

Aug. 20, 1968 T. GASSINO ET AL 3,397,837
PRINTING CALCULATING MACHINE HAVING A TRANSVERSELY
MOVABLE REGISTER
Filed April 8, 1966 9 Sheets-Sheet 1

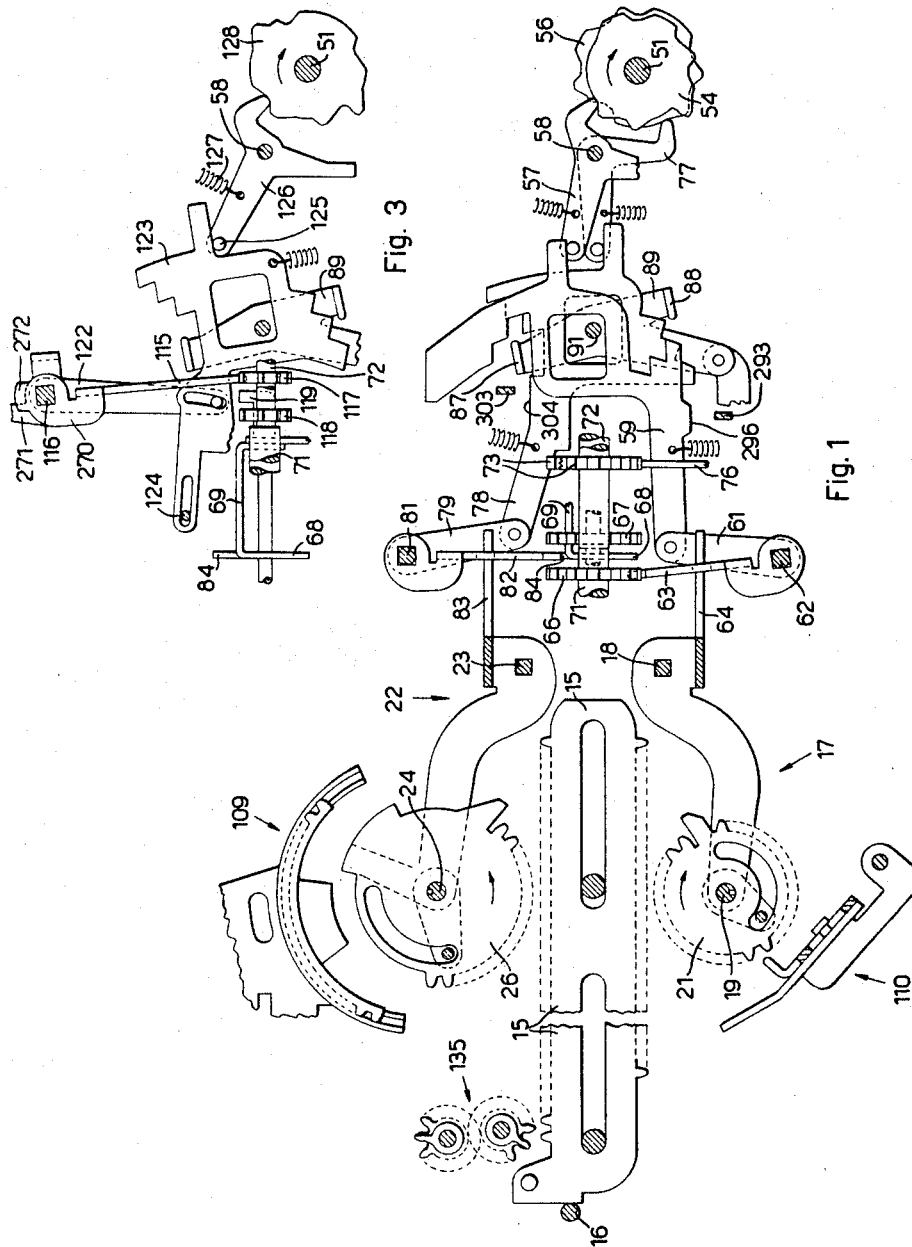
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9 Sheets-Sheet 1



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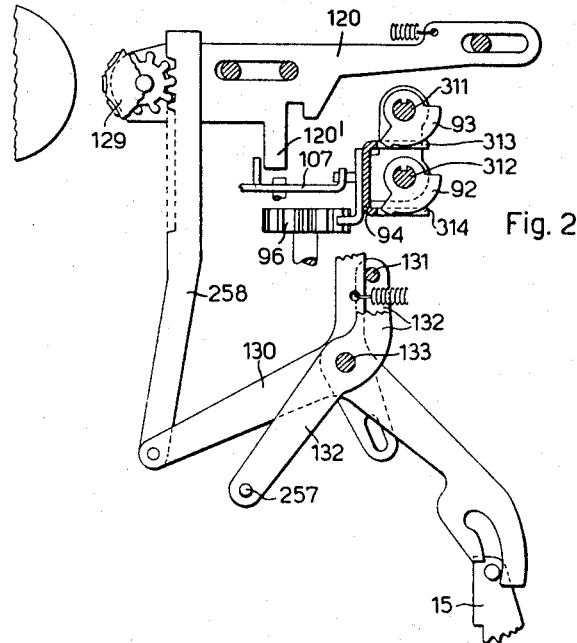


Fig. 2

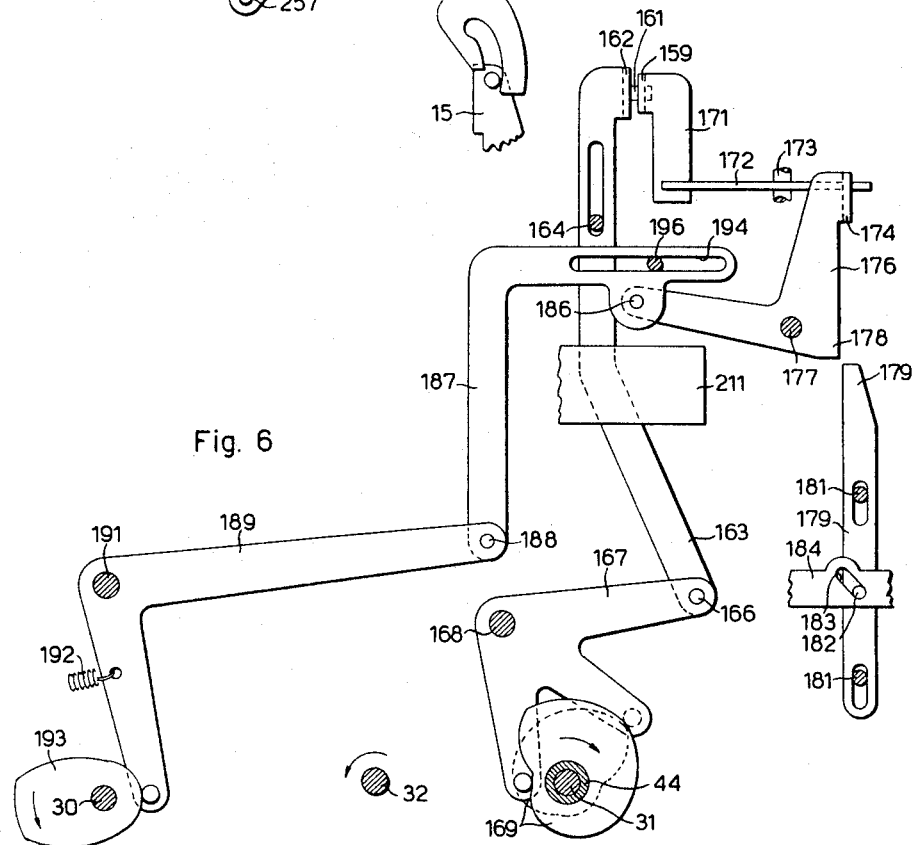


Fig. 6

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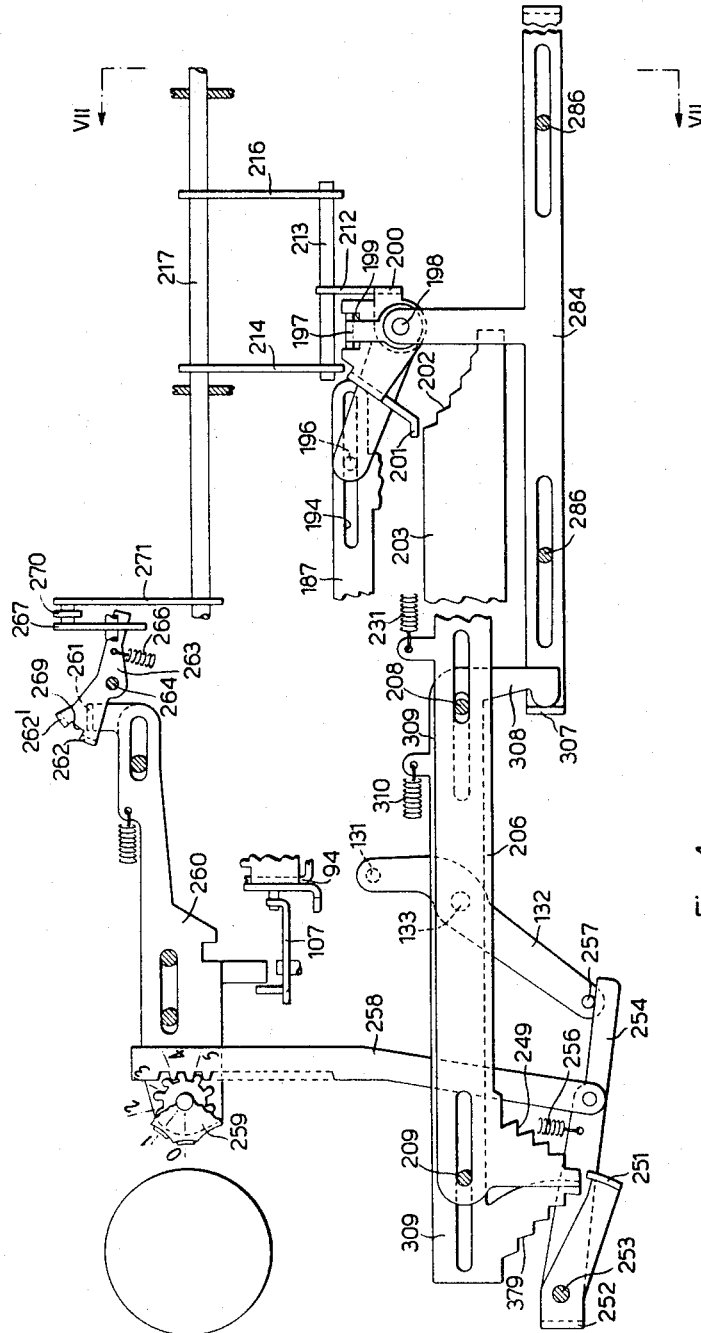


Fig. 4

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9 Sheets-Sheet 4

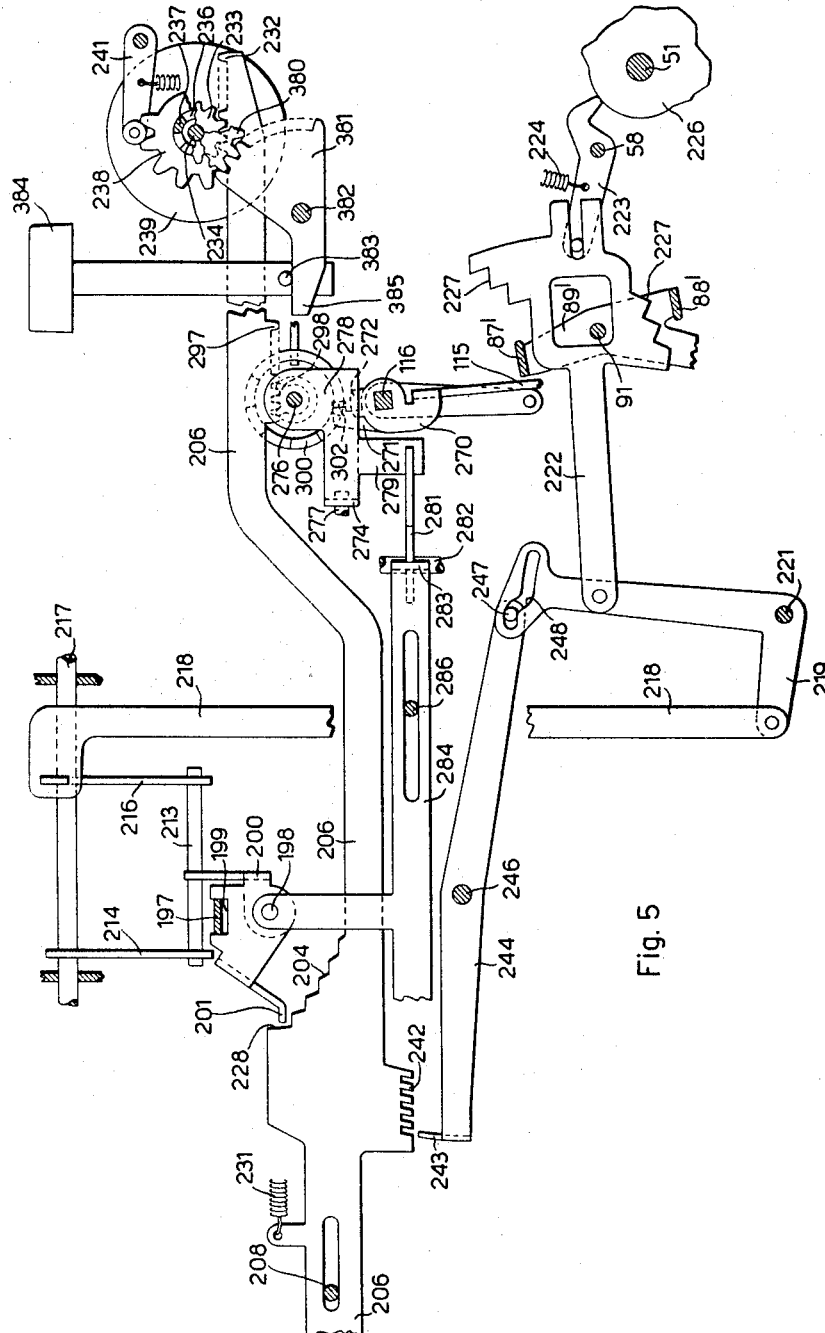


Fig. 5

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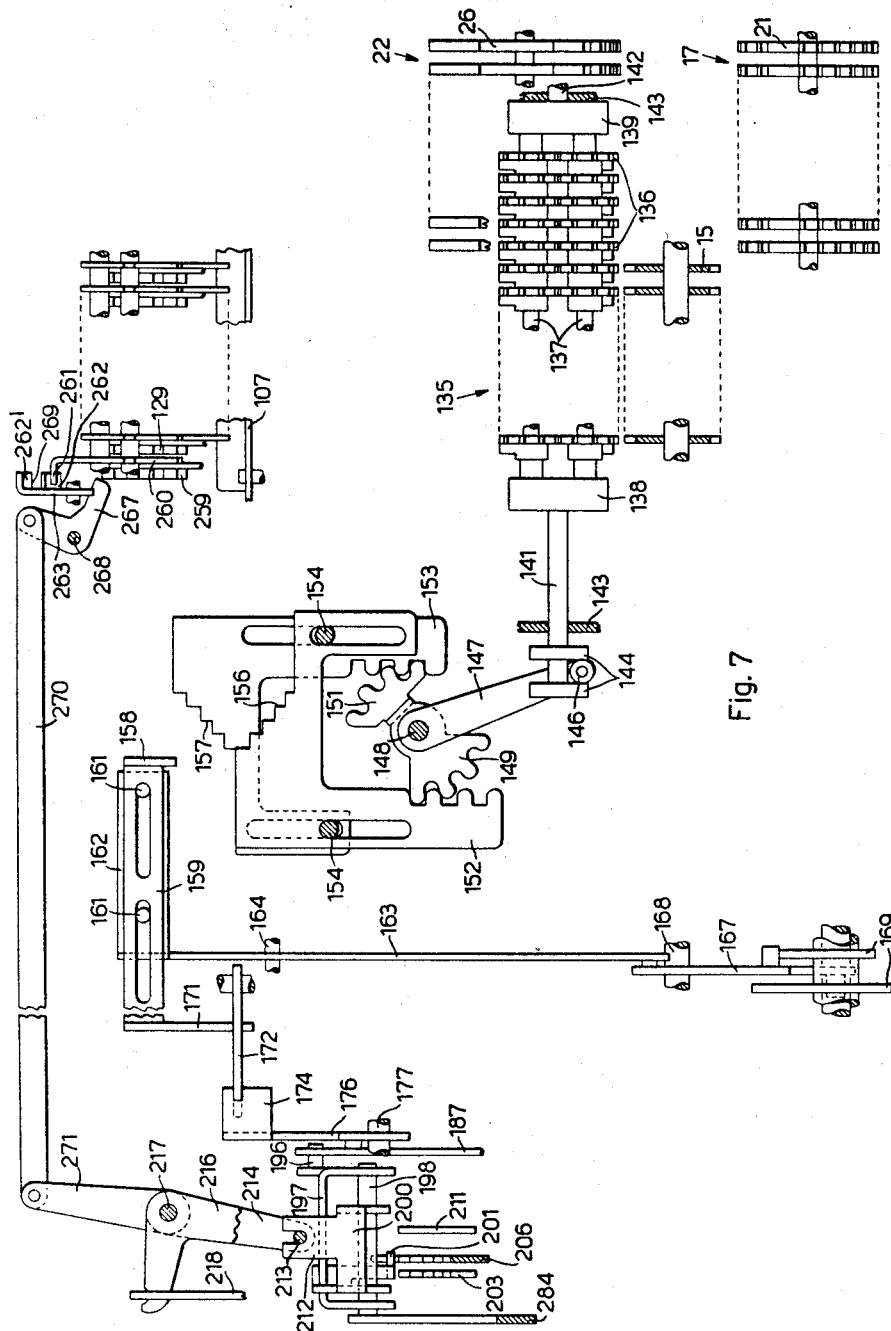


Fig. 7

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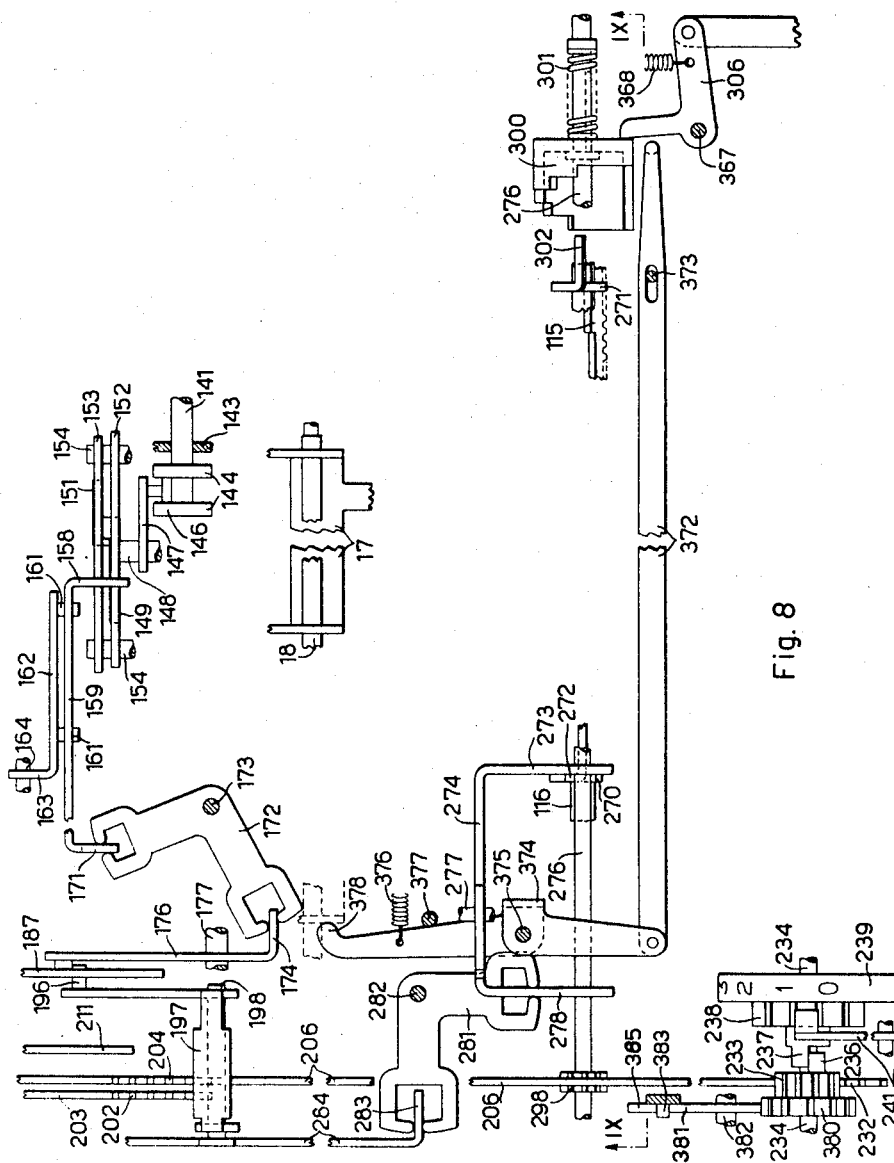


Fig. 8

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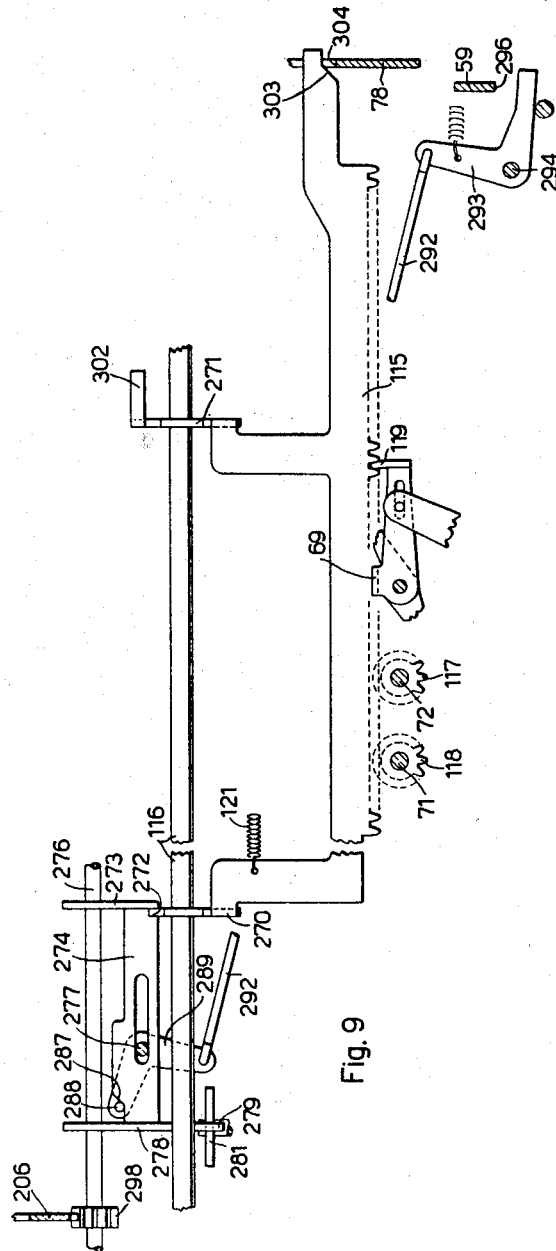
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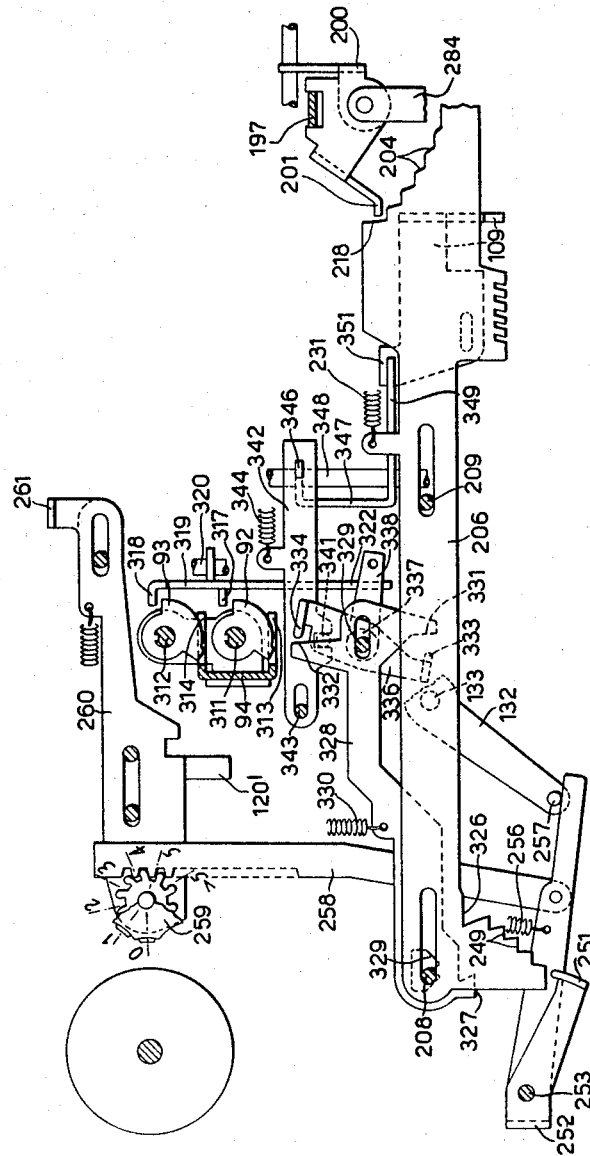


Fig. 10

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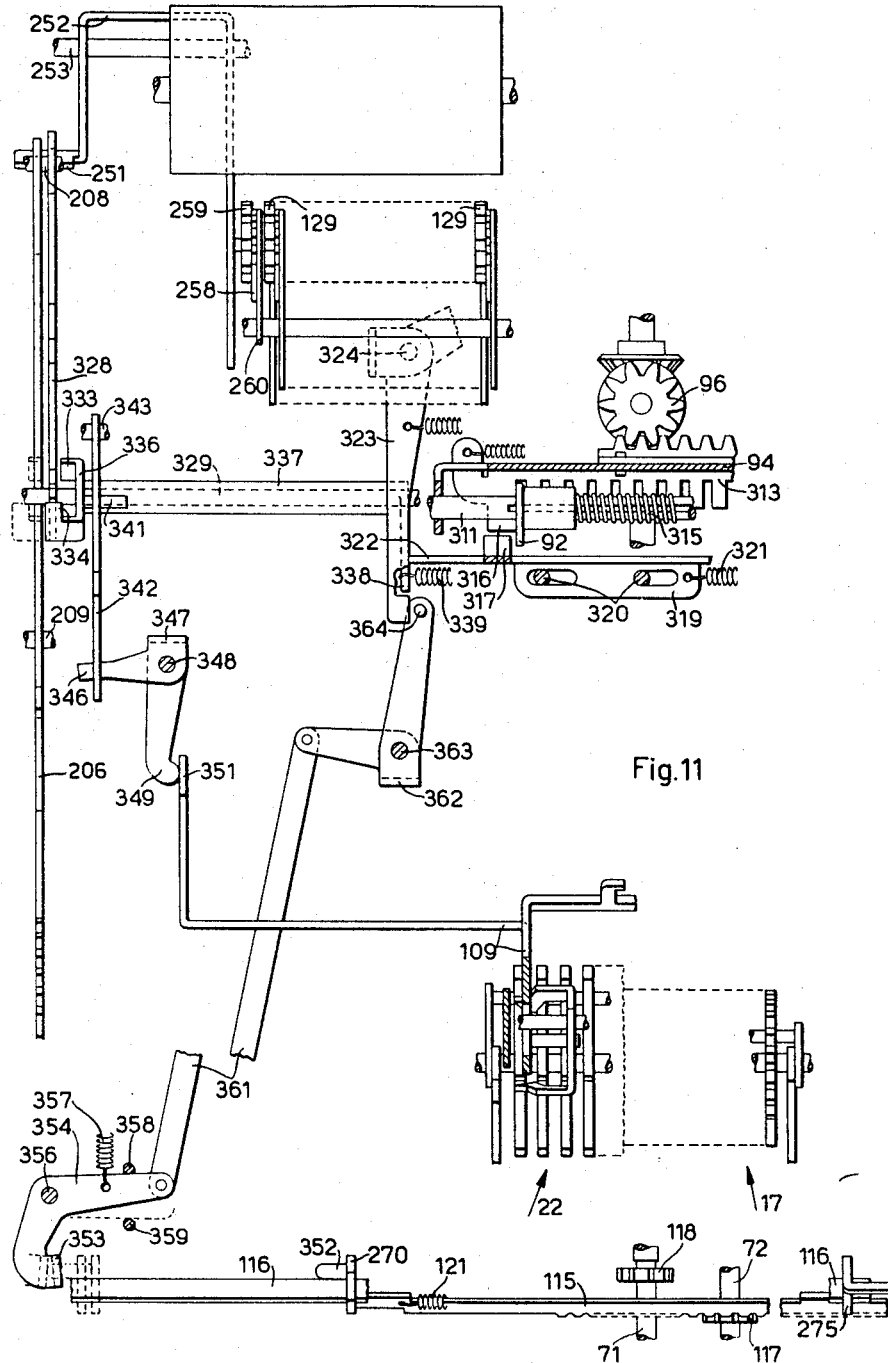


Fig. 11

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3,397,837

PRINTING CALCULATING MACHINE HAVING A TRANSVERSELY MOVABLE REGISTER

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8,942/65; Feb. 11, 1966, 3,560/66

16 Claims. (Cl. 235—60.24)

ABSTRACT OF THE DISCLOSURE

A printing calculating machine having a register provided with a set of denominations exceeding the actuators is adapted to locate the register in an initial transverse position with said exceeding denominations at the right of the actuators and to displace transversely the same under the control of a differentially settable stepped member to cause a predetermined number of said exceeding denominations to cooperate with said actuators to accumulate therein corresponding orders of an amount. A total taking device causes the register to return to the initial position to cut off the denominations of the total contained in the exceeding denominations of said register, and an additional printing member prints said predetermined number of said exceeding denominations simultaneously with the total.

The present invention relates to a printing calculating machine comprising a plurality of denominationally arranged actuators differentially movable to represent an amount and associated with a plurality of printing members for printing said amount, and comprising a transversely movable register adapted to engage said actuators and having a set of denominations exceeding said plurality, a differentially settable member being provided for causing said register to be transversely moved to engage a predetermined number of said exceeding denominations with said actuators.

There are known printing calculating machines of the above type wherein the exceeding denominations are normally at left of the actuators, the register being displaced rightwards in some specific cases for engaging the exceeding denomination with the actuators. When the total is taken, the figures accumulated in said denominations are cut off, without having any record thereof on the paper.

This and other disadvantages are obviated by the printing calculating machine according to the invention, which is characterized by an additional printing member adapted to be conditioned by said settable member for printing a figure corresponding to said predetermined member simultaneously with the amount printed by said plurality of printing members.

This and other characteristics of the invention will become apparent from the following description of a preferred embodiment thereof and from the accompanying drawings, wherein:

FIG. 1 is a left hand partial longitudinal sectional view of a printing calculating machine according to the invention;

FIG. 2 is a left hand sectional view of a detail of the calculating machine;

FIG. 3 is a left hand sectional view of another detail of the calculating machine;

FIG. 4 is a second left hand partial sectional view of the calculating machine;

FIG. 5 is a third left hand partial sectional view of the calculating machine;

FIG. 6 is a fourth left hand partial sectional view of the calculating machine;

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FIG. 7 is a front sectional view taken according to the line VII—VII of FIG. 4;

FIG. 8 is a partial plan view of the calculating machine;

FIG. 9 is a front sectional view taken according to the line IX—IX of FIG. 8;

FIG. 10 is a left hand partial sectional view of a modified form of the calculating machine;

FIG. 11 is a partial plan view of FIG. 10.

General description

The calculating machine comprises fifteen actuators formed of racks **15** (FIG. 1) differentially movably under the control of a universal bar **16** through an advancing stroke (leftwards in FIG. 1) and a return stroke to represent an amount. The calculating machine comprises also a first storing device formed of a set up carriage **17** transversely slidable on a square shaft **18** rotatably mounted on the machine frame, and on a shaft **19** vertically movable on the same frame. The carriage **17** is provided with fifteen toothed sectors **21** rotatably and slidably mounted on the shaft **19** and adapted to be differentially set up clockwise from the position zero indicated in FIG. 1 by a ten key keyboard not shown in the drawings. A second storing device formed of a second set up carriage **22**, substantially symmetrical to the carriage **17** with respect to the racks **15**, is transversely slidable on a second square shaft **23** rotatable on the machine frame, and on a vertically movable shaft **24**. The carriage **22** is provided with fifteen toothed sectors **26** rotatably and slidably mounted on the shaft **24** and adapted to be differentially set up counterclockwise with respect to the zero position of FIG. 1, through the same ten key keyboard. The sectors **21** of the carriage **17** and the sectors **26** of the carriage **22** are normally rotated according to the last amount set up thereon, in the manner described in the United States patent application No. 398,915, dated Sept. 24, 1964, now Patent No. 3,319,882.

The calculating machine is provided with a cyclically operating mechanism comprising three shafts **30**, **31** and **32** (FIG. 6), substantially described in the United States patent application No. 506,958, dated Nov. 9, 1965, now Patent No. 3,331,556. The shaft **30** is rotated counterclockwise one revolution at the depression of any function motor key. Near the end of its cycle the shaft **30** starts the first part of an auxiliary cycle effected by the shaft **31** bodily rotated clockwise with a sleeve **44**. The shaft **31** and the sleeve **44** are stopped after being rotated 270 degrees clockwise, while a cycle of the third shaft **32** is started to control the universal bar **16** of the racks **15** (FIG. 1), whereby the shaft **32** represents the main shaft of the machine. At the end of this cycle a second part of the auxiliary cycle is effected. The whole of one cycle of the shafts **30**, **31** and **32** represents a machine cycle.

The calculating machine is also provided with a program control device comprising a shaft **51** (FIG. 1) having a set of cams each one adapted to control a function of the machine, substantially as described in the United States copending patent application Ser. No. 533,974, dated Mar. 14, 1966, now patent No. 3,370,788, entitled: Program Control Device for a Calculating or Like Machine. Particularly the shaft **51** is adapted to assume a predetermined sequence of stations selected from a plurality of twenty stations I, II, . . . XX. The shaft **51** is selectively rotated under the control of a cam of the sleeve **44**, and predisposes some machine functions. For example the shaft **51** is provided with a pair of cams **54** and **56** (FIG. 1) associated with the carriages **17** and **22** and each one adapted to control the transverse displacement of the corresponding carriage. To this end the cam **54**, through a lever **57** fulcrumed at **58**, is adapted to locate a link **59** into three different angular positions. The link **59** is connected with a crank lever **61** secured to a

square shaft 62 slidably mounting a rack 63. The latter on one hand is provided with a notch engaged by a projection 64 of the carriage 17, on the other hand it is adapted to engage a pinion 66 for being displaced leftwards, or a pinion 67 for being displaced rightwards, or an arm 68 of a bail 69 for being transversely locked. The pinion 66 is secured to a longitudinal shaft 71 adapted to be rotated by a clutch not shown in the drawings, while the pinion 67 is secured to a second shaft 72 connected to the shaft 71 through a pair of pinions 73 to be rotated in an opposite direction.

Similarly the cam 56 (FIG. 1) of the shaft 51, through a lever 77 also fulcrumed at 58 is adapted to locate a second link 78 into three different positions. The link 78 is connected with a crank lever 79 secured to a square shaft 81 slidably mounting a second rack 82 engaging a projection 83 of the carriage 22. The rack 82 is adapted to engage the pinion 67 for being displaced leftwards, or the pinion 66 for being displaced rightwards, or another arm 84 of the bail 69 for being transversely locked. The carriages 17 and 22 are drawn rightwards by individual springs not shown in the drawings, which are normally without effect because one of the pinions 73 is locked by a latch 76.

Thereafter the links 59 and 76 predisposed by the corresponding cams 54 and 56 are longitudinally displaced by two lugs 87 and 88 of a lever 89 fulcrumed on a stationary shaft 91. The lever 89 is rocked clockwise at the beginning of any cycle of the shaft 30, as well as in the first part of the auxiliary cycle before the program shaft 51 is displaced, whereby the function predisposed by the program when it reaches a specific station is actuated only in the following machine cycle.

Each one of the two carriages 17 and 22 is associated with a sector 92 (FIG. 2), respectively 93, slidably mounted on a corresponding shaft 311, respectively 312, but bodily rotatable therewith. Each sector 92, 93 is urged leftwards by a compression spring 315 (FIG. 11) to contact a projection 316 of a corresponding toothed bent edge 313, respectively 314 (FIG. 2), of a slide 94 transversely slidable on the shafts 311 and 312. The slide 94 is provided with another toothed edge engaging a pinion 96 synchronously rotating with the shaft 71. The sectors 92 and 93 are selected by a cam of the program shaft 51 and are operated for controlling the transverse displacement of the corresponding carriage, whereas their position on the slide 94 represents a record of the number of denominations set up on the same carriage.

Furthermore, each sector 92, 93 is adapted to cooperate with a corresponding lug 317, 318 of a slide 319 slidably mounted on two stationary pins 320 (FIG. 11). The slide 319 is normally urged rightwards by a spring 321 prevailing over the springs 315 and is provided with a projection 322 adapted to cooperate with a bail 323 fulcrumed on a vertical shaft 324. In turn the bail 323 may cooperate with a clutch not shown in the drawings, which is adapted to be engaged by a cam of the shaft 30 (FIG. 6) and by a cam of the shaft 31 for rotating the shaft 71 and the pinion 96 (FIG. 11) to move the slide 94 leftwards.

When one of the carriages 17 and 22 is to be displaced leftwards, the above clutch is engaged while the corresponding sector 92, 93 (FIG. 10) is rocked at first counterclockwise for temporarily disengaging the toothed edge 313, 314. Thereafter the sector 92, 93 is returned clockwise to an intermediate position so as to reengage the edge 313, 314 and to lie on the horizontal plane of the lug 317, 318 of the slide 319. Now, when the sector 92, 93 encounters the corresponding lug 317, 318, the slide 319 (FIG. 11) is displaced leftwards thus rocking the bail 323 clockwise, whereby the above clutch is disengaged. The slide 319 may return rightwards when the sector 92, 93 (FIG. 2) will be again disengaged from the toothed edge 313, 314.

Furthermore, the calculating machine comprises a rack 115 (FIGS. 3 and 9) which will be called hereinafter "capacity rack." The rack 115 is provided with two arms 270 and 271 slidably mounted on a square shaft 116 rotatably mounted on the machine frame. The rack 115 may alternately engage a pinion 117 of the shaft 72 for being displaced leftwards, or a pinion 118 of the shaft 71 for being displaced rightwards, or a projection 119 of the bail 69 for being transversely locked. The rack 115 is normally urged rightwards by a spring 121 and engages the pinion 117. The diameter of the pinions 117 and 118 is less than that of the pinions 66 and 67, whereby the rack 115 has a correspondingly minor pitch.

Secured to the shaft 116 is an arm 122 (FIG. 3) pin and slot connected with a link 123 slidably mounted on a stationary pin 124. Furthermore the link 123 is normally spring urged to contact a pin 125 of a lever 126 fulcrumed at 58 and normally urged by a spring 127 to contact a cam 128 of the program shaft 51. The link 123 is provided with two complementary stepped edges which may cooperate with the lugs 87 and 88 of the lever 89.

The carriages 17 and 22 and the rack 115 (FIGS. 1 and 3) may be restored rightwards by disengaging the latch 76 from the pinion 73, or by causing a cam of the sleeve 44 operating during the second part of the auxiliary cycle to disengage, under the control of the program shaft 51, the bail 69 from the rack 115, 63 and 82. When the program shaft 51 is at rest, it normally predisposes the disengagement of the sole latch 76.

The calculating machine is provided with a printing device comprising fifteen typewheels 129 (FIG. 2), each one connected to one of the actuators 15 by an intermediate lever 130. The levers 130 are controlled by a universal bar 131 carried by a pair of arms 132 fulcrumed at 133 and rocked clockwise only in the printing cycles. The typewheels 129 are individually mounted on a slide 120 having a projection 120' adapted to be controlled by a zero printing control plate 107 in the manner described in the United States patent application No. 405,368, dated Oct. 21, 1964, now patent No. 3,260,499. To this end, before printing an amount, the carriage 17 (FIG. 1) is displaced leftwards together with the slide 94, till the plate 107, which is moved leftwards by the slide 94, is placed at left of the highest denomination of the amount to be printed. In this manner the carriage 17 is aligned with the amount to be printed and, in the case a total is taken, said total is automatically back transferred to the carriage 17.

The calculating machine is provided with an automatic multiplication device adapted to process the multiplier starting from the highest order, substantially as described in the copending United States patent application Ser. No. 539,457, dated Apr. 1, 1966, entitled, "Automatic Short-cut Multiplication Device for a Calculating Machine." Upon setting up the multiplicand into the carriage 17, a multiplication key is depressed and on one hand it causes the multiplicand to be printed, on the other it starts the program shaft 51 for a sequence of stations comprising the stations VI, VII, XII and XIV. The program in the station VI predisposes the carriage 22 for setting up the multiplier.

Then the carriage 22 is displaced leftwards step by step together with the carriage 17 and the capacity rack 115, which is thus displaced leftwards as many steps as the sum of the denominations of the multiplicand and the multiplier.

Now a product key is depressed and under the control of the program causes the carriage 22 to be returned rightwards. Thereafter the program predisposes the carriage 22 for being displaced leftwards and the carriage 17 for being displaced rightwards. Then, under the control of the program in the station VII, the sectors 26 are sequentially sensed by a sensing device comprising a support generically indicated by the numeral 109, for controlling the num-

ber of cycles required by the corresponding multiplier denomination.

The multiplier may be already stored in the carriage 22. In this case the product key is depressed without setting up the multiplier through the keyboard. Then, before beginning the multiplication, under the control of the program, the two carriages 17 and 22 are tabulated leftwards through a number of steps equal to the number of the denominations of the multiplier. The support 109 at the beginning of the multiplication is displaced leftwards and is then locked in an effective position. Thereafter the carriage 22 is returned at right, while the support 109 is lowered for sequentially cooperating with the various sectors 26 of the multiplier carriage 22.

For shifting from one denomination to the next lower one of the multiplier, the carriage 22 is displaced leftwards step by step, while the carriage 17 is returned rightwards step by step. When the carriage 22 reaches the position it had immediately after the set up operation, the sector 93 (FIG. 2) causes the program shaft 51 to be displaced to the station XII, wherein it causes the multiplier to be printed. Finally, the program in the station XIV causes the product to be printed.

Furthermore, the calculating machine is provided with an automatic division device of the type described in the copending United States patent application Ser. No. 539,379, dated Apr. 1, 1966, entitled: Ten Key Calculating Machine Adapted To Effect Multiplications as Well as Divisions. Upon setting up the dividend into the carriage 17, a division key is depressed, which on one hand causes the dividend to be printed, and on the other hand starts the program shaft 51 for a sequence of stations comprising the stations X, XIII, XV, XVI, XVII, XVIII and XIX. The program in the station X predisposes the carriage 22 for setting up the divisor and the capacity rack 115 for being displaced leftwards.

Thereafter a quotient key is depressed and, under the control of the program in the station XIII, causes the divisor to be printed. Then under the control of the program in the station XV, the capacity rack 115 is predisposed for being displaced leftwards and the divisor is automatically aligned with the dividend, whereby the rack 115 is displaced leftwards a number of steps equal to the maximum number of denominations of the quotient. The carriage 17 is now returned rightwards and under the control of the program in the station XVI it is cleared, while the carriage 22 and the rack 115 are predisposed for being returned rightwards.

Thereafter, under the control of the program in the station XVII, a counting member, generically indicated by the numeral 110, accumulates the quotient denominations digit by digit into the sectors 21 of the carriage 17. For shifting from one denomination to the other of the quotient, the carriage 17 is displaced step by step leftwards, while the carriage 22 and the rack 115 are returned step by step rightwards. When the rack 115 is displaced behind its initial position, it causes the program shaft 51 to be displaced to the station XVIII, wherein the quotient is printed. Then the program is displaced to the station XIX, wherein the division remainder is printed.

Cut-off denominations from the product

The racks 15 may cooperate with a register 135 of the type having two sets of intermeshing pinions. Particularly, the register 135 is provided with twenty pairs of pinions (FIG. 7), that is with five denominations 136 exceeding the capacity of the carriages 17 and 22 and the racks 15, substantially of the type described in the copending United States patent application Ser. No. 537,489, dated Mar. 25, 1966, now Patent No. 3,358,917, entitled Total Taking Device for a Calculating or Like Machine, with reference to FIG. 7 thereof. Since the denominations 136 may accumulate denominations of a product or a dividend to be cut off, they will be hereinafter called cut off denominations. The pinions of the register 135 are rotatably mount-

ed on a pair of shafts 137 carried by two flanks 138 and 139, each one secured to a shaft 141, respectively 142. The shafts 141 and 142 are rotatably and slidably mounted on two plates 143 transversely stationary, but adapted to be vertically displaced for engaging the register 135 with the racks 15. Normally the register 135 is located in the position of FIG. 7, wherein the five cut off denominations 136 are at right of the racks 15.

The shaft 141 is provided with two flanges 144, co-operating with a roller 146 of a lever 147 fulcrumed on a shaft 148 rotatably mounted on the machine frame. Secured to the shaft 148 are also two opposite toothed sectors 149 and 151 engaging two vertical slides 152 and 153 vertically slidable on two stationary pins 154. The two slides 152 and 153 are provided with two opposite stepped edges 156, respectively 157, adapted to cooperate with a lug 158 of a slide 159. This latter is horizontally slidable on two pins 161 secured to a lug 162 of a vertical link 163 slidably mounted on a stationary pin 164 (FIG. 6). The link 163 is also linked at 166 with a lever 167 pivoted at 168 and cooperating with a pair of complementary cams 169 of the sleeve 44.

The slide 159 is provided with another lug 171 engaging a forked arm of a horizontal lever 172 (FIG. 8) fulcrumed on a stationary pivot 173. A second forked arm of the lever 172 engages a lug 174 of a lever 176 (FIG. 6) fulcrumed on a stationary pivot 177. The lever 176 is provided with a shoulder 178 adapted to cooperate with the upper end of a slide 179 slidably mounted on two stationary pins 181. The slide 184 is provided with a pin 182 cooperating with a tapered slot 183 of a horizontal slide 184, which is adapted to be displaced forwards at the depression of a total key in a known manner. Furthermore the lever 176 is linked at 186 with a link 187 connected at 188 with a lever 189 fulcrumed on a stationary pivot 191. The lever 189 is normally urged by a spring 192 to contact cam 193 of the shaft 30.

The link 187 is provided with a slot 194 engaged by a pin 196 of a bail 197 (FIG. 4) fulcrumed on a pivot 198. The transverse portion of the bail 197 is engaged by a notch 199 of a sensing member formed of a bail 200 (see also FIG. 7) rotatably and slidably mounted on the pivot 198. The bail 200 is provided with a lug 201 normally located above both a stepped edge 202 of a stationary plate 203 and a first stepped edge 204 (FIG. 5) of a differentially settable member or slide 206 (FIG. 4) slidably mounted on two stationary pins 208 and 209.

Located at right of the slide 206 (FIG. 7) and distanced therefrom twice the distance between the slide 206 and the plate 203 is a second stationary plate 211 (FIG. 6) adapted to cooperate with the lug 201 (FIG. 7) when the bail 200 is displaced at right of the slide 206. To this end the bail 200 is provided with a projection 212 having a notch engaged by a bar 213 carried by two arms 214 and 216 secured to a longitudinal shaft 217 rotatably mounted on the machine frame. The arm 216 is connected through a link 218 (FIG. 5) with a lever 219 fulcrumed at 221. Linked with the lever 219 is a link 222 pin and slot connected with a lever 223 fulcrumed at 58 and normally urged by a spring 224 to contact a cam 226 of the program shaft 51. The link 222 is provided with two complementary stepped edges 227 adapted to cooperate with a pair of lugs 87' and 88' of a second lever 89' fulcrumed on the shaft 91 and movable simultaneously with the lever 89 (FIG. 1) in a manner known per se.

The slide 206 is provided with an element or shoulder 228 adapted to be frontally engaged by the lug 201 of the bail 200. The forward end of the slide 206 is provided with a toothed portion 232 engaging a pinion 233 rotatably mounted on a stationary shaft 234. The pinion 233 is axially provided with a tooth 236 (FIG. 8) adapted to cooperate with a tooth 237 of a second pinion 238 secured to a manipulative knob 239 rotatably mounted on the shaft 234. The pinion 238 cooperates with a spring

urged locking member 241 (FIG. 5) the action of which prevails over the spring 231. The cylindrical surface of the knob 239 (FIG. 8) is provided with a scale indicating the number of denominations the register is to be displaced.

Furthermore, the slide 206 (FIG. 5) is provided with a toothed edge 242 adapted to be engaged by a lug 243 of a lever 244 fulcrumed at 246 and provided with a pin 247 cooperating with a cam slot 248 of the lever 219. Finally, the slide 206 is provided with a second stepped edge 249 (FIG. 4) adapted to be sensed by a lug 251 of a bail 252 fulcrumed on a stationary shaft 253. Another arm 254 of the bail 252 is normally urged by a spring 256 to contact a pin 257 secured to one of the two lugs 132 of the universal bar 131. Linked with the arm 254 is also a rack 258 engaging an additional printing member or typewheel 259 similar to the typewheels 129 (FIG. 2) and provided with numerical characters from zero to five differently shaped with respect to the figures of the typewheels 129, for example leaned towards the left (FIG. 4). The typewheel 259 is carried by a slide 260 located at left of the slide of the typewheels 129 (see also FIG. 7) and not provided with the projection 120' cooperating with the zero printing control plate 107. The slide 260 is provided with a bent lug 261 adapted to selectively cooperate with a printing control member formed of a lever 263 fulcrumed at 264 and having a pair of lugs 262 and 262' mutually distanced by a gap 269. The lever 263 is normally urged by a spring 266 to contact a lever 267 (FIG. 7) fulcrumed at 268 and connected through a link 270 with an arm 271 secured to the shaft 217.

Normally the knob 239 is located at its zero position as shown in FIG. 8, whereby the slide 206 is located in the longitudinal position of FIG. 5. Then the lug 201 in sensing the stepped edge 204 is not affected thereby, whereas the lever 263 (FIG. 4) through its lug 262 locks the slide 260, thus preventing the typewheel 259 from the printing.

Assuming that a multiplication is to be effected, the product of which is requested to have a predetermined number of denominations cut off, for example two denominations at right of a decimal point, before starting the multiplication the number of denominations to be cut off is set up by manually rotating the knob 239 (FIG. 5) clockwise two steps. The knob 239 through the tooth 237 of the pinion 238 rotates the pinion 233, which in turn displaces the slide 206 rearwards two steps. During the cycle wherein the multiplicand is printed, and in all the cycles effected in a station of the program wherein the cam 226 holds the link 222 in the position of FIG. 5, the register 135 is not displaced because the lug 201 (FIGS. 4 and 7) of the bail 200 senses the toothed edge 202 of the stationary plate 203 and is immediately arrested thereby. Furthermore, the lug 262 of the lever 263 still prevents the typewheel 259 from printing.

After having set up the multiplicand and the multiplier, when the program shaft 51 is located in the station VII, the cam 226 predisposes the link 222 in its central position. During the cycle of the shaft 30 which precedes the counting cycles of the shaft 32 corresponding to the first denomination of the multiplier, the lever 89' is rocked clockwise and displaces the link 222 rearwards, thus rocking the lever 219 counterclockwise. Then the cam slot 248 rocks the lever 244, the lug 243 of which engages the toothed edge 242, thus positively locking the slide 206 in the reached position. An accidental rotation of the knob 239 during the multiplication is thus prevented.

Furthermore, the lever 219 through the link 218 rocks the arm 216 (FIG. 7) counterclockwise bodily with the shaft 217, the arm 214 and the bar 213. This latter displaces the bail 200 rightwards and removes the lug 201 from the stationary plate 203, whereby the lug 201 may sense only the slide 206. The arm 271 is also rocked bodily with the shaft 217 and, through the link 270 and

the lever 267, rocks the lever 263 (FIG. 4) counterclockwise to locate the gap 269 into the path of the lug 261 thus releasing the slide 260.

Thereafter, the cam 193 (FIG. 6) of the shaft 30 causes the spring 192 to rock the lever 189 clockwise. The lever 189 through the link 187 and the pin 196 rocks the bail 197 (FIG. 4) counterclockwise together with the bail 200. The lug 201 after being rocked two steps is now arrested by the stepped edge 204 (FIG. 5) of the slide 206. Therefore, through the bail 197 and the slide 187 (FIG. 6), the lever 174 is rotated counterclockwise two steps. In turn the lever 172 (FIG. 8), displaces the slide 159 leftwards two steps.

During the first part of the following auxiliary cycle of the shaft 31 (FIG. 6) and of the sleeve 44, the cams 169 rock the lever 167 clockwise. Then the slide 163, through the pins 161 (FIG. 7) lowers the slide 159, the lug 158 of which engages the two complementary stepped edges 156 and 157 of the slides 152 and 153. These latter now through the sectors 149 and 151 and the shaft 148, rock the lever 147 clockwise, thus displacing the register 135 leftwards two steps. The first two cut off denominations 136 of the register 135 are thus located in correspondence with the racks 15, whereby the two lowest denominations of the product will be accumulated into the denominations 136.

At the end of the counting cycles of the multiplication, the program shaft 51 (FIG. 5) is displaced to the station XII to control the printing of the multiplier. Thus the cam 226 through the lever 223 additionally displaces the link 222 downwards. In the cycle of the shaft 30 preceding the printing of the multiplier, the lever 89' through the link 222 rocks the lever 219 additionally counterclockwise. Now the slot 248 no longer displaces the lever 244 which still locks the slide 206. On the contrary, the link 218 through the arm 216 (FIG. 7), the shaft 217, the link 270 and the lever 267, additionally rocks the lever 263 (FIG. 4), thus locating the lug 262' into the path of the lug 261. Furthermore the bar 213, which is rocked counterclockwise bodily with the arms 214 and 216 (FIG. 7), additionally displaces the bail 200 rightwards, thus locating the lug 201 at right of the slide 206 and above the stationary plate 211.

Thereafter, the cam 193 (FIG. 6) of the shaft 30, through the lever 189, the link 187 and the bail 197 (FIG. 4) causes the bail 200 to sense the stationary plate 211 (FIG. 7). Now this latter immediately arrests the lug 201 of the bail 200, whereby the slide 159 remains in the position of FIG. 7. Then, the cams 169 (FIG. 6) of the sleeve 44, through the lever 167 and the slide 163 lower the slide 159. The lug 158 (FIG. 7) of the slide 159 through the plates 152 and 153, the sectors 149 and 151, and the lever 147, returns the register 135 to the right hand end position, whereby the cut off denominations 136 are returned at right of the racks 15. Simultaneously the program shaft 51 is displaced to the station XIV.

During the subsequent cycle of the main shaft 32 wherein the multiplier is printed, the arms 132 (FIG. 4) of the universal bar 131 are rocked clockwise and the pin 257 releases the arm 254 of the bail 252. Then the lug 251 of the bail 252 senses the stepped edge 249 of the slide 206, thus causing the rack 258 to position the typewheel 259 for printing the figure "2." The lug 262' however still prevents the typewheel 259 from printing.

Furthermore during this cycle, which is a non-print cycle, the cut off denominations 136 are zeroized in the manner described in the cited Patent No. 3,358,917 entitled Total Taking Device for a Calculating or Like Machine, whereby the slide 184 (FIG. 6) has been displaced forwards by the automatic depression of the corresponding total taking key, which was effected at the beginning of the cycle of the shaft 30. Then the slot 183 of the slide 184 raises the slide 179 which is brought into the path of the shoulder 178 of the lever 176. The bail 200 (FIG. 4) is thus prevented by the slide 179 from sensing the slide

206 both in this and in the following machine cycle. In the cycle of the shaft 30, relating to the following machine cycle, the lever 89' (FIG. 5) returns the lever 219, and therefore the bail 200 (FIG. 7) and the lever 263 (FIG. 4), into their intermediate position. Since the bail 200 is prevented by the slide 179 (FIG. 6) from sensing the stepped edge 204 (FIG. 4) of the slide 206, the register 135 remains in the right hand position.

During the cycle of the shaft 32 the product is finally printed, the two lowest denominations of which have been cut off. Therefore, the arms 132 are rocked clockwise again and enable the bail 252 to sense again the stepped edge 249. Now the bail 252 predisposes the typewheel 259 according to the figure "2," which is printed at left of the product, to indicate the number of cut off denominations which in this case is equal to the number of steps effected by the register 135 for accumulating the product.

Extended multiplication

The calculating machine is adapted to effect multiplications the product of which exceeds the capacity of the actuators. Such multiplication will be called "Extended multiplication." To this end the arm 270 (FIG. 9) of the capacity rack 115 is provided with a projection 272 normally urged by the spring 121 to contact an arm 273 of a slide 274 transversely slidable on a shaft 276 and on a stationary pivot 277. Furthermore, the slide 274 is provided with a second arm 278 distanced from the arm 270 fifteen steps of the rack 115. A lug 279 (FIG. 5) of the arm 278 engages a forked arm of a lever 281 (FIG. 8) fulcrumed at 282 and engaging with a second forked arm a lug 283 of a member automatically movable from a rest position and formed of a longitudinal slide 284 (FIG. 4). This latter is slidably mounted on a pair of pins 286 and carries the pivot 198 of the bail 200. Furthermore, the slide 274 (FIG. 9) is provided with a tapered shoulder 287 adapted to engage a pin 288 of a lever 289 fulcrumed on the pivot 277 and connected through a rod 292 with a lever 293. This latter is fulcrumed on a pivot 294 and is adapted to engage a shoulder 296 of the link 59 (FIG. 1).

The capacity rack 115 (FIG. 9) engages the pinion 117 when the multiplicand is set up, as well as when the multiplier is set up, whereby the rack 115 is displaced leftwards as many steps as the sum of the number of denominations of the multiplicand and the multiplier. If this sum is comprised between fifteen and twenty, the product overcomes the capacity of the racks 15 (FIG. 7), but does not overcome the capacity of the register 135. Then the multiplication is effected by automatically causing the cut off denominations 136 of the register 135 to accumulate the denominations of the products exceeding the capacity of the racks 15.

In fact, when the rack 115 (FIG. 9) has been displaced fifteen steps leftwards, the projection 272 of the arm 270 engages the arm 278 of the slide 274. Now, if the rack 115 is additionally displaced leftwards, the slide 274 is displaced leftwards as well and, through the shoulder 287, the lever 289, the rod 292 and the lever 293, predisposes the link 59 in its central position. Furthermore the slide 274, through the lever 281, displaces the slide 284 (FIG. 4) rearwards, together with the pivot 198, the bail 197 and the bail 200. Thus the lug 201 of the bail 200 engages the shoulder 218 of the slide 206, which is displaced rearwards as many steps as the denominations of the product exceeding the capacity of the racks 15.

In the station VII of the program, during the cycle of the shaft 30 concerning the first denomination of the multiplier, due to the position of the link 59, the rack 63 (FIG. 1) is engaged with the arm 68 of the bail 69, instead of the pinion 67, while the slide 206 (FIG. 5) is locked in the reached position by the lever 244. Now, during the step by step displacements of the carriage 22, the rack 115 (FIG. 9), the slide 284 (FIG. 4) and the bail 200 are returned rearwards step by step. Therefore

in the cycle of the shaft 30 concerning each following denomination of the multiplier, the lug 201 of the bail 200 senses the stepped edge 204 of the slide 206 and displaces the register 135 (FIG. 7) leftwards step by step, while the carriage 17 remains at its extreme leftward position.

When the bail 200 (FIG. 4), and therefore also the slide 284, are restored forwards, the bail 200 causes the register 135 (FIG. 7) to be no more displaced. In turn, when the slide 274 (FIG. 9) is restored, the shoulder 287 releases the pin 286, whereby the link 59 (FIG. 1) returns to the lower position. Then the rack 63 engages the pinion 67 and is thus predisposed for being displaced rightwards step by step. The multiplications will be completed in a manner similar to that above described with reference to the case wherein the slide 206 (FIG. 5) is manually set up for cutting off of a number of denominations of the product equal to the denominations now exceeding the capacity of the racks 15. Therefore the product will be printed with said denominations cut off, while the typewheel 259 (FIG. 4) will print a figure equal to the number of denominations cut off at right of the product in the manner above described.

According to a modified form of the invention, the typewheel 259 (FIG. 10) is provided with a further character ">5," whereas the slide 206 is provided with an edge 326 distanced two steps from the highest step of the stepped edge 249. A further settable member or slide 328 is provided with a projection 327 normally located into the path of the lug 251 and adapted to arrest the lug 251 one step higher than the highest step of the edge 249. The slide 328 is provided with a window 329 having a W-shaped edge urged by a spring 330 to cooperate with the pin 208. Furthermore the slide 328 is slidably mounted on a stationary shaft 329 and is provided with a pair of engageable elements or shoulders 331 and 332 adapted to cooperate with a corresponding pair of counterelements or lugs 333 and 334 of a lever 336. This latter is secured to a sleeve 337 (FIG. 11) rotatably and slidably mounted on the shaft 329. Furthermore, secured to the sleeve 337 is an arm 338 normally urged by a spring 339 to contact the projection 322 of the slide 319. Normally the lug 334 of the lever 336 is on the plane of the slide 328, whereas the lug 333 is located on the right of the slide 328.

Furthermore, secured to the lever 336 is a pin 341 cooperating with a notch of a slide 342 (FIG. 10) slidably mounted on a stationary pin 343 and urged by a spring 344 to contact this pin. The slide 342 is also provided with a notch engaged by an arm 346 (FIG. 11) of a bail 347 fulcrumed on a vertical shaft 348. A second arm 349 of the bail 347 is normally located in the transverse path of a projection 351 of the multiplication cycle counting support 109.

Secured to the arm 270 of the capacity rack 115 is a pin 352 adapted to engage a lug 353 of a lever 354, when the rack 115 is displaced leftwards fifteen steps. The lever 354 is fulcrumed at 356 and is normally urged by a spring 357 to contact a stationary stop 358. A second stationary stop 359 is adapted to limit the clockwise rotation of the lever 354. This latter is also connected through a link 361 to a bail 362 fulcrumed on a stationary shaft 363 and provided with a pin 364 adapted to cooperate with the bail 323.

As it has already been mentioned, before the beginning of the multiplication the carriage 22 is displaced leftwards according to the number of denominations of the multiplier. Then generally the sector 93 (FIG. 10) contacts the lug 318 of the slide 319, which thus holds the bail 323 (FIG. 11) rocked clockwise, and the arm 338, together with the sleeve 337 and the lever 336, displaced leftwards in the position shown by broken lines in FIG. 11.

Now, when the support 109 is displaced leftwards, the projection 351 rocks the bail 347 clockwise, thus displacing the slide 342 rearwards. This latter through the pin

341 rocks the lever 336 (FIG. 10) counterclockwise, but if the slide 328 is already displaced forwards as shown in FIG. 10, the lever 336 has no effect on the slide 328. Thereafter the support 109 is lowered and the projection 351 releases the bail 347 which is restored bodily with the slide 342 by the spring 344, whereby the slide 342 will not be further affected till the beginning of the next multiplication. Then the lever 336 is angularly restored, while after the first denomination of the multiplier has been processed, the slide 94 returning rightwards together with the sector 93, causes the slide 319 (FIG. 11) to be transversely restored together with the lever 336.

If the product exceeds the capacity of the racks 15 (FIG. 7), but not the capacity of the register 135, the carriage 17 is displaced leftwards only fifteen steps and is aligned with the highest denomination of the racks 15. The slide 94 (FIG. 10), through the sector 93 and the slide 319, predisposes the lever 336 into the position shown in FIG. 1 by broken lines as in the preceding case. In the case the slide 206 is displaced leftwards five steps, when the product is printed, the bail 252 is arrested by the projection 327 and predisposes the typewheel 259 for printing the figure "5."

Now, it is assumed that the multiplier is already set up on the carriage 22 and that the multiplicand set up is such as the product exceeds the capacity of the register 135 (FIG. 7). When the two carriages 17 and 22 (FIG. 11) are tabulated leftwards, the rack 115, upon being displaced twenty steps thus reaching the position corresponding to the maximum capacity of the register, engages with the pin 352 the lug 353. Then the lever 354 is rocked clockwise and, through the link 361, the bail 362, and the pin 364, rocks the bail 323 clockwise, thus disengaging the clutch of the shaft 71, whereby the slide 94 is arrested. Then the sector 93 (FIG. 10) does not reach the lug 318 of the slide 319, which remains in the position of FIG. 11 together with the arm 338 and the lever 336. In turn the rearward displacement of the bail 200 (FIG. 10) and of the slide 206 is stopped together with the displacement of the rack 115 (FIG. 11).

Now, when the support 109 is displaced leftwards, the projection 351, through the bail 347 and the slide 342, rocks the lever 336 (FIG. 10) counterclockwise. Then the lug 334 of the lever 336 engages the shoulder 332 and displaces the slide 328 rearwards thus locating the projection 327 out of the path of the lug 251. Now the multiplication is effected as in the preceding case, whereby the register 135 (FIG. 7) is firstly displaced leftwards step by step till its left hand extreme position, that is through five steps. Thereafter the carriage 17 (FIG. 11) begins to be displaced rightwards.

The only difference with the preceding case is due to the fact that, when the lowest denomination set up on the carriage 17 is aligned with the rack 15 of the lowest denomination, the multiplier is not exhausted. Then the multiplication is extended by additionally displacing the carriage 17 rightwards step by step to process the exceeding denominations of the multiplier, the lower denominations of the multiplicand being progressively excluded. Then, when the product is printed, the lug 251 (FIG. 10) of the bail 252 is arrested by the edge 326 of the slide 206 so predisposing the wheel 259 in correspondence to the character ">5," whereby a record is made of the fact that the product exceeds the register capacity and that the cut off denominations are more than five.

The slide 328 may be restored forwards only at the beginning of a multiplication, the product of which does not exceed the register capacity. In fact then, when the support 109 rocks the lever 336 clockwise, the slide 319 (FIG. 11) displaces the lever 336 leftwards, whereby the lug 333 engages the shoulder 331 (FIG. 10) and displaces the slide 328 forwards.

Decimal point in the quotient

The slide 206 (FIG. 5) is provided with another toothed

edge 297 engaging a pinion 298 secured to the shaft 276, which is rotatably mounted on the machine frame. Furthermore, slidably and rotatably mounted on the shaft 276 is a stepped member or drum 300 (FIG. 8) normally urged leftwards by a compression spring 301 and adapted to cooperate with a lug 302 of the arm 271 of the capacity rack 115. The right end of the rack 115 (FIG. 9) is provided with a tapered edge 303 adapted to engage a shoulder 304 of the link 78.

The drum 300 (FIG. 8) is normally contacted by a lever 306 fulcrumed at 307 and urged counterclockwise by a spring 308. The lever 306 when rocked clockwise causes the division to be stopped in the manner described in the cited patent application Ser. No. 539,379 entitled: Ten Keg Calculating Machine Adapted To Effect Multiplications as Well as Divisions.

Furthermore, the lever 306 may be engaged by an end of a slide 372 slidably mounted on a stationary pin 373 and connected with a bail 374 fulcrumed at 375 and normally urged by a spring 376 to contact a stationary stop 377. An arm 378 of the bail 374 is adapted to be engaged by the left end of the carriage 17 upon being displaced leftwards fifteen steps and therefore at the end of its leftward stroke. The slide 284 (FIG. 4) is provided with a lug 307 adapted to cooperate with a projection 308 of another slide 309 slidably mounted on the pins 208 and 209 and normally urged by a spring 310 to contact the pin 209. The slide 309 is provided with a stepped edge 379 opposite to the stepped edge 249 of the slide 206 and adapted to be sensed by the same lug 251 of the bail 252, but normally out of the path thereof. If the knob 239 is located in the zero position as in FIG. 5, on one hand the slide 206 does not cause the register to be displaced, on the other hand the stepped drum 300 remains in the position of FIG. 8 and operates the lever 306 to stop the division when the capacity rack 115 is displaced rightwards one step from the position of FIG. 8, whereby the division is stopped at the end of the accumulation of the lowest whole denomination of the quotient.

Now assuming that a quotient is required with a predetermined number of decimal denominations, for example three denominations at right of the decimal point, before starting the division the knob 239 is rotated clockwise three steps from the position of FIG. 5. Then the knob 239 displaces the slide 206 rearwards three steps, whereby the pinion 298 through the shaft 276 rotates the stepped drum 300 clockwise three steps. Now the lug 302 (FIG. 8) of the capacity rack 115 must be displaced rightwards four steps besides the rest position before displacing the drum 300 leftwards to rock the lever 306, whereby three additional denominations of the quotient will be accumulated in the carriage 17.

During the cycles wherein the dividend and the divisor are printed, the cam 226 (FIG. 5) of the program shaft 51 holds the link 222 in the position of FIG. 5, whereby the stationary plate 203 does not allow the lug 251 to displace the register 135 leftwards, whereas the typewheel 259 (FIG. 4) is prevented from printing. The link 222 (FIG. 5) is not displaced even when the program shaft 51 is located in the stations XV, XVI and XVII in order to accumulate the quotient. As already mentioned, when the program shaft 51 is located in the station XVII, the carriage 22 is displaced rightwards step by step together with the capacity rack 115. When this latter is restored to the position shown in FIG. 9 in order to accumulate the lowest whole denomination of the quotient, the projection 272 of its arm 270 contacts again the arm 273 of the slide 274, while the tapered edge 303 engages the shoulder 304 and locates the link 78 (FIG. 1) in the central position, whereby the rack 82 will engage the arm 84 of the bail 69.

At the beginning of the following cycle of the shaft 30, the rack 115 is displaced one step rightwards, while the carriage 22 remains in the reached position that is with

all the denominations of the divisor in correspondence with the racks 15. Now, since the rack 115 (FIG. 9) not yet engages the stepped drum 300, this latter does not stop the division, but the arm 270 (FIG. 8) of the rack 115, through the slide 274 and the lever 281, displaces the slide 284 (FIG. 4) forwards together with the pivot 198, the bail 197 and the bail 200. Now during the cycle of the shaft 30, the lug 201 senses the first step of the stepped edge 202 of the stationary plate 203 and predisposes the slide 159 (FIG. 7) for displacing the register 135 leftwards one step. In this manner the dividend-divisor shift required for accumulating the next denomination of the quotient, that is the first decimal denomination of the quotient, is effected by displacing the register 135 leftwards instead of displacing the carriage 22 rightwards.

Similarly, at each further rightward step of the rack 115 (FIG. 9), the bail 200 is displaced one step forwards to cause the register 135 to be displaced one step leftwards. When the lug 302 of the rack 115 encounters the stepped drum 300, rocking the lever 306, it causes the program shaft 51 to be displaced to the station XVIII, wherein the quotient is printed. In this station the cam 226 (FIG. 5) predisposes the link 222 in the central position, whereby the bail 200 (FIG. 7) locates the lug 201 above the slide 206, and the lever 263 (FIG. 4) locates the gap 269 into the path of the lug 261.

Since the slide 206 is displaced forwards three steps, during the cycle wherein the quotient is printed, the bail 252 upon sensing the stepped edge 249 locates the typewheel 259 in correspondence with the figure "3," which is then printed at left of the quotient. Simultaneously the cut off denominations 136 (FIG. 7) are zeroized as in the case of the cycle wherein the multiplier is printed, whereby the slide 184 (FIG. 6) locates the slide 179 into the path of the shoulder 178 of the lever 176, while the program shaft 51 is displaced to the station XIX. Since the cam 226 (FIG. 5) of the program shaft 51 in the station XIX returns the link 222 in the position of FIG. 5, in the following remainder printing cycle, the lug 262 (FIG. 4) of the lever 263 prevents the printing operation of the typewheel 259, while the slide 179 (FIG. 6) prevents the lever 176 from being rocked, whereby the register 135 is restored rightwards.

If the sum of the whole denominations of the quotient and of the required decimal denominations is higher than fifteen, that is it exceeds the capacity of the carriage 17 (FIG. 8) of the quotient, the carriage 17 upon being displaced through fifteen steps engages the bail 374, which is rocked counterclockwise and displaces the slide 372 rightwards, thus rocking the lever 306 clockwise to stop the division. In the quotient printing cycle the lug 251 (FIG. 4) is now arrested by the stepped edge 379 after a number of steps equal to the steps effected by the slide 284. Therefore, now the typewheel 259 prints a figure indicating the number of the decimal denominations of the quotient effectively accumulated, instead of the figure corresponding to the decimal denominations set up on the knob 239.

Percentage calculating device

The pinion 233 (FIGS. 5 and 8) is integral with a second pinion 380 engaging a toothed sector 381 fulcrumed at 382. The sector 381 is provided with an arm 383 (FIG. 5) cooperating with a pin 385 secured to a key 384 for calculating the percentage, substantially of the type described in the cited Patent No. 3,370,788 entitled Program Control Device for a Calculating or Like Machine with reference to the key there indicated by the numeral 349.

When the key 384 is depressed, through the sector 381 the pinion 380 is rotated clockwise four steps from the position of FIG. 5, together with the pinion 232 independently from the position of the knob 239, whereby the slide 206 is displaced rearwards four steps. If a percentage uplift or a percentage discount is to be calculated, the rate,

which generally is given with two denominations at right of the decimal point, is set up as a multiplier. Then the displacement of the slide 206 causes four denominations to be cut off from the product, which thus presents the amount of the required uplift or the increasing or the required discount.

On the contrary if the rate is to be calculated according to the formula

$$\frac{a \pm b}{b}$$

the slide 206 upon being displaced four steps causes the quotient to be calculated with four denominations at right of the decimal point. Said quotient represents the value of the rate percent with two denominations at right of the decimal points.

It is intended that many changes, improvements and additions of parts may be made to the described calculating machines without departing from the scope of the invention, as claimed in the appended claims.

What we claim is:

1. In a printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of printing members associated with said actuators for printing said amount, and a register adapted to cooperate with said actuators, said register having a set of denominations exceeding said plurality, the combination comprising:

- (a) displacing means for transversely displacing said register with respect to said actuators,
- (b) a differentially settable member for controlling said displacing means to cause a predetermined number of said exceeding denominations to cooperate with said actuators,
- (c) an additional printing member,
- (d) and means controlled by said settable member for conditioning said additional printing member to print a figure corresponding to said predetermined number of said exceeding denominations simultaneously with the amount printed by said plurality of printing members.

2. In a printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of printing members associated with said actuators for printing said amount, and a register adapted to cooperate with said actuators, said register having a set of denominations exceeding said plurality, the combination comprising:

- (a) means normally locating said register in an initial transverse position with said exceeding denominations at right of said actuators,
 - (b) displacing means for transversely displacing said register with respect to said actuators,
 - (c) a differentially settable member for controlling said displacing means to cause a predetermined number of said exceeding denominations to cooperate with said actuators to accumulate therein corresponding orders of said amount,
 - (d) a total taking device,
 - (e) means controlled by said device for causing said displacing means to return said register to said initial position to cut off the denominations of the total contained in the exceeding denominations of said register,
 - (f) an additional printing member,
 - (g) means controlled by said settable member to print a figure for predisposing said additional printing member according to said predetermined number of said exceeding denominations,
 - (h) and a printing control member controlled by said device for causing said additional printing member to print said figure simultaneously with said total.
3. In a ten key printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of

printing members associated with said actuators for printing said amount, a multidenominational multiplicand storing device transversely movable with respect to said actuators, a multidenominational multiplier storing device, and a register adapted to cooperate with said actuators, said register having a set of denominations exceeding said plurality, the combination comprising:

- (a) means normally locating said register in an initial transverse position with said exceeding denominations at right of said actuators,
- (b) displacing means for transversely displacing said register with respect to said actuators,
- (c) a manually differentially settable member for predisposing a predetermined number of said exceeding denominations to be cut off from the product,
- (d) means controlled by said settable member before beginning a multiplication for conditioning said displacing means to cause said predetermined number of denominations to cooperate with said actuators,
- (e) a product printing device,
- (f) means controlled by said device for causing said displacing means to return said register to said initial position to cut off said predetermined number of denominations of said product,
- (g) an additional printing member,
- (h) a stepped edge on said settable member,
- (i) means for sensing said stepped edge for predisposing said additional printing member to print a figure according to said predetermined number of said exceeding denominations,
- (j) and a printing control member controlled by said device for causing said additional printing member to print said figure simultaneously with said product.

4. In a ten key printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of printing members associated with said actuators for printing said amount, a multidenominational multiplicand storing device transversely movable with respect to said actuators, a multidenominational multiplier storing device, and a register adapted to cooperate with said actuators, said register having a set of denominations exceeding said plurality, the combination comprising:

- (a) means normally locating said register in an initial transverse position with said exceeding denominations at right of said actuators,
- (b) displacing means for transversely displacing said register with respect to said actuators,
- (c) a manually differentially settable member for predisposing a predetermined number of denominations to be cut off from the product,
- (d) a first stepped edge on said settable member,
- (e) a first member for sensing said first stepped edge before beginning a multiplication for conditioning said displacing means to cause said predetermined number of denominations to cooperate with said actuators,
- (f) a product printing device,
- (g) means controlled by said device for causing said displacing means to return said register to said initial position to cut off said predetermined number of denominations from said product,
- (h) an additional printing member,
- (i) a second stepped edge on said settable member,
- (j) a second member for sensing said second stepped edge to predispose said additional printing member to print a figure according to said predetermined number of said exceeding denominations,
- (k) and a printing control member controlled by said device for causing said additional printing member to print said figure simultaneously with said product.

5. In a ten key printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of printing members associated with said actuators for print-

ing said amount, a multidenominational multiplicand storing device transversely movable with respect to said actuators, a multidenominational storing device, and a register adapted to cooperate with said actuators, said register having a set of denominations exceeding said plurality, the combination comprising:

- (a) means normally locating said register in an initial transverse position with said exceeding denominations at right of said actuators,
- (b) displacing means for transversely displacing said register with respect to said actuators,
- (c) a member differentially settable for predisposing a predetermined number of said exceeding denominations to be cut off from the product,
- (d) a first stepped edge on said settable member,
- (e) a first member for sensing said first stepped edge before beginning a multiplication for conditioning said displacing means to cause said predetermined number of denominations to cooperate with said actuators,
- (f) a member mounting said first sensing member and automatically movable from a rest position according to said predetermined number of denominations of said product exceeding said plurality,
- (g) an element on said settable member,
- (h) a counterelement on said movable member for engaging said element to set said settable member according to said predetermined number,
- (i) a product printing device,
- (j) means controlled by said device for causing said displacing means to return said register to said initial position to cut off said predetermined number of denominations from said product,
- (k) an additional printing member,
- (l) a second stepped edge on said settable member,
- (m) a second member for sensing said second stepped edge to predispose said additional printing member to print a figure according to said predetermined number of said exceeding denominations,
- (n) and a printing control member controlled by said device for causing said additional printing member to print said figure simultaneously with said product.

6. In a calculating machine according to claim 5, wherein the multiplier is processed from the highest to the lower denominations, the combination comprising:

- (o) a member differentially movable for indicating the number of denominations of said product,
- (p) and means controlled by said indicating means when said number of denominations exceeds said plurality for returning said movable member one step towards said rest position upon processing each multiplier denomination to cause said register to be moved one step leftwards instead of displacing said multiplicand storing device rightwards.

7. In a calculating machine according to claim 6, wherein in the case the product overcomes the capacity of said register the multiplication may be completed by suppressing a corresponding number of multiplicand denominations, the combination comprising:

- (q) a further settable member adapted to be automatically set before effecting such a multiplication, said second sensing member being adapted to sense said additional member instead of said second stepped edge when this latter has been set behind a predetermined position.

8. In a calculating machine according to claim 7, the combination comprising:

- (r) setting means for setting said further settable member from a rest position to an effective position upon setting up factors the product of which exceeds the capacity of said register for causing said additional printing member to print a sign indicating that the number of cut off denominations is more than said exceeding denominations, said setting means being also adapted to return said further settable member

to said rest position upon setting up factors the product of which does not exceed said capacity.

9. In a calculating machine according to claim 7, wherein both said storing devices are transversely movable and may be restored without zeroizing the stored factors, the combination comprising:

- (r) means for causing one of said storing devices to be rendered effective through a transverse tabulation,
- (s) arresting means for arresting said indicating member upon being displaced according to the capacity of said register,
- (t) and means controlled by said arresting means for displacing said further settable member from a rest position to an effective position to cause said additional printing member to print a sign indicating that the number of cut off denominations is more than said exceeding denominations.

10. In a calculating machine according to claim 7, the combination comprising:

- (r) a pair of engageable elements on said further settable member,
- (s) a rockably and slidably mounted lever,
- (t) a pair of opposite counterelements on said lever axially mutually distanced for alternately engaging said elements,
- (u) means for axially displacing said lever,
- (v) and means for rocking said lever at the beginning of each multiplication to set said further settable member from a rest position upon setting up factors the product of which exceeds the capacity of said register for causing said additional printing member to print a sign indicating that the number of cut off denominations is more than said exceeding denominations, and to return said further settable member to said rest position upon setting up factors the product of which does not exceed said capacity.

11. In a printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of printing members associated with said actuators for printing said amount, and a register adapted to cooperate with said actuators, said register having a set of denominations exceeding said plurality, the combination comprising:

- (a) means normally locating said register in an initial transverse position with said exceeding denominations at right of said actuators,
- (b) displacing means for transversely displacing said register with respect to said actuators,
- (c) a differentially settable member for controlling said displacing means to cause a predetermined number of said exceeding denominations to cooperate with said actuators,
- (d) a step by step transversely movable storing device for a quotient,
- (e) a member differentially movable for indicating the number of whole denominations of said quotient,
- (f) means controlled by said indicating member when it reaches a predetermined position for normally stopping a division when said storing device has been displaced a number of steps equal to said whole denominations,
- (g) a quotient printing device,
- (h) an additional printing member,
- (i) means controlled by said settable member for predisposing said additional printing member to print a figure according to said predetermined number of said exceeding denominations,
- (j) and a printing control member controlled by said device for causing said additional printing member to print said figure simultaneously with said quotient,
- (k) and a stepped member movable by said settable member for altering said predetermined position so as to condition said storing device to additionally store a corresponding number of decimal denominations of said quotient.

12. In a calculating machine according to claim 11, the combination comprising:

- (l) a transversely movable divisor storing device,
- (m) and means controlled by said indicating member when it reaches said predetermined position for preventing said divisor storing device from being step by step displaced rightwards and for causing said register to be transversely step by step displaced leftwards.

13. In a printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of printing members associated with said actuators for printing said amount, and a register adapted to cooperate with said actuators, said register having a set of denominations exceeding said plurality, the combination comprising:

- (a) means normally locating said register in an initial transverse position with said exceeding denominations at right of said actuators,
- (b) displacing means for transversely displacing said register with respect to said actuators,
- (c) a manually differentially settable member for predisposing a predetermined number of said exceeding denominations to cooperate with said actuators,
- (d) a first stepped edge on said settable member,
- (e) a first member for sensing said first stepped edge before beginning a division for conditioning said displacing means to cause said predetermined number of denominations to accumulate a dividend part,
- (f) a step by step transversely movable storing device for a quotient,
- (g) a member differentially movable for indicating the number of whole denominations of said quotient,
- (h) means controlled by said indicating member when it reaches a predetermined position for normally stopping a division when said storing device has been displaced a number of steps equal to said whole denominations,
- (i) a stepped member movable by said settable member for altering said predetermined position so as to condition said storing device to store a corresponding number of decimal denominations of said quotient,
- (j) a quotient printing device,
- (k) an additional printing member,
- (l) a second stepped edge on said settable member,
- (m) a second stepped member for sensing said second edge for predisposing said additional printing member to print a figure according to said predetermined number of said exceeding denominations,
- (n) a printing control member controlled by said device for causing said additional printing member to print said figure simultaneously with said quotient,
- (o) a transversely movable divisor storing device,
- (p) and means for connecting said second sensing member with said indicating member, said indicating member when it reaches said predetermined position being adapted to prevent said divisor storing device from being further displaced rightwards and enabling said first sensing member to cause said register to be displaced leftwards step by step.

14. In a calculating machine according to claim 13, the combination comprising:

- (q) another stepped member adapted to be sensed by said first sensing member instead of said first stepped edge when the number of decimal denominations of the quotient effectively accumulated is less than the number of decimal denominations set up on said settable member.

15. In a printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of printing members associated with said actuators for printing said amount, and a register adapted to cooperate with said

actuators, said register having a set of denominations exceeding said plurality, the combination comprising:

- (a) means normally locating said register in an initial transverse position with said exceeding denominations at right of said actuators, 5
- (b) displacing means for transversely displacing said register with respect to said actuators,
- (c) a differentially settable member for controlling said displacing means to cause a predetermined number of said exceeding denominations to cooperate with said actuators to accumulate therein corresponding orders of said amount, 10
- (d) a total taking device,
- (e) means controlled by said device for causing said displacing means to return said register to said initial position to cut off the denominations of the total contained in the exceeding denominations of said register, 15
- (f) an additional printing member,
- (g) means controlled by said settable member for predisposing said additional printing member to print a figure according to said predetermined number of said exceeding denominations, 20
- (h) a printing control member controlled by said device for causing said additional printing member to print said figure simultaneously with said total, 25
- (i) and means operable for calculating a percentage and adapted to automatically set up said settable member to a predetermined position.

16. In a printing calculating machine having a plurality of denominationally arranged actuators differentially movable to represent an amount, a plurality of printing members associated with said actuators for printing said amount, and a register adapted to cooperate with said actuators, said register having a set of denominations exceeding said plurality, the combination comprising: 30

- (a) a pivotally mounted member connected to said register and adapted to be rotated for transversely displacing said register with respect to said actuators,
- (b) a pair of opposite toothed sectors secured to said pivotally mounted member,
- (c) a pair of complementary stepped members associated with said sectors and having each one a toothed edge engaging the associated sector,
- (d) a differentially settable member for presetting a predetermined number of said exceeding denominations to cooperate with said actuators,
- (e) an actuating member differentially moved in a first direction under the control of said settable member for selecting the steps of said stepped members to be engaged,
- (f) cyclically operable means for moving said actuating member through a constant stroke in a second direction substantially perpendicular to said first direction for engaging the steps so selected,
- (g) an additional printing member,
- (h) and means controlled by said settable member for conditioning said additional printing member to print a figure corresponding to said predetermined number of said exceeding denominations simultaneously with the amount printed by said plurality of printing members.

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