W. F. McCALEB.

ADDING MACHINE.

APPLICATION FILED OCT. 7, 1912.

1,153,129.

Patented Sept. 7, 1915.

4 SHEETS—SHEET 1.

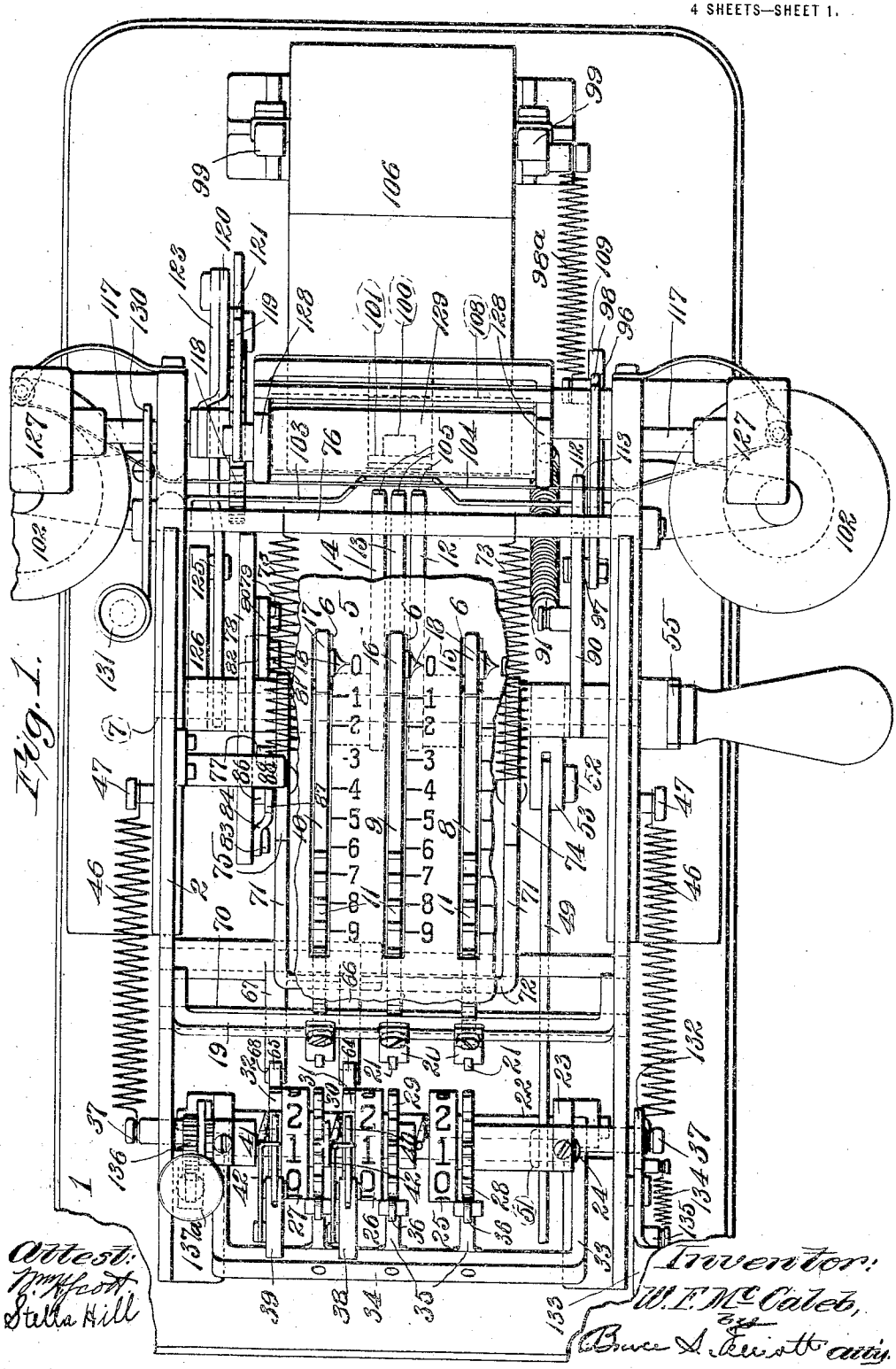


Fig. 1.

Attest:
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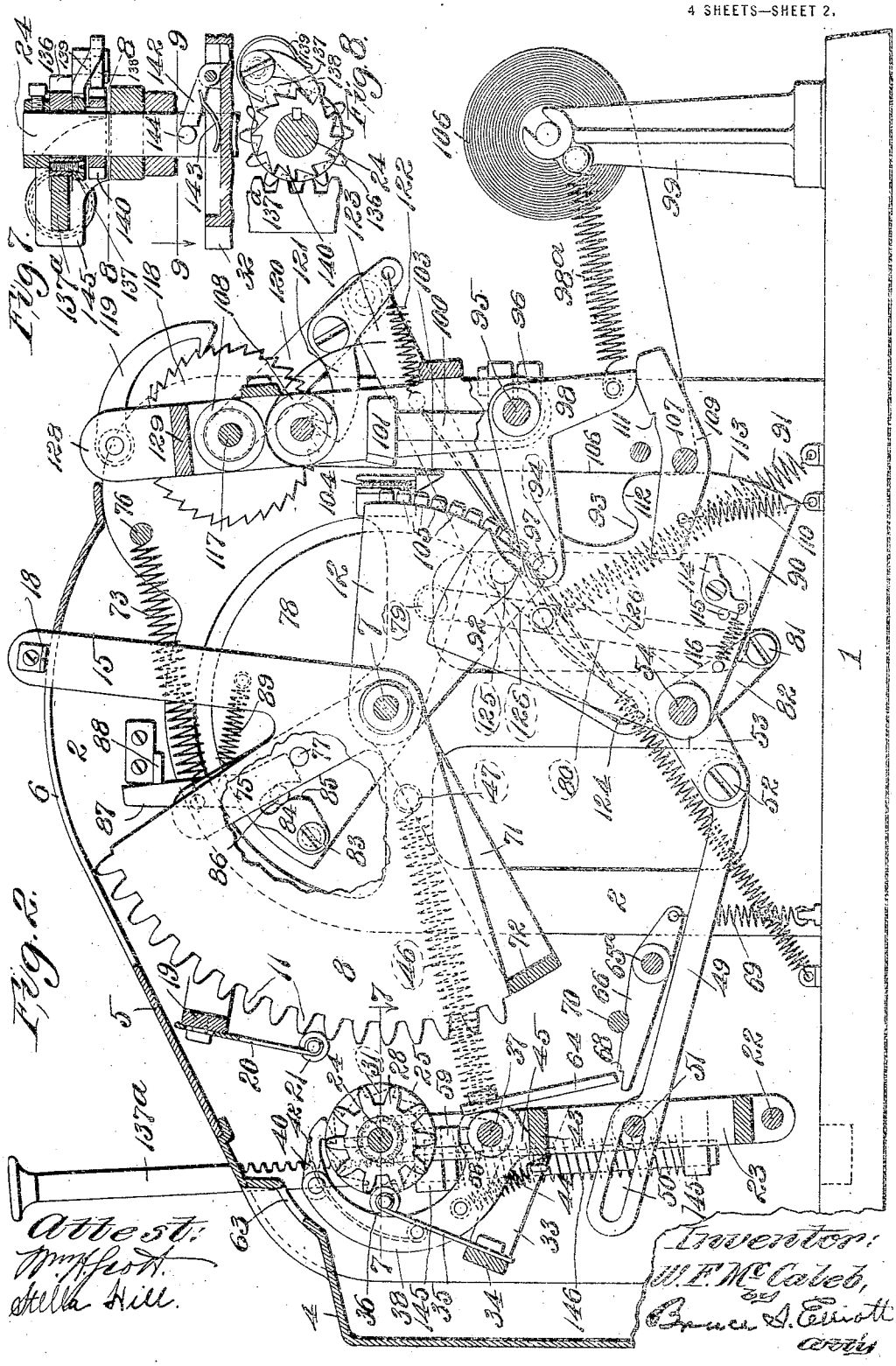


Fig. 2.

Witnesses:
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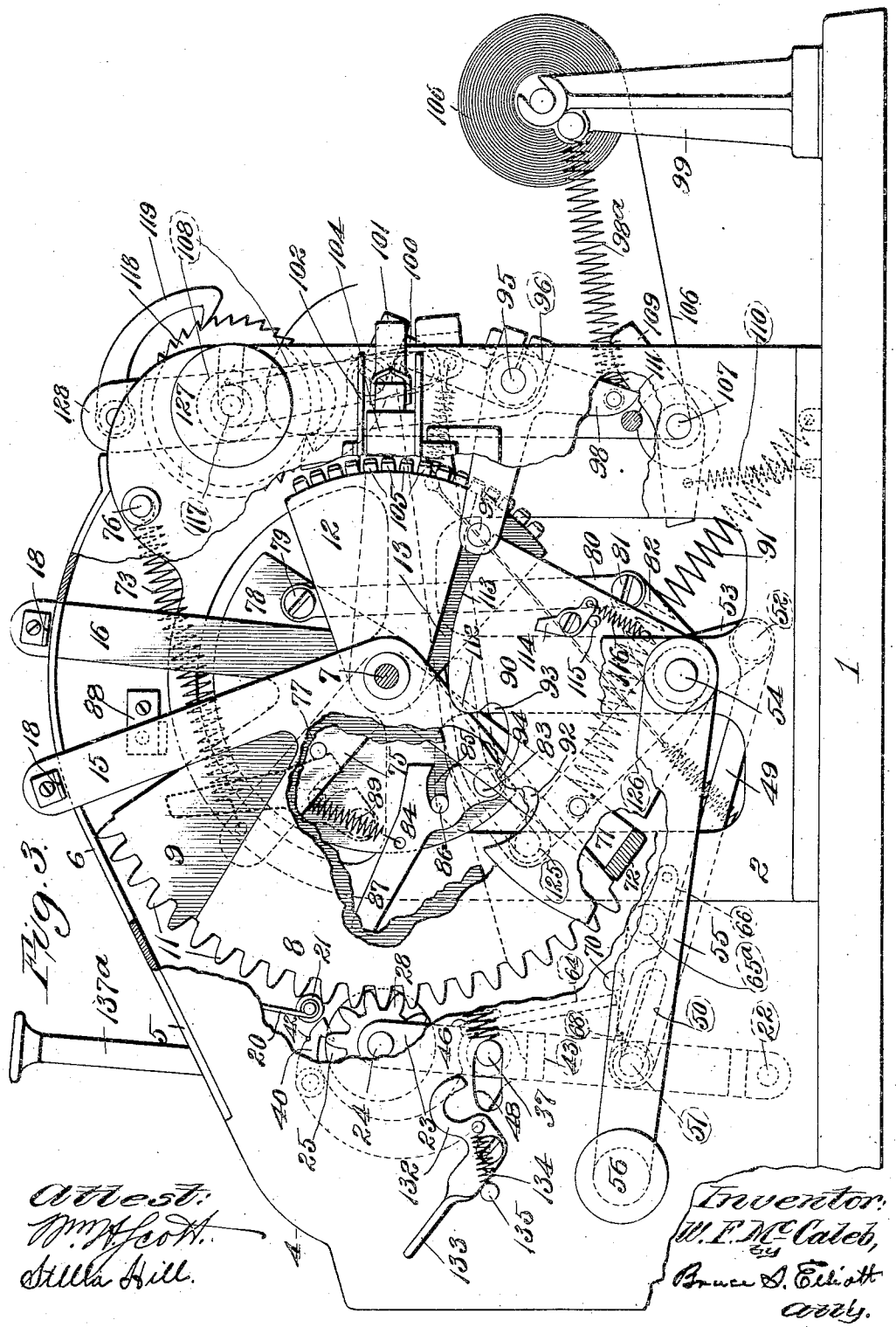


Fig. 3.

Witnesses:
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4 SHEETS—SHEET 4.

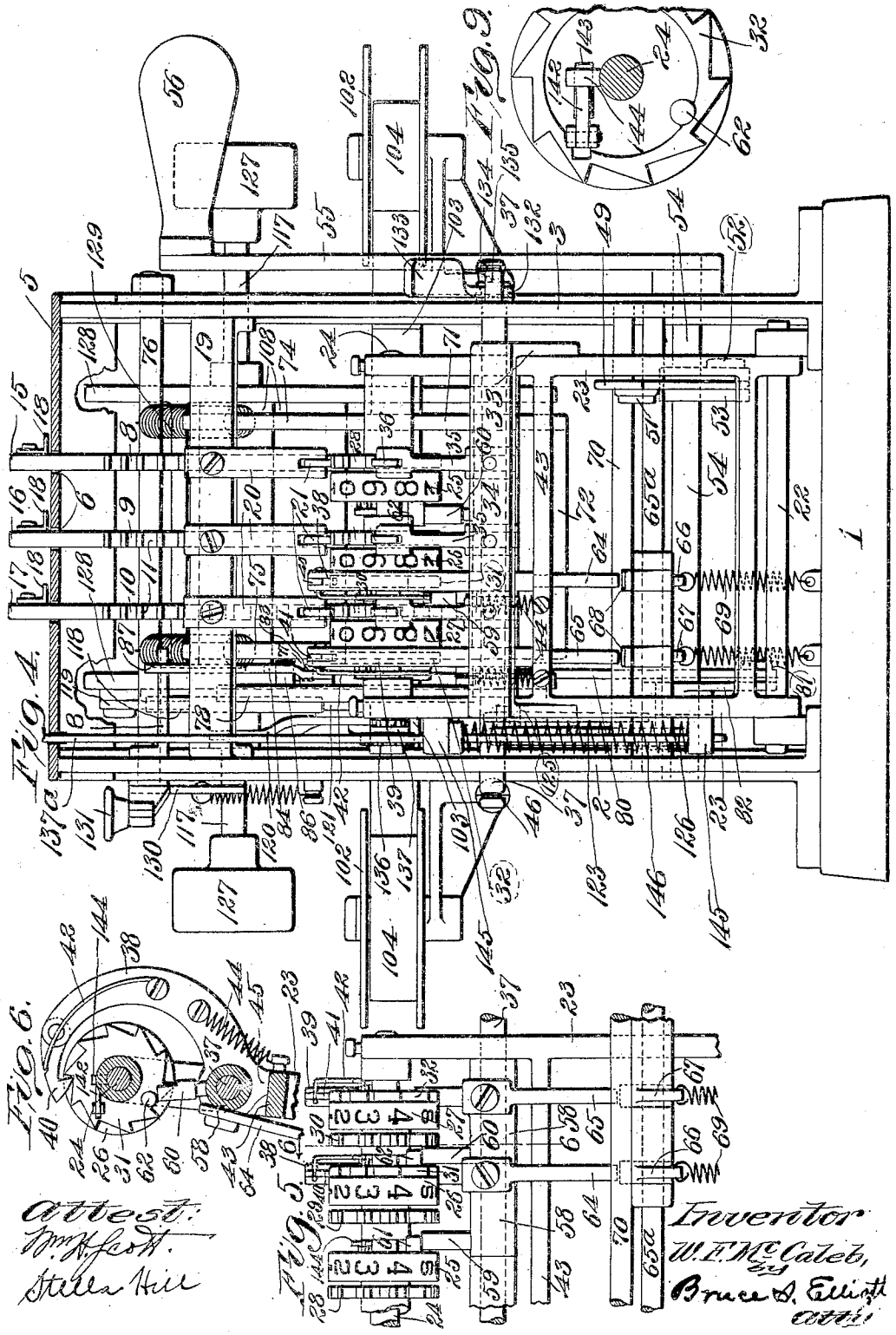


Fig. 4.

Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE.

WALTER F. McCALEB, OF SAN ANTONIO, TEXAS, ASSIGNOR TO McCALEB ADDING MACHINE COMPANY, OF SAN ANTONIO, TEXAS, A CORPORATION OF DELAWARE.

ADDING-MACHINE.

1,153,129. Specification of Letters Patent. Patented Sept. 7, 1915.

Application filed October 7, 1912. Serial No. 724,259.

To all whom it may concern:

Be it known that I, WALTER F. McCALEB, a citizen of the United States, residing in San Antonio, in the county of Bexar and State of Texas, have invented new and useful Improvements in Adding-Machines, of which the following is a specification.

This invention relates to adding machines, and has for its general object to provide a machine of this type adapted to the operations of adding and listing, and which shall be extremely simple in construction so that it may be manufactured at comparatively small cost.

A further object of the invention relates to the construction of improved devices, preferably of unitary structure, coöperating at one of their ends with the adding wheels, and at their other end with the listing device; to an improved paper-carrying device which may be readily tilted to permit an inspection of the work; to an improved construction of adding wheels whereby, in a simple manner, I am enabled to carry forward from one adding wheel of a lower denomination to an adjacent adding wheel of a higher denomination; and finally to an automatic arrangement for returning the combined adding and listing sectors to normal position after each operation of the machine.

The above indicate the principal objects of the invention.

Still further objects relate to details of construction and to combinations, arrangements and operations of parts which will be more readily understood from the detailed description to follow.

In addition to the objects of the invention above specified, I may further state that the construction of machine which I have devised enables the same to be used either as an adding machine, or as a listing machine, or for both purposes.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the machine as a whole, a portion of the upper casing being broken away to better illustrate the construction; Fig. 2 is a longitudinal sectional view, the parts being shown in normal position; Fig. 3 is a view in side elevation, a portion of the side of the casing being removed, and showing the position of the parts after one or more of the sectors has been moved and the operating handle has been drawn forward to permit the adding wheels to be brought into connection with said sectors and the listing device to operate to make an impression from the type on the rear ends of said sectors; Fig. 4 is a view in front elevation, the front of the casing being removed; Fig. 5 is a detached view in rear elevation, illustrating the method of carrying forward from one adding wheel to the other; Fig. 6 is a section on the line 6—6 of Fig. 5; Fig. 7 is a broken sectional view on an enlarged scale, taken on the line 7—7 of Fig. 2, illustrating details in the mechanism for returning all of the adding wheels to zero; Fig. 8 is a sectional view on the line 8—8 of Fig. 7; and Fig. 9 is a broken sectional view taken on the line 9—9 of Fig. 7, and viewed in the direction of the arrow.

Referring now to the drawings, 1 indicates the base of the machine, 2, 3, the sides thereof, 4 an end plate covering the front of the machine, and 5 a top plate. This top plate, or cover, is provided with any desired number of parallel slots 6, three of such slots being shown in the drawings. The machine shown in the drawings is capable of adding and listing only within the range of hundreds, and for this reason only three slots 6 are shown. It will be obvious, however, the adding and listing devices, as hereinafter described, may be multiplied indefinitely so that the machine may have any desired capacity. Extending from side to side of the machine, and mounted in the side plates 2, 3, thereof, is a cross shaft 7 on which are journaled three double sectors, each forward sector 8, 9, 10, respectively, being provided on its front face with a series of teeth 11, and each rear sector, 12, 13, 14, being provided on its rear face with number type, the numbers running consecutively from 0 to 9. As shown in the drawings, the central double sector, composed of the sectors 9, 13, is formed as a single integral plate, while the companion sector 12 of the sector 8, and the companion sector 14 of the sector 10, are shown in each instance to be located to one side of the respective sectors 8 and 10, the purpose of this being to bring the sectors 12, 13 and 14 in closely adjacent relation for printing therefrom in the listing operation.

It will be understood, however, that the sectors 8 and 12 and 10 and 14, respectively, move together as a unit. Each double sector is provided with an arm 15, 16, 17, respectively, which projects upward through the respective slots 6 of the cover plate, and each of said arms is provided with a pointer 18 which moves over the curved cover plate 5, which, in each instance, adjacent to the slot 6, is provided with graduation marks indicated by numbers running from 0 to 9. The arms 15, 16 and 17 are preferably formed integral with the respective sectors 8, 9 and 10. Extending between the side plates 2, 3, in front of the sectors 8, 9 and 10, is a bar 19 to which are secured the upper ends of three leaf-springs 20, the lower end of each of which is provided with a roller 21 which is adapted to yieldingly engage the teeth 11 of the sectors, and thus afford a yieldable resistance to their movement, while at the same time operating to hold the sectors in any position to which they may be moved, the roller 21 in such case resting in the space between two teeth, as clearly shown in Figs. 2 and 3. Toward the front of the machine, near the bottom thereof, a shaft 22 is secured in and extends between the side plates 2, 3, and pivotally mounted on this shaft is a rectangular frame 23, mounted in the upper end of which is a cross shaft 24, on which is journaled, in spaced relation, three adding wheels 25, 26 and 27, respectively.

Connected to each adding wheel, at one side thereof, is a gear wheel 28, 29 and 30, respectively, and connected to the opposite side of the adding wheels 26 and 27 is a ratchet wheel 31 and 32, respectively. Connected to the frame 23 is a bracket 33 having a cross bar 34, to which are connected the lower ends of three leaf-springs 35, the upper end of each of which is provided with a roller 36, which rollers yieldingly engage the teeth of the gears 28, 29 and 30 so as to offer a slight resistance to the rotation of the adding wheels, while at the same time operating to hold them in any position to which they may be turned. Extending between the side bars of the frame 23 is a cross shaft 37, loosely mounted on which, at their lower ends, are two curved arms 38 and 39 which are arranged in front of the respective ratchet wheels 31 and 32, and each of which has a pawl 40, 41, respectively, controlled by springs 42, each pawl being adapted to ride over the teeth of its ratchet wheel in the inward movement of the arm, and to engage one of said teeth in its outward movement to turn the adding wheel to which the ratchet wheel is secured.

Extending between the side bars of the frame 23 is a cross bar 43 to which is secured the ends of two coil springs 44 which respectively engage the two curved arms 38, 39, and hold them normally in an outward position, that is, in the position shown in Fig. 2. Each of the arms 38, 39, is provided at its lower end with a shoulder 45 which is adapted to engage the cross bar 43 and limit the outward movement of the said arms. Each of the ratchet wheels 31, 32, is provided with ten teeth, and the arms 38, 39, are operated successively to carry over from the units wheel 25 to the tens wheel 26, and from the tens wheel to the hundreds wheel 27. The means for effecting this operation will be described later on.

The frame 23 is under the constant tension of two coil springs 46, located on opposite sides of the machine, one end of each spring being secured to a stud 47 mounted on the frame of the machine, and the other end to a projecting end of the shaft 37 on which the curved arms 38 and 39 are mounted. The side plates of the machine are slotted, as indicated at 48, to allow for the movement of the shaft 37 as the adding wheel frame 23 is swung inward or outward on its pivot 22. The springs 46, as will be understood, tend to swing the frame 23 inward. This tendency is resisted, however, except at certain periods, by a bar 49 having its outer end provided with a slot 50 which works over a pin 51 mounted on one of the side members of the frame 23, the inner end of said slot being adapted to engage said pin to hold the frame in its outward position, or that position shown in Fig. 2. The inner end of the bar 49 is pivotally secured at 52 to a crank arm 53 which is fixedly secured on a shaft 54 which extends across the machine and is journaled in the side frames thereof. The shaft 54 projects a slight distance beyond one side of the machine and has fixedly secured thereon the main operating lever 55, which is provided at its outer end with a handle 56. A coil spring 91, hereinafter referred to, acts to turn the shaft 54 when the operating lever 55 is released, and the said operating lever is normally held by said spring in the upright position shown in Figs. 1 and 4. In the normal position of the lever 55 the parts will be in the position shown in Fig. 2, that is to say, with the adding wheel frame 23 in its outer position, and these parts will be maintained in such position until the operating lever 55 is swung forward, as in Fig. 3, in which movement the crank arm 53 will draw the bar 49 inward so as to release engagement of the inner end of the slot 50 with the pin 51, and the springs 46 will then be free to exert their action, which results in swinging the frame 23 inward to the position shown in Fig. 3, in which position the gears 28, 29 and 30 of the adding wheels will be in engagement with the teeth 11 of the sectors 8, 9 and 10. In order that the operation of the parts subsequently to be described may

be more clearly understood, the first operation employed in the use of the machine for adding will here be described.

The operator desiring to add a series of numbers places his fingers upon the arm 15 of what may be termed the unit sector 8, and draws it forward until the pointer 18 is opposite the appropriate figure adjacent to the slot 6, indicating the unit digit of the first number to be added; in like manner the arm 16 is pulled forward until its pointer 18 is brought opposite the figure on the scale indicating the tens digit of said number, and so with the arm 17 to indicate the hundreds digit of the number. The operator next grasps the handle 56 and pulls the operating lever 55 forward, or to the position shown in Fig. 3, which operation, among others to be later described, permits the frame 23 to be drawn inward by the springs 46 to bring the gears 28, 29 and 30 of the adding wheels into engagement with the teeth 11 of the sectors 8, 9 and 10. The next step in the process is to return the arms 15, 16 and 17 to normal position. In practice this is effected automatically, but for the present we will assume that the operator simply pushes the arms back by hand. This operation results in turning the gear wheels 28, 29 and 30, and, of course, the corresponding adding wheels. After this operation the handle may be returned to normal position, in which movement the arm 49 is thrown outward by the crank arm 53 and when the rear end of the slot 50 is reached the frame 23 will be forced outward against the resistance of the springs 46. We will now assume that the next number to be added will involve carrying over from the units to the tens wheel, and from the tens to the hundreds wheel. The mechanism for effecting this is more clearly illustrated in Figs. 5 and 6. The curved arms 38 and 39 are loosely mounted on the shaft 37 through the medium of independent sleeves 58 which may be formed integral with said arms, and from each of the sleeves 58 there projects a pin 59, 60, respectively. From the inner side of the adding wheel 25 there projects a pin 61, and from the inner side of the ratchet wheel 31 of the adding wheel 26 there projects a similar pin 62. The pins 59 and 60 are located, respectively, in the paths of the pins 61 and 62, and the latter pins are so positioned on the adding wheels that they will be in a position to engage the pins 59 and 60 when the numeral 9 has shown on the adding wheels. In Fig. 2 I have shown a sight opening 63 in the front of the casing extending transversely thereof over the adding wheels. When the numeral 9 of the adding wheel 25 appears opposite this sight opening the pin 61 will be in contact with the pin 59. When the next addition takes place the unit wheel will, of course, be turned, and this operation, through the engagement of the pin 61 with the pin 59, results in turning the sleeve 58 and drawing the curved arm 38 inward, or toward the adding wheel, a distance sufficient to allow the pawl 40 to ride over one tooth of the ratchet wheel 31 and spring back into engagement therewith. As this occurs while the gears of the adding wheels are in mesh with the teeth of the sectors it is necessary to hold the curved arm 38 in this position until after the adding wheels have been turned by the sectors by returning the arms 15, 16 and 17 to their normal position, which, of course, is determined by the ends of the slots 6, so that when the parts are released the curved arm may operate to move the tens wheel 26 one digit in advance of the position to which the wheel had been turned by its sector. The same applies, of course, to the hundreds wheel. For this purpose there is secured to each of the sleeves 58 a downwardly-extending arm 64, 65, respectively. Pivotally mounted on a cross shaft 65^a are two catch levers 66, 67, respectively, the outer end of each of which is provided with a shoulder 68. Each catch lever is pivoted intermediate its ends on the shaft 65^a, its inner end being normally held in a depressed position by a coil spring 69 secured to said inner end and to the base of the machine, respectively, and the outer end is normally pressed upward against a stop 70. When the frame 23 is thrown inward to the position shown in Fig. 3, and when the curved arm 38 has been moved to the position described by the engagement of the pin 62 with the pin 60, the lower end of the arm 64, as the curved arm 38 moves inward, depresses the inner end of the catch lever 66 until it passes over and behind the shoulder 68. By the construction just described the curved arm 38 will thus be held in the advanced position while its adding wheel may continue to be rotated by the corresponding sector. When the adding operation has been completed and the frame 23 returned to the outer position by the arm 49, the arm 64 will be moved out of engagement with the shoulder 68 and the spring 44 of the curved arm 38 immediately acts to draw said curved arm downward, thereby rotating the adding wheel 26 an additional notch, which operation adds the additional tens carried forward from the unit wheel. In the same manner just described, when the digit 9 of the adding wheel 26 appears opposite the sight opening, the pin 62 thereof will be in position to engage the pin 60 of the sleeve 58, and in the next addition, when the tens wheel is turned, the sleeve 50 will be turned on the shaft 37, throwing the curved arm 39 inward so that its pawl 40 will be advanced one tooth on the ratchet wheel 32 and its arm 65 will engage the

catch lever 67 and hold the curved arm 39 in its advanced position until the frame 23 has been moved outward, when the arm 65 will be disengaged from the shoulder of the catch lever 37 and the spring of the curved arm 39 will pull it outward, thereby rotating the wheel 27 an additional notch, thereby adding the hundreds carried forward from the tens wheel 26.

The mechanism for automatically returning the sectors to normal position after the adding operation will now be described. Pivotally mounted on the cross shaft 7 on which the sectors are mounted, but independently of the sectors, is a bail 71 having a cross bar 72 which extends under the lower side of the three sectors 8, 9 and 10, and is normally held in contact with the under side of said sectors by means of coil springs 73 secured at one end to arms 74, 75, respectively, extending upward from said bail at the sides thereof, and preferably formed integral therewith, the other ends of said springs being secured to a cross bar 76. The arm 75 is likewise provided with an inwardly-extending pin 77, shown more clearly in Figs. 2 and 3. Pivotally mounted on the cross shaft 7 is a semicircular plate 78, to the inner side of which is pivotally connected, at 79, the upper end of a connecting rod 80, the lower end of which is pivotally connected at 81 to a crank arm 82, which is fast on the shaft 54 on which the main operating lever 55 is secured. The crank arm 82, however, is on the opposite end of the shaft 54 to that at which the lever 55 is mounted. Pivotally mounted on the plate 78 at a point 83, practically diametrically opposite to the point of pivotal connection 79, above referred to, is a dog 84 provided with a curved slot 85 which engages over a pin 86 projecting from the side of the plate 78, and also provided with an arm 87 which, in the normal or retracted position of the sectors, is adapted to engage a fixed stop 88 mounted on the side plate 2 in such manner that the top of the slot 85 will be lifted some distance above the pin 86, and the bottom of the dog 84 will be raised above the pin 77 on the arm of the bail 71. A coil spring 89, secured at one end to the arm 87 and at the other end to the plate 78, tends normally to draw the arm 87 downward so that the top of the slot 85 will rest on the stop pin 86. Fixedly secured on the shaft 54 is a sector plate 90, the purpose of which will presently appear, which is moved forward by the main operating lever 55 against the resistance of a strong coil spring 91, one end of which is secured to said sector plate and the other to the base. This spring operates through the medium of the shaft 54 to return the lever 55 and the sectors 8, 9 and 10 to normal position when pressure on the handle 56 of the operating lever is released.

The parts being in normal position, as shown in Fig. 2, as the arms 15, 16 and 17, or either, or any two of them, are pulled forward, the under edge of the corresponding sector plate will engage the cross bar 72 of the bail 71 and depress the same against the resistance of the springs 73 secured to the outer ends of the arms 74 and 75, which, as above described, are integral parts of the bail. In this movement of the bail the pin 77 on the arm 75 would pass under the dog 84 by reason of the fact that the said dog is held upward by the stop 88, and the said pin 77 may move to the position shown in Fig. 3, or to a lower position, depending upon the distance one or the other of the arms 15, 16 and 17 is moved in its slot. After the sectors have been positioned the operating lever 55 is then drawn forward to bring the gears of the adding wheel into mesh with the teeth of the sectors, as previously described, and in this operation the crank arm 82 pushes the connecting bar 80 upward, thereby raising the rear portion of the plate 78 from the position shown in Fig. 2 to that shown in Fig. 3. In such movement of the plate 78 the dog 84 will pass over the pin 77 on the arm 75 of the bail, the spring 89 operating to throw the arm 87 backward so that the top of the slot 85 will engage the pin 86. In this position the bottom of the dog will be below the pin 77 and will engage said pin in the return movement of the plate 78. This occurs when the operating lever 55 is released or moved backward, when the spring 91, operating through the plate 90 on the shaft 54, will throw the crank arm 82 and connecting rod 80 downward, thereby drawing down the inner portion of the plate 78, and raising the dog 84 until it comes in contact with the pin 77 which it engages, and through such engagement carries the arm 75 back with it, thereby raising the bail 71 and turning the sectors 8, 9 and 10 and their arms to normal position. During this movement of the sectors the gears of the adding wheels will have remained in contact with the teeth of the sectors owing to the lost motion permitted by the slot 50 in the end of the bar 49. The arm 87 engages the stop 88 just before the arms 15, 16 and 17 engage the rear ends of their slots, and the slight further movement brings the sectors to rest by such engagement of the arms at the moment that the dog 84 is raised above the pin 77. At this moment the rear end of the slot 50 has engaged the pin 51 of the frame 23 and as the dog 84 is released from the pin 77, the plate 78, sector plate 90 and shaft 54 will continue to turn under the influence of the spring 91 until the arm 49 has drawn the frame 23 outward to disengage the gears of the adding wheels from the teeth of the sectors. It will be understood that after the

handle 56 has been moved forward and released the spring 91 will return the parts to the normal position, and thus the movement of the adding wheels by the sectors and the return of the sectors to normal position will be effected automatically. Ordinarily, however, the operator retains his hold of the handle so that the operation of returning the parts to normal position and of simultaneously turning the adding wheels may be effected in part manually and in part by the spring aforesaid. It will be further understood that the ten teeth of the gear wheels of the adding wheels coöperate with ten teeth only of the sectors, and that when a pointer 18 is moved, say, to 5 on the scale, the roller 21 will pass over five teeth of the sector moved, and that when the gears of the adding wheels are brought into engagement with the teeth of the sectors, that sector whose arm has been moved to 5, when returned to normal position, will move its adding wheel from 0 to 5.

The mechanism, as thus far described, constitutes a complete adding machine, and can be used independently of the listing device. That is to say, after the adding operations the operator, by looking through the sight opening 63, can see and make a memorandum of the total amount of addition. It is usually desired, however, to list the numbers added, and this operation in my machine is accomplished by the following mechanism:

The sector plate 90, previously referred to, is provided in its rear edge portion with two recesses 92, 93, respectively, affording an intermediate cam 94. At the rear of the machine there is rotatably mounted in the side frames a cross shaft 95 on which is fixedly secured a bell crank lever 96, one arm of which is provided with a pin 97 which is adapted to seat in either of the recesses 92 or 93. To the other arm 98 is secured one end of a coil spring 98^a, the other end of which is secured to one of two uprights 99 mounted on the base of the machine some distance to the rear of the main frame. Fixedly secured on the shaft 95 is an arm 100 having mounted on its outer end a hammer 101. Rotatably mounted on brackets at each side of the machine at the rear end thereof are two ribbon spools 102, one of them being a take-off spool, and suitable guides of the usual construction, such as indicated at 103, being provided to cause the ribbon 104 to pass directly in front of the number type 105 mounted on the rear curved edge of each of the sectors 12, 13 and 14. Mounted in the uprights 99 is a roll of paper 106, said paper being passed under a shaft 107, thence between the ribbon 104 and the hammer 101, and thence between two feed rolls 108. Pivotally mounted on the cross shaft 107 is a latch plate 109, the outer end of which is normally held in contact with the lower end of the arm 98 of the bell crank lever by means of a coil spring 110, one end of which is secured on the base 1, and the other to the latch plate on one side of the shaft 107. On the other side of the shaft 107 the latch plate is provided, at a point removed from its end, with a notch 111. Normally, the parts above described are in the position shown in Fig. 2. When the main operating lever 55 is drawn forward, thereby swinging forward the sector plate 90, the cam 94 of said sector plate engages the pin 97 of the bell crank lever 96, turning the said bell crank lever and the shaft 95, and moving the hammer 101 a slight distance outward, this movement of the bell crank lever being opposed by the spring 98^a. As the sector plate 90 continues to move forward the pin 97 passes off of the cam 94, and the spring 98^a instantly throws the arm 98 backward, throwing the pin downward into the recess 93 and thereby throwing the hammer 91 with considerable impact against the paper 106, which latter is forced against the ribbon 104, and the ribbon, in turn, against the type numbers 105, whereby the impression of the type in line with the hammer is made upon the paper. The body of the sector plate 90 is continued upward above the bottom of the groove 93 to provide a cam 112, and from the cam 112 to the lower side of the sector plate 90 the outer edge of the sector plate provides a curved surface 113 on which the pin 97 may ride. After the impact of the hammer 101 with the type, as above described, and in the continued forward movement of the sector plate 90, the pin 97 rides out of the recess 93, and up on the cam 112, thence on to the curved surface 113, this movement operating to raise the pin 97 and swing the arm 98 inward until its lower end is engaged by the notch 111 of the latch plate 109 which holds the bell crank lever 96 in this position until the return of the sector plate to the normal position shown in Fig. 2, whereupon the inner edge of the sector plate 90 above the recess 92 engages the pin 97 and throws the pin downward into the recess 92, causing the lower end of the arm 98 to ride out of the notch 111 and to pass on to the outer end of the latch plate 109. It is obvious that when the cam 94, by engagement with the pin 97, turns the arm 98 inward, the notch of the latch plate 109 would engage the lower end of the arm 98 and prevent the spring 98^a from drawing it outward to produce the impact of the hammer with the type. To obviate this, I pivotally mount a pawl 114 on the sector plate 90 which is normally held against a stop 115 by means of a spring 116. The inner end of the latch plate 109 is in the path of this pawl and as the sector plate moves upward the pawl 114 engages the inner end of

the latch plate and raises it and holds it in such position until after the pin 97 has passed off of the cam 94, thus allowing the hammer to be drawn forward with a quick snap. On the return movement of the sector plate the pawl will yield to pass over the end of the latch plate, as will be understood.

It is, of course, necessary to feed the paper 106 forward a step after each impact of the hammer 101. This is accomplished as follows: The upper feed roll 108 is fixedly secured on a cross shaft 117 to which is also secured a ratchet wheel 118, which is prevented from backward movement by a pivoted latch 119. Loosely mounted on the cross shaft 117 is the upper end of a throw lever 120, on which is pivotally mounted a pawl 121 which is held in yieldable engagement with the teeth of the ratchet wheel 118 by means of a coil spring 122. Pivotally connected at its outer end to the lower end of the throw lever 120 is a bar 123, the inner end of which is provided with an elongated slot 124 in which works a pin 125 mounted in the outer end of an arm 126, the lower end of which is fast on the main cross shaft 54. As the operating lever 55 is drawn forward, the pin 125 will move in the slot 124, and near the completion of the stroke will engage the end of said slot and draw the bar 123 forward, drawing the throw lever 120 downward, and causing the pawl 121 to pass over one or more of the teeth on the ratchet wheel 118, according to the distance it is desired to move the paper. As the parts are returned to normal position the pin 125 ultimately engages the inner end of the slot 124, thereby pushing the bar 123 and the throw lever 120 outward and causing the pawl 121 to rotate the ratchet wheel 118, and thereby, through frictional engagement between the feed rolls 108 and the paper, causing a given length of paper to be drawn past the type. The shaft 117 is provided with nobs 127 by means of which it may be turned by hand to wind off a given length of paper, as at the completion of the adding and listing operations. It will, of course, be apparent that the machine can also be manipulated to indicate the total at the bottom of the numbers listed. To do this, the operator notes through the sight opening the total amount of the addition; he then moves the arms 15, 16 and 17 to the appropriate numbers on the scale indicating the total amount, which operation, of course, moves the corresponding numbers on the sectors 12, 13 and 14 opposite the hammer, when, by drawing the operating lever 55 forward, in the manner previously described, the total amount will be presented on the paper at the bottom of the list of the numbers. In order to prevent confusion the nobs 127 may be turned to move the paper before this last operation so that a space will be left between the last number listed and the number indicating the total amount of the addition. Thus, without any additional mechanism for the purpose, the machine affords the function of a totalizer. The feed rolls 108 and the parts coöperating therewith, are pivotally mounted in a frame composed of side bars 128 joined by a cross bar 129, the frame, as a whole, being pivotally mounted at its lower end on the cross shaft 95. A latch 130, which may be operated by a button 131, is adapted to engage the shaft 117 to hold the feed roll frame in operative position. By lifting the latch 130 the frame may be swung outward so that the operator can readily observe the numbers which have been printed upon the strip of paper.

When it is desired to use the machine wholly for listing it is necessary to hold the frame 23 so that when it is freed from the restraining influence of arm 49 it will nevertheless be incapable of allowing the gears of the adding wheels to engage the teeth of the sectors. For this purpose I pivotally mount on the side of the machine a latch 132 adapted to engage over the projecting end of the shaft 37, and provided with a lever 133 for operating it. A coil spring 34, connected at one end to the latch and at the other to a stop 135, normally holds said latch inoperative, as shown in Fig. 3. When it is desired to hold the frame 23 from movement, the operator grasps the lever 133 and draws it forward so that the latch will engage over the end of the shaft 37. When the operating lever is moved, drawing the arm 49 inward, the latch will hold the frame against being drawn inward by the springs 46. A latch may be provided at both sides of the machine if desired.

For the purpose of returning all of the adding wheels to zero I provide shaft 24 at one end with a gear wheel 136 (see Figs. 1 and 7) which is loosely mounted thereon, and with which the rack teeth of a push bar 137^a (see Fig. 3) are designed to engage. Secured to the gear wheel 136 to move therewith is an arm 137, to the outer end of which is pivotally mounted a pawl 138, controlled by a spring 139. Fixedly secured on the shaft 24 adjacent to the arm 137 is a ratchet wheel 140 with which the pawl 138 coöperates. The ratchet of each adding wheel, save the units wheel, and the side of the latter, carries a pivoted dog 142 which is normally held outward by a spring 143. On the shaft 24 I arrange a series of stops 144, each of which is designed to coöperate with a corresponding dog 142. When shaft 24 is turned in one direction the stops 144, which are fast thereon, will ride over the dogs 142, turning them inwardly against the tension of their springs, without affecting

the adding wheels; but when the shaft is moved in the opposite direction the stops 140 will engage the dogs and return all the wheels to zero. When the push bar 137 is depressed it will turn the gear wheel 136 and the pawl 138 will ride over the ratchet wheel 140 without turning the shaft. When the push bar rises, however, the pawl 138 will engage the teeth of said ratchet wheel and turn the shaft 24 so that, in the course of its revolution, each stop 144 will engage a dog 142 to return the adding wheels to zero. The push bar 137 works in guides 145, and is returned to normal position after being depressed by a coil spring 146. The length of the rack on the push bar 137, and the size of the gear wheel 136, are so proportioned that when the push bar is depressed to the limit of its movement its return movement will cause a complete revolution of the shaft 24 to insure that each stop 144 will engage its dog to turn its corresponding adding wheel to the zero position.

An advantage incident to the construction I have described, involving a series of adding wheels normally held out of operative engagement with their sectors is the fact that in moving the sectors so that their pointers shall indicate the numbers to be added, no effect is produced upon the adding wheels, so that if one of the pointers is moved to the wrong number all the operator has to do is to move it to the correct number. In all adding machines with which I am familiar separate mechanism is employed to enable the operator to correct a mistake where he has manipulated the wrong key, or other member, in the adding operation.

It is believed that the operation of the machine, as a whole, has been sufficiently outlined in the course of the above description. I desire, however, to emphasize the simple and compact construction and arrangement of my machine, and particularly in connection with the double sectors and the parts coöperating therewith, whereby in one movement the front sector is set for the adding operation and the rear sector for the listing operation. The forward and rear movement of the main operating lever then effects the addition and listing. The simplicity of this construction will be more clearly apparent when it is noted that the central double sector with its operating arm 16 is formed as a unitary structure from a single plate of metal. The side double sectors could be formed in the same way, except that it is desirable to bring the rear sectors 12, 13 and 14 in closely adjacent relation for the purpose of listing the numbers, as otherwise the numbers would appear on the paper with their digits in widely separated relation. In each instance, however, the double sector presents a unitary structure, and in one movement of either of the arms 15, 16 and 17 both sectors are simultaneously set for operation, the front sector for adding, and the rear sector for listing.

I claim:

1. The combination with a series of toothed sectors and means for independently turning each sector through any required degree of its total arc of movement, of a series of adding wheels, a pivotally mounted carrier for said adding wheels, a spring tending normally to move said carrier to effect operative engagement between the adding wheels and the toothed sectors, a main operating shaft, mechanism controlled thereby for returning the sectors to zero, and mechanism also controlled by said shaft for permitting at will the said movement of the adding wheel carrier, and for moving said carrier to effect disengagement between the adding wheels and the sectors after the sectors have been returned to zero.

2. The combination with a series of independently movable toothed sectors each of which is provided with a rigid arm for moving it through any required degree of its total arc of movement, a face plate having slots through which said arms project and provided adjacent to each slot with a numerical scale, of a series of adding wheels mounted to be moved toward and from the toothed sectors and having teeth for coöperating therewith, means tending normally to move the adding wheels into engagement with the sectors, a main operating shaft, mechanism controlled thereby for returning the sectors to zero, and mechanism also controlled by said shaft and operable in the movement thereof in one direction to permit engagement of the adding wheels with the toothed sectors, and in the opposite movement of the shaft to move the adding wheels out of such engagement after the sectors have been returned to zero.

3. The combination with a series of toothed sectors and means for independently turning each sector through any required degree of its total arc of movement, of a series of adding wheels, a pivotally mounted carrier for said adding wheels, a spring tending normally to move said carrier to effect operative engagement between the adding wheels and the toothed sectors, a main operating shaft, mechanism controlled thereby for returning the sectors to zero, a lever having a slotted engagement with said carrier and operating in the movement of the shaft in one direction to permit the said movement of the adding wheel carrier and in the opposite movement of the shaft to move said carrier away from the sectors to effect disengagement between the adding wheels and the sectors after the sectors have been returned to zero.

4. The combination with a series of type-carrying sectors, a corresponding series of

toothed sectors rigid therewith, and means for moving each type-carrying sector and its corresponding toothed sector through any required degree of their total arcs of movement, of a series of adding wheels mounted to be moved toward and from the toothed sectors and having teeth for coöperating therewith, a striker designed to engage said type-carrying sectors, a main operating shaft, and mechanisms controlled thereby for effecting operative engagement between the adding wheels and the toothed sectors, and for operating said striker.

5. The combination with a series of type-carrying sectors, a corresponding series of toothed sectors rigid therewith, and means for moving each type-carrying sector and its corresponding toothed sector through any required degree of their total arcs of movement, of a series of adding wheels mounted to be moved toward and from the toothed sectors and having teeth for coöperating therewith, a striker designed to engage said type-carrying sectors, a main operating shaft, and mechanisms controlled thereby for effecting engagement between the adding wheels and the toothed sectors, for operating said striker, for returning the sectors to zero while in engagement with the adding wheels, and, finally, for moving the adding wheels out of engagement with said sectors.

6. The combination with a series of type-carrying sectors, a corresponding series of toothed sectors rigid therewith, and an arm for simultaneously moving each type-carrying sector and its corresponding toothed sector through any required degree of their total arcs of movement, of a series of adding wheels having teeth coöperating with the toothed sectors, a carrier for said adding wheels, means tending to move said carrier to effect the engagement between the adding wheels and the toothed sectors, means normally restraining such carrier but independent thereof, a main operating shaft for removing said restraining means, a striker designed to engage said type-carrying sectors, and means controlled by said shaft for operating said striker.

7. The combination with a series of type-carrying sectors, a corresponding series of toothed sectors rigid therewith and an arm for simultaneously moving each type-carrying sector and its corresponding toothed sector, of a series of adding wheels having teeth for coöperating with the toothed sectors, a pivoted carrier for said adding wheels, a spring tending to move said carrier to effect the engagement between the adding wheels and the toothed sectors, a main operating shaft, a bar controlled by said shaft for normally restraining such carrier but capable of independent movement, a striker designed to engage said type-carrying sectors, and means controlled by said shaft for operating said striker.

8. The combination with a series of type-carrying sectors, a corresponding series of toothed sectors rigid therewith and an arm for simultaneously moving each type-carrying sector and its corresponding toothed sector, of a series of adding wheels having teeth for coöperating with the toothed sectors, a carrier for said adding wheels, means tending to move said carrier to effect the engagement between the adding wheels and the toothed sectors, means normally restraining such carrier but independent thereof, a main operating shaft for removing said restraining means, a spring-impelled striker designed to engage said type-carrying sectors, a trip lever for moving said striker in opposition to its spring, and means for actuating said lever from said main operating shaft.

9. The combination with a series of type-carrying sectors and means for moving each sector, of a main operating shaft, a shaft having a striker designed to engage said type-carrying sectors fixedly secured thereon, a spring-controlled bell crank lever also fixedly secured on said shaft, a cam plate mounted on the operating shaft for moving said bell crank lever against the resistance of its spring, then releasing the same and again moving it against the resistance of its spring, a spring-controlled latch for holding the bell crank lever in the latter position during the return movement of the cam plate, and means carried by said cam plate for releasing said latch from engagement with said bell crank lever and holding it out of such engagement at the time the said lever is released by the cam plate to enable the spring to actuate the striker.

10. The combination with a series of toothed sectors and means for independently moving each sector through any required degree of its total arc of movement, of a series of adding wheels mounted to move toward and from the toothed sectors and having teeth for coöperating therewith, a main operating shaft, mechanism controlled thereby for effecting operative engagement of the adding wheels with the toothed sectors and for moving the adding wheels out of such engagement, a member common to the series of toothed sectors for returning them to their normal position, and means movable by said operating shaft into engagement with said member to effect the return movement of the sectors.

11. In combination with a series of toothed sectors and means for independently moving each sector through any required degree of its total arc of movement, of a series of adding wheels mounted to move toward and from the toothed sectors and having teeth for coöperating therewith, a

main operating shaft, mechanism controlled thereby for effecting operative engagement of the adding wheels with the toothed sectors and for moving the adding wheels out of such engagement, a member common to the series of toothed sectors for returning them to their normal position, and means movable by said operating shaft into engagement with said member to effect the return movement of the sectors before the adding wheels are moved out of engagement therewith.

12. The combination with a series of toothed sectors and means for independently moving each sector, of a series of adding wheels mounted to move toward and from the toothed sectors and having teeth for cooperating therewith, a main operating shaft, mechanism controlled thereby for effecting operative engagement of the adding wheels with the toothed sectors and for moving the adding wheels out of such engagement, a member common to the series of toothed sectors for returning them to their normal positions, and a spring-actuated dog movable by said operating shaft into engagement with said member to effect the return movement of the sectors.

13. The combination with a series of toothed sectors and means for independently moving each sector, of a series of adding wheels mounted to move toward and from the toothed sectors and having teeth for cooperating therewith, a main operating shaft, mechanism controlled thereby for effecting operative engagement of the adding wheels with the toothed sectors and for moving the adding wheels out of such engagement, a member common to the series of toothed sectors for returning them to their normal positions, a stop on said member, a spring-actuated dog movable by the operating shaft into engagement with said stop to return the sectors to their normal positions, and means for releasing the dog from engagement with said stop to allow a further movement of the operating shaft whereby to move the adding wheels out of engagement with the sectors.

14. The combination with a series of toothed sectors and means for operating the same, of a series of adding wheels mounted to be moved toward and from the toothed sectors and having teeth for coöperating therewith, an actuator on all but the last adding wheel, a series of wheel-advancing members adapted to coöperate with all but the first adding wheel, means adapted to be engaged by each of said actuators to move the member of the wheel of the next higher denomination into active position, and means for reversing the movement of such member when the wheels are free of the sectors, to advance said wheel of higher denomination.

15. In combination with a series of toothed sectors and means for operating the same, a series of adding wheels mounted to be moved toward and from the toothed sectors and having teeth for coöperating therewith, an actuator on all but the last adding wheel, a series of wheel-advancing members adapted to coöperate with all but the first adding wheel, means adapted to be engaged by each of said actuators to move the member of the wheel of next higher denomination into active position, means for maintaining the member in such position while the adding wheels and sectors are in engagement, and means for reversing the movement of such member, when the wheels are free of the sectors, to advance said wheel of higher denomination.

16. In combination with a series of toothed sectors and means for operating the same, a series of adding wheels mounted to be moved toward and from the toothed sectors and having teeth for coöperating therewith, a lateral projection on all but the last adding wheel, a shaft having a series of sleeves loosely mounted thereon, each of said sleeves having a pin adapted to be engaged by one of said projections to turn the sleeve and an arm carrying a pawl adapted to be moved by the turning of the sleeve into active engagement with the wheel adjacent to the wheel containing the projection that moved said sleeve, means for maintaining the pawl in engagement with its adding wheel while the adding wheels and sectors are in engagement, and a spring for reversing the movement of each of said arms when the adding wheels are free of the sectors whereby to advance its adding wheel.

17. In combination with a series of adding wheels, means for actuating the same, a carrier therefor, a shaft supported by said carrier and upon which the wheels are mounted, coöperating arms supported by the carrier, and means carried by the faces of adjacent wheels with which said arms engage, both arms being moved by one wheel, and means for reversing the movement of said arms whereby one of them will advance the wheel adjacent to the one actuating said arms.

18. In combination with a series of adding wheels, the faces of adjacent wheels having one, a pin, and the other a ratchet, a pivoted sleeve carrying two arms, one adapted to be engaged by said pin to move both arms, the other arm having a pawl which, on the reverse movement, is designed to engage with the ratchet to advance its wheel, and means for reversing the movements of said arms.

19. In combination with a series of adding wheels, a wheel of lower denomination having a pin and an adjacent wheel of higher denomination a ratchet, a pivoted sleeve carrying two arms, one adapted to be engaged by said pin to move both arms, the other arm

having a pawl designed to engage the ratchet on the reverse movement of the arm to advance the wheel of higher denomination, a third arm carried by said sleeve, means with which said third arm engages for holding the arms in the position into which they are moved by the wheel of lower denomination, and means for disengaging said third arm and reversing the movement of the two first mentioned arms.

20. In combination with a series of type-carrying sectors, a corresponding series of toothed sectors, and means for simultaneously moving each type-carrying sector and its corresponding toothed sector, of a pivoted frame carrying a series of adding wheels mounted to be moved by said frame toward and from the toothed sectors and having teeth for coöperating therewith, a spring tending normally to draw said frame toward the toothed sectors, means normally restraining such movement, a main operating shaft, mechanism controlled thereby to release said restraining means for effecting operative engagement of the adding wheels with the toothed sectors, a striker designed to engage said type-carrying sectors, means for operating said striker, and means for holding the adding wheel frame from movement toward the toothed sectors when the machine is to be used for listing only.

21. In an adding machine, in combination with a series of adding wheels loosely mounted upon a shaft and means for independently moving each adding wheel, means for returning all of the adding wheels to zero comprising a gear loosely mounted on the shaft and carrying a pawl, a ratchet wheel fixedly secured on the shaft with which said pawl engages, a spring-controlled dog carried by each adding wheel, a series of stops secured on the shaft for engagement with said dogs, and a spring-controlled, depressible rack bar coöperating with said gear wheel, the combination operating as described.

In testimony whereof, I have hereunto set my hand in presence of two subscribing witnesses.

WALTER F. McCALEB.

Witnesses:
LEON N. WALTHALL,
W. B. HAMILTON, JR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."