To all whom it may concern:

Be it known that I, DANIEL W. SHIEK, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Adding-Machines or the like, of which the following is a description.

My invention relates to mechanism for any suitable form of adding or calculating machine or the like, for numbering the items and totals or automatically recording the successive operation of the machine, and for indicating that the machine has not been intentionally or accidentally manipulated to record false or incorrect items or totals.

The device is particularly applicable to that type of machine known as the "Burroughs" adding machine, illustrated in Letters Patent of the United States granted to Alvin Macauley, No. 823,171, dated June 12, 1906, and in the various Letters Patents of the United States granted to William S. Burroughs mentioned therein or to improvements thereon, but the device is applicable in all its essential features to other adding machines of a similar character or intended for similar purposes or wherever it may be found suitable.

The Burroughs machine with others of similar character or type are employed for the purpose of printing or recording a list of items or amounts, adding up or accumulating such lists and printing or recording at any time the total of the added items. With machines of this character it may be found convenient to consecutively number the items and total, and it has also been found possible to print or record a false item or total.

My invention is designed to number preferably in consecutive order, the several items and total and at the same time by said numbering to prevent the improper manipulation of the machine. For example, a false total may be recorded in the machine mentioned by inserting a sheet of paper or the equivalent between the type and the paper on which the individual items have been printed, and printing the correct total on the substituted sheet, then removing the sheet and printing a false total below the individual items where the correct total should be. As another example, an item may be omitted, the space where it should be being reserved, and after the total is taken and printed, the space filled in with the item as it should be. In this case the item would not be included in the total. Checking over the individual items in either case would give no indication of any error in the total, and the assumption would be that the recorded total was correctly accumulated and recorded by the machine, properly manipulated and therefore correct, while as a matter of fact it would be false or incorrect.

The primary purpose of the machine is to avoid mental computation or checking which would have to be done mentally or by re-listing the items to check the total.

My invention is arranged to prevent wrongful manipulation of the machine, preferably by indicating all of the operations of the same on the sheet bearing the recorded items and totals, thereby proving their correctness. In the preferred construction it is impossible to print the numbers or characters except coincident with the recording of an item or total. The device is also preferably arranged so that the numbering printing mechanism may be prevented from operating, but in this case the parts are so arranged that the numbering setting up mechanism will operate so that it will be apparent when the printing mechanism is again operated that the machine has been operated without the numbering printing mechanism in operation. If the correct total is recorded on a suitable sheet as before mentioned, and then a false total recorded or printed on the sheet bearing the items to be added, the false total bearing a higher numeral than the correct total would have borne will indicate that one or more operations of the machine have been omitted in the recording, or if an item has been filled in after a total has been taken, the item bearing a higher numeral than the total will indicate that the recording has not been consecutively done. In either case the printed slip calls attention to the fact that the machine has probably been wrongly manipulated.

The invention also comprises means arranged in the path of the paper whereby paper cannot be inserted in the path of the
printing mechanism in a reverse direction to the regular movement of the paper in operating the machine. This prevents the insertion of a substitute sheet as before mentioned.

To this end and with these objects in view my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings wherein like reference characters indicate like or corresponding parts, Figure 1 is a side elevation of my device taken substantially on lines 1—1 of Figs. 2 and 11. Fig. 2 is a cross sectional view of the same taken substantially on line 2—2 of Fig. 1. Fig. 3 is a cross sectional view taken substantially on line 3—3 of Fig. 1. Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 2. Fig. 5 is a sectional view taken substantially on line 5—5 of Fig. 2. Fig. 6 is a perspective view of the paw 22. Fig. 7 is a sectional view substantially similar to Fig. 1 showing a portion of the printing mechanism omitted and the parts in slightly different positions after a number of operations of the machine. Fig. 8 is a perspective view of the ratchet 7. Fig. 9 is a perspective view of the ratchet 12. Fig. 10 is a perspective view of one of the members 36. Fig. 11 is a top elevation of a portion of the machine showing my device as well as a portion of the mechanism of the Burroughs machine mentioned, and Fig. 12 is a sectional view of a portion of my device taken substantially on lines 12—12 of Figs. 1 and 11.

For further illustration and a more detailed description of the complete Burroughs machine and its operation, reference may be had to the Macaulay patent heretofore mentioned and to the patents mentioned therein, as well as to any other patents for improvements on the same machine.

My numbering device comprises printing and setting up mechanism for the same, the printing mechanism being preferably similar and operated in the same manner as the printing mechanism in the patents mentioned.

Briefly, the construction and operation of the printing mechanism of the Burroughs machine using my similar mechanism to explain the same, is as follows:

Referring to Fig. 11, which shows a portion of the Burroughs machine, there are a plurality of levers 611, each provided with an extended end, the same being extended in the form of a sector, and carrying type plates 618, which are normally resiliently held in retracted position by means of suitable springs (not shown) so that they may be forced outward and then retracted by the springs. The levers are pivotally carried by the shaft 600, the position of any particular type relative to the platen 619 being controlled by the levers 6 and carriers 611, and by suitable setting, up and accumulating mechanism not shown, in a manner not necessary to describe here.

Referring back to Fig. 1, which is a sectional view showing my preferred form of printing mechanism similar to the Burroughs printing mechanism for printing with the type plates 618 carried by carriers 611, the type carriers 611 and 611 are carried on the shaft 600 and provided with suitable type plates 618. The type plates 618 upon their respective type carriers are forced rearward against the platen 619 by means of hammers or strikers 715 fulcrumed at their lower rear ends upon a rod 701, and are provided with curved slots 700, in which fit studs 711, carried by bent levers or hammer drivers 716, fulcrumed on a rod 702. Coiled springs 780 connected to the forward ends of the hammer drivers 716 tend to swing their vertical arms rearward and carry their studs 711 through the slots 700 in the striker 715 and thereby swing the upper ends or heads of said strikers rearward into contact with the type plates 618, to forcc the latter against the platen 619. The levers or hammer drivers 716 are normally restrained from such movement under the stress of the springs 780 by latches 717, engaging the upper ends of the levers 716 and fulcrumed on a rod 700. These latches are adapted to be tripped by hooked tripping pawls 718, hung upon a rod 704 supported in the upper ends of a pair of side arms 711 (see arm dotted in Fig. 1) fastened at their lower ends upon a rock shaft 703.

A bail composed of side pieces 712 and a cross rod 757, normally engages the hammer drivers, but as the operating handle (not shown) is operated this bail is lifted through the medium of a link 820, connecting the bail with a crank plate and a rock shaft not shown. At each operation of the machine the shaft 708 is rocked in a direction to swing the rod 704 and the pawls 718 carried by it in a forward direction, and the hooked ends of the pawls engage the shoulders upon the upper sides of the latch plates 717 and lift the lower rear ends of the latter and release the levers 716, which levers are thereupon rocked by the springs 780, and by their slot and pin connections with the levers 715 throw the upper ends of the latter rearward against those type plates which are at the time in line between them and the platen roller 619. As the operating handle is drawn back to normal position, the link 820, members 712 and cross rod 757, which by the forward movement of the handle have been moved up to the positions indicated by the dotted lines in Fig. 4, are returned to normal positions.
thus returning all the operated hammers and hammer drivers back to the positions shown in Fig. 1.

The above description, as before stated, covers the preferred form of printing mechanism for my device, which printing mechanism is alike for all the type carriers except that the main body, or Burroughs part of the machine, includes means for preventing and controlling the operation of the hammer drivers as well as other features, but these form no part of my invention and hence it is unnecessary to go into detail in regard to the same other than to explain my construction for throwing out, preventing or otherwise controlling the operation of the printing mechanism included or forming a part of my numbering device.

Coming now to my improved form of setting up mechanism for controlling the position of the type plates 618, as is shown, I preferably provide two levers and carriers 611 and 611a substantially similar to the carriers 611a, it being of course understood that there may be any required or desired number. It is of course understood that the type plates bear suitable type, such as, for example, from 0 to 9 on each carrier, or such other characters and in such order as may be desired. As shown, the carriers are each provided with extended ends 1 and 2 respectively, each having a rack 3 thereon. Supported on a rod or shaft 4 is arranged a sector 5, provided with teeth meshing with the rack 3, the member 5 having an extended arm 6, carrying a pawl 18 or the equivalent for the purpose. On the rod 4 is also arranged what may be termed a ratchet or disk 7, provided with a plurality of teeth 8, four being shown (see Fig. 8). The disk 7 is secured to or formed integral with a ratchet provided with a plurality of teeth, as shown with 40. Loosely arranged on the shaft 4 is a member 10 (see Fig. 3) provided with an extended arm 11 (see Figs. 1, 4 and 7). A disk 12 provided with a plurality of notches 13, four being shown, is also provided; the same being preferably secured to or formed integral with the ratchets 7 and 9. Another ratchet 14 preferably provided with a plurality of teeth, 40 being shown, is also arranged on the shaft 4; the same being provided with a disk 15, secured to or formed integral therewith, which disk is substantially similar to the disk or ratchet 7 before mentioned. A sector 16 provided with an arm 17, the same being substantially similar to the sector 6, is also provided and loosely supported about the shaft 4, the same being arranged to cooperate with the rack 3 on the end 2 of the carrier 611a. The pawl 18 on the arm 6 is normally held in engagement with the teeth 8 on the ratchet 7 by means of a spring 19, or its equivalent for the purpose. Carried by the member 10 is a pawl 20, which normally engages the ratchet 9, the same being normally held in engagement by means of a resilient member 21 or its equivalent. A pawl 22 (see Figs. 2 and 6) is also arranged on the member 10, which pawl cooperates with the ratchet 12 and the ratchet 14 (see Fig. 5), a resilient member 23 or its equivalent being preferably provided to normally maintain the pawl in operative position. The arm 17 of the member 16 also carries a pawl 25 similar to the pawl 18 carried by the arm 6, which pawl is resiliently retained in position by means of a spring or resilient member 26. This pawl is arranged to cooperate with the disk or ratchet 15. A resilient member 27 tends to normally draw the end or arm 11 of the member 10 to the position indicated by the dotted lines in Fig. 4. A stop 28 is also provided for the pawls 18 and 25. As shown, the ratchets 9 and 14 are provided with pawls or detents 29 and 30 respectively.

As most clearly shown in Figs. 1, 11 and 12, the tripping pawls 716 carry a pin 31, which pin extends under the arm 32 of a lever 33, which is pivotally supported at 34. The purpose of this lever 33 is to prevent the printing of the numbers or characters, as will be more fully explained in the operation of the device. As shown the pin 31 is also extended sufficiently to be engaged by a lug 35 on the adjacent pawl 718 of the Burroughs mechanism. (See Figs. 11 and 12). This construction makes it impossible to print the numbers without printing an item or total in conjunction, or otherwise operating the other part of the machine.

As most clearly shown in Figs. 1, 10 and 11, I also provide a plurality of levers or arms 36 pivotally supported at 37, which are resiliently retained in contact with the plate 619. These members are preferably tapered at the free ends, as indicated at 39, and arranged as shown in Fig. 11. They form substantially an obstruction in the path of paper backed into the machine, so that paper cannot be inserted between the platen and the type plates in a direction reverse to the regular movement of the paper in the operation of the machine.

The operation of the machine may be described as follows: Each time the operating handle, not shown, is operated, the rod 757 is raised, the resilient member 27 at the same time drawing up the arm 11, as shown in the dotted lines in Fig. 4. At this operation, assuming that the lever 33 is as shown in Fig. 1, the hammers 715 are released as heretofore described, printing the character which is on the plate between the hammer 125 and platen, in this case a number. As the handle is brought back to its normal position the hammers are retrieved as heretofore described, and the arm 11 drawn down by the rod 757, the movement of the same being
sufficient to move the ratchet \(9\) the distance of one tooth. As is obvious, this also moves the disk \(7\) the distance of one tooth on the ratchet \(9\) and the arm \(6\) carrying the pawl \(18\) contacting with the tooth \(8\) on the ratchet \(7\), rotates the sector \(3\), thereby raising the carrier \(611\) through the movement of its extended end \(1\), meshing with the sector \(3\). The carrier moves a sufficient distance to bring a new type plate before the platen \(619\) at each operation of the handle of the machine. The operation is substantially the same until the last type plate has been presented before the platen, at which time the pawl \(18\) has reached a position substantially as shown in Fig. 7, so that it contacts with the stop \(28\). Further movement of the arm \(11\) and the ratchet \(7\) will cause the pawl \(18\) to contact with its stop \(28\) and release the ratchet \(7\), whereupon the carrier \(611\) will drop back because of gravity to the position shown in Fig. 1. The pawl or detent \(29\) will prevent the ratchet \(9\) and ratchet \(7\) from going back during the return movement of the arm \(6\). This describes the printing of the unit column.

Referring particularly to Figs. 2, 3 and 5, it will be seen that the pawl \(22\) normally rides on the ratchet between the notches \(13\), that is, there being one notch for each ten teeth on the ratchet \(9\), the pawl \(22\) will ride on the disk between the notches for nine operations and then drop into a notch, at which time it will engage both the notch \(13\) and a tooth on the ratchet \(11\), and on the completion of the operation advance the carrier one order. At the next operation of the machine the pawl will ride on the disk again and be prevented from engaging any of the teeth of the ratchet \(14\) until the next notch \(13\) is reached. Movement or rotation of the ratchet \(14\) also moves the ratchet \(15\) secured thereto, and this through the pawl \(25\) operates or moves the arm \(17\), which meshes with the rack \(3\) on the extended end of the carrier \(611\), thereby bringing a new type into position. It is thus seen that there will be a change in the tens column of the numbers at every tenth operation of the machine. When the pawl \(25\) reaches the stop \(28\) the ratchet \(15\) and pawl \(25\) will be disengaged and the carrier dropped back as shown in Fig. 7. It is of course obvious that while only two carriers are shown there may be any number desired, the several parts being substantially arranged to correspond.

When the lever \(33\) is pushed toward the platen \(619\) the arm \(32\) raises the hooked ends of the pawls \(718\) so that the hammers \(715\) are not released during the operation of the machine, thereby preventing the printing of any numbers. When the two pawls \(718\) of my numbering device are arranged so as to be controlled by the adjacent pawl \(718\) of the Burroughs machine, it is impossible to print a number without printing an item or total. The reason for this is that in the Burroughs machine the end of the pawl \(718\) bearing the lug \(33\), will be forced down if an item is not printed, as is clearly explained in the patents heretofore mentioned, and forcing down the end \(55\) would force down the pin \(31\), thereby preventing the operation of my numbering device. It should be noted that the numbering or setting up mechanism for my device continuously operates so that the construction substantially comprises the adding and printing mechanism and operating means of the Burroughs machine, for example, with suitable numbering mechanism, having printing mechanism, there being intermediate mechanism between the main printing mechanism and the numbering printing mechanism and intermediate mechanism between the operating mechanism and the numbering mechanism, whereby the numbering mechanism is automatically advanced an interval at each operation of the machine and any character indicating the number of the operations of the machine is printed whenever the printing mechanism is operated.

It is of course obvious that while the invention is shown as particularly applied to a Burroughs machine, it may be used wherever it may be found applicable on any type of computing or other machine for the printing of items, etc., and in which it is desired to number the items, lines or the like.

Having thus described my invention it is obvious that various immaterial modifications may be made in the construction arrangement, combination of parts or shown, described or mentioned without departing from the spirit of my invention. Hence I do not wish to be understood as limiting myself to the exact form, construction arrangement, combination of parts or uses shown, mentioned or described.

What I claim as new and desire to secure by Letters Patent is:

1. In an adding machine mechanism arranged to print a series of individual items and also the total thereof on a paper strip, the combination of means actuated by said mechanism for consecutively numbering the individual items as they are printed and also numbering the totals thereof with the next consecutive number whereby the several operations of the machine including the printing of the total are consecutively numbered.

2. In a machine of the character described the combination of printing mechanism arranged to record on a paper strip a series of individual items and to record the total thereof, said mechanism including spring actuated movable type hammers, releasing means for the latter, and automatic mechanism actuated by said releasing means ar...
ranged to consecutively print on the strip a number for each, recording operation of the total or individual items.

3. In a device of the kind described having means for printing on a paper strip a series of individual items and printing the total thereof, said means including type hammers, means for moving the same to striking position, and means for returning the same to normal position, in combination with means for printing a distinguishing character on the strip at each operation of the machine with the item or total printed at said operation, the last mentioned means including type hammers actuated by the releasing means for the first mentioned hammers, and means for positioning the type carrier in the return movement of said first mentioned hammers.

4. In a device of the kind described for printing individual items on a strip to be detached from the machine and printing the total thereof, the combination of operating means therefor including hammer releasing devices and means actuated by said devices for printing an independent number on the strip at each operation of the machine with the item or total printed at said operation.

5. In a device of the kind described provided with printing mechanism for printing a series of individual items and accumulating and printing the total thereof on a strip to be detached, and operating means therefor, the combination of means actuated by the first mentioned printing mechanism for automatically printing characters coincident with the operation of the machine to indicate the various operations of the machine in the printing of said items and total.

6. In a printing and adding machine having spring actuated type hammers and releasing means therefor, the combination of means cooperating with the printing mechanism of the machine for automatically and progressively printing on the printed surface numbers coincident with the printing of each item or total to indicate the successive operations of the machine in printing all of the items or totals, said last mentioned printing means being actuated by the releasing means for the type hammers.

7. In a device of the kind described provided with means for recording and accumulating a series of individual items and recording the total thereof, the combination of means actuated by said recording means and operative in conjunction with the printing of an item or total for consecutively numbering said items and said total.

8. In a device of the kind described comprising means for recording and accumulating a series of individual items and recording the total thereof, the combination of means operative in conjunction with the recording of each item or total for consecutively numbering said items and said total comprising auxiliary printing and setting-up mechanism actuated by the operation of the recording mechanism.

9. In a device of the kind described comprising means for recording and accumulating a series of individual items and recording the total thereof, the combination of means operative in conjunction with the recording of each item or total for consecutively numbering said items and said total comprising auxiliary printing and setting-up mechanism actuated by the operation of the recording mechanism.

10. In a device of the kind described comprising means for recording a series of individual items and recording the total thereof, the combination of means operative only coincident with the recording of each item or total for consecutively numbering said items and said total, said recording mechanism including movable type hammers and actuating means therefor, and said numbering mechanism including setting-up mechanism actuated by the hammer actuating means, and printing mechanism cooperating therewith.

11. In a device of the kind described comprising means for recording a series of individual items and recording the total thereof, the combination of means operative in conjunction with the printing of each item or total for consecutively numbering said items and said total comprising setting-up and printing mechanism operatively connected with and actuated by the recording mechanism, and manually controlled means for disconnecting the operative connection between the last mentioned printing mechanism and the recording mechanism.

12. In a device of the kind described comprising means for recording individual items and recording the total thereof on a paper strip, the combination of means for cooperating with the recording mechanism of the machine for consecutively numbering each item and total recorded in conjunction with the recording of an item and total comprising setting-up printing mechanism with connected mechanism engaged by the recording mechanism whereby the same is controlled by the operation of the recording mechanism, and means for throwing the number printing mechanism out of operation.

13. In combination with a machine for recording a series of individual items and recording the total thereof on a paper strip, of means for cooperating with the recording mechanism for consecutively numbering said items in conjunction with the recording of an item, comprising setting-up and printing mechanism automatically controlled by the operation of the operative parts of the machine in recording each item, operative con-
connection between the recording mechanism and printing mechanism, and manual means for releasing said connection and thereby preventing the operation of said number printing mechanism at will.

14. In an adding machine for recording and accumulating a series of individual items and recording the total thereof on a paper strip, comprising a plurality of type carriers located side by side, setting-up mechanism therefor, and operating means therefor, the combination of a plurality of type carriers located at one side of the first mentioned carriers and bearing identifying characters, and means cooperating with said first mentioned carriers and actuated thereby to cause said characters to be automatically printed coincident with the operation of the machine in consecutive order at one side of said items or total.

15. In an adding machine, printing mechanism and operating means therefor, in combination with numbering mechanism for each individual item, printing mechanism therefor, intermediate mechanism between the main printing mechanism and the numbering printing mechanism, whereby the numbering mechanism is automatically advanced one step at each operation of the printing mechanism and the character indicating the number of the operation is also printed whenever the printing mechanism is operated, and means whereby the numbering printing mechanism is inoperative except when actuated by the main printing mechanism.

16. In an adding machine, the combination of recording mechanism, operating means therefor including a movable cross bar 737 and means for automatically printing a distinguishing character at each operation of the recording mechanism including setting-up mechanism, a pivotally mounted arm having at one end type plates and at the opposite end a rack, a segment to engage the rack, and means actuated by said cross bar for operating the segment.

17. In an adding machine, the combination of recording mechanism including spring actuated type hammers, releasing means therefor including bails and a connected cross bar, auxiliary printing mechanism adapted to automatically print a series of numerals consecutively during the operation of said printing mechanism, said auxiliary mechanism including setting-up mechanism, and actuating devices for the latter engaged and controlled by said cross bar of the main printing mechanism.

18. In an adding machine, the combination of recording mechanism including spring actuated type hammers, releasing means therefor including bails and a connected cross bar, auxiliary printing mechanism adapted to automatically print a series of numerals consecutively during the operation of said printing mechanism, said auxiliary mechanism including setting-up mechanism, and actuating devices for the latter engaged and controlled by said cross bar of the main printing mechanism.
tion of recording mechanism and means for automatically printing a character at each operation of the recording mechanism including a pivotally mounted arm having at one end type plates and at the opposite end a rack, a segment to engage the rack, a shaft for the segment, a ratchet wheel mounted on the shaft, a spring actuated pawl interposed between the ratchet wheel and segment, an auxiliary ratchet wheel connected to the first mentioned ratchet wheel, a rotatable member sleeved upon the shaft, an operative connection between said rotatable member and the auxiliary ratchet wheel, and an extension on the rotatable member in the path of a movable part of the recording mechanism whereby the same is actuated thereby.

24. In an adding machine, the combination of printing mechanism for printing individual items and for printing the total thereof, an auxiliary printing mechanism for printing the numbers of said items and the totals comprising a movable type carrier, a spring operated hammer for forcing the type of said carrier against the platen, a latch normally restraining said hammer from movement, a trip for said latch, operating means therefor, and setting-up mechanism governed by the movement of said last mentioned means.

25. In an adding machine the combination of printing mechanism adapted to record items and totals of said items, auxiliary printing mechanism to consecutively number each item and each total recorded, said last mentioned mechanism including an elongated arm pivotally supported and having at one end type plates and at the opposite end a rack, a segment to engage said rack, a pawl carried thereby, a ratchet wheel to engage the pawl to impart movement to the segment, a second ratchet wheel connected to the first mentioned ratchet wheel, a swinging arm having a pawl to engage the second mentioned ratchet wheel, hammer actuated means, and means governed by the latter for actuating the last mentioned swinging arm.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

DANIEL W. K. HICKS.

Witnesses:
Roy W. H., Sr.
CHARLES T. COBB.