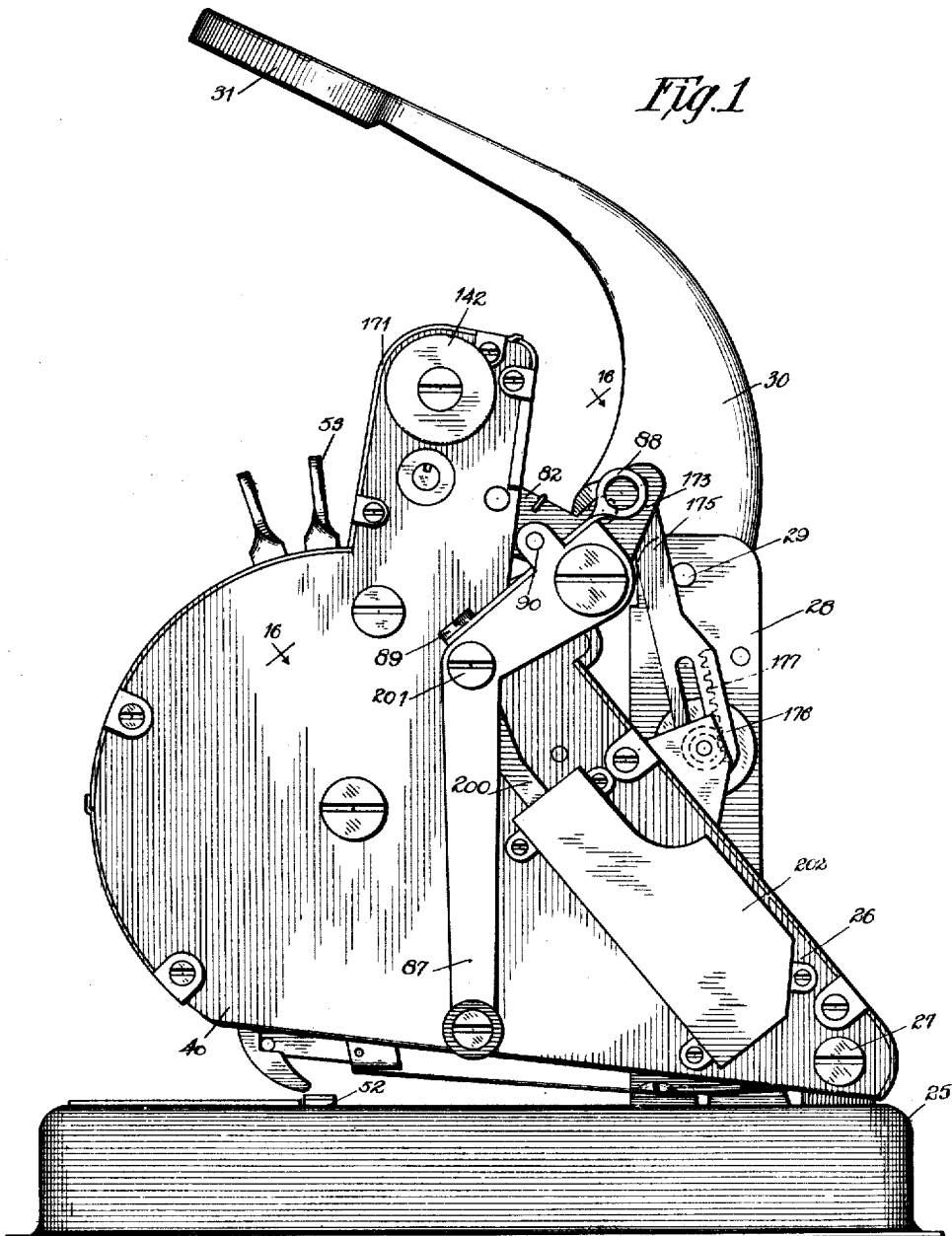


I. ENGSTROM.
 COMBINED ADDING MACHINE AND CHECK PROTECTOR.
 APPLICATION FILED JAN. 13, 1916.

1,334,743.

Patented Mar. 23, 1920.
 7 SHEETS—SHEET 1.



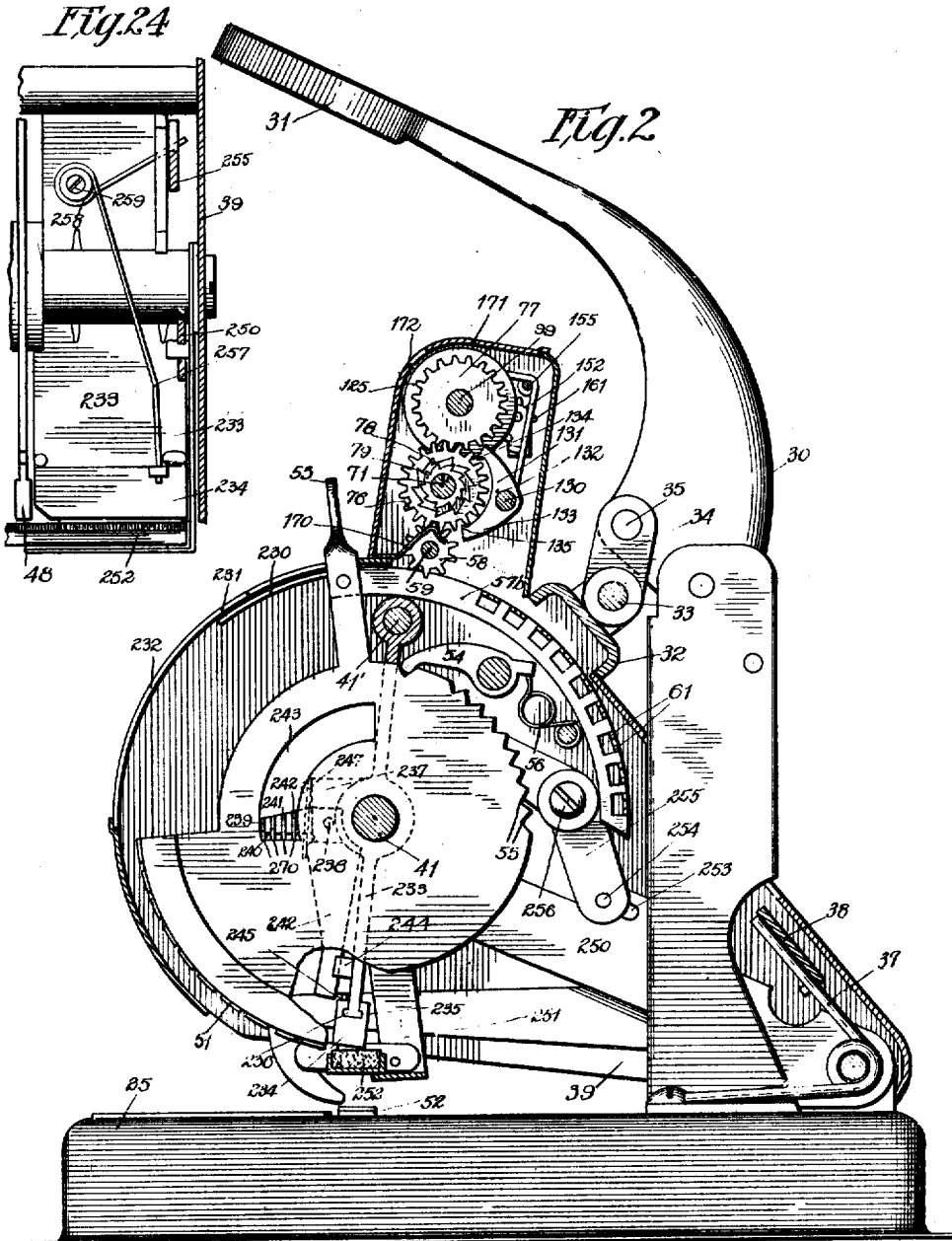
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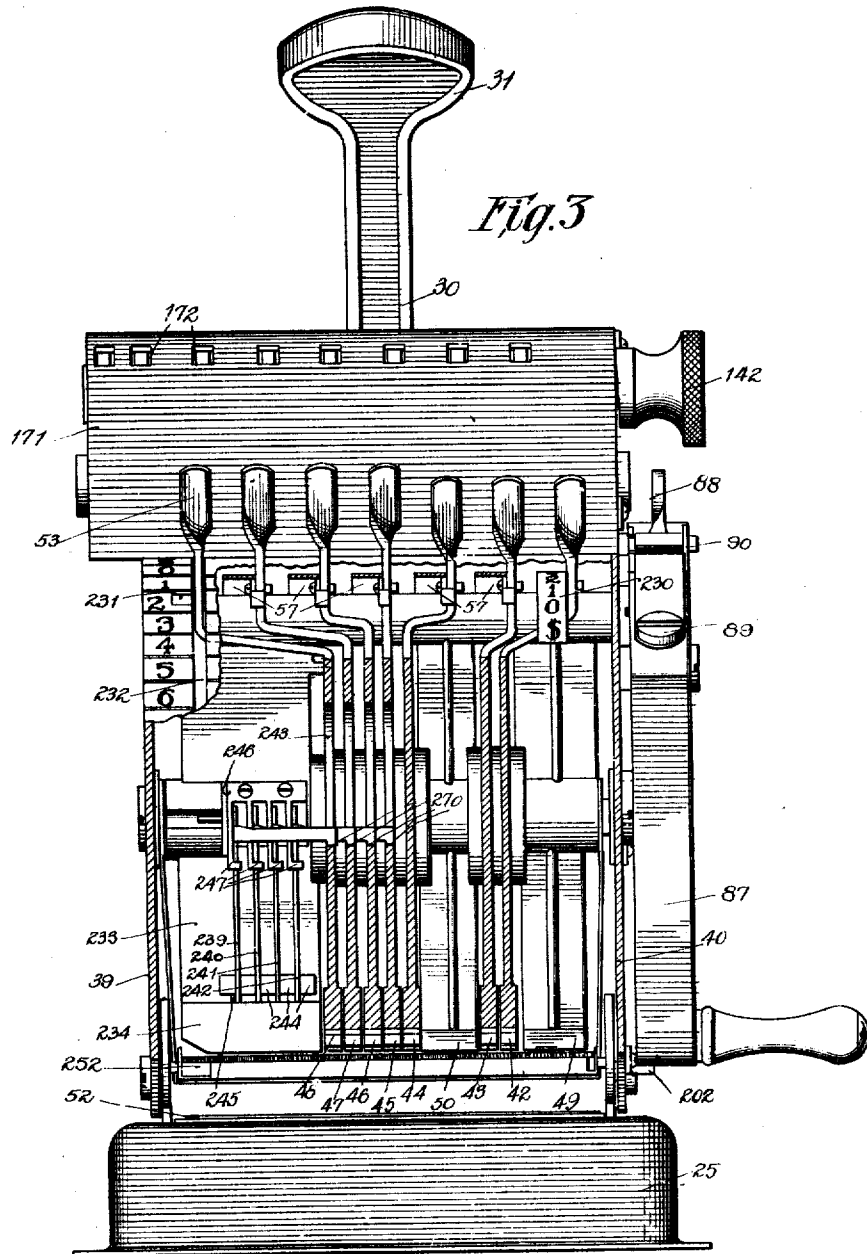
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Fig. 4

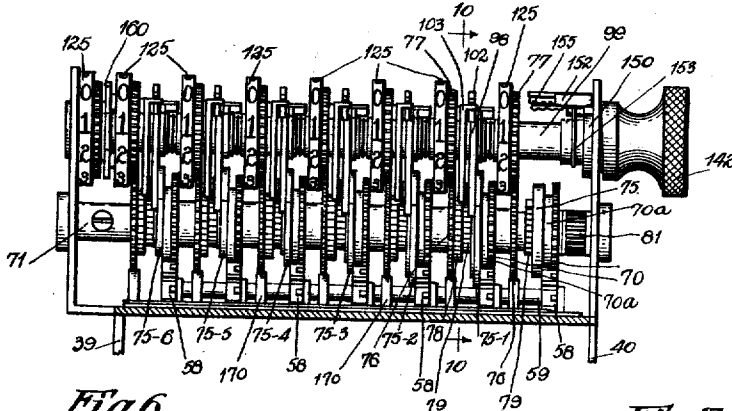


Fig. 6

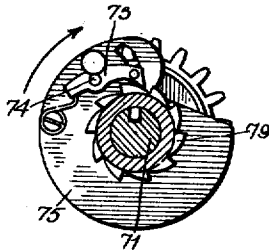


Fig. 7

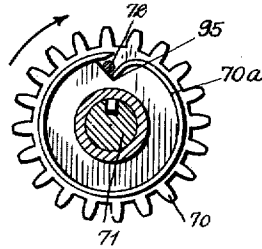


Fig. 5

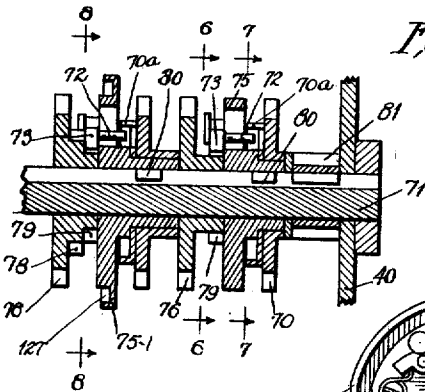


Fig. 8

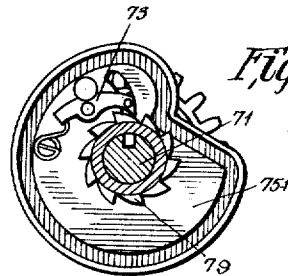
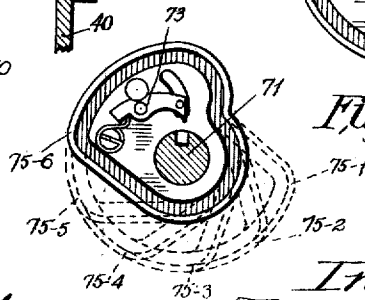


Fig. 9



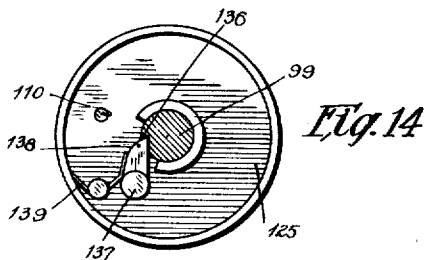
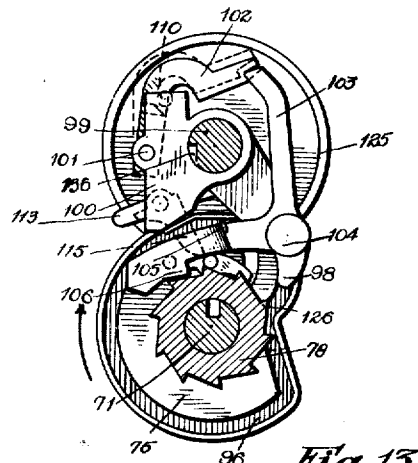
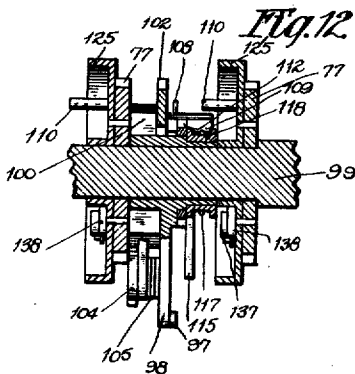
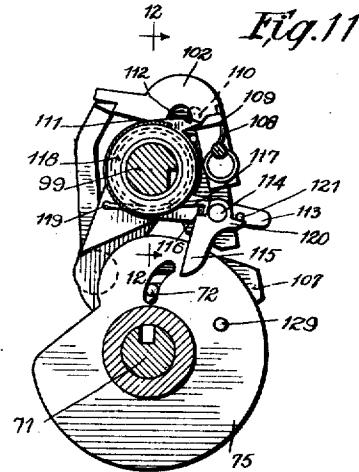
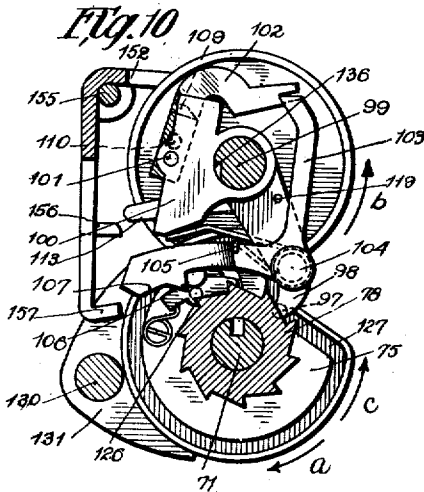
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 7 SHEETS—SHEET 5.



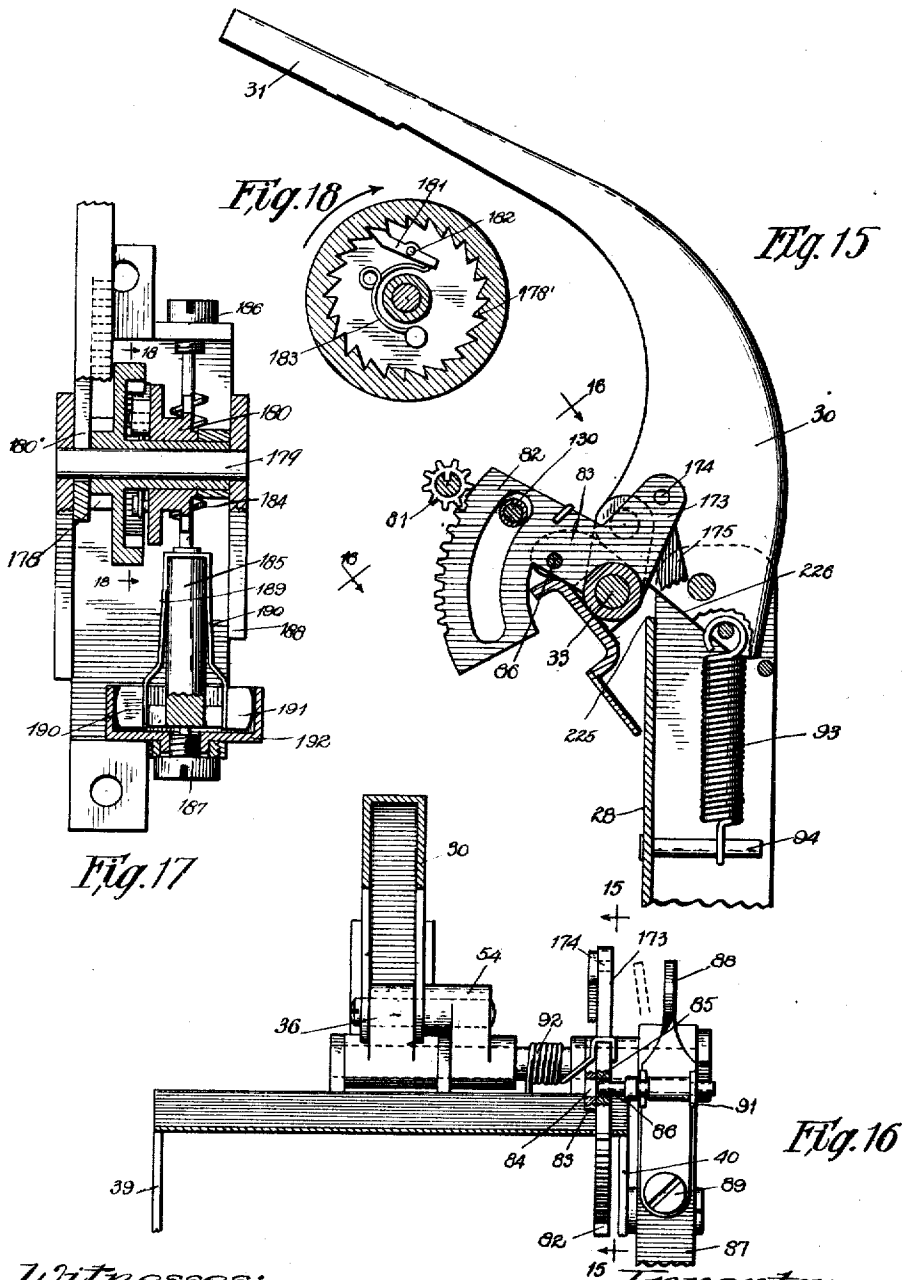
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1,334,743.

Patented Mar. 23, 1920.
 7 SHEETS—SHEET 7.

Fig. 19

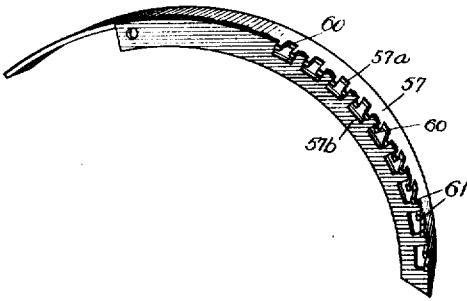


Fig. 20

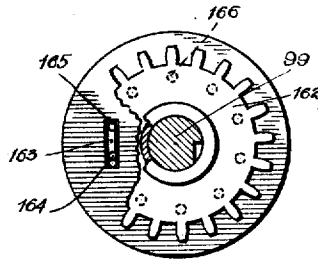


Fig. 21

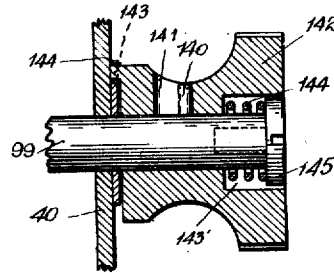
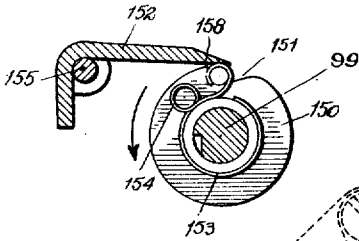
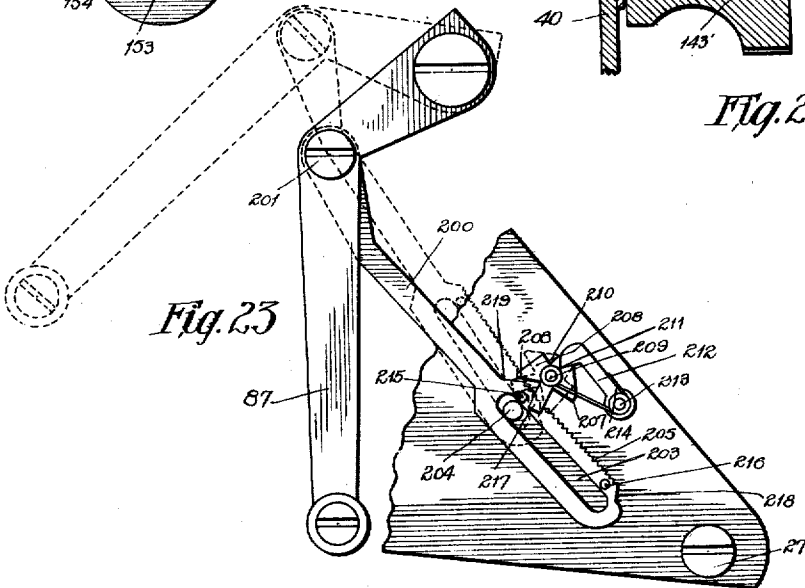


Fig. 22

Fig. 23



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UNITED STATES PATENT OFFICE.

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COMBINED ADDING-MACHINE AND CHECK-PROTECTOR.

1,334,743.

Specification of Letters Patent.

Patented Mar. 23, 1920.

Application filed January 13, 1916. Serial No. 71,831.

To all whom it may concern:

Be it known that I, IVAN ENGSTROM, a citizen of the United States; residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Combined Adding-Machines and Check-Protectors, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a combined adding machine and check protector and has for its object certain improved constructions and modes of operation which will be more fully set forth hereinafter.

The device of my invention consists generally of a stationary base member to which is pivoted a housing or casing arranged to contain the several printing segments for printing or cutting upon a check any desired amount. The base member is provided with an upwardly extending pedestal to which is pivoted an operating lever connected by means of a link to the above mentioned casing, and arranged when operated to bring the casing together with the several segments against a platen carried by a stationary base. The housing carries a totalizer, or adding attachment which is operatively connected with the several segments above mentioned, so that any number set up by the segments in order to print a number upon a check may be carried upon operation of the operating lever, into the totalizer.

A novel feature of my invention is the provision of mechanism whereby the totalizer may be used in conjunction with the check protector so that a total is made of the checks protected, or the check protector may be used independently of the totalizer, so that the checks which are stamped are not included in the total or are not added into the numeral wheels; or the device may be used as an adding machine proper, that is, certain numbers may be set up by the setting keys and added into the totalizer without necessitating operation of the check protecting means. I provide simple and quickly operated means for causing connections and disconnections between the various parts to facilitate the converting of the device of my invention into any one of these three machines.

Each of the segments which contains the

printing type, carries a segmental Geneva gear which is stamped of sheet metal and rigidly secured thereto. These segmental Geneva gears cooperate with Geneva pinions which act to transmit motion from the segmental gears to the totalizer. Since these segmental gears are stamped of sheet metal the cost of manufacture is greatly reduced. The Geneva gear segments and pinions cooperating therewith are arranged so that the segmental gears are allowed to have a certain rotative movement, independent of the pinions. The segments, or at least some of them, are provided with indicating numerals running from zero to nine, including a dollar sign, which is normally in register with the sight opening which permits the operator to ascertain the position to which the several segments have been set. In moving the segment from the dollar sign to the zero position, movement of the segment must not be imparted to the cooperating pinions and thus to the totalizer, and I have, therefore, provided a means whereby the segmental gears may have a small angular movement independently of the pinions. There is provided a lost motion connection between the pinions and the Geneva segments, so that the necessity of having a certain ratio between the distance from the teeth of the Geneva segment to their pivot and the distance between the teeth of the cooperating pinions and their pivot, is avoided as will be more fully described hereinafter.

Each of the numeral wheels in the totalizer is provided with an inertia governor which prevents operation of the machine at too high a speed. The inertia governor is in the form of a gear which is rotated when a number is carried into the totalizer. Co-operating with this gear is a pawl, somewhat similar to an escapement used in connection with clocks. This pawl, however, has no time interval involved in its operation. When the above mentioned gear is rotated the pawl is caused to reciprocate into and out of engagement with the several teeth of the gear. When the machine is operated at a low speed this reciprocating pawl operates very slowly, thus requiring very little force to act upon the gear to rotate the same. When, however, the gear is rotated at a higher rate of speed the pawl will be moved into and out of engagement with its teeth at a corresponding rate of

speed. As the pawl is moved into engagement with the gear it attains a certain inertia which must be overcome before the pawl is moved in the opposite direction. 5 The overcoming of this inertia consequently places a load upon its cooperating gear tending to prevent its rotation. As the velocity of the gear is doubled the force required to reciprocate the pawl is increased by the 10 square of the velocity; in other words, four times the force is required to reciprocate the governor pawl when the velocity of its cooperating gear is doubled. It will be seen, therefore, that I provide means for automatically placing upon the operating mechanism a load when the machine is operated 15 above a predetermined speed. When the speed is increased, the load is increased, and when the speed is decreased, the load is decreased, thus preventing the operator from 20 operating the machine too fast and probably breaking or distorting some of its parts. These governors differentiate from a constant friction drag, in that such a drag exerts upon the operating mechanism a load 25 which is the same whether the machine is operated at a high or low rate of speed. These governors are new, so far as I am aware, in connection with all kinds of machinery in which a governor or speed limiting device is to be employed. 30

A further feature of my invention is the mechanism which goes to make up the totalizer, the parts being arranged so that practically all of them can be carried upon two 35 supporting shafts and thus enable the device to be placed in a very small space.

To reset the numeral wheels to zero position, when this is desired I provide novel 40 mechanism whereby this may be done in one operation and by the manipulation of a single member or unit. This device consists of a re-setting knob which has a pin and slot connection with the numeral wheel shaft so 45 that the knob may have a certain longitudinal movement relatively to the shaft, spring means being employed to hold it in a certain side-wise position. This knob is provided with a stop which normally abuts against a 50 stop carried by the casing of the machine, and is normally held in this position. In resetting the numeral wheels, the knob is moved longitudinally of the shaft to disengage the stops and then rotated, in this instance in a clockwise direction to effect 55 resetting of the numeral wheels. After the knob has been given a slight rotation that is enough to prevent the stops from interfering, the knob may be moved back by its 60 spring and the rotation of the knob continued, regardless of the longitudinal position of the knob relatively to the shaft. When the numeral wheels have all been returned to zero the stops again cooperate and 65 retain the knob in locked position.

When the numeral wheels are rotated to their zero position they pass through a certain portion of the cycle where the carry-over between the numeral wheels is effected. 70 In order to prevent the carry-over mechanism from being placed in a position to operate upon the next succeeding stroke of the adding machine actuating lever, I provide means operated by the resetting button for causing all of the carry-over mechanism to 75 be rendered inert temporarily, that is, until the numeral wheels have been reset. After the wheels have been reset the carry-over mechanism is again placed in a condition to carry out its function. 80

To necessitate a complete operation of the mechanism for adding, or for stamping a check, or for doing both, I provide a rack adapted to cooperate with a flip-over pawl 85 which pawl permits movement of the rack in but one direction, until the rack has reached a certain predetermined position, whereafter the rack may be moved in an opposite direction and in this direction only, until it reaches a second predetermined position 90 where the flip over pawl permits the rack to again return. This pawl is in the form of two tooth arms, one of the arms cooperating with the teeth of the rack at a time. The rack is permitted to move a short distance beyond the point where the flip-over 95 pawl causes one tooth to disengage the rack and the other tooth to engage, so that this additional movement provided for the actuating lever takes care of errors or inaccuracies in manufacture. 100

As herein before referred to the housing or casing is pivoted to the base and is arranged by means of an actuating lever to be moved downwardly against the base. In 105 order to prevent any distortion of the mechanism due to the housing bearing upon the base with too great a force, I have provided a positive stop for the actuating lever which stop permits the housing or printing 110 segments contained therein to have the necessary engagement with the base member, but prevents the segments from being forced downwardly beyond a certain point.

In conjunction with the speed governors 115 which act directly upon the totalizer I provide a centrifugal friction governor, which is operated directly by the actuating levers of the machine to serve also as a check for preventing too rapid operation of the 120 machine. The centrifugal members are adapted to frictionally engage a hollow cylindrical member, the greater the speed of operation of the machine, the greater will be the friction between the centrifugal 125 members and the cylindrical member, referred to.

These and other features of my invention will be more clearly referred to in the accompanying specification in which refer- 130

ence is made to the accompanying drawings wherein,

Figure 1 is a side elevational view of the device of my invention;

Fig. 2 is a vertical sectional view of Fig. 1, some of the parts being broken away to more clearly reveal the construction;

Fig. 3 is a front elevational view of the machine, some of the parts being broken away and illustrated in section to more clearly reveal the construction;

Fig. 4 is a front elevational view of the totalizer mechanism which is mounted at the top of the machine and which coöperates with the printing segments;

Fig. 5 is a detailed cross sectional view of the lower shaft of the totalizer mechanism, illustrated in Fig. 4;

Fig. 6 is a vertical cross sectional view taken along the lines 6—6 of Fig. 5 looking in the direction indicated by the arrows;

Fig. 7 is a cross sectional view taken along the line 7—7 of Fig. 5 and looking in the direction indicated by the arrows;

Fig. 8 is a cross-sectional view taken along the line 8—8 of Fig. 5 and looking in the direction indicated by the arrows;

Fig. 9 is a view similar to Fig. 8 showing the cam which is employed in connection with the highest numeral wheel, this figure also illustrating in dotted lines the shapes of the cams associated with the numeral wheels disposed between the highest and lowest order numeral wheels;

Fig. 10 is a cross-sectional view of the totalizer mechanism. This view being taken along the line 10—10 of Fig. 4 and looking in the direction indicated by the arrows;

Fig. 11 is a rear view of the mechanism illustrated in Fig. 10;

Fig. 12 is a vertical sectional view of a portion of the upper shaft of the totalizer mechanism, this view being taken along the line 12—12 of Fig. 11 and looking in the direction indicated by the arrows;

Fig. 13 is another view of the mechanism illustrated in Fig. 10, the operating parts being here shown, in positions different from those illustrated in Fig. 10;

Fig. 14 is a vertical cross sectional view of the upper shaft of the totalizer mechanism, illustrating a numeral wheel and devices whereby the numeral wheel may be reset;

Fig. 15 is a fragmentary detail view of the actuating lever for causing the housing to move toward the stationary base, and devices connected with the lever for operating the totalizer when this is desired. This view is taken along the line 15—15 of Fig. 16;

Fig. 16 is a fragmentary cross-sectional view of the mechanism illustrated in Fig. 15, this view being taken along the line 16—16 of Fig. 15 and along the line 16—16 of Fig. 1;

Fig. 17 is a cross-sectional view of the

centrifugal speed governor coöperating with the actuating levers;

Fig. 18 is a vertical cross-sectional view of the ratchet mechanism for causing the centrifugal means to operate only in one direction;

Fig. 19 is a perspective view of the sheet metal Geneva gear segment employed in connection with each of the printing segments;

Fig. 20 is a detail view of the numeral wheel of highest order;

Fig. 21 is a detail cross-sectional view of a portion of the mechanism for rendering the carry-over devices of the totalizer temporarily inoperative;

Fig. 22 is a vertical cross-sectional view of the re-setting knob;

Fig. 23 is a fragmentary detail view of the rack and flip-over pawl for necessitating a complete operation of the machine; and

Fig. 24 is a detail view of the mechanism employed for causing a character to be printed immediately adjacent to the left-hand end of a numeral or character which is printed upon the check.

Similar characters of reference refer to similar parts throughout the several views.

Referring first to Fig. 1, 25 illustrates the stationary base and 26 the movable housing or casing which is pivoted at 27 to lugs extending upwardly from the base. The base 25 has an upwardly extending pedestal 28 to which is pivoted at 29 an actuating lever 30 provided with a handle portion 31. As illustrated in Fig. 2 the housing 26 carries a channel 32 which supports a shaft 33, to which is secured one end of the link 34, the upper end of the link is pivotally connected at 35 to a forwardly extending portion of an actuating lever 30. A second link 36 is provided, which is somewhat similar to the link 34, as illustrated in Fig. 16. From the construction thus far described it will be seen that upon downward movement of the lever 30 the housing 26 will be caused to rotate upon its pivot 27 toward the base 25. The pedestal 28 extends upwardly through an aperture in the housing as illustrated in Fig. 2. To return the housing to its normal position after it has been moved downwardly, I provide a pair of springs, one being illustrated in Fig. 2 at 37, which has its central portion extending around the pivot shaft 27, its lower end abutting against the base member and its upper end against a bar 38 connecting the side walls 39 and 40 of the casing.

Secured in the side walls 39 and 40 is a shaft 41 upon which is rotatably mounted a plurality of printing segments illustrated at 42, 43, 44, 45, 46, 47 and 48 (Fig. 3), also carried by this shaft 41 are two stationary printing members 49 and 50. The movable printing segments 42 to 48 inclusive are

provided with serrated type 51, which when moved to operative position engage a stationary platen, or plate, 52 carried by the base. Each of the printing segments is provided with an upwardly extending handle or finger piece 53, so as to permit any one of the segments to be set. Detent mechanism 54 adapted to engage with the notches 55 is provided for each of the segments, spring 56 serving to hold the detent in engagement with the printing segment. Each one of the finger pieces 53 carries a Geneva gear segment 57, this segment being illustrated in perspective in Fig. 19. Each one of these segments coöperates with a Geneva pinion 58 rotatably mounted upon a shaft 59 carried by suitable supports extending from the walls of the casing.

Each one of the Geneva gear segments 57 is formed of sheet metal and bent at an angle to form two walls 57^a and 57^b disposed at right angles to each other. The wall 57^a is cut away at portions illustrated at 60—60 to provide spaces for the wide teeth of the Geneva pinion 58. The wall 57^b has stamped therefrom a plurality of fingers 61 which extend outwardly parallel to the wall 57^a to engage the narrow teeth of the Geneva pinion 58. When the Geneva segment is in its normal position, that is, the position illustrated in Fig. 2, one of the teeth of the pinion will extend downwardly parallel along the side of the wall 57^b, the two adjacent wide teeth riding upon the periphery of the segment. It will be seen by referring to this figure that the Geneva segment is permitted to have a certain rotative movement independent of the Geneva pinion. The fingers 61 and apertures 60 provided in the Geneva segments are spaced according to the positions of the type 51, so that each time one type is advanced two of the fingers 61 will be advanced one step to impart to the pinion 58 one-fifth of a revolution. In order to obtain this result I provide a lost motion connection between the short teeth of the pinion 58 and the finger 61. It will be seen, therefore, that by setting a printing segment from its zero position to its one position the pinion 58 will be given a two-tenths revolution, by moving the segment two points the pinion will receive a four-tenths revolution, etc.

Each one of the Geneva pinions 58 meshes with a cam gear 70 which is rotatably mounted upon the shaft 71, supported in the end walls 39 and 40. These cam gears consist in a gear provided with twenty teeth, as illustrated in Fig. 7, and with a cam surface 70^a which is arranged to be engaged by a pin 72 carried by a pawl 73 pivotally mounted at 74 on a disk 75. These disks 75 are of different shapes, as will be presently pointed out, but the cam gears 70 are simi-

lar throughout the totalizer. Disposed adjacent to each of the disks 75 is an intermediate gear 76 which meshes with a gear 77 rigidly secured to a numeral wheel. The intermediate gears 76 are all provided with two ratchet wheels 78 and 79, except the intermediate gear 76, which is associated with the numeral wheel of lowest order. This gear is provided only with ratchet wheel 79. Each of the disks 75 is keyed at 80 to the shaft 71, so as to rotate therewith. Mounted upon the extreme right hand end of the shaft 71 and keyed thereto is a pinion 81 meshing with a gear segment 82 pivotally, but loosely mounted upon the shaft 33. The pinion 81 contains nine teeth and a blank so that the segment may have movement relative to it when in either extreme position. The shaft 33 has an arm 83, illustrated in dotted lines in Fig. 15, which extends forwardly along the side of the gear segment 82, the arm 83 is provided with an aperture 84 which is arranged to register with an aperture 85, provided in the gear segment. A connecting pin 86 is employed to extend through both of these apertures to connect the arm 83 and segment 82 when this is desired. The shaft 33 extends outwardly and has loosely mounted thereon a handle 87 which carries a connector 88 pivoted at 89. This connector 88 has a bifurcated extension 90 which extends between enlarged portions of the pin 86, so that movement of the connector 88 in a counter clockwise direction (Fig. 16) causes the connecting pin 86 to move to the left to connect the gear segment 82 and the arm 83. The right hand end of the pin in this figure is supported by an ear 91 which extends upwardly from the crank 87. A spring 92 is coiled around the shaft 33 and has one end attached to the gear segment 82, so that it normally is held in the position illustrated. If the connecting pin 86 is in the position illustrated in Fig. 16 and the crank 87 is pulled upwardly the gear segment 82 will be moved in a clockwise direction (Fig. 15). When the connecting pin is in this position the lever 30 may be operated without in any way causing movement of the gear segment 82. If, however, the connector 88 is moved to the position illustrated in dotted lines the pin 86 will serve to connect the gear segment 82 and the arm 83, so that upon downward movement of the lever 30 the shaft 33 will be given a part rotation in a counter-clockwise direction, (Fig. 15) thus imparting to the gear segment 82 a similar movement. Since the gear segment 82 is adapted to mesh with the pinion 81, this pinion will be rotated in a counter clockwise direction on the upward movement of the segment 82 and a clockwise direction upon the downward movement thereof. The actuating

lever 30 has its lower end connected by means of a spring 93 to a post 94 carried by the pedestal 28.

Pins 72 which are carried by the pawl 73 are normally in the position illustrated in Fig. 7, extending between the ends of the cam 70^a. The pawl 73 is normally in the position illustrated in Fig. 6 ready to engage the ratchet wheel 79. If the cam gear 70 is rotated by means of its associated type segment the cam surface 70^a will be advanced ahead of the pin 72 and held there until the type segment is again moved to zero position. If we assume that a gear 70 is advanced so that it is desired to add four into the totalizer the end 95 of the cam surface will be moved four steps ahead of the pin 72 when, therefore, the shaft 71 is rotated in the direction indicated by the arrow 20 the pawl 73 will engage the ratchet 79 and cause rotation of its associated intermediate gear 76. As soon as the pin 72 reaches the incline 95 of the cam 70^a the engaging end of the pawl 73 will be drawn upwardly so as 25 to disengage the pawl from the ratchet wheel. The pin 72 will then ride upon the outer periphery of the cam 78 until the shaft 74 has been given a complete rotation, whereupon it will be returned through the same path. As has been pointed out the intermediate gears 76 are directly connected with the numeral wheels so that upon rotation of these intermediate gears the numeral wheels are rotated and thus the numbers set 30 up by the finger pieces 53 are recorded.

The carry-over mechanism employed for causing a numeral wheel of higher order to be advanced one step when the numeral wheel of the next lower order passes through 40 the zero point consists in the mechanism illustrated in Figs. 10 to 13 inclusive. Each of the disks 75, except the one connected with the numeral wheel of lowest order is provided with a cam groove 96 in which 45 rides a pin 97 connected to the lower end of an arm 98 mounted upon the upper shaft 99. Each one of the arms 98 carries an enlarged portion 100 to which is pivoted at 101 a latch 102 which normally locks a 50 pawl 103 in the position illustrated in Fig. 10. The pawl 103 is pivoted at 104 to the arm 98 and is provided with a spring 105 acting between the pawl and the member 109 to tend to rotate the pawl 103 in a 55 counter clockwise direction (Fig. 10). The pawl 103 carries a tooth 106 adapted when moved downwardly to engage the teeth of the ratchet 78 carried by the intermediate gear 76. The outer end of the pawl 103 has 60 a disengaging face 107 which assists in disengaging the tooth 106 from the teeth of the ratchet 78 when the ratchet has been advanced the required amount. The latch 102 has acting upon it a spring 108 which tends 65 to rotate the latch in a counter clockwise di-

rection (Fig. 11). The latch 102 has a cam 109 extending toward its associated numeral wheel and is arranged to be operated upon by a pin 110 carried by the numeral wheel.

Rotatably mounted on the member 100 is 70 a lock 111 which has an extension 112 resting against the cam 109. This lock also carries an arm 113 to which is pivoted at 114^a trip finger 115. This finger 115 has a lug 75 116 to which is secured a spring 117. The spring 117 coils around a grooved member 118 and is attached at 119 to the arm 98. The trip finger 115 carries a stop 120 abutting against a pin 121 carried in the arm 80 113. The spring 117 serves two purposes, one to tend to rotate the lock 111 in a clockwise direction (Fig. 11), and the other to tend to rotate the trip finger 115 in a counter clockwise direction against the pin 121. 85

The operation of the carry-over mechanism is as follows:

When one of the numeral wheels passes the zero point and the shaft 71 is rotated by means of the gear segment 82 in a direction indicated by the arrow "a", the 90 carry-over mechanism will be moved to the position illustrated in Fig. 13. The pawl 103 will be moved toward the ratchet 78, when the pin 97 carried by the arm 98 rides 95 outwardly in the groove 96, but the tooth 106 is not moved down far enough to cause it to engage one of the teeth of the ratchet gear. When, however, the numeral wheel 125 passes the zero point the pin 110 is 100 moved in the direction indicated by the arrow "b" in Fig. 10 and engages the cam 109 to move the latch 102 to the position illustrated in dotted lines in Fig. 13. When the latch is thus moved the pawl 103 permits the 105 spring 105 to move it downwardly into engagement with the ratchet 78. The ratchet 78 with which it is arranged to be connected is associated with, or is a part of the intermediate gear which operates the numeral 110 wheel of next higher order. When the pawl 103 is thus released it assumes the position illustrated in Fig. 13. As the disk 75 is rotated in the direction indicated by the arrow "a", (Fig. 10) the tooth 106 of the 115 pawl is moved first to the right and then when the pin 97 again reaches the position illustrated in Fig. 10, which occurs when the shaft 71 has made one complete revolution, the tooth 106 of the pawl is moved to 120 the left until it clears the upper face of the tooth 126, whereupon, the spring 105 causes the tooth 106 to again drop and engage this tooth 126. Upon the return movement of the disk 75 (that is in the direction indicated by the arrow "c" in Fig. 10) 125 the pin 97 is moved along the portion 127 of the groove 96, whereupon the tooth 106 is moved to the right in Fig. 10. This movement of the tooth 106 imparts to the ratchet 130

78 a movement which is one-tenth of a revolution. When the ratchet has made this step the face 107 of the pawl engages the upper face of the next succeeding tooth of the ratchet so that the tooth 106 is positively moved out of the path of the ratchet. When the latch 102 was moved to the position illustrated in dotted outline, the extension 112 of the lock 111 was permitted to drop, due to the spring 117 acting upon it. This drops to a position where the extension 112 hits the stop pin 128 where it will be held. When the extension 112 is moved against this stop pin the beveled portion carried thereby will extend under and engage the cam 109 of the latch 102 and thus securely lock the same in its upper position away from the pawl 103. The dropping of the arm 113 necessarily causes the trip finger 115 to drop also into the path of a pin 129 carried by the disk 75. If when the disk 75 is moved first in the direction indicated by the arrow "a", pin 129 engages the trip finger 115, the trip finger will merely oscillate upon its pivot 114, but cause no movement of the lock 111. When, however, the disk 75 is moved back again, that is, in the direction indicated by arrow "c" the pin 129 will engage the straight side of the finger 115 and thus lift the member 111, due to the pin and stop connection 120 and 121. When the lock 111 is thus returned to its original position the latch 102, is, by means of the extension 112 of the lock and the cam 109 of the latch, lifted so that when the extension 112 clears the cam 109 and assumes the position illustrated in Fig. 11, the latch 102 drops downwardly to again hold the upper end of the pawl 103.

The several disks 75 are shaped as illustrated in Fig. 9. The disk associated with the first numeral wheel is illustrated at 75-1, the one cooperating with the second at 75-2, with the third at 75-3, fourth 75-4, fifth 75-5, and the sixth at 75-6. The disk 75-2 is one-tenth of the circumference smaller than the disk 75-1, the disk 75-3 one-tenth smaller than the circumference of the disk 75-2, and so on. The reason for this construction is that the carry-over devices are caused to operate one after the other instead of all simultaneously if each numeral wheel is in a carry-over condition.

Extending parallel to the shaft 71 and immediately behind the same in a shaft 130 upon which are mounted a number of reciprocating speed governor pawls 131 each arranged to have angular movement relative to the shaft 130. Each of the pawls 131 comprises an upward arm 132 and a lower arm 133. The upper arm being provided with a tooth 134 and the lower arm with a tooth 135. Each one of the pawls 131 is disposed directly behind one of the interme-

mediate gears 76 and having its teeth 134 and 135 extending into and cooperating with the teeth of the gear. As one of the gears 76 is rotated the arms of the governor pawl will be moved inwardly and outwardly, due to the teeth 134 and 135 engaging the teeth of the gear. When the gear 76 is rotated slowly the pawl 131 is reciprocated slowly and thus produces a very small load on the gear. When, however, the speed of the gear is increased the governor pawl is reciprocated in a correspondingly faster rate of speed and this produces a greater load tending to prevent rotation of the gear. The teeth of the pawl 132 are beveled, as indicated, so that engagement of the gear teeth with the same will cause alternate inward and outward movement of the pawl arms. By means of this construction I obtain simple means for automatically placing upon the machine a load when the operator attempts to operate the machine above a predetermined speed.

I will now describe the mechanism I employ for resetting the numeral wheels to their zero position. Shaft 99 has a slot 136 running the entire length of the shaft. Each of the numeral wheels 125 has pivoted thereto at 137 a pawl 138 which is held in the position illustrated in Fig. 14, by means of the spring 139. When the numeral wheel is rotated by means of the totalizer mechanism the pawl 138 is moved away from the groove 136 in a counterclockwise direction (Fig. 14), so that the groove does not in any way interfere with this operation. The shaft 99 is normally stationary and is supported by the end plates 39 and 40. The right hand end of the shaft 99 extends through the plate 40 and carries a pin 140 which extends out into a slot 141 provided in a re-set knob 142 which is mounted on the end of the shaft. The knob 142 is provided with a chamber 143 into which extends a compression spring 144 acting between the knob and a screw 145 carried by the shaft. The knob 142 is permitted to have longitudinal movement relative to the shaft but not angular movement because of the pin and slot connection 140 and 141. The spring 144 normally holds the knob 142 in the position illustrated in the drawings. The knob 142 has a stop 143 which engages a stop 144 carried by the side wall 140. In resetting the numeral wheels the knob 142 is pulled outwardly to disengage the stops 143 and 144 and then rotated in a clockwise direction. After the stop 143 has passed the stop 144 it is no longer necessary for the operator to hold the knob 142 against the tension of the spring 144, but may permit the spring to act to hold the knob against the side wall 40. As the knob 142 is rotated the shaft is rotated in a counter

clockwise direction, as indicated in Fig. 14. As this shaft is rotated the pawls 138 will fall into the groove 136 when the groove reaches the pawl and thus return the numeral wheels to their zero positions.

To temporarily place the carry-over mechanism in an inoperative position while the numeral wheels are being re-set I provide a disk 150 rigidly secured to the shaft 99 and which is cut away at 151 into which cut away portion extends the upper end of a bell crank lever 152. This lever is held in the position illustrated in Fig. 21 by means of a spring 153 which encircles the shaft 99 and which includes a spring convolution 154. The lever 152 is pivoted to a rod 155. The lower end of the bell crank lever 152 is provided with a number of arms 156 and 157, one arm 156 for each of the lifter arms 113 and one arm 157 for each of the pawls 103. When the disk 150 is in the position illustrated in Fig. 21 the arms 156 and 157 are in the position illustrated in Fig. 10. When, however, the shaft 99 is rotated by means of the re-setting knob 142 the disk 150 causes the bell crank lever 152 to swing in a counter-clockwise direction (Figs. 10 and 21). This swinging will cause the arm 156 to slide in under the arm 113, and the arm 157 to slide in under the face 107 of the pawl 103. When the bell crank lever is moved to this position there is no possibility of the carry-over mechanism to be set because the arms 156 and 157 securely hold the pawl and lifter against downward movement. After the disk 150 has been given a complete rotation the notch 151 will again accommodate the outer end of the upper lever arm and permit the arms 156 and 157 to move away from the carry-over mechanism. The stop 143 will prevent rotation of the shaft 99 in one direction, and the side 158 of the notch 151 will prevent rotation of the shaft in the opposite direction. The notch 151 is beveled so that the disk can be rotated in but one direction.

The numeral wheel of the highest order is operated through the numeral wheel of next lower order, by means of a disk 160 which is attached to the numeral wheel of lower order. This disk carries one tooth which when its numeral wheel passes the zero point meshes with a Geneva gear 161. This Geneva gear meshes in turn with the gear 162 (Fig. 20) of the numeral wheel of highest order. The gear 162 is frictionally connected with its numeral wheel by means of a flat spring 163 which is riveted at 164 to the numeral wheel. This spring lies in a recess, as illustrated. The free end of the spring 163 contains a head 165 which is arranged to extend into any one of ten apertures 166, evenly spaced around the gear 162. This frictional connection between the numeral wheel and the gear causes

the numeral wheel to advance one step whenever the gear is advanced. In re-setting, the re-set pawl contained by this numeral wheel, which pawl is similar in all respects to the pawl illustrated in Fig. 14, the numeral wheel is rotated in unison with the re-set knob. Since the gear 162 is, however, tightly held by means of the Geneva gear 161 and the one tooth disk 160, the spring 163 will be moved into its recess to disengage its head 165 from the apertures 166 so that the numeral wheel can be re-set.

Each one of the intermediate gears 76 is provided with a spring 170 having its lower end secured to the casing and its upper end looped so as to extend between two of its teeth. The purpose of these springs are to frictionally hold the intermediate gears and thus the numeral wheels in any position to which they may be moved. The cover 171 is provided with sight openings 172 through which the numbers of the numeral wheels are visible.

The gear segment 82 has an upwardly extending arm 173, to which is pivoted at a gear rack 175. This rack extends downwardly from the arm 173 and has a strip 176 disposed at right angles to the plane of the arm 173, which carries a plurality of gear teeth 177. These gear teeth, as illustrated in Fig. 17, mesh with a pinion 178 rotatably mounted upon a shaft 179, which shaft extends through a slot 180' provided in the rack 175, thus holding the teeth 177 carried by the rack into engagement with the pinion 178. The pinion 178 is secured to, or forms part of, an internal ratchet 178' between which, and a worm wheel 180, a dog 181 acts. This dog is pivoted at 182 to the worm wheel 180 and is by means of a spring 183 normally held into engagement with the teeth of the internal ratchet 178'. The worm gear 180 meshes with a worm 184 carried by shaft 185 bearing at 186 and 187 in the casing or support 188. This entire governor mechanism is preferably made as a unit, as illustrated, so that it can be secured to the housing 26. The lower end of the shaft 185 carries two spring arms 189 and 190, the lower end of each spring arm carrying a weight 191. These weights 191 are disposed within a cylinder 192 carried by the support 188, and are rounded on their outer surfaces as illustrated.

When the segment 82 is moved upwardly the rack 175 is moved downwardly and the pinion 178 moved in a direction indicated by the arrow. Due to the dog 181 rotation will be imparted to the worm wheel 180 which upon rotation rotates the shaft 185. The rotation of the shaft 185 will, due to centrifugal force, force the weights 191 outwardly against the inner face of the cylinder 192. The friction between the member 191 and the cylinder 192 will depend upon the rate of

speed at which the shaft 185 is driven, that is, for low speeds there will be very little friction and for high speeds a considerable amount. Upon the return stroke of the rack 175 the pinion 178 will be rotated in a direction reverse to that shown by the arrow, whereupon the internal ratchet will merely ratchet past the dog and have no effect on the worm wheel.

To necessitate a complete operation of the actuating levers in both directions, that is, forward and backward, I provide a rack 200 pivoted at 201 to the crank 87. This rack 200 extends into a housing 202 secured to the side wall 40 of the housing 26. This rack is slotted at 203 so as to receive a pin 204 carried by the wall 40. The upper face of the rack is provided with teeth or serrations 205 which coöperate with tooth arms 206 and 207 of a flip-over pawl 208. This pawl is pivoted at 209 to the wall 40 and is notched at 210 and 211, into one of which is arranged to extend a detent arm 212 pivoted to the casing at 213. The spring 214 serves to hold the detent in the position illustrated in the drawings, that is toward the flip-over pawl. The rack 200 carries two pins 215 and 216, one disposed at each end of the series of teeth 205. Extending between the pins 215 and 216 and adapted to be operated thereby is an arm 217 extending from the flip-over pawl 208. The rack is cut away or beveled at 218 immediately adjacent to the pin 216 and at 219 immediately adjacent to the pin 215, the function of which will be presently explained. When the crank 87 is moved upwardly, or to the position illustrated in dotted lines in Fig. 23, the rack 200 is moved to the position illustrated in dotted lines in this figure. As the teeth 205 move upwardly past the flip-over pawl the tooth arm 206 will ratchet into and out of engagement with the teeth. Any tendency to move the rack 202 downwardly while the arm 206 is in engagement with the teeth 205 will tend to rotate the flip-over pawl in a counter-clockwise direction (Fig. 23) and thus securely lock the rack against this downward movement. When the crank 87 reaches the position illustrated in dotted lines the pin 216 will engage the arm 217 and impart to the flip-over pawl a slight rotation to a position where the detent 212 will engage the notch 210, as illustrated in dotted lines. This movement of the flip-over pawl will cause the arm 206 to disengage the teeth of the rack and move the arm 207 into engagement therewith. It is to be noted that when the flip-over pawl is rotated by means of the pins 215 and 216 the arm which is brought into engagement with the rack is not caused to immediately engage the teeth thereof. The arm, either 206 or 207, will extend downwardly as illustrated alongside of the bev-

eled portion 218 or 219, but will not have contact therewith. This construction successfully prevents wearing of the engaging faces of the arms 206 and 207. Upon the downward stroke of the crank 87 and rack, the pin 215 will upon the returning of the rack to its normal position rotate the flip-over pawl again to the position illustrated in full lines. Since the crank 87 is connected with the segment 82 and with the shaft 33, when the adding operation is to be done by means of the actuating lever 30, the crank 87 will be rotated upon a downward movement of the lever 30 and thus operate the rack flip-over pawl mechanism.

The pedestal 28 is formed into a channel, as illustrated in Fig. 15, having its front wall cut away at 225 to provide a positive stop for the actuating lever 30. The base 25 is constructed of sheet metal and is arranged to have a slight spring so that when the type segments are moved against it, the base member may move with the segments and not form a dead stop therefor. To prevent distortion of the base or mechanism contained in the housing 26, I provide the positive stop 225 which when the lever 30 is moved to its down position engages the lower edges 226 of the lever. The lever 30 has a channel cross section as illustrated in Figs. 3 and 16. The edges 226 engage the stop 225 immediately after the printing segments touch the platen 52.

The Geneva gears 57 have at their forward end a strip 230 which contains numerals corresponding with the type 51 and which are exposed through a sight opening 231 provided in the front wall of the casing. This sight opening is immediately adjacent a slot 232 through which the finger piece 53 extends. The stationary type member 49 contains the letters "CTS," and the stationary member 50 the letters "AND." Carried by the shaft 41 and by a rod 41', is a support 233 upon which is slidably mounted a block 234. This block, as illustrated in Fig. 24, carries a T shaped groove 235 into which extends a T 236 of the support 233. The support 233 has a plurality of forwardly extending plates 237, to which are pivoted at 238 four stop bell crank levers 239, 240, 241, 242. The lever 239 has its upper end extending into a slot 243 provided in the segment 48. The bell crank levers 40 extend into a similar slot in the segment 47, the lever 241 into the segment 46, and the lever 242 into the segment 45. The lower ends of the levers 239—242 fit between blocks 244 which blocks prevent distortion of the lower ends of the levers. Carried by the upper face of the block 234 is a pin 245 which normally clears the lower ends of the levers, as illustrated in Fig. 2. The support 233 has secured thereto a plate 246 cut away in por-

tion to form four downwardly extending spring arms 247, one for each of the bell crank levers. The tendency of these spring arms is to rotate the levers in a counter-clockwise direction (Fig. 2). When the printing segments are in their normal position, as illustrated, this rotation is prevented by the lower wall of the slot 243 which is engaged by the upper arms of the bell cranks. The upper arms of the bell crank levers 239 to 242 have downwardly extending engaging ends 270 which extend below that portion of its associated arm which passes through the other segments. When, however, a printing segment is set its corresponding bell crank will be rotated by means of the spring plate 246. For example, if the segment 45 is set the lower end of the lever 242 is swung inwardly into the path of the pin 245. Rigidly secured to the base member 25 is an arm 250 which has secured at its forward end a link 251 carrying an inking pad 252. This construction is similar in all respects to the construction illustrated and claimed in my Patent No. 1,242,162, Oct. 9, 1917, and it is not thought necessary to describe this construction here. It will suffice to say that when the casing 26 is moved downwardly the link 251 will move the inking pad away from the printing segments so as to permit the segments to engage the platen. The arm 250 is slotted at 253 to be engaged by a pin 254 carried by the lower end of the lever 255. This lever is pivoted at 256 to the side wall 39 and extends forwardly to connect with a spring 257, as illustrated in Fig. 24. This spring is formed into the shape of a bell crank lever and has its lower end connected with a sliding block 234. The spring 257 is coiled at 258 through which coil extends a pivot screw 259 carried by the support 233.

The operation of this mechanism is as follows:

Assuming that the segment 45 has been moved the bell crank lever 242 will be swung inwardly so that its lower end is in the path of the pin 245. As the housing 26 is moved downwardly and since the arm 250 is stationary so far as the housing is concerned, the lever 255 will be given a counter-clockwise rotation (Fig. 2). This movement of the lever will move the upper arm of the spring 257 toward the lower arm which is connected with the sliding block 234, thus placing a tension in the spring, tending to move the sliding block toward the printing segments. As there is nothing in the path of the pin 245 except the lower end of the lever 242 the block will be moved in a direction toward the printing segments until the pin 245 engages the lever 242. When this occurs the edge of the block is immediately adjacent the

moved printing segment of highest order. The block 234 contains the characters "Pay \$" and thus prints this character immediately adjacent the number of the highest significant character. It is to be noted that the block 234 in no way engages the printing segments, so that there is no tendency to distort or bend the segments, all of the tension of the spring 257 being taken up by one of the bell crank levers. In moving the housing upwardly the spring 257 is again returned to its original position so that the sliding block is again returned to the position indicated in Fig. 3.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

1. A combined check protector and adding machine comprising, a plurality of movable printing members for printing the amount of each check, finger pieces for setting the members, means for actuating the printing members to effect the printing operation, an adding attachment connected with the printing members, devices for causing the adding attachment to total the amount of the checks protected by said printing members simultaneously with the operation of said actuating means, and mechanism for operating the adding attachment to total any amount set up by the finger pieces without actuating said printing members.

2. In a combined check protector and adding machine the combination of a base, a housing pivotally mounted on the base, a plurality of printing members carried by the housing and adapted when moved against the base to print amounts, means for setting the printing members to any desired amount, and adding attachment arranged to be set but not actuated by said setting means, a lever for moving the housing and thus the printing members toward the base to effect the printing operation, a crank carried by the housing, and devices for selectively causing the adding attachment to accumulate the amounts to which said means has been set when the said lever is actuated or when the crank is actuated independently of said lever.

3. In a combined check protector and adding machine, the combination of a base, a housing pivotally mounted on the base, a plurality of printing members carried by the housing and adapted when moved against the base to print an amount, means for setting the printing members to any desired amount, an adding attachment arranged to be set but not actuated by said setting means, mechanism for moving the housing and thus the printing members toward the base to effect the printing operation, a crank, and devices for selectively causing the adding attachment to accumulate the amount to which the said means

has been set when the said mechanism is actuated or when the crank is actuated independently of said mechanism.

4. In a combined check protector and adding machine the combination of, a base, a housing pivotally mounted on the base, a plurality of printing members carried by the housing and adapted when moved against the base to print an amount, means for setting the printing members to any desired amount, an adding attachment arranged to be set but not actuated by said setting means, a lever for moving the housing and thus the printing members toward the base to effect the printing operation, a crank carried by the housing connected with the adding attachment and arranged when operated to total the amount set up by said means, and means for connecting the lever with the crank to cause operation of the crank when the printing members are moved to printing position.

5. In a combined check protector and adding machine the combination of, a base, a housing pivotally mounted on the base and arranged to rock thereon, a plurality of printing members carried by the housing and adapted when moved against the base to print an amount, means for setting the printing members to any desired amount, an adding attachment arranged to be set but not actuated by said setting means, mechanism for moving the housing and thus the printing members toward the base to effect the printing operation, a crank connected with the adding attachment and arranged when operated to total the amount set up by said means, and means for connecting the said mechanism with the crank to cause operation of the crank when the printing members are moved to printing position.

6. A device for protecting checks and adding the amounts thereof consisting in the combination of, a base, a housing pivoted to the base so as to rock thereon, a support carried by the base, a manually operated lever pivotally carried by the support, a shaft journaled in the housing and connected with the lever by means of a link, the actuation of the lever serving to rock the housing and oscillate the shaft, printing members carried by the housing, means for setting the printing members, and a totalizer, which is set but not actuated by the said means, operatively connected with said oscillating shaft whereby the totalizer is caused upon the operation of the lever to add the amount set up by the setting means.

7. In a combined adding machine and check protector the combination of, a base, a housing pivoted to the base so as to rock thereon, a support carried by the base, a

manually operated lever pivotally carried by the support, a shaft journaled in the housing and connected with the lever by means of a link, the actuation of the lever serving to rock the housing and oscillate the shaft, printing members carried by the housing, means for setting the printing members, a totalizer which is set but not actuated by the said means, crank mechanism connected with the totalizer and adapted upon actuation to cause the totalizer to add the amount set up by the setting means, and devices for connecting the oscillating shaft with the crank mechanism.

8. A device for protecting checks and adding the amounts thereof consisting in the combination of, a base, a housing pivoted to the base so as to rock thereon, a support carried by the base, a manually operated lever pivotally carried by the support, a shaft journaled in the housing and connected with the lever by means of a link, the actuation of the lever serving to rock the housing and oscillate the shaft, printing members carried by the housing, means for setting the printing members, a totalizer, which is set but not actuated by the said means operatively connected with said oscillating shaft whereby the totalizer is caused upon operation of the lever to add the amount set up by the setting means, and means for causing complete operation of the oscillating shaft in both directions.

9. In a combined adding machine and check protector the combination of, a base, a housing pivoted to the base so as to rock thereon, a support carried by the base, a manually operated lever pivotally carried by the support, a shaft journaled in the housing and connected with the lever by means of a link, the actuation of the lever serving to rock the housing and oscillate the shaft, printing members carried by the housing, means for setting the printing members, a totalizer which is set but not actuated by the said means, crank mechanism connected with the totalizer and adapted upon actuation to cause the totalizer to add the amount set up by the setting means, devices for connecting the oscillating shaft with the crank mechanism, and means connected with the crank mechanism for causing complete operation of the mechanism in both directions.

In witness whereof, I hereunto subscribe my name this 8th day of January, A. D. 1916.

IVAN ENGSTROM.

Witnesses:

A. G. McCaleb,
ROBERT F. BRACE.