

F. M. GREENUP.
 COMBINED COMPUTING AND LISTING MACHINE.
 APPLICATION FILED FEB. 5, 1914.

1,176,959.

Patented Mar. 28, 1916.

3 SHEETS—SHEET 1.

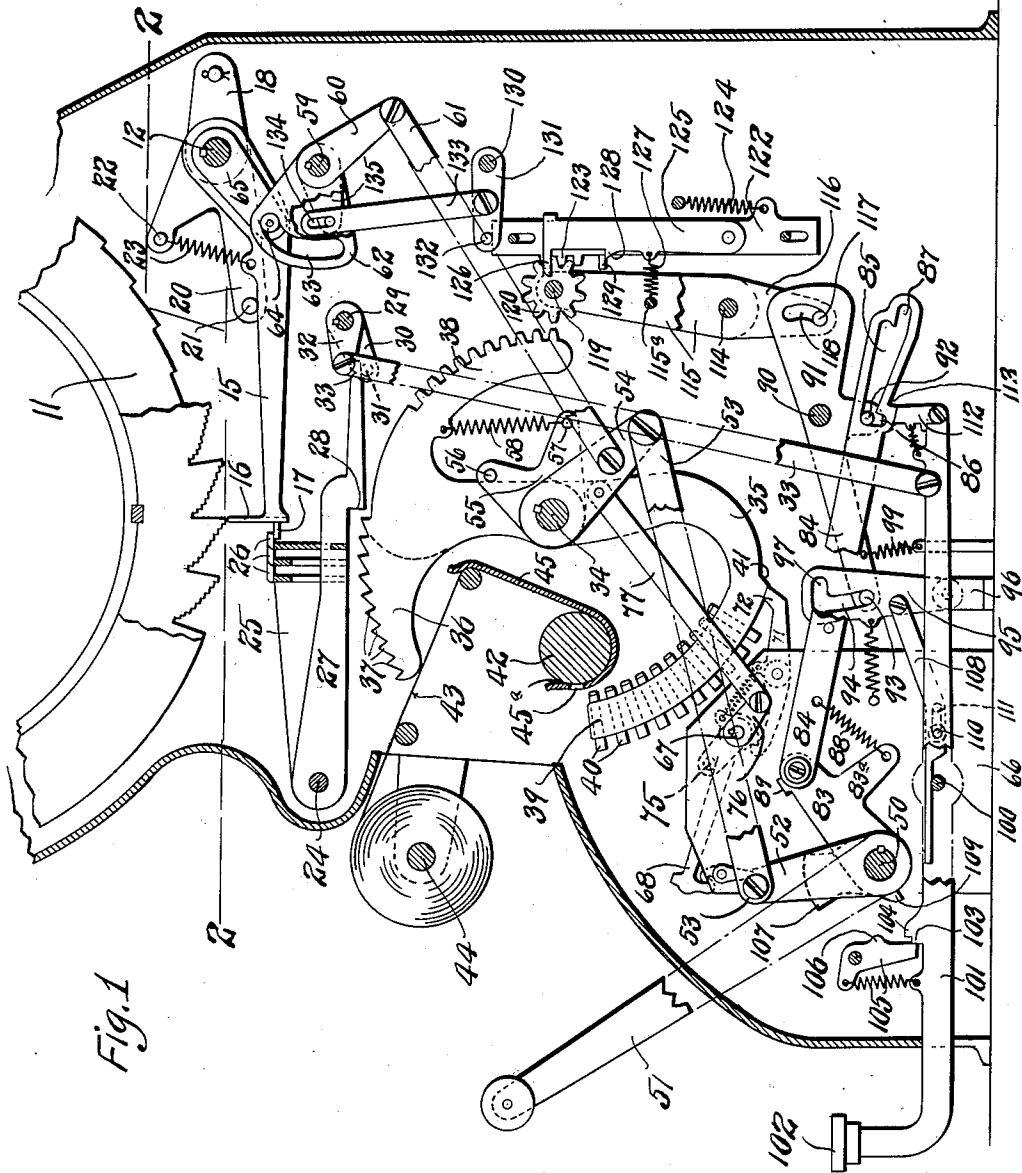


Fig. 1

Witnesses

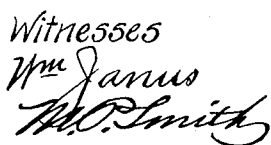
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3 SHEETS—SHEET 2.



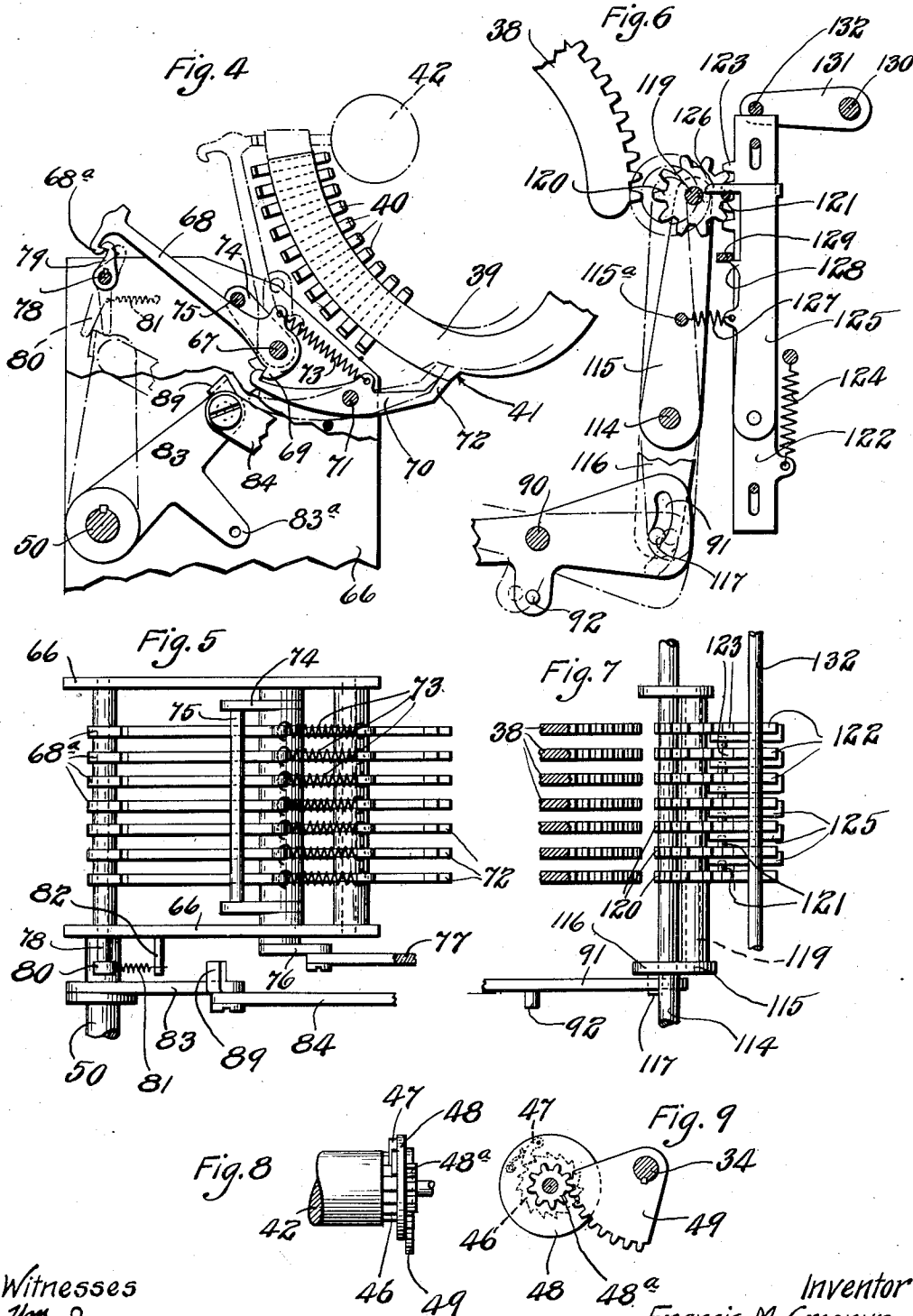
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UNITED STATES PATENT OFFICE.

FRANCIS M. GREENUP, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO HARRY A. JACKSON, OF ST. LOUIS, MISSOURI.

COMBINED COMPUTING AND LISTING MACHINE.

1,176,959.

Specification of Letters Patent.

Patented Mar. 28, 1916.

Original application filed April 21, 1913, Serial No. 762,544. Divided and this application filed February 5, 1914. Serial No. 816,796.

To all whom it may concern:

Be it known that I, FRANCIS M. GREENUP, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain
5 new and useful Improvement in Combined Computing and Listing Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make
10 and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section of the machine with parts thereof broken away in
15 order to more clearly illustrate the construction of the machine, said section being taken approximately on the line 1—1 of Fig. 2. Fig. 2 is a horizontal section taken approximately on the line 2—2 of
20 Fig. 1. Fig. 3 is a detail plan view of parts of a series of racks made use of in my improved machine, and also showing parts of arms which control said racks. Fig. 4 is an enlarged detail section taken approxi-
25 mately on the line 4—4 of Fig. 2, and showing a portion of one of the segments carrying the printing type, and also showing a hammer and hammer actuating mechanism. Fig. 5 is a plan view of the printing ham-
30 mers and hammer actuating mechanism. Fig. 6 is an enlarged detail section taken approximately on the line 6—6 of Fig. 2. Fig. 7 is a plan view of the accumulator wheels and transfer mechanism. Fig. 8 is
35 an elevational view of one end of the platen. Fig. 9 is an end elevational view of the platen and the segments utilized for imparting rotary motion to said platen.

My invention relates to a combined computing, and listing machine, the same being
40 particularly adapted for use in connection with a weighing machine or scale, such as is ordinarily used in stores and shops for weighing comparatively small quantities of
45 commodities, such as meat, butter, sugar, tea, coffee, and like articles of household use.

This application is a division of an application filed by me April 21, 1913, Serial No.
50 762,544, on a combined computing, indicating, and adding scale.

The principal object of my invention is to produce a comparatively simple mechanism for adding up and totalizing various

amounts, and further to provide simple
55 means for printing upon a continuous web of paper the various amounts added into or accumulated within the machine, and also to print the total of the individual items or amounts accumulated in the machine. 60

With the above and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described and
65 claimed.

Referring by numerals to the accompanying drawings, 10 designates a suitable housing, preferably constructed of sheet metal and within which the operating parts of my improved computing machine are located. 70 Arranged in the upper portion of this housing is a series of flat rings 11 provided with notched peripheries, said rings being arranged side by side and forming a part of the weighing mechanism with which my
75 improved computing machine is associated, and for a more detailed description of this weighing mechanism and notched disks, reference may be had to my copending application hereinbefore referred to. 80

Loosely mounted in suitable bearings in the upper rear portion of the housing 10 is a shaft 12 in which is formed a groove 13 and mounted for sliding movement on this shaft is a hub or collar 14 provided with a
85 key or feather which occupies the groove 13. Loosely mounted on the central portion of this hub or collar are three horizontally disposed and forwardly projecting arms 15, the forward ends of which are provided with
90 upwardly projecting pins 16 which are adapted to engage the notches of the rings 11 when the forward ends of the arms 15 are elevated. Projecting forwardly from the forward ends of these arms 15 are short
95 fingers 17 which are adapted to engage beneath fingers carried by a series of racks hereinafter described.

Loosely mounted on one end of the hub 14 is a rearwardly projecting arm 18 to
100 which is connected one end of a rod 19, which slides through a bearing formed in one of the side walls of the housing 10, and said rod being operated in any suitable manner for shifting the hub 14 upon the shaft 12. 105

Where my improved calculating machine is combined with a weighing mechanism, the rod 19 is actuated during the operation of

said weighing mechanism. Fixed on the hub 14 is a bell crank 20 and seated in the horizontally disposed arm thereof is a pin 21 which overlies the arms 15. Fixed to the upwardly projecting arm of this bell crank is a pin 22 to which is attached the upper ends of three retractile springs 23, the lower ends of which are attached to the arms 15.

- Arranged within the upper front portion of the housing 10 is a rod 24, and loosely mounted therein are the ends of three rearwardly projecting frames 25, forward portions of which occupy positions immediately in front of the forward ends of the arms 15. Formed on the rear ends of these frames 25 are rearwardly projecting fingers 26, the same being arranged in sets of three each, and the rear ends of these fingers overlie the three fingers 17 projecting forwardly from the arms 15. (See Fig. 3.)

- Loosely mounted on the shaft 24 and extending rearwardly therefrom beneath the frames 25 is a series of horizontally disposed arms 27, the undersides of which are provided with shoulders 28 which are adapted to engage the teeth of segments hereinafter described.

- The first three of these arms 27, designated by *a*, *b*, *c*, are utilized in connection with the accumulating printing mechanism of my improved machine, while the remaining arms are utilized only in connection with the total adding mechanism hereinafter described.

- The arm *a* of the series 27 is connected to the frame *a* of the series 25, so as to move vertically therewith, and the remaining two frames of the series 25 are slotted vertically to permit this movement without affecting said arm *a*.

- The arm *b* of the series is connected to the intermediate frame *b* to move vertically therewith, and the other two frames being slotted to permit such vertical movement; likewise the arms *c* of the series 27 is connected to the frame *c* of the series 25 to move vertically therewith and the other two frames are slotted to permit such vertical movement.

- All of the frames 25 are slotted to permit the remaining arms of the series 25 to move vertically independently of each other, and independently of said frame.

- Journaled in suitable bearings in the side walls of the housing 10 is a shaft 29, and fixed thereto is a pair of forwardly projecting arms 30 in which are seated the ends of a short rod 31 which extends beneath the rear ends of all of the arms 27. Fixed to the shaft 29 is a short crank arm 32 to which is pivotally connected the upper end of a link 33.

- Arranged near the central portion of the housing 10 and journaled in suitable bearings in the side walls thereof is a shaft 34, and loosely mounted thereon immediately

below the arms 27 is a series of substantially S-shaped segments 35. There is one of these segments for each arm 27, and formed integral with the first three of these segments, and which first three correspond with the arms *a*, *b*, and *c*, of the series 27, are forwardly projecting arms 36 in the upper edge of each of which is formed a series of 10 teeth 37. These teeth are formed on the edge of a circle which is eccentrically arranged with respect to the axis formed by the shaft 34, the purpose of which arrangement will hereinafter be more fully set forth.

Under normal conditions, the first teeth of each series are positioned directly behind the corresponding shoulder 28 of the corresponding arm 27. It is not necessary to provide these teeth on the segments beyond the first three, as a single tooth which is normally positioned directly behind the corresponding shoulder 28, is sufficient to normally hold these remaining segments in proper position.

Formed integral with the upper portions of all of the segments and extending downwardly and rearwardly are curved racks 38 which have ten teeth, and the same being formed on arcs of a circle, concentric with the axis of movement which is the shaft 34. Formed integral with the lower portion of each segment is an upwardly and forwardly curved arm 39, the same carrying a series of spring held type or printing members 40, the faces of which bear the characters from zero to 9 inclusive.

Formed on the underside of each curved arm 39 is a shoulder 41. Positioned immediately in front of the shaft 34 and the segments thereon is a transversely disposed platen 42 around which is adapted to pass a web of paper 43 as it unwinds from a spool or spindle 44. This spool or spindle is suitably positioned immediately in front of the housing 10 and the web of paper passes through a suitable opening in the housing and around suitable supports before reaching the platen.

A paper guard 45 partially surrounds the platen, said guard being provided with an aperture 45^a through which the printing members or type are moved to contact with the surface of the paper. Fixed on one end of the platen 42 is a ratchet wheel 46 which is engaged by a spring held pawl 47, the latter being carried by a disk 48 which is loosely mounted on the end of the platen spindle. This disk carries a pinion 48^a which is engaged by the teeth of a segment 49, the latter being fixed on the shaft 34. Thus as the shaft 34 is rocked, the segment 49 imparts partial rotary movement to the platen through the pinion 48^a, ratchet wheel 46, and pawl 47.

Loosely mounted in suitable bearings in

the lower front portion of the housing is a shaft 50, the right hand end of which extends to the exterior of the casing 10, and fixed on said extending end is a crank handle 51. Fixed on this shaft 50 within the housing is a crank arm 52, and pivotally connected to the upper end thereof is the forward end of a link 53 and the rear end of this link is pivotally connected to the lower end of a crank arm 54, which is fixed to the shaft 34. Loosely mounted on this shaft 34 adjacent to this arm 54 is a bell crank 55, the short arm of which carries a pin 56, which is normally positioned immediately behind the upper portions of all of the segments 35. Attached to the other arm of this bell crank is a pin 57 to which is connected the lower ends of retractile coil springs 58, the upper ends of which are attached to the upper portions of the segments 35.

Arranged immediately beneath the shaft 12 is a shaft 59 to which is fixed a crank arm 60, and pivotally connected to the lower end thereof is a link 61, the forward lower end of which is pivotally connected to crank arm 54.

Fixed on shaft 59 is a segment 62 in which is formed an eccentric or cam slot 63, which receives a roller 64, the same being journaled on the side of a crank arm 65 which is fixed to shaft 12. Positioned on the base of the machine in the lower front portion of the housing is a pair of upright plates 66, and arranged in the rear upper portion thereof is a shaft 67 on which is loosely mounted a series of hammers 68, there being one hammer for each segment 35, and the heads of said hammers are adapted to strike against the rear ends of the printing members 40 to move the same through their bearings in the curved arms 39 to cause their forward ends to strike against and print upon the strip of paper carried by the platen 42. The lower ends of these hammers 68 are provided with lugs 69 which are normally engaged by hooks formed on the forward ends of detents 70, the same being loosely mounted on a rod 71, the ends of which are seated in the plates 66, and the rear ends of these detents are provided with lugs 72 which normally rest on the outer edges of the curved arms 39 immediately adjacent to the shoulders 41 thereof.

Connecting each detent 70 with its corresponding hammer is a retractile spring 73, and fixed on the shaft 67 to the sides of the hammers 68 is a pair of short arms 74, the upper ends of which carry a rod 75, which overlies all of said hammers.

Fixed to the right hand end of shaft 67 is a short crank arm 76, to which is pivotally connected the lower end of a link 77, the upper end of which is pivotally connected to crank arm 54. Journaled in the

upper forward corners of the plates 66 is a shaft 78, and fixed thereon is a series of hammer detents 79, the hooks on which normally engage hooks 68^a formed on the rear sides of the heads of hammers 68, thereby holding said hammers in their retracted positions. Fixed on the right hand end of this shaft is a depending finger 80 and connected thereto is one end of a retractile spring 81, the opposite end of which is connected to a pin 82, which projects from the right hand one of the plates 66. Fixed on the shaft 50 is a short crank arm 83 to the upper end of which is pivotally connected the forward end of a link 84 in the rear portion of which is formed a slot 85 provided at its forward end with a depending notch 86 and at its rear end with a rearwardly extending notch 87.

Arm 83 is provided with a depending extension 83^a and arranged between the end thereof and the link 84 on the upper end of arm 83 is an inwardly projecting lug 89 which when the arms swing upward is adapted to engage the lower end of finger 80 to rock the shaft 78, thereby releasing the hammer detents. Positioned in the housing below and slightly to the rear of the shaft 34 is a rod 90 on which is fulcrumed a lever 91 and depending therefrom is a key which carries a pin 92, the same normally occupying the forward end of slot 85 in link 84.

The forward end of lever 91 is provided with a laterally projecting pin 93, which normally occupies the lower end of a slot 94 which is formed in a vertically disposed link 95, the lower end of which is pivotally connected to a bracket 96 on the base of the housing. The upper end of slot 94 is provided with a rearwardly projecting notch 97 which is adapted to receive pin 93.

A retractile spring 98 connected to link 95 and one of the plates 66 normally pulls said link 95 forwardly and maintains the same in position seen in Fig. 1. A retractile coil spring 99 is connected to the forward end of lever 91 drawing the same downward so that the pin 93 normally occupies the lower end of slot 94. Fulcrumed in a bearing 100 is a horizontally disposed lever 101, the forward end of which projects through a suitable opening in the front wall of the housing, and said forward end carries a disk or key 102.

Formed on the upper side of the lever 101 and near the forward end thereof is a pair of stop lugs 103 and 104 and adapted to engage therewith is the lower end of a spring held detent 105 provided on its front side with a lateral projection 106. This projection is adapted to be engaged by the end of an arm 107 which is fixed to the shaft 50 when said shaft is rocked to its forward limit of movement by the crank handle 51.

Pivotally connected to the lower portion of arm 95 is the rear end of a horizontally disposed lever 108, the rear portion of which overlies the rod 100 and the rear end of this lever normally occupies a position immediately beneath the shaft 50. Formed on the lower end of arm 83 is a lug 109 which is adapted to engage the rear end of lever 108 when the same has been elevated during a certain operation of the machine, but normally, or when the adding operations are carried out, this lug does not engage with the rear end of said lever.

A pin or screw 110 is seated in the lever 101 and passes through a slot 111 formed in lever 108. Pivotally connected to the rear end of lever 101 is a vertically disposed spring held detent 112 which normally engages beneath the rear portion of link 84 and formed in the underside of said link beneath the slot 83 is a shoulder 113 against which the upper end of detent 112 is adapted to engage.

Positioned above and to the rear of shaft 90 is a shaft 114 on which is loosely mounted a pair of upright members, one of which is provided with a depending portion 116, and seated therein is a pin 117 which normally occupies the lower end of a short eccentrically curved slot 118, which is formed in the lever 91.

Journalled in the upper ends of the members 115 is a shaft 119, and loosely mounted thereon is a series of pinions 120, the same corresponding to the toothed racks 38, and each pinion being provided with ten teeth. Each of these pinions is provided with a short laterally projecting pin 121. Arranged for vertical movement to the rear of these pinions is a corresponding series of plates 122, and formed in the front sides thereof are teeth 123 which are adapted to mesh with the teeth of pinions 120. Connected to these plates and adapted to hold the same normally elevated are retractile springs 124.

Pivotally mounted on each plate 122 is a secondary plate 125, the upper end of which carries a horizontally disposed arm 126, the forward end of which is beveled or rounded. These arms extend between the pinions 120 and overlie the pins 121 carried by said pinions.

Connecting each secondary plate 125 with a rod 115^a carried by the arms 115 is a retractile spring 127, and formed on each secondary plate 125 is a lug 128 which normally engages against a horizontally disposed rail 129, the same being arranged between the vertical plates and the members 115.

Mounted on a shaft 130 to the rear of the upper ends of the plates 122 is a pair of forwardly extending arms 131, the forward ends of which carry a rod 132, which normally bears upon the upper end of said

plates 122. Pivotally connected to one of the arms 131 is the lower end of a link 133, the upper end of which is provided with a slot 134 in which engages a pin carried by a short arm 135, which latter is fixed on shaft 59.

The operation of my improved machine is as follows: Under normal conditions the various parts of the machine occupy positions seen in Fig. 1, and as the scale with which my improved adding machine is associated, is operated, the notched rings are partially rotated, thereby bringing certain of the notches of said rings into position directly above the pins 16 on the forward ends of arms 15. It will be understood that prior to the movement of the notched rings, the rod 19 is shifted lengthwise during the weighing operation so as to shift the hub 14 and the arms 15 upon the shaft 12 so that the pins 16 are properly positioned relative to a certain set or series of notched rings 11. To add and print the amount set up on the setting up mechanism which, in the present instance, comprises the notched disks 11, the operator engages the crank handle 51 and pulls the same forwardly and downwardly, thereby partially rocking shaft 50 and moving the arms which are fixed thereto. As arm 52 moves forwardly link 53 connected thereto actuates arm 54 and shaft 34 is partially rotated. This movement also is transmitted through link 61 to arm 60, thereby partially rotating shaft 59 and the segment 62 moving upward actuates roller 64 which occupies the slot 63, thereby swinging arm 65 upward and partially rotating shaft 12. Bell crank 20 which is fixed on shaft 12 is correspondingly elevated, thereby raising pin 21 and permitting the three arms 15 to move upward under the influence of retractile springs 23. The pins 16 on the forward ends of these arms engage in the notches of the three rings 11 immediately above said arms, and assuming the number set up by disks 11 to be 120 then the teeth of the first arm occupy the first notch in the hundreds disk. The second arm occupies the second notch in the tens disk, while the pin on the third arm occupies a position against the edge of the units disk. As the arms are thus elevated, the fingers 17 engage against corresponding fingers 26 of the frames 25, thereby differentially elevating said frames and correspondingly differentially elevating the arms *a*, *b*, and *c* of the series 27. As these arms are elevated the shoulders 28 on the undersides thereof are raised to different distances with respect to the teeth 37 of the three corresponding segments 35, and thus the segment corresponding to the hundreds, will be permitted to move the distance of one tooth, the second segment corresponding to tens will be permitted to move a distance of two teeth, while the third arm will not be ele-

vated an appreciable distance, thereby holding the third segment against movement, and which operation gives a result of zero in the subsequent operations. As shaft 34 was partially rocked by the initial movement of the handle 51, bell crank 55 will be actuated thereby moving pin 56 away from the rear sides of the segments 35, such action expanding springs 58 and creating tension therein. The first three segments will be partially rotated upon the shaft 34 so as to bring the corresponding teeth 37 into engagement with the shoulders 28 of the arms 27.

It will be understood that the teeth 37 of the segments are eccentric with respect to the axis formed by the shaft 65, and for this reason the shoulders 28 will act as stops to engage the teeth of the segments as the same are actuated.

As handle 51 is actuated, crank arm 83 and link 84 are drawn forward and just prior to the end of the stroke of the handle 51, the shoulder at the end of slot 85 will engage pin 92, thereby swinging lever 91 upon its fulcrum, which is the shaft 90, and as a result pin 117 will be moved rearwardly a slight distance, thereby actuating the frame comprising the uprights 115 so that the shaft 119 carrying the pinions 120 will be moved forward so that said pinions are brought into engagement with the teeth of the curved racks 38. As the handle 51 is returned to its normal position, the various parts just referred to, will return to their normal positions, and in so doing the teeth of the curved racks 38 will impart partial rotary movement to the pinions 120, thereby adding into or accumulating therein, the amount set up on the notched rings 11. Immediately prior to this return movement of the various parts, and after the segments 35 have been actuated as described, the printing of the amount set up and added by the machine is accomplished in the following manner. As the segments reach their limit of movement the rear ends of the detents 70 pass beyond the shoulders 41 on the curved arms 39, thereby disengaging the hooks on the forward ends of said detents from the lugs 69. As arm 83 reaches its limit of movement, lug 89 thereon strikes against the lower end of finger 80 thereby partially rocking shaft 78 and releasing the pawls 79 from the hooks 68^a on the hammer heads. The tension of springs 73 now actuates the hammers and the heads thereof move upward with a quick motion, and strike the rear ends of the printing members 40 which have been moved into position immediately in front of aperture 45, and as a result the amount set up and added into the machine is printed on the paper carried by the platen 42. The platen is rotated step by step to advance the paper by the engagement of the teeth of the segment 49 with the

teeth of pinion 48^a, which latter is connected to disk 48 carrying the pawl 47, and which latter engages with the teeth of the ratchet wheel 46 carried by said platen. As the handle 51 is returned to its normal position the various parts of the adding and printing mechanism just described return to their normal positions. The pinions 120 act as accumulators inasmuch as the different amounts set up and added into the machine are accumulated during the successive operations, and as the first pinion makes a complete revolution, that is, ten teeth, the pin 121 carried by said wheel will strike against the inclined or rounded forward end of the adjacent finger 126, thereby swinging the upper end of auxiliary plate 125 rearward to release lug 128 from rail 129. This releasing movement takes place while the pinions 120 are in mesh with the teeth of racks 38, and as soon as such release takes place, plates 125 and 122 are drawn upward under the influence of spring 124. The length of upward movement of the parts 122 and 125 corresponds to one tooth of the pinions, and when said pinions have swung backward to normal position, they reengage with the teeth 123 and the parts will now be in position to transfer from the first pinion to the second or third, as the case may be. When the first pinion has made a complete revolution and a transfer is made to the second pinion, a total of 10 is set up in the accumulators, and when the second pinion has been rotated a complete revolution a transfer is made to the third pinion, thereby setting up 100 in the accumulators. The plates 122 and 125 move upward only when rod 132 is elevated, which action is brought about by means of link 133 which is elevated by arm 135 on shaft 59 and owing to the slot 134 in side link, the rod 132 is not raised until after the shaft 59 has been partially rocked and the pin carried by arm 135 reaches the upper end of slot 134. When shaft 59 rocks back to its normal position, link 133 is moved downward thereby moving rod 132 downward and as a result the plates 122 which were elevated, will be moved downward the distance of one tooth, and as a result, the engaged pinions will be rotated a distance of one tooth, and consequently transferring from one pinion to another and accumulating the total in said pinions.

To obtain a total of all transactions, as for instance, at the close of a day's business, the operator depresses the forward end of lever 101 by engaging key 102, and as this movement takes place the detent 105 passes from shoulder 103 to shoulder 104, thereby locking said lever in its depressed position. As the rear end of this lever is elevated, the pawl 112 raises the rear end of lever 84 until the pin 92 is engaged by notch 86. The op-

erator now engages handle 51 and pulls the same forwardly and downward, and following the initial forward movement of link 84, the lever 91 will be rocked upon shaft 90, as a result of the engagement of pin 92 by notch 86. As a result, the rear end of lever 91 will be depressed and the forward end will be elevated, and said lever will be locked in this position by the engagement of pin 93 in notch 97. As the rear end of lever 91 is depressed pin 118 will be engaged to move the members 115 forwardly, thereby bringing the pinions 120 into engagement with the teeth of racks 38. As the rear end of lever 101 is elevated link 33 will be likewise elevated, thereby partially rocking shaft 29, and as a result the arms 30 carrying rod 31 will be slightly elevated, thereby elevating the free ends of arms 27 so as to move the shoulders 28 out of the path of travel of the teeth 37 on the segments. The continued movement of the handle 51 actuates the segments in the manner hereinbefore described, and the same are shifted to various positions by reason of their engagement with the pinions 120, and which during this movement, are reversely rotating to their home or zero positions with the pins 121 in position beneath the fingers 126. This movement positions the proper printing members 40 in front of the opening 45^a and as the hammers are actuated in a manner heretofore described, the proper printing members are struck to print the total of all the transactions upon the paper carried by the platen. The final movement of handle 51 brings the end of arm 107 into engagement with lug 106, thereby moving the detent 105 off the shoulder 104 to release lever 101 and at the same time lug 109 strikes the forward end of member 108 to move the same rearwardly, thereby rocking lever 95 so as to unseat pin 93 from notch 97, thereby permitting spring 99 to restore lever 91 to its normal position. Thus the pinions 120 are disengaged from racks 38 and reengaged with the teeth on the plates 122. During the taking of totals and immediately after the initial movement of link 84 to engage pin 92 to rock lever 91, the forward movement of lever 84 will bring the notch 113 opposite the upper end of detent 112, and thus the rear end of link 84 will drop a short distance, thereby unseating pin 92 from notch 86, and as the movement of handle 51 is continued pin 92 will travel through slot 85 and pass into the extension or notch 87 without further affecting lever 91. On the reverse movement of link 84, the upper edge of slot 85 bears on pin 92 so that the rear end of said lever is restored to its normal position upon pawl 112.

A computing and listing machine of my improved construction is comparatively simple, is particularly adapted for use in

connection with computing scales, can be easily operated and very rapidly performs the necessary operations for adding various amounts, accumulating the total thereof, and printing the individual amounts and likewise the total thereof.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved computing and listing machine may be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. In a machine of the class described, a series of segments each comprising a curved member provided with a series of teeth, adjustable stops adapted to be engaged by the teeth of the segments to limit the movements thereof, a curved rack forming a part of each segment, the teeth of which curved rack are adapted to engage the teeth of an adding pinion, a curved arm forming a part of each segment, and a series of printing members carried by each curved arm, there being the same number of printing members as there are teeth on the segment and on the curved rack.

2. In a machine of the class described, a shaft, a series of segments loosely mounted thereupon, each of which segments comprises a body portion, a curved arm integral with one end of said body portion, there being a series of teeth formed in the outer edge of one end of said curved arm, an adjustable stop adapted to be engaged by said teeth, the series of gear teeth formed in the outer end of the opposite end of said curved arm, which last mentioned teeth are adapted to engage the teeth of an adding pinion, a curved arm integral with the opposite end of the body of the segment, and a series of printing members loosely mounted in the last mentioned curved arm.

3. In a machine of the class described, a shaft, a series of segments loosely mounted thereupon, each of which segments comprises a body portion, a curved arm integral with one end of said body portion, there being a series of teeth formed in the outer edge of one end of said curved arm, an adjustable stop adapted to be engaged by said teeth, a series of gear teeth formed in the outer end of the opposite end of said curved arm, which last mentioned teeth are adapted to engage the teeth of an adding pinion, a curved arm integral with the opposite end of the body of the segment, a series of printing members loosely mounted in the last mentioned curved arm, a platen adapted to receive paper, and a hammer adapted to engage the printing members and force the same against the paper on the platen.

4. In a machine of the class described, a

shaft, a series of segments loosely mounted thereupon, each of which segments comprises a body portion, a curved arm integral with one end of said body portion, there
5 being a series of teeth formed in the outer edge of one end of said curved arm, an adjustable stop adapted to be engaged by said teeth, a series of gear teeth formed in the outer end of the opposite end of said
10 curved arm, which last mentioned teeth are adapted to engage the teeth of an adding pinion, a curved arm integral with the opposite end of the body of the segments, a series of printing members loosely mounted

in the last mentioned curved arm, a platen 15 adapted to receive paper, a hammer adapted to engage the printing members and force the same against the paper on the platen, and means for shifting the position of the segment and imparting movement to the 20 hammer.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this 30th day of January, 1914.

FRANCIS M. GREENUP.

Witnesses:

M. P. SMITH,
M. A. HANDEL.