier, hammer, and detent, the latter and the adjacent one of the first-mentioned detents having companion pitmen one of which carries a pivoted coupler to engage the other under spring pressure; a rocking member normally restraining said coupler; a lever connected to said member and having a cam edge; an oscillatory prime mover having a stud to act on said cam edge; and means for controlling the said lever by the accumulating mechanism.

13. In a machine of the character described, the combination of a set of accumulating wheels; actuators therefor; printing mechanism including special printing devices for characterizing the imprint of the first item accumulated; and means for controlling said special printing devices by their engagement with the accumulating wheels.

14. In a machine of the character described, the combination of a set of accumulating wheels; actuators therefor; printing mechanism including special printing devices for characterizing the imprint of the

first item accumulated; and means for controlling said special printing devices by their engagement with the accumulating wheels, the latter being equipped to restrain said means except when all stand at zero position.

15. In a machine of the character described, the combination of a set of accumulating wheels; actuators therefor; printing mechanism including special printing devices for characterizing the imprint of the first item accumulated; and means for controlling said special printing devices by their engagement with the accumulating wheels, the latter being recessed peripherally to permit effective action of said means when all the wheels stand at zero position.

16. In a machine of the character described, the combination of a set of accumulating wheels; actuators therefor; printing mechanism including special printing devices for characterizing the imprint of the first item accumulated; means for controlling said special printing devices by their engagement with the accumulating wheels, said means tending to render effective the said special printing devices; and a prime mover normally restraining said means.

17. In a machine of the character described, the combination of a set of accumulating wheels; actuators therefor; printing mechanism including special printing devices for characterizing the imprint of the first item accumulated; means for controlling said special printing devices by their engagement with the accumulating wheels, the latter being equipped to restrain said means except when all stand at zero position, and a prime mover normally restraining said means.

18. In a machine of the character described, the combination of a set of accumulating wheels; actuators therefor; printing mechanism including special printing devices for characterizing the imprint of the first item accumulated; means for controlling said special printing devices by their engagement with the accumulating wheels, the latter being recessed peripherally to permit effective action of said means when all the wheels stand at zero position, and a prime mover normally restraining said means.

19. In a machine of the character described, the combination of a set of accumulator-wheels having peripheral recesses adapted to aline when the wheels are all at zero position; a rocking member having fingers to enter said recesses when so alined; and actuators and printing mechanism co-operating with the accumulator wheels, the printing mechanism including special printing devices controlled by said rocking member to characterize the first accumulated item.

20. In a machine of the character described, the combination of a set of accumu-

lator wheels, having peripheral recesses adapted to aline when the wheels are all at zero position; a rocking member having fingers to enter said recesses when so alined; 5
actuators for the several wheels; amount-printing devices coöperating with said actuators; special printing devices coöperatively related to the amount-printing devices with provisions for suspending the coöperative 10
relationship; and a member for controlling such relationship itself controlled by the aforesaid rocking member.

21. In a machine of the character described, the combination of a set of accumulator wheels having peripheral recesses adapted to aline when the wheels are all at 15
zero position; a rocking member having fingers to enter said recesses when so alined; actuators for the several wheels; amount-printing devices coöperating with said actuators; special printing devices; a coupler between the latter and the amount printing de- 20

vices; and a lever controlling said coupler and connected to the aforesaid rocking member.

22. In a machine of the character described, the combination of a set of accumulator-wheels having peripheral recesses adapted to aline when the wheels are all at 25
zero position; a rocking member having fingers to enter said recesses when so alined; 30
actuators for the several wheels; amount-printing devices coöperating with said actuators; special printing devices; a coupler between the latter and the amount printing 35
devices; a spring-drawn lever controlled by said coupler and connected to the aforesaid rocking member, said lever having a cam portion; and an oscillatory prime-mover having a stud engaging the latter.

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Witnesses:

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