April 11, 1944. T. O. MEHAN 2,346,265

ZERO PRINTING AND COLUMN SPLIT MECHANISM

Filed Dec. 30, 1940 5 Sheets-Sheet 1

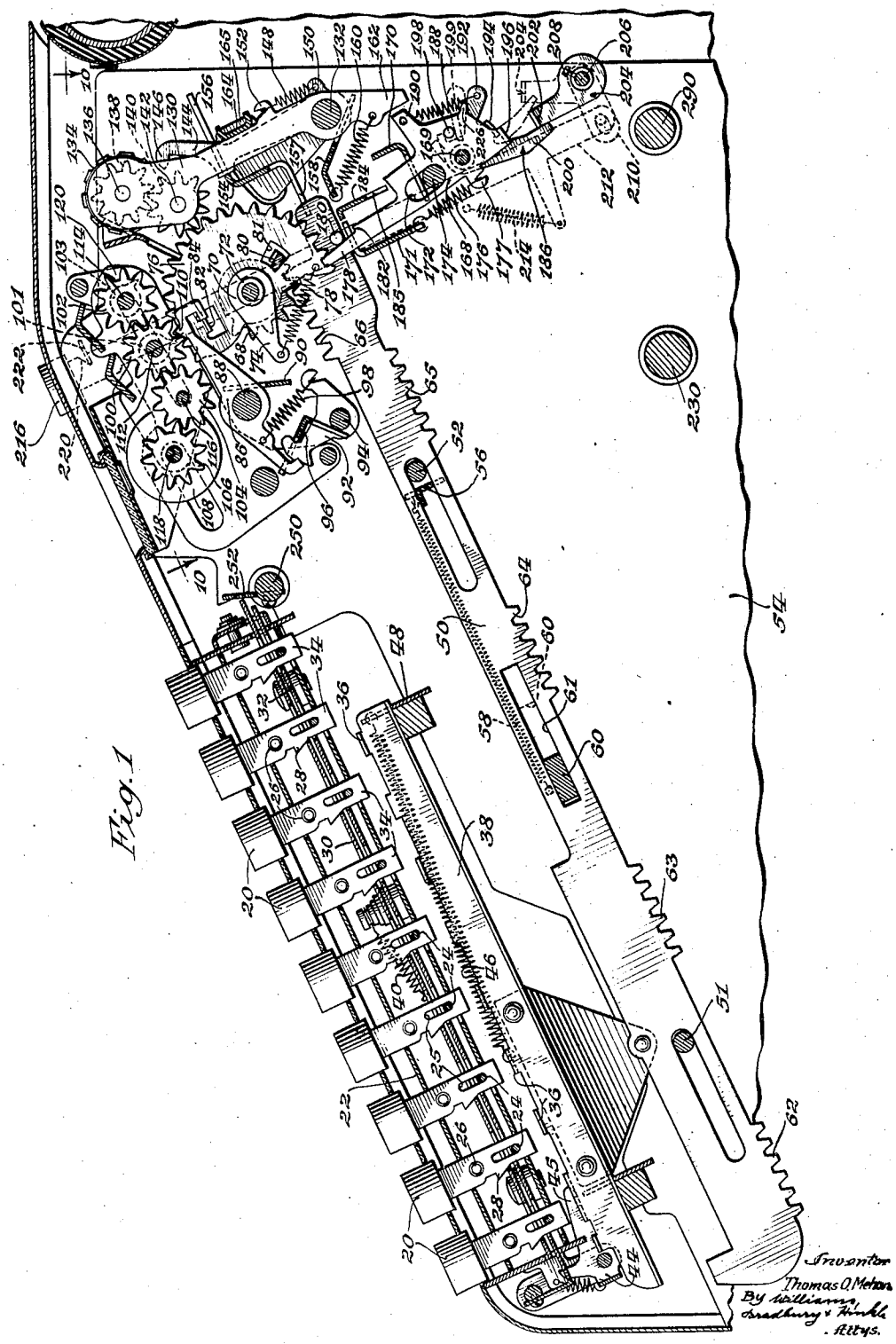

Fig. 1

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Fig. 4

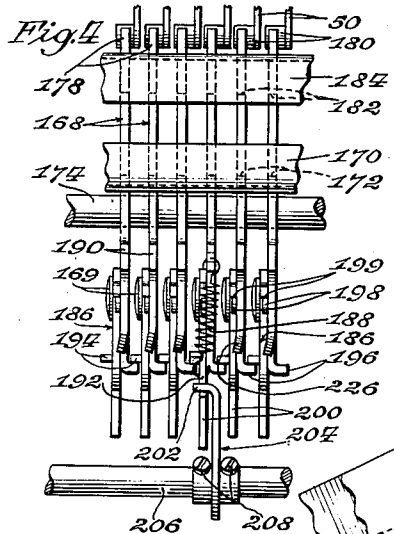


Fig. 2

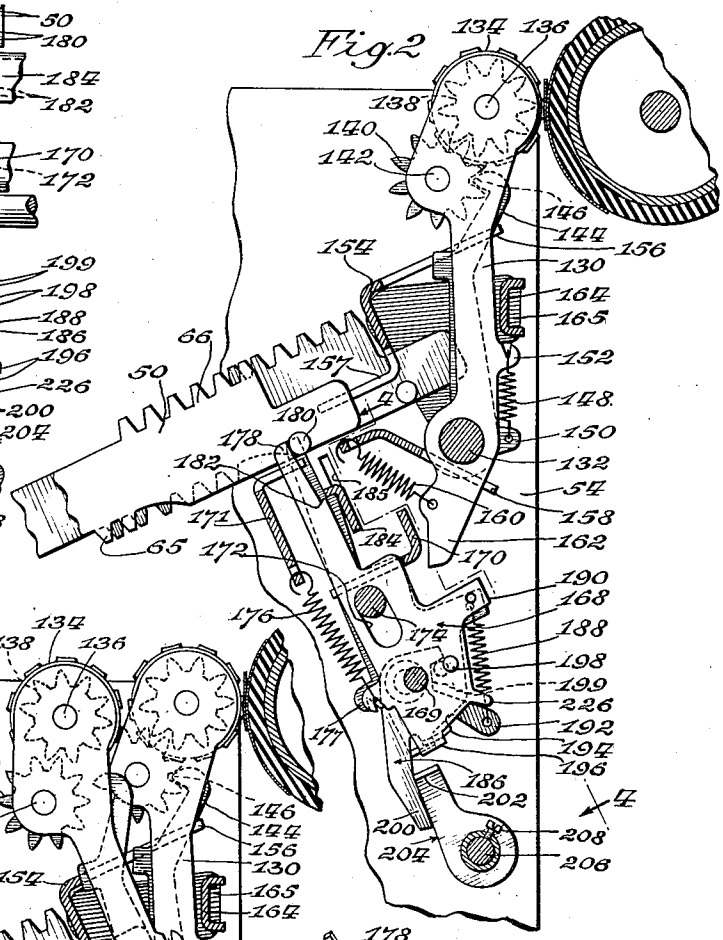


Fig. 3

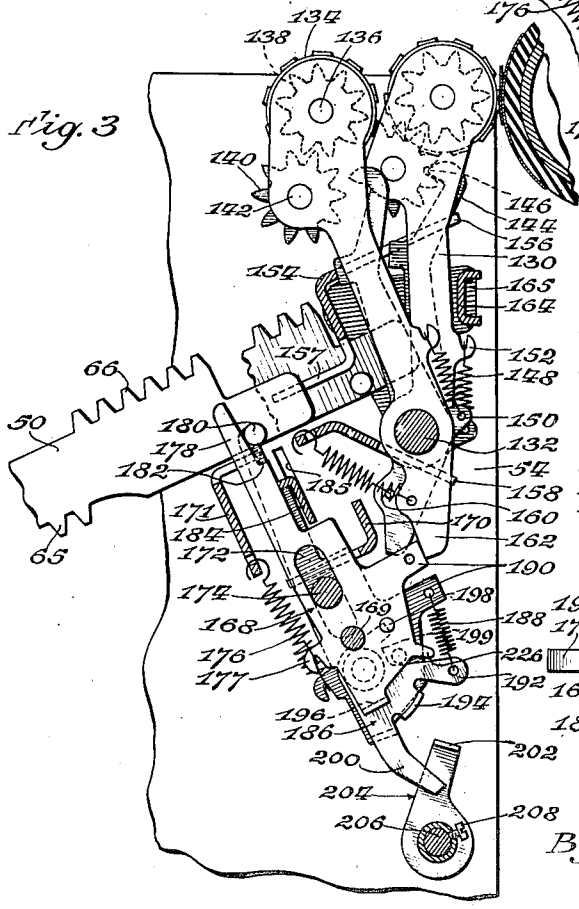


Fig. 11

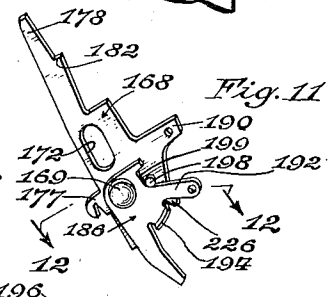
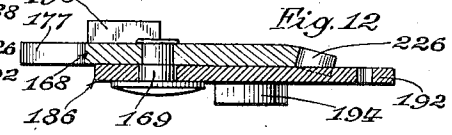


Fig. 12



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ZERO PRINTING AND COLUMN SPLIT MECHANISM

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Fig. 5

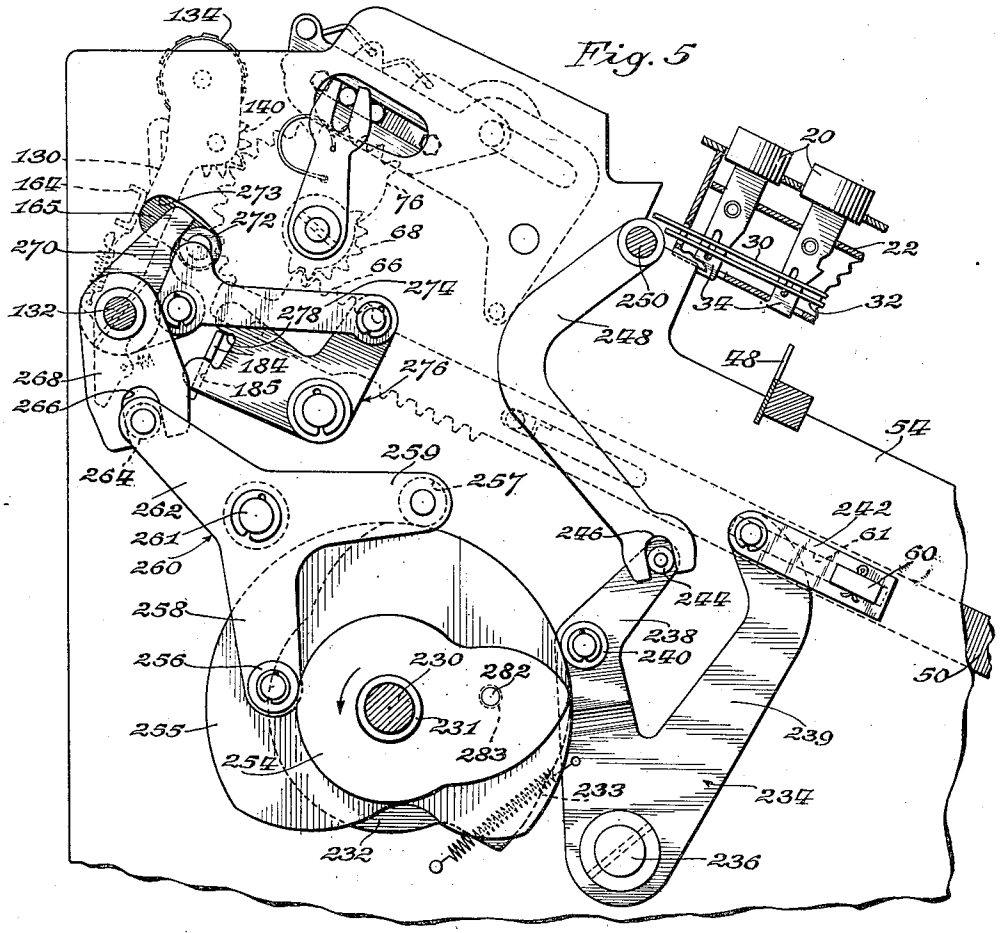


Fig. 6

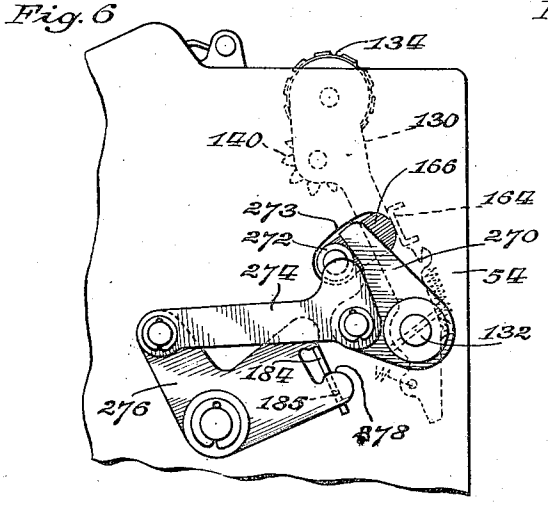
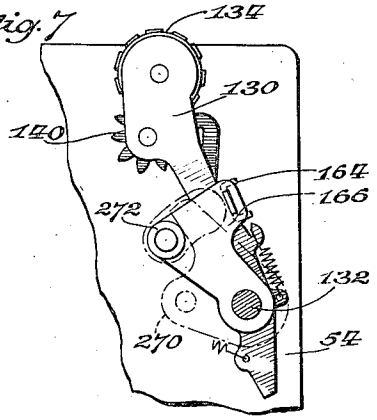


Fig. 7



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ZERO PRINTING AND COLUMN SPLIT MECHANISM

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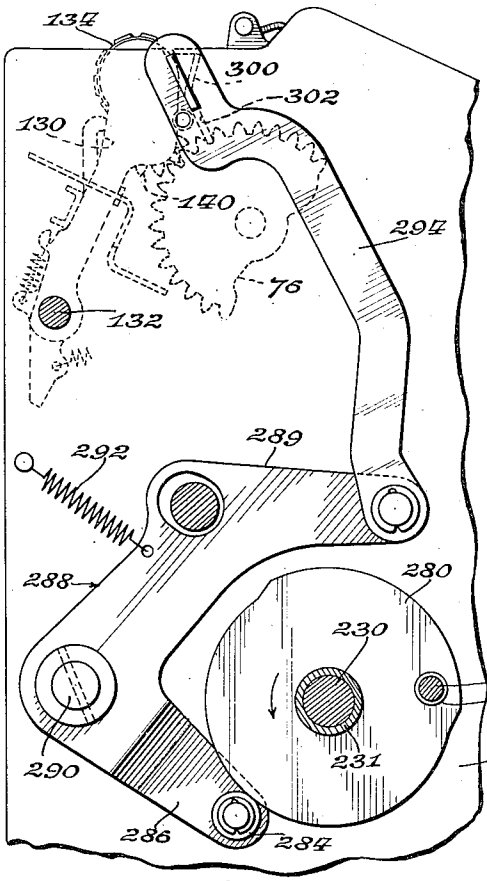

Fig. 8

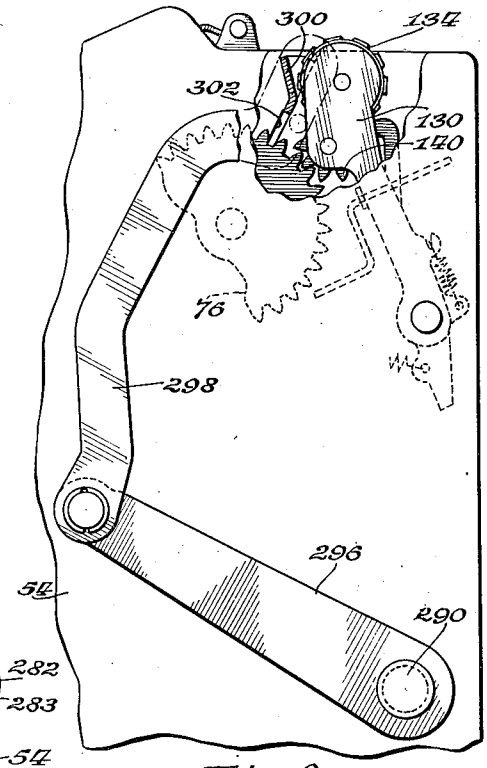

Fig. 9

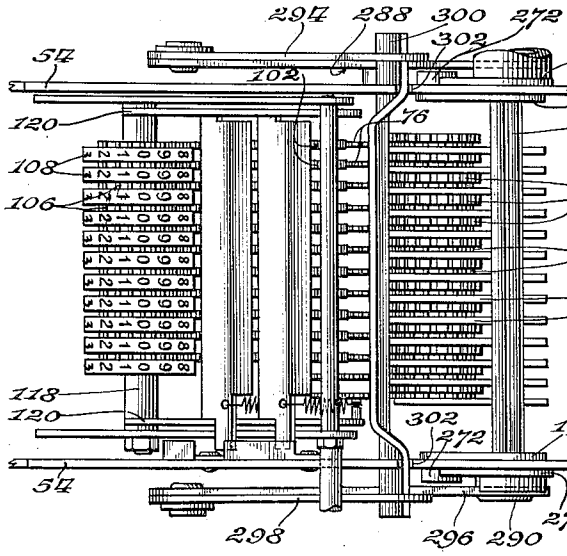

Fig. 10

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ZERO PRINTING AND COLUMN SPLIT MECHANISM

Filed Dec. 30, 1940 5 Sheets-Sheet 5

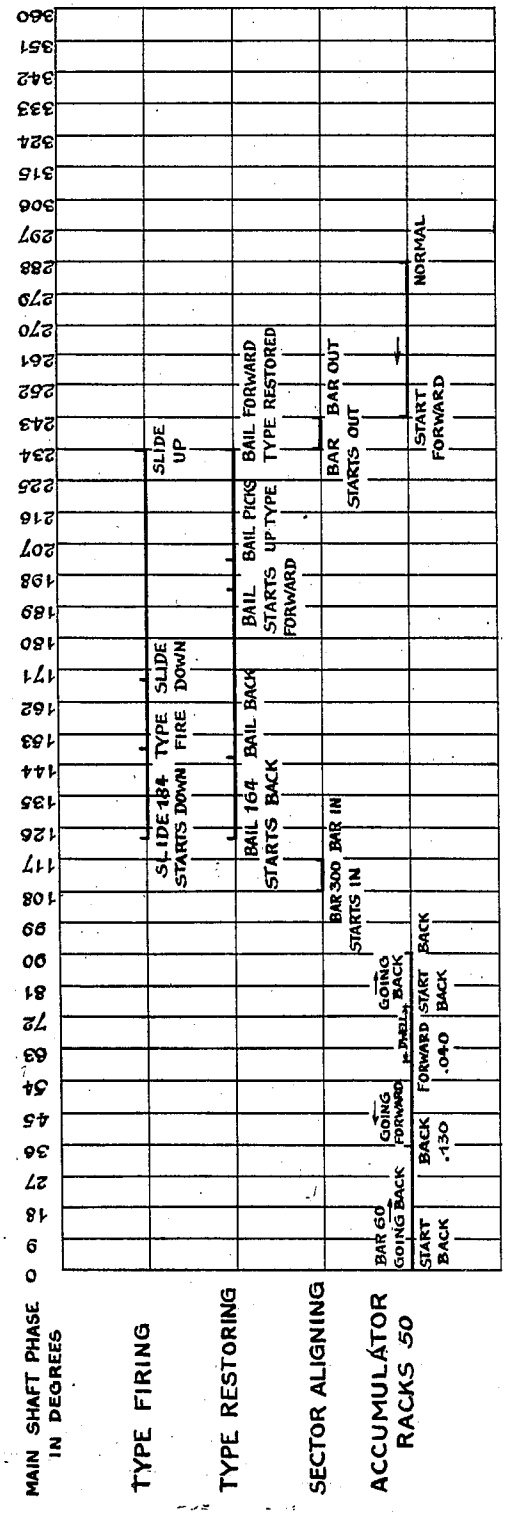

Fig. 13

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Patented Apr. 11, 1944 2,346,265

UNITED STATES PATENT OFFICE

2,346,265

ZERO PRINTING AND COLUMN SPLIT MECHANISM

Thomas O. Mehan, Park Ridge, Ill., assignor to Victor Adding Machine Co., Chicago, Ill., a corporation of Illinois

Application December 30, 1940, Serial No. 372,290

6 Claims. (Cl. 101—96)

My invention relates generally to calculating machines, and more particularly to improvements in printing mechanisms particularly adapted for use in such machines.

It is an object of my invention to provide an improved printing mechanism for calculating machines in which the mechanism may be readily "split" to permit the use of a single accumulator and printing mechanism for the simultaneous listing of a plurality of columns of figures.

A further object is to provide an improved means for determining the location of the split in the printing mechanism.

A further object is to provide an improved split mechanism which may be readily adjusted, and in which a preadjusted split arrangement may be readily rendered effective.

A further object is to provide an improved printing mechanism for calculating machines and the like in which is incorporated a simple and effective split mechanism which may be easily controlled.

A further object is to provide an improved printing mechanism for calculating machines and the like which is simple in construction, reliable in operation, and which may be economically manufactured.

Other objects will appear from the following description, reference being had to the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view showing the keyboard, the accumulator, printing mechanism, and differential actuating mechanism of the calculating machine;

Fig. 2 is an enlarged longitudinal sectional view of the printing mechanism, showing the parts in the positions assumed at the instant of making a printing impression;

Fig. 3 is a view similar to Fig. 2, showing one of the type wheels in the position assumed at the instant of making an impression, while the other type wheel is in normal position;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary longitudinal sectional view of the left-hand portion of the machine, showing the cams and linkage for operating the printing mechanism;

Fig. 6 is a fragmentary sectional view of the right-hand portion of the machine, showing the means for operating the type wheel restoring bail;

Fig. 7 is a view similar to Fig. 6, showing the type wheel restoring bail;

Fig. 8 is a vertical sectional view taken from the left-hand side of the machine, showing the cam and linkage for operating the aligner bar;

Fig. 9 is a fragmentary sectional view taken from the right side of the machine, showing the linkage of the right-hand side of the machine for operating the aligner bar;

Fig. 10 is a fragmentary plan sectional view taken on the line 10—10 of Fig. 1;

Fig. 11 is a perspective view of the type arm releasing sear member and associated split lever;

Fig. 12 is a transverse sectional view taken on the line 12—12 of Fig. 11; and

Fig. 13 is a timing chart of various machine parts.

Amount set up, actuating accumulating, and printing mechanism

Referring to Fig. 1, the machine incorporates a plurality of numeral keys 20 mounted for vertical reciprocation in a key guide plate 22 and guided for longitudinal movement by rods 24 extending through suitable slots 25 formed in the key stems. The keys are held in the normal position shown in Fig. 1 by coil springs 26 which extend transversely of the machine through a transverse row of keys, the coil springs being adapted to be flexed upon the depression of a key and thus return the key to normal position when it is released, as will appear hereinafter. It will be understood that the ends of the springs 26 are anchored to the keyboard frame structure.

Each of the key stems is provided with a cam projection 28 of saw-tooth conformation cooperable progressively with a key latching slide 30 and a key locking slide 32. Each of the key stems has an end portion 34 which, when the key is in depressed position, lies in the path of one of a plurality of stops 36 formed upon a stepped actuator bar 38. When a key 20 is depressed, its projection 28 forces its latching slide 30 forwardly against the tension of a spring 40 so that when the key is fully depressed, the slide 30 will be pulled rearwardly and latch the key in depressed position. The cam projection 28 also engages the locking slide 32, and through the latter, swings a bail 44 counterclockwise, the bail 44 carrying a hook arm 45 which engages a suitable stop on the stepped actuator bar 38. Thus, when the bail 44 is swung counterclockwise upon the complete depression of the key, the associated stepped actuator bar 38 will be released for rearward sliding movement under the influence of a tension spring 46, one end of which is attached to the stepped actua-

tor bar and the other (rearward) end of which is attached to a guide comb 48. The stepped actuator bar 38 is rigidly connected to an accumulator rack 50 which is guided for longitudinal movement upon a pair of rigid transverse rods 51 and 52 suitably supported on the section frame plates 54 as well as by an angle comb 56 which maintains the rearward ends of the accumulator racks in properly spaced relation. Each of the accumulator racks is biased to move rearwardly by a tension spring 58, one end of which is suitably secured to the accumulator rack and the other end of which is anchored to the fixed comb 56.

A restoring bail 60 is guided for transverse sliding movement in the center section plates 54 and extends through slots 61 formed in the accumulator racks 50. It will be understood that during the initial portion of the operating cycle of the machine the restoring bail 60 will be moved rearwardly and upwardly in the direction of the slot 61 to the position shown in dotted lines in Fig. 1 so as to permit the rearward movement of the accumulator racks under the influence of their actuating springs 58 as limited by the engagement of one of the stops 36 on the stepped actuator bar 38 with the end 34 of the depressed key. From the foregoing, it will appear that the accumulator racks 50 will move differentially as determined by the amount set up by the keys 20 during the initial portion of the operating cycle, in a manner common in many types of adding machines.

Each of the accumulator racks is provided with a plurality of rack sections 62, 63, 64, 65, and 66 for the operation of accumulators. In order to avoid unnecessary duplication, only the master accumulator mechanism, which is operated through the rack section 66, is illustrated in Fig. 1, it being understood that the lower accumulator mechanisms may be provided for operation by the rack sections 62, 63, 64, and 65.

The master accumulator mechanism comprises a segmental pinion 68 which is peened to a tubular hub 70 freely rotatable upon a hollow shaft 72. An arm 74 is also peened to the hub 70. A segmental gear 76 is freely rotatable upon the hub 70 between the arm 74 and the segmental pinion 68 and is resiliently biased to move clockwise with respect to the arm 74 by a tension spring 78. The extent of movement of the segmental gear 76 with respect to the arm 74 and the pinion 68 is limited by a lug 80 which extends sidewardly from the pinion 68 through a slot 81 formed in the segmental gear 76. The segmental gear 76 has a sidewardly projecting stop lug 82 cooperable with the hook-shaped end 84 of a transfer pawl 86 freely pivoted upon a shaft 88 and maintained in alinment by a fixed comb plate 90. The transfer pawl 86 is normally held in the position in which it is shown in Fig. 1 by a locking dog 92 pivoted on a shaft 94 and maintained in alignment with the transfer pawl 86 by an angle comb plate 96, a tension spring 98 being provided to swing the locking dog 92 counterclockwise and the transfer pawl 86 counterclockwise, thereby to maintain the ends of these elements in engagement, as shown in Fig. 1. The master accumulator comprises a plurality of subtract accumulator pinions 100 which are in mesh with adding accumulator pinions 102, as well as with idler pinions 104, the latter being in mesh with pinions 106 secured to amount indicating wheels 108. Adjacent to and secured to the subtract pinions 100 and add pinions 102 are transfer cams 101 and 103 respectively, the high points of which are cooperable with a projection 110 formed on the transfer pawl 86. In the position shown, the master accumulator is in position for performing a subtract operation by virtue of the fact that the subtract pinion 100 is in mesh with the segmental gear 76. The pinions 100, 102, 104, and 106 are mounted for free rotation upon shafts 112, 114, 116 and 118 respectively, these shafts being suitably secured in a pair of inner frame plates 120.

The details of the construction of the accumulator, the transfer mechanism, the means for causing engagement of the accumulator pinions with the segmental gears 76, and the means for shifting the accumulator pinions to locate the add pinions 102 instead of the subtract pinions 104 for engagement with the segmental gears 76, are more fully disclosed in my copending application Serial No. 359,271, filed October 1, 1940, and my copending application Serial No. 372,289, filed December 30, 1940. For the purposes of the present application, the accumulator and the means for engaging it with the segmental gears 76 may be of any suitable conventional construction.

The printing mechanism comprises a plurality of arms 130 freely pivoted upon a shaft 132 carried in the side section plates 54. Each of the arms 130 has a type wheel 134 freely pivoted on a shouldered rivet 136, the type wheel having type faces for the figures "0" to "9." Each of the type wheels 134 is rigidly secured to a pinion 138 which is at all times in mesh with an idler pinion 140 freely rotatable upon a shouldered rivet 142 secured to the arm 130. The idler pinion 140 is normally in mesh with its associated segmental gear 76.

An aligner arm 144 is pivoted upon the rod 132 adjacent each of the arms 130 and has a toothed portion 146 at its end for engagement between the teeth of the idler pinion 140. The arm 144 is normally urged to swing counterclockwise with respect to its adjacent type wheel carrying arm 130 by a tension coil spring 148 which is stretched between a lug 150 forming part of the arm 144 and a notched ear 152 forming part of the arm 130.

The arms 130 and 144 for the various denominational orders are maintained in properly spaced relation by a slotted Z-shaped bar 154 forming comb portions 156 and 157, the bar 154 being suitably secured in the side section plates 54. The ends of the actuators 50 are similarly spaced by the comb portion 157. The lower ends of the arms 130 and 144 are maintained in properly spaced relation by a stationary comb 158. The comb 158 also serves as an anchorage for tension springs 160, each of which has one end secured to the comb and the other end secured to the depending portion 162 of an arm 130. A restoring bail 164 is provided to return the type wheel carrying arms 130 to normal position, this bail being carried by a pair of arms 165 and 166 which are pivoted upon the shaft 132 (Figs. 5, 6, and 7). The means for actuating this bail will be described hereinafter.

In alignment with each of the type carrying arms 130 is a type release member 168 which is guided in fixed slotted combs 170 and 171 for vertical movement. The member 168 has an elongated slot 172 formed therein to receive a transverse rod 174 which is fixed in the inner section plates of the machine. The member 168 is nor-

mally held in its uppermost position as limited by the engagement of the lower edge of the slot 172 with the rod 174 by a tension spring 176 which is anchored to the comb 171 and to an ear 177 formed on the member 168.

The member 168 has an upwardly extending portion 178 which lies in front of a stud 180 projecting sidewardly from the actuator rack 50. Directly beneath the end portion 178 is a shoulder 182 which is adapted to engage beneath a depressing slide 184 which is mounted for generally downward movement in a pair of slots 185 formed in the inner section plates 54. The mechanism for operating the depressing slide 184 will be described hereinafter.

Each of the members 168 has a lever 186 pivotally secured thereto by a shouldered rivet 169. In Fig. 1, assuming the section as illustrating the hundred's denominational order, the lever 186 therein shown will not be pivoted to the member 168 which is shown in this figure, but to the member 168 for the next or thousand's denominational order. The lever 186 for the thousand's denominational order is normally urged to swing counterclockwise on its member 168 by a tension spring 188, one end of which is attached to a projection 190 formed on the member 168 and the other end of which is attached to an arm 192 forming part of the lever 186. The lever 186 has a sidewardly extending lug 194 which normally overlies an oppositely directed lug 196 formed on the member 168. A partially punched stop 198 limits pivotal movement of the release lever 186 with respect to the member 168, since it projects into a notch 199 formed in the lever 186.

The lever 186 has a downwardly extending arm 200 which is adapted to be engaged by the sidewardly extending portion 202 of an arm 204 secured to a shaft 206 by means of set screws 208. As best shown in Fig. 4, the arm 204 may be adjusted longitudinally on the shaft 206 so as to have its end portion 202 in alignment with the depending arm 200 of any one of the levers 186, it being shown in Fig. 4 as being in alignment with the arm 200 of the thousand's denominational order.

The shaft 206 is mounted for free rotation in the inner section plates 54, and at its end has an arm 210 rigidly secured thereto, this arm having a key stem 212 pivotally connected thereto, the key stem being urged upwardly by a tension spring 214. A key button 216 is secured to the upper end of the key stem 212 and is provided with a notch 220 engageable with a suitable fixed stop 222 when the key is depressed, so as to hold the key in depressed position, permitting the ready release of the key merely by swinging it forwardly slightly to disengage its notch 220 from the fixed stop 222. When the key is depressed, it will be noted that the arm 204 will swing the lever 186 for the thousand's order clockwise to cause its lug 194 to overlie the lug 196 on the member 168 of the hundred's denominational order so that whenever the member 168 for the thousand's order is moved downwardly, it will carry with it the member 158 for the hundred's denominational order, and when the key 216 is released, the lug 194 will be moved to a position in which it cannot engage lug 196, and the printing mechanism will be split between the hundred's and thousand's orders, as will more fully appear hereinafter.

The levers 186, which are attached to the members 168 of all of the denominational orders except the thousand's order, are not provided with a tension spring corresponding to the spring 188, but instead, these levers are held in either position to which they may be moved by a detent portion 226. The detent portion 226, as best shown in Figs. 11 and 12, is bent sidewardly so as to lie partially in the path of movement of the arm 192. This detent portion 226 may be bent back to its original straight position so as not in any way to affect the movement of the lever 186, when the lever is to have a spring 188 attached thereto.

The provision of this detent projection, which may be bent either to be ineffective or effective to hold the lever 186 in either of its extreme positions, makes it possible for the service man readily to change the position at which the split takes place. He will do this merely by bending the detent portion 226 out of the way on the member 168 at which he desires the split to take place, attach a spring 188 to such lever 186 and member 168, and move the arm 204 along the shaft 206 and secure it in position to engage the lever 186 to which the spring 188 has been attached. The detent portion 226 in a denominational order at which the machine was previously adjusted to split, will, of course, be bent to the position in which it is shown in Fig. 12 so as to hold the lever 186 in the position at which its lug 194 overlies the lug 196 of the member 168 of the next lower denominational order. The spring 228 attached to such lever 186 may also be removed, although such removal is not essential since the spring is not sufficiently powerful to overcome the holding effect of the detent portion 226.

The mechanism for operating the parts previously described comprises a main shaft 230 which, as viewed in Fig. 5, makes one counterclockwise revolution during each operating cycle of the machine. A plate cam 232 is rigidly secured to a hub or tubular shaft 231, in turn secured to the main shaft 230, and is adapted to oscillate a forked arm 234 secured to a pivotally mounted shaft 236. One of the arms 238 of the forked arm 234 has a follower roller 240 thereon which is engageable with the edge of the cam 232. The forked arm 234 is pivotally connected to a link 242 which is slotted to receive the end of the restoring bail bar 60. It will be understood that the shaft 236 extends transversely through the machine and that at its opposite end it is provided with an arm similar to the arm 239 and a link similar to the link 242, to assure uniform translatory movement of the restoring bar 60.

The arm 238 carries a roller 244 received in an open end slot 246 formed in the end of an elbow-shaped arm 248 which is secured to a shaft 250. The shaft 250 is provided for operation of the ribbon feeding mechanism, which is not disclosed herein, since it may be of any conventional construction.

The hub 231 secured to the main shaft 230 carries a pair of plate cams 254 and 255 which are respectively cooperable with follower rollers 256, 257 rotatably mounted on the ends of arms 258 and 259 of a three-arm lever 260 pivoted upon a fixed stud 261. The third arm 262 of the three-arm lever 260 carries a roller 264 which rides in an open-end slot 266 formed in an arm 268 which is secured to a rotatable shaft 132. Likewise secured to the shaft 132 so as to rotate therewith are a pair of arms 270, the ends of which engage rollers 272 attached to the arms 165 and 166, previously described. The rollers 272 project through suitably shaped arcuate slots

273 formed in the inside section plates. The rollers 272 may be provided in slightly different diametral sizes so that by using rollers of proper size, adjustment may be made for slight irregularities in the pinions 140 and gear segments 76 and the supports for these parts, so as to assure proper interengagement of their teeth. Each of the arms 270 has a link 274 pivotally connecting the lever with a pivotally mounted bell crank 276. Each of the bell cranks 276 has a notch 278 formed at the end of the rearwardly extending arm thereof to engage one of the ends of the slide 184. Through this linkage the slide 184 will be lowered and raised once during each operating cycle of the machine.

Means are provided to align the segmental gears 76 just prior to the release of the type carrying arms for making a printing impression and after the accumulator racks have completed their rearward movement. This means is best shown in Figs. 8 and 9, and comprises a plate cam 280 which is secured to a hub 231 carried on the main shaft 230. The cam 280 is rigidly secured to the cams 232, 254, and 255 by a rivet 282 which may be surrounded by suitable separator sleeve 283 to hold the cams in properly spaced relation. The cam 280 is cooperable with a follower roller 284 rotatably mounted at the end of one arm 286 of a bell crank lever 288 which is secured to a shaft 290 rotatably supported in the inner section plates 54. The bell crank 288 is normally swung counterclockwise by a suitably anchored tension spring 292 to maintain the roller 284 in engagement with the edge of the plate cam 280. The arm 289 of bell crank lever 288 is pivotally connected to a link 294.

At the right hand side of the machine, the shaft 290 has an arm 296 rigidly secured thereto and has a link 298 pivotally connected to the end of the arm 296, the link 298 corresponding to the link 294. An aligner bar 300 is mounted for substantially vertical sliding movement in a pair of slots 302 formed in the inner section plates 54. The cam 280 thus swings the bell crank 288 clockwise (and the arm 296 counterclockwise), thereby to lower the aligner bar 300 into a position in which it engages between the teeth of the segmental gears 76 and holds these gears in properly aligned position so as to assure proper reengagement of the idler pinions 140 with the segmental gears when the type carrying arms are returned to normal position after making a printing impression.

The operation of the mechanism above described will be more clearly understood by reference to the timing chart of Fig. 13, in which the particular phase angle of the main shaft 230 from its normal position is indicated as related to the functioning of the various mechanisms.

In describing the operation of the machine, it will be assumed that the lever 186 attached to the member 168 for the thousand's order is equipped with the spring 188 and that the arm 204 is secured in the position in which it is shown in Fig. 4. It will also be assumed that the remaining levers 186 are positioned so that their lugs 194 overlie the lugs 196 of the members 168 of the adjacent lower denominational orders, the levers 186 being held in this position by the detents 226.

Assuming that the amount keys 20 have been depressed to set up the desired amount in the keyboard, the operating cycle will be started, either by operation of the usual motor control switch or by manually rotating the main shaft 230. During the initial portion of the operating cycle, the arm 234 (Fig. 5) will commence swinging counterclockwise due to the depressed portion 233 formed in the cam 232. Such movement will cause the restoring bar 60 to move rearwardly a distance corresponding to the rotation of the segmental gears 76 through an angle slightly greater than that represented by the pitch of the teeth on these gears. This slight counterclockwise movement of the segmental gears 76 will permit restoration of such of the transfer pawls 86 which had been operated during the preceding cycle to effect a transfer operation. As shown on the chart Fig. 13, this rearward movement of the restoring bar 60 and accumulator racks takes place during the first 36° of angular movement of the main shaft 230. During the following 21° of the main shaft rotation, the cam 232 will swing the lever 234 clockwise (Fig. 5), and thus move the restoring bar 60 to normal position. After a short dwell period, the sharp drop portion of the surface of the cam 232 will reach the roller 240, and as a result, the arm 234 will again be moved counterclockwise to move the restoring bar 60 rearwardly and thereby permit such of the actuator racks as have been released to be moved rearwardly until arrested by the engagement of the lugs 36 with the ends of the depressed keys.

After the accumulator racks have thus been positioned in accordance with the amount set up on the keyboard, the accumulator pinions 100 or 102 (depending whether a subtracting or adding operation is to be performed) will be brought into engagement with the segmental gears 76 so that upon the following return stroke of the actuator racks, the amount set up may be added in to the accumulator. The type wheels 134 being effectively in mesh with the segmental gears 76 during the rearward movement of the actuator racks 50 will, of course, be set to imprint the amount set up in the keyboard.

Each of the racks 50 which is released for rearward movement due to the fact that a key in its denominational order has been operated will, in moving rearwardly, displace its stud 180 from the position in which it is shown in Fig. 1 rearwardly a sufficient distance to permit the associated member 168 to swing clockwise to a position in which its shoulder 182 lies beneath the generally horizontal flange portion of the releasing slide 184.

At this point in the cycle, the aligning bar 300 is moved downwardly by the cam 280 (Fig. 8) operating through the bell crank 288 and link 294 so as to hold the segmental gears 76 in aligned position. Shortly thereafter, the bail bar 164 commences swinging rearwardly from the position in which it is shown in Fig. 1 to the position in which it is shown in Fig. 2, while at the same time, the slide 184 will commence moving downwardly and pushing downwardly such of the members 168 as have been permitted to swing clockwise by the removal of the associated studs 180. Shortly after the type restoring bail bar 164 reaches the position in which it is shown in Fig. 2, the slide 184 will have depressed the members 168 sufficiently to cause their projections 190 to be moved beyond the ends of the depending portions 162 of the type wheel carrying arms 130, thereby releasing the latter for actuation by their respective springs 160 to swing the type to make the printing impression.

In the event that all of the levers 186 are in the position in which such lever is shown in full

lines in Fig. 1, all of the members 168 to the right of the highest order digit in the amount set up will be pushed downwardly upon downward movement of the slide 184 because of the series overlapping relationship of the lugs 194 and 196. For example, if the amount 6 0 0 0 1 2 is set up in the keyboard, the rearward movement of the actuator rack in the hundred thousand's denominational order will result in the engagement of the shoulder 182 of the member 168 associated with this rack to engage beneath the flange portion of the slide 184, and the latter, in its downward movement, will carry not only the member 168 for the hundred thousand's order, but, due to the overlapping arrangement of the lugs 194, 196, will also depress the members 168 for the tens of thousand's, thousand's, and hundred's denominational orders. The members 168 for the ten's and unit's orders will, of course, be moved downwardly directly by the slide 184, since these members will have been swung rearwardly to cause engagement of their shoulders 182 with the slide 184.

If, however, the key 216 is moved forwardly to release its notch 220 from engagement with the stop 222, the spring 214 will raise the key, and thus swing the arm 204 from the position in which it is shown in full lines in Fig. 1 to the position in which it is shown in dotted lines in said figure. As a result of such movement of the arm 204, the lever 186 in alignment with this arm, which will have a spring 188 attached thereto, will swing from the full to the dotted line position of Fig. 1, thereby moving its lug 194 from its position above the lug 196. Under these circumstances, with the given example of the amount set up in the keyboard, the machine would print 6 0 0 1 2. In addition to the split between the thousand's and hundred's orders, a split may be effected between any other orders merely by manually swinging counterclockwise the levers 186 located in the higher of the two orders between which the splits are to be made.

Due to minor irregularities in the dimensions of the parts, the depending portions 162 will not be released from the projections 190 of the members 168 at the same instant, and as a result, the type will not strike the platen at the same time. The amount of noise produced by the type striking the platen will therefore be considerably reduced as compared with other constructions in which the type are swung as a unit against the platen.

After the type have fired, the bail bar 164 will commence swinging forwardly, and the slide 184 will commence moving upwardly, and after the idler pinions 140 have thus been returned to engagement with the segmental gears 76, the aligner 300 will commence moving upwardly by virtue of the rise portions on the cam 180.

After the algner bar 300 has been disengaged from the segmental gears 76, the accumulator actuating racks 50 will be moved forwardly by the restoring bar 60 to normal position. During the forward movement of the actuator racks 50, the accumulator pinions 100 or 102 will be in mesh with the segmental gears 76 to effect the subtraction or addition of the amount set up. As the actuator racks 50 reach their normal position, they will engage the upper ends 178 of the members 168 and swing the latter forwardly to release the shoulders 182 thereof from engagement beneath the flange on the slide 184.

From the foregoing, it will be apparent that the machine may readily be adjusted to effect a split in a particular location merely by releasing the key 216 and that if it is desired to split the machine between some other denominational orders, such splitting may be accomplished very readily merely by swinging the particular lever 186 counterclockwise, the levers 186 being, of course, held in either of their extreme positions by the detent portion 226.

Furthermore, it will be noted that the sear members 168, together with the split levers 186 pivoted thereto form a simple mechanism and perform numerous functions, namely, determining which type arms 130 shall be released, including the release of the zero printing type arms, releasing the type arms, and providing a simple means for effecting a split in the printing mechanism, controlled either by the key 216 or by individual adjustment of the split levers 186.

While I have shown and described a particular embodiment of my invention, it will be apparent to those skilled in the art that numerous variations and alterations may be made without departing from the underlying principles of my invention. I therefore desire, by the following claims, to include within the scope of my invention such variations and modifications as will readily occur to those skilled in the art by which substantially the results of my invention may be obtained by the use of substantially the same or equivalent means.

I claim:

1. In a printing mechanism for calculating machines and the like having a plurality of differentially movable actuators, one for each denominational order, the combination of a platen, a plurality of arms each carrying type differentially positionable by said actuators and cooperable with said platen, resilient means individual to each of said arms to urge it to swing its type toward said platen, a sear member for each of said arms normally preventing it from swinging toward said platen, an operator for moving said sear members to type arm releasing position, means rendered effective by said actuators respectively to cause engagement of said sear members with said operator, a disengageable operating connection between each sear member and the sear member of the next lower denominational order, said disengageable connection comprising a lug on said sear member, a lever pivoted to said member, said lever having a portion overlying the lug on the sear member of the next lower denominational order when the lever is in normal position and being movable to split position in which said portion does not overlie said lug, and means to hold said lever alternatively in its split or its normal position.

2. In a printing mechanism for calculating machines and the like having a plurality of differentially movable actuators, one for each denominational order, the combination of a platen, a plurality of arms each carrying type differentially positionable by said actuators and cooperable with said platen, resilient means individual to each of said arms to urge it to swing its type toward said platen, a sear member for each of said arms normally preventing it from swinging toward said platen, an operator for moving said sear members to type arm releasing position, means rendered effective by said actuators respectively to cause engagement of said sear members with said operator, a disengageable operating connection between each sear member and the sear member of the next lower denominational order, said disengageable connection com-

prising a lug on said sear member, a lever pivoted to said member, said lever having a portion overlying the lug on the sear member of the next lower denominational order when the lever is in normal position and being movable to split position in which said portion does not overlie said lug, a key, and means operated by said key to move said lever from its split to its normal position.

3. In a printing mechanism for calculating machines and the like having a plurality of differentially movable actuators, one for each denominational order, the combination of a platen, a plurality of arms each carrying type differentially positionable by said actuators and cooperable with said platen, resilient means individual to each of said arms to urge it to swing its type toward said platen, a sear member for each of said arms normally preventing it from swinging toward said platen, an operator for moving said sear members to type arm releasing position, means rendered effective by said actuators respectively to cause engagement of said sear members with said operator, a disengageable operating connection between each sear member and the sear member of the next lower denominational order, said disengageable connection comprising a lug on said sear member, a lever pivoted to said member, said lever having a portion overlying the lug on the sear member of the next lower denominational order when the lever is in normal position and being movable to split position in which said portion does not overlie said lug, a spring connected between said lever and said member to move said lever to split position, a key, and means operated by said key to move said lever to normal position against the force of said spring.

4. In a printing mechanism for calculating machines and the like, having a plurality of differentially movable actuators, one for each denominational order, the combination of a platen, a plurality of arms each carrying type differentially positionable by said actuators and cooperable with said platen, resilient means individual to each of said arms to urge it to swing its type toward said platen, a sear member for each of said arms normally preventing it from swinging toward said platen, an operator for moving said sear members to type arm releasing position, means rendered effective by said actuators respectively to cause engagement of said sear members with said operator, a disengageable operating connection between each sear member and the sear member of the next lower denominational order, said disengageable connection comprising a lug on said sear member, a lever pivoted to said member, said lever having a portion overlying the lug on the sear member of the next lower denominational order when the lever is in normal position and being movable to split position in which said portion does not overlie said lug, and a deformable detent on said sear member effective to hold said lever in either of its two positions.

5. In a printing mechanism for calculating machines and the like having a plurality of differentially movable actuators, one for each denominational order, the combination of a platen, a plurality of arms each carrying type differentially positionable by said actuators and cooperable with said platen, resilient means individual to each of said arms to urge it to swing its type toward said platen, a sear member for each of said arms normally preventing it from swinging toward said platen, an operator for moving said sear members to type arm releasing position, means rendered effective by said actuators respectively to cause engagement of said sear members with said operator, a disengageable operating connection between each sear member and the sear member of the next lower denominational order; said disengageable connection comprising a lug on said sear member, a lever pivoted to said member, said lever having a portion overlying the lug on the sear member of the next lower denominational order when the lever is in normal position and being movable to split position in which said portion does not overlie said lug, a key, a shaft movable by said key, and an element adjustable along said shaft to engage any one of said levers to move the latter from one of its said positions to the other upon movement of said shaft by said key.

6. In a printing mechanism for calculating machines and the like having a plurality of differentially movable actuators, one for each denominational order, the combination of a platen, a plurality of arms each carrying type differentially positionable by said actuators and cooperable with said platen, resilient means individual to each of said arms to urge it to swing its type toward said platen, a sear member for each of said arms normally preventing it from swinging toward said platen, an operator for moving said sear members to type arm releasing position, means rendered effective by said actuators respectively to cause engagement of said sear members with said operator, a disengageable operating connection between each sear member and the sear member of the next lower denominational order, said disengageable connection comprising a lug on said sear member, a lever pivoted to said member, said lever having a portion overlying the lug on the sear member of the next lower denominational order when the lever is in normal position and being movable to split position in which said portion does not overlie said lug, and key-controlled means determining the position of said lever.

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