March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 1

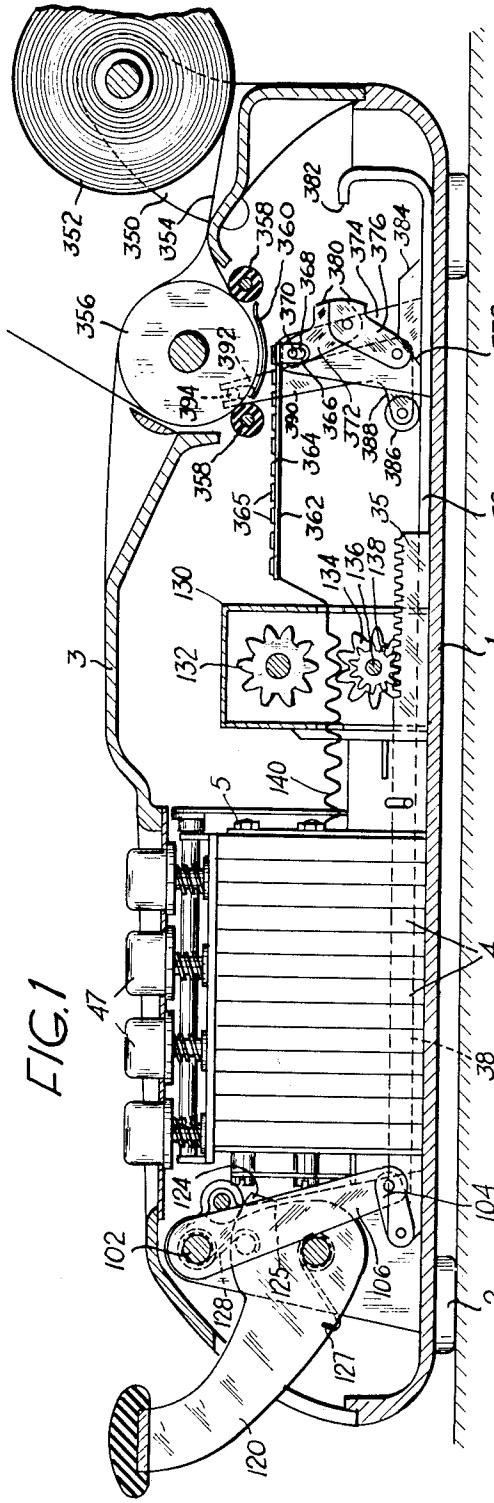


FIG. 1

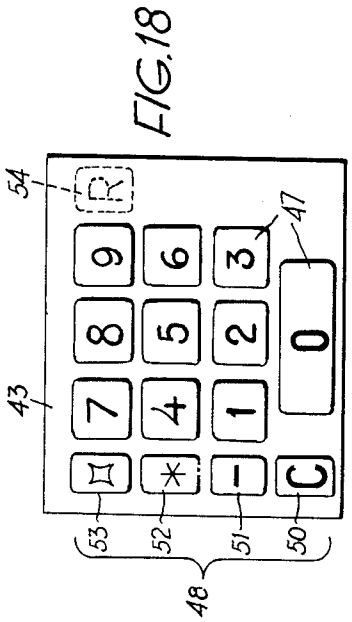


FIG. 18

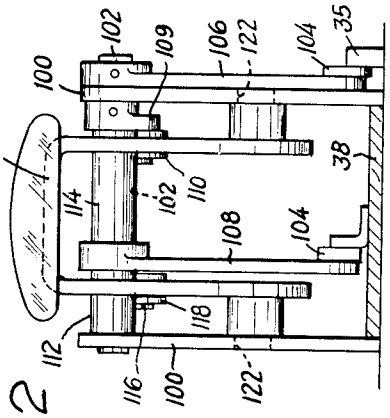


FIG. 2

INVENTOR
Lord Erik Daniel Bilde

BY Cushman, Darby & Cushman

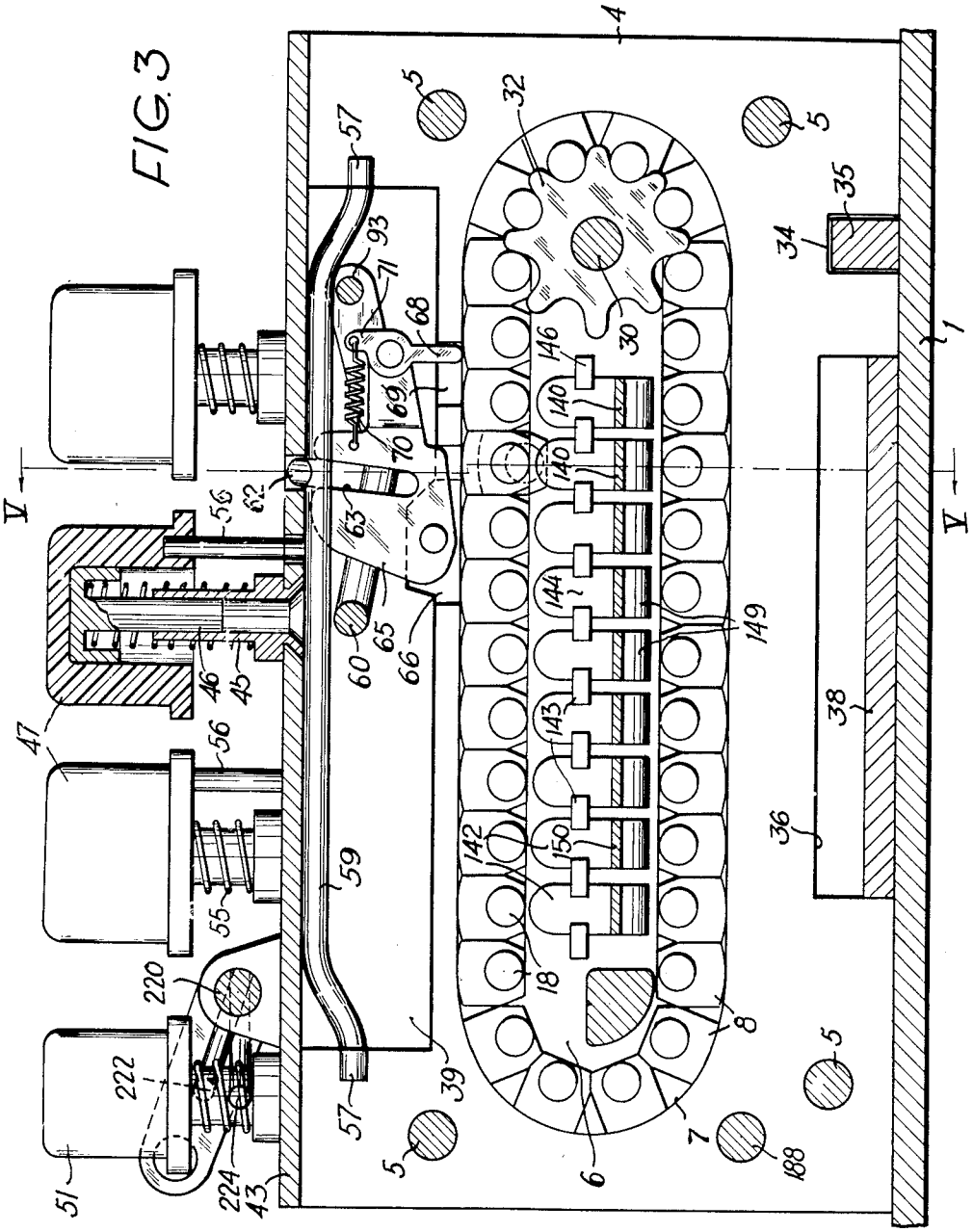
ATTORNEYS

March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 2

FIG. 3



INVENTOR

Ford Erik Daniel Bilde

BY Cushman, Darby & Cushman

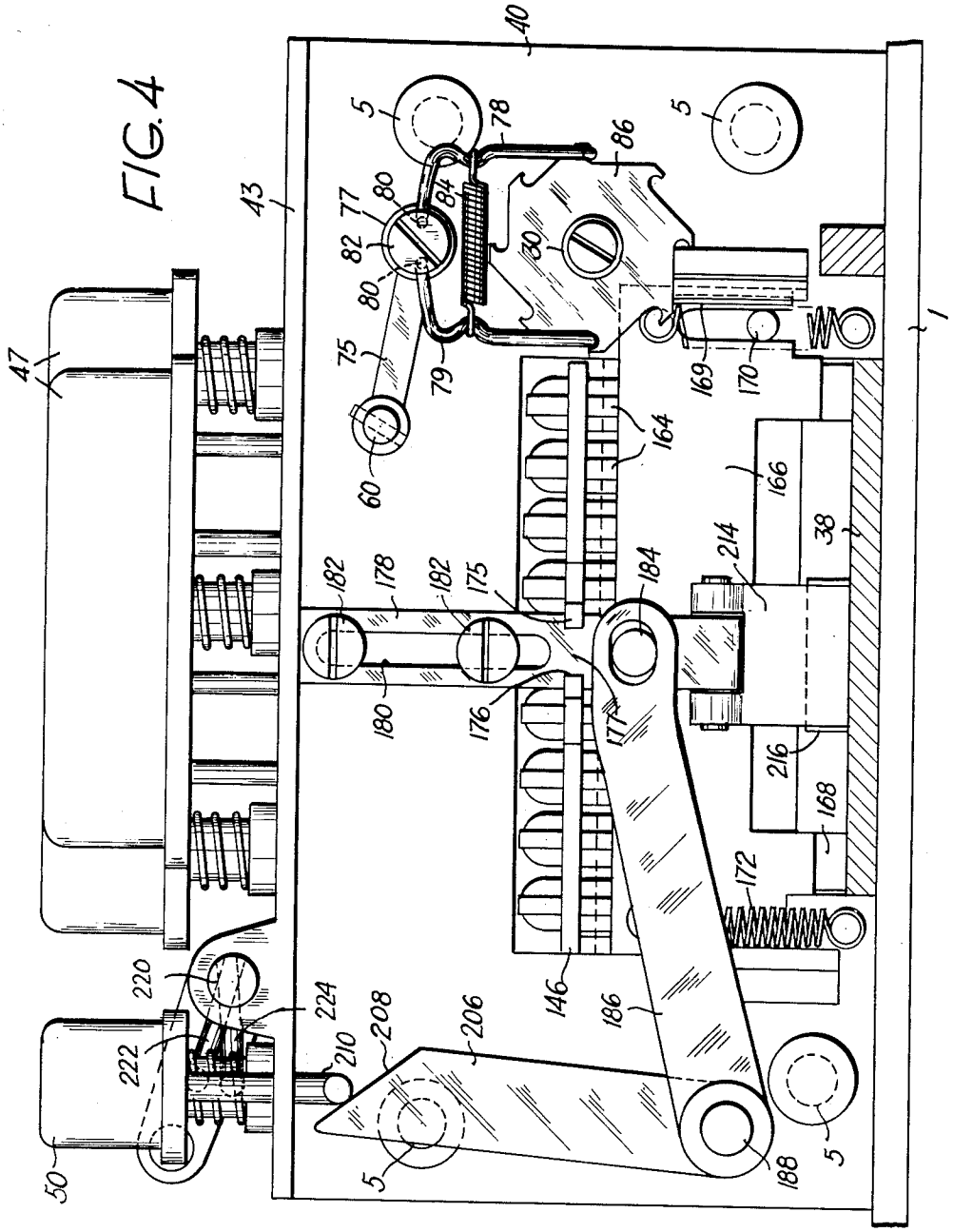
ATTORNEYS

March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 3

FIG. 4



INVENTOR

Toid Erik Daniel Bilde

BY Cushman, Darby & Cushman

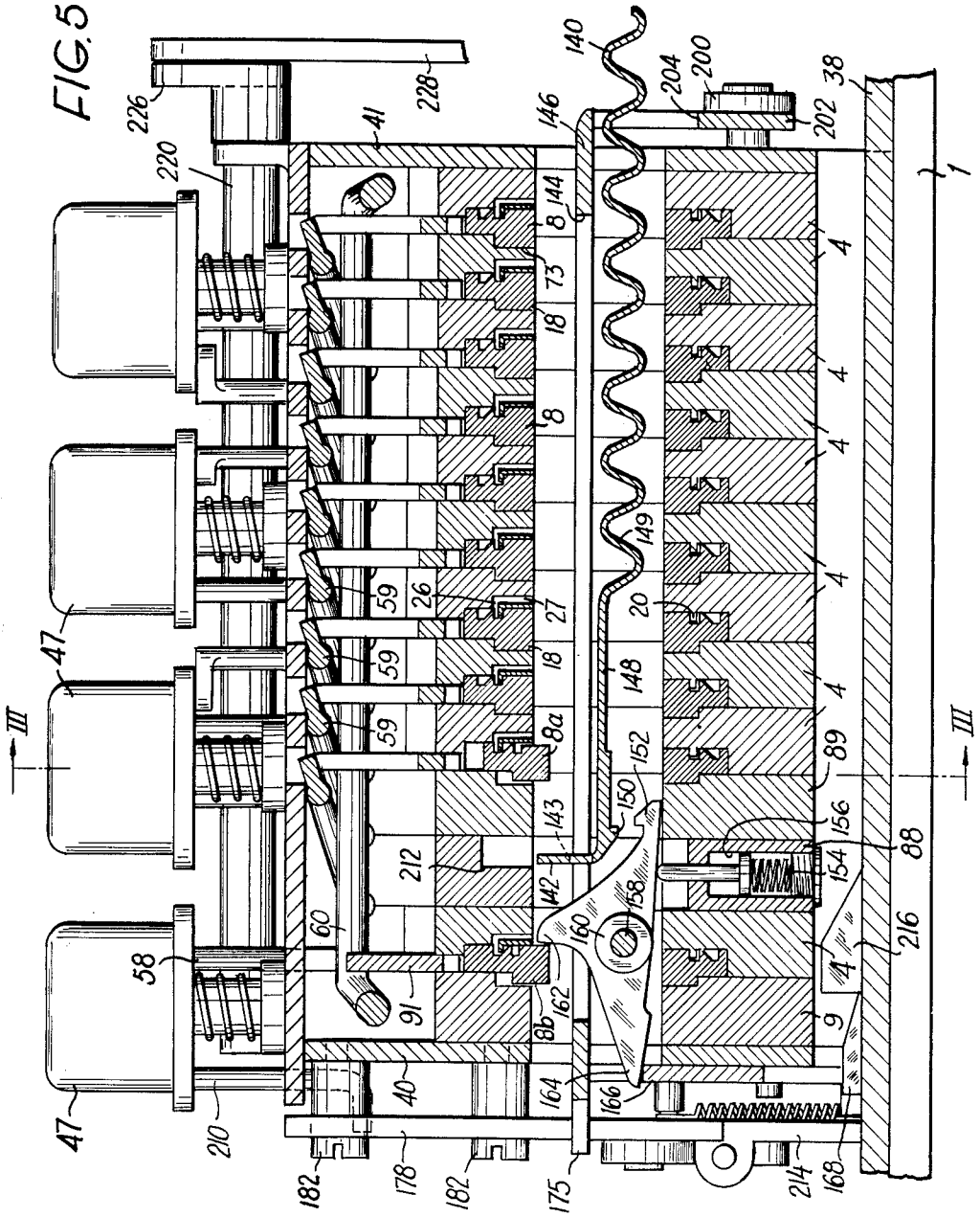
ATTORNEYS

March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 4

FIG. 5



INVENTOR

Lord Erik Daniel Bilde

BY Cushman, Darby & Cushman

ATTORNEYS

March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 5

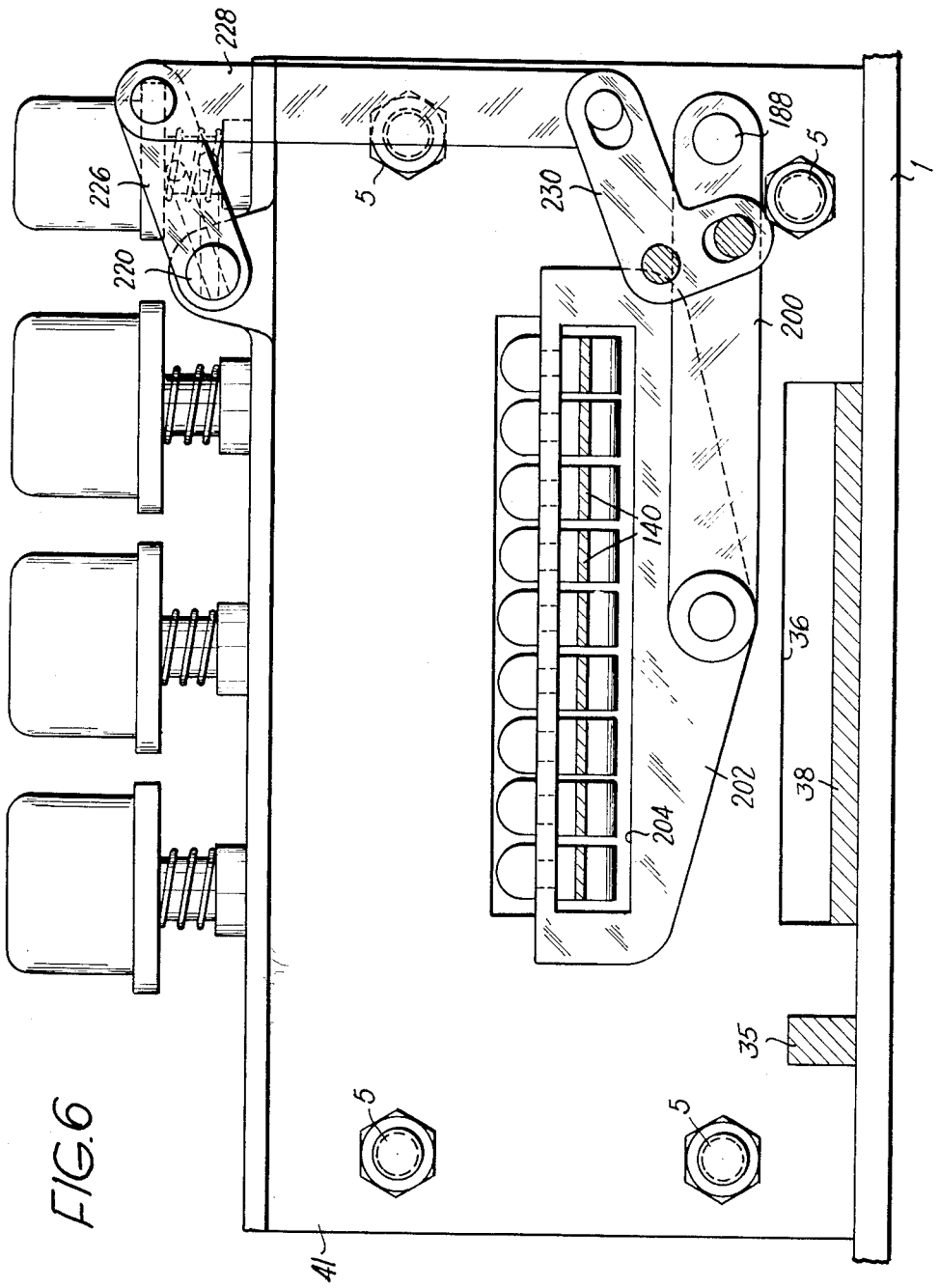


FIG. 6

INVENTOR
Lord Erik Daniel Bilde

BY Cushman, Darby & Cushman

ATTORNEYS

March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 6

FIG.7

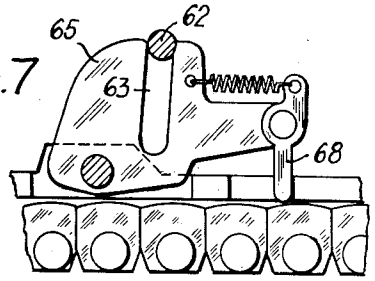


FIG.8

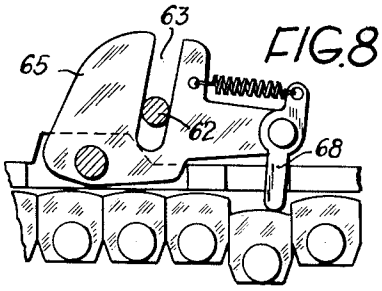


FIG.9

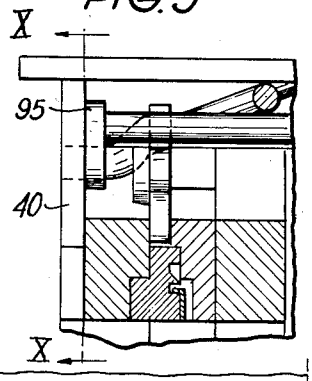


FIG.10

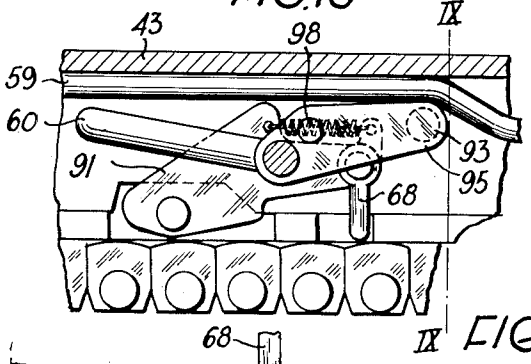
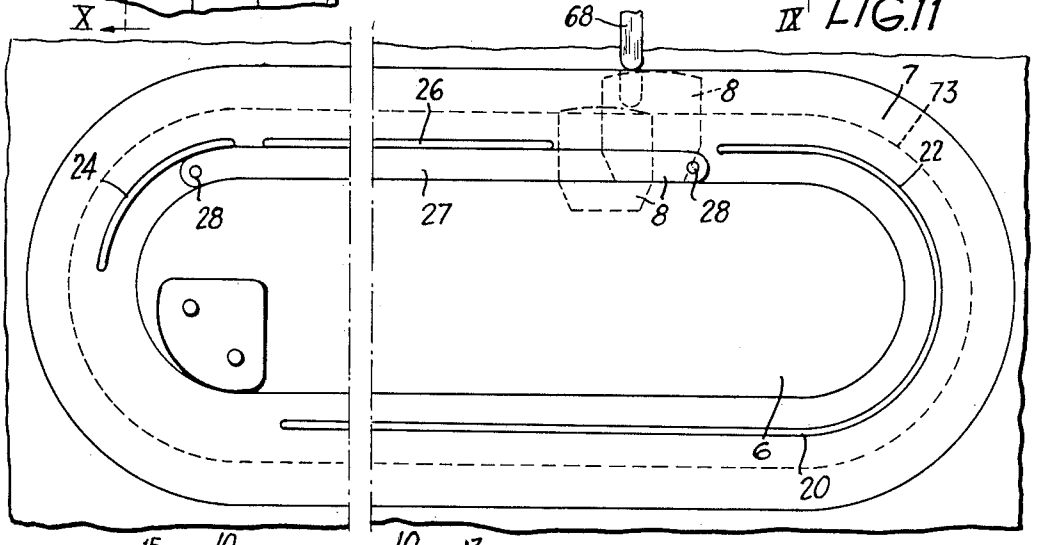


FIG.11



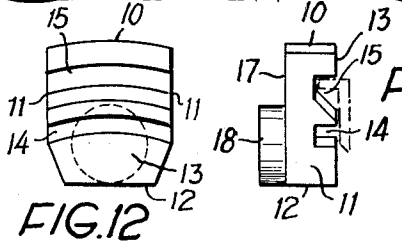


FIG.12

FIG.13

INVENTOR

Lord Erik Daniel Bilde

BY Cushman, Darby & Cushman

ATTORNEYS

March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 7

FIG. 15

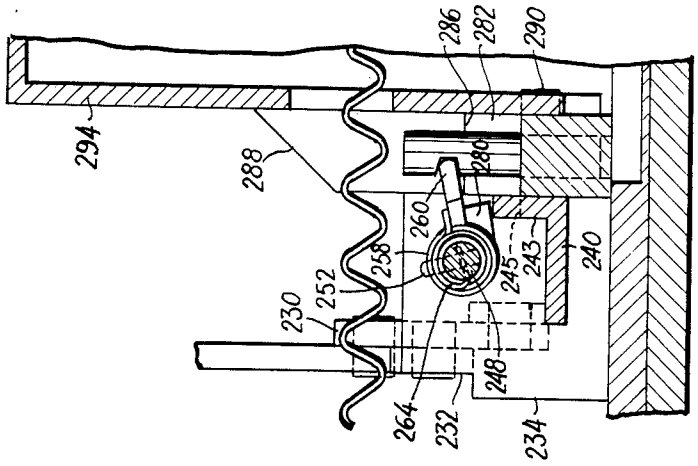
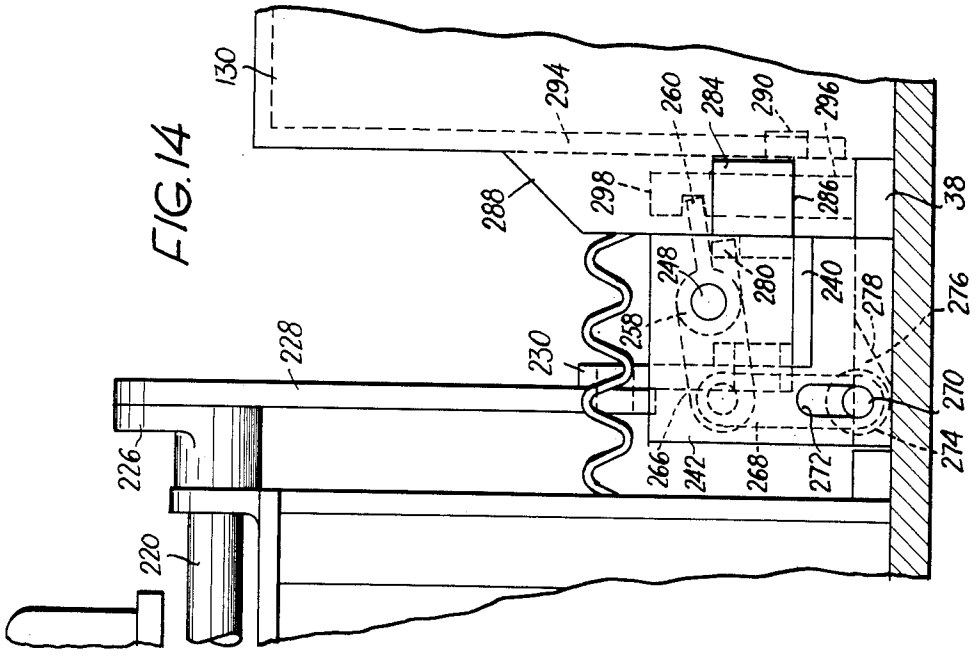


FIG. 14



INVENTOR
Lord Eric Daniel Bilde

BY Cushman, Darby & Cushman

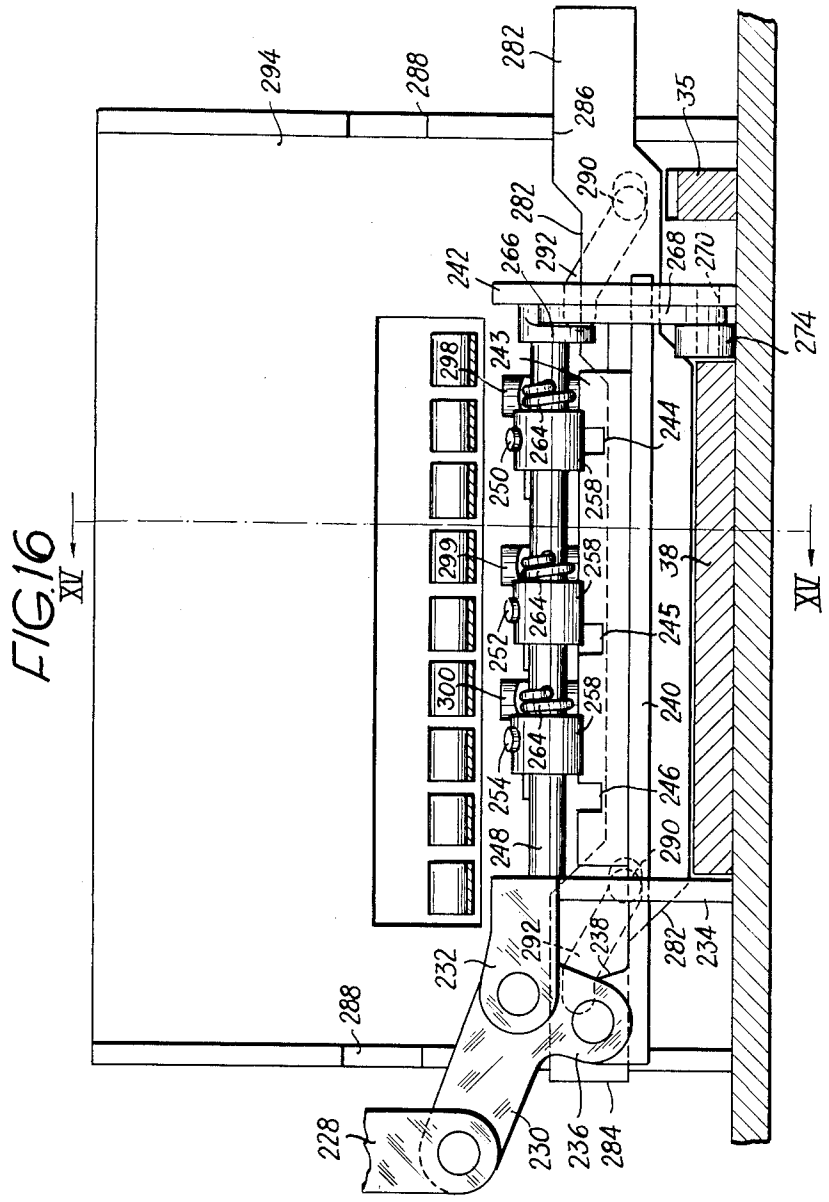
ATTORNEYS

March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 8

FIG. 16



INVENTOR

Lord Erik Daniel Bilde

BY Cushman, Darby & Cushman

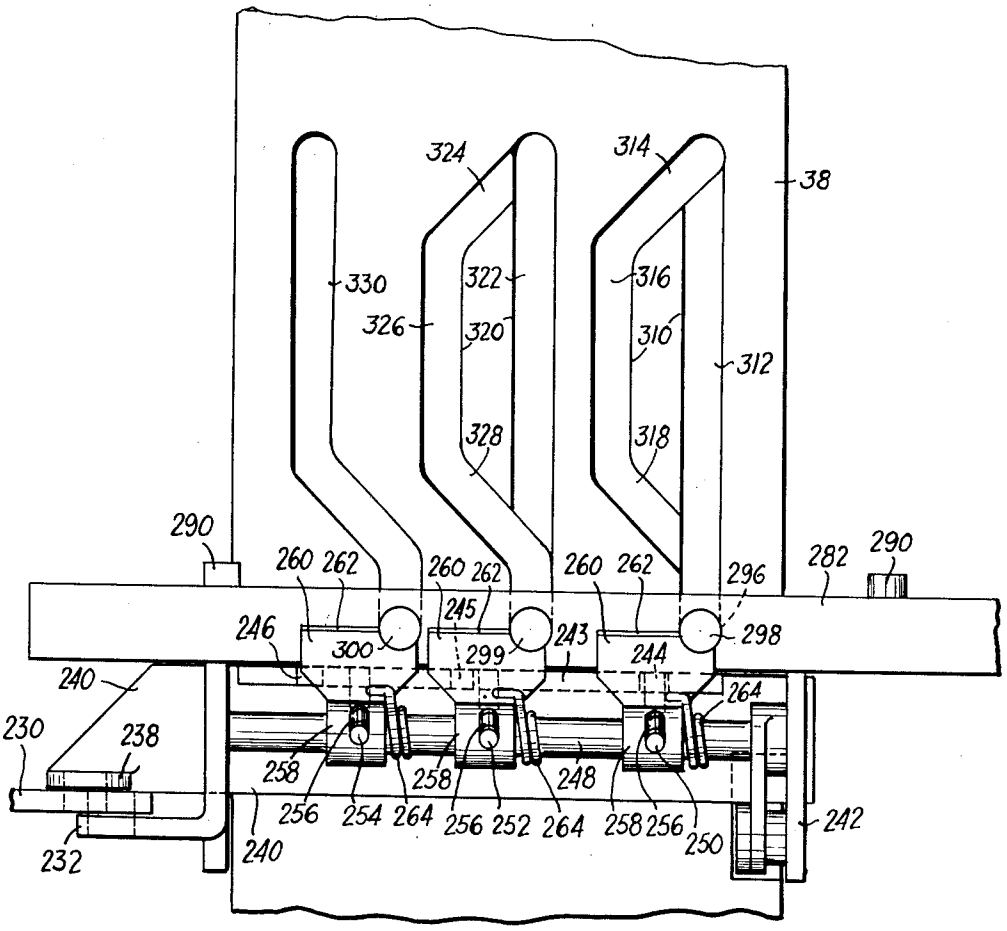
ATTORNEYS

March 13, 1956 T. E. D. BILDE 2,738,128

TEN KEY ADDING MACHINE

Filed Nov. 28, 1952 9 Sheets-Sheet 9

FIG. 17



INVENTOR

Tord Erik Daniel Bilde

BY Cushman, Darby & Cushman

ATTORNEYS

United States Patent Office 2,738,128
Patented Mar. 13, 1956

2,738,128

TEN KEY ADDING MACHINE

Tord Erik Daniel Bilde, Stockholm, Sweden, assignor to Richard Nilsson AB., Stockholm, Sweden, a corporation of Sweden

Application November 28, 1952, Serial No. 322,941

20 Claims. (Cl. 235—60)

This invention relates to a computing machine of the reduced key board type specially adapted for addition and subtraction purposes and adapted to be placed on a table or the like for computing work.

The invention more particularly refers to computing machines of the type above described in which a number of stop members arranged in a number of transverse rows corresponding to the number of units in the numeral system considered and with a number of stop members in each transverse row corresponding at least to the number of decades in the machine are operable by setting keys for displacement from an idle position to an operative position and in either position are at each operation displaced in the transverse direction a distance corresponding to the distance between two adjacent decades in the row, and in which a number of actuator members are displaced longitudinally to be stopped in a position determined by a stop member in operating position, said displacement corresponding in each decade to the figure to be entered into the totalizer.

Throughout the following description I have used the terms "longitudinal," "transverse," "right," "left," "forward," "rearward," "front" and "back" as the movements, positions or parts considered appear seen from the standpoint of the operator, which, as usual for computing machines of the type described, has the machine placed before him on a horizontal support, f. ex. a table, with the keyboard nearest and the direction of the length of the machine directed away from him.

In a machine of the type described the actuator members are capable of transmitting their displacement to a totalizer and to a printing device for entering the amount set on the keys into the totalizer and respectively for printing the amount entered on a paper strip or other printing sheet fed on a printing platen, the cooperation of the actuator members, the totalizer and the printing device being also reversible for extracting a sum from the totalizer and printing it on the printing sheet.

The purpose of the invention is to obtain a computing machine, in which all the complicated mechanisms of known computing machines are replaced by very simple mechanisms having a reduced number of parts.

Another purpose of the invention is to obtain a computing machine which is considerably reduced in size.

A further purpose of the invention is to reduce considerably the mass of the parts to be moved at each computing operation so as to reduce the necessary force for driving the machine and also to reduce the resistance of the different parts to motion so as to further reduce the necessary driving force.

Consequently it forms another purpose of the invention to obtain a computing machine which can be driven with a very reduced effort and in which the ordinary driving handle with a long crank lever or the ordinary heavy electric motor and the necessary mechanism for connecting and disconnecting of the main driving shaft from the motor at each revolution of said shaft can be replaced by a single driving key adapted for relatively

reduced motion and thereby causing only a reduced interruption of the handwork at the machine.

With these and other purposes and advantages in view I have constructed a computing machine of the type above described, which contains a number of different mechanisms, i. e. a setting mechanism, a driving mechanism, an actuator mechanism for the totalizer, which in itself forms no part of this invention, a control mechanism and a printing mechanism. Each of these mechanisms will be described in the following in its special chapter with reference to the accompanying drawings, which show an embodiment of my machine, and in which Fig. 1 is a side elevation of the machine with the casing in section to show the different mechanisms. Fig. 2 is a front elevation of the driving mechanism. Fig. 3 is a transverse section at an enlarged scale through the setting mechanism approximately along line III—III in Fig. 5. Fig. 4 is a front elevation of the setting mechanism at an enlarged scale. Fig. 5 is a longitudinal section through the setting mechanism at an enlarged scale approximately along line V—V in Fig. 3. Fig. 6 is a rear elevation of the setting mechanism. Figs. 7 and 8 show a detail of the setting mechanism in two different positions. Fig. 9 is a section in part along line IX—IX in Fig. 10 and Fig. 10 is a section in part through the setting mechanism approximately along line X—X in Fig. 9. Fig. 11 is a front view of a portion of a frame forming part of the setting mechanism. Fig. 12 is a rear elevation and Fig. 13 a side elevation of one of the stop members. Fig. 14 is a side elevation of the control mechanism and Fig. 15 a section thereof approximately along line XV—XV in Fig. 16. Fig. 16 is a front elevation of the control mechanism and Fig. 17 a plane view thereof wherein the totalizer and the actuator members have been left out to show guide grooves thereunder. Fig. 18 shows the key-board.

As illustrated in Fig. 1, the computing machine comprises a casing having a base plate **1** supported by feet **2** of rubber or other elastic and adhering material fixed to the underside of the base plate **1**. The casing further comprises an upper cover portion **3** preferably of plastic or other resisting but light material joined border to border to the bent up border edges of the base plate and having recesses and openings adapted to the inner mechanisms of the machine and permitting the parts to be operated or observed from the outside to extend through said openings to the outside of the casing. Nearly all the parts extending to the outside and all the other parts of the mechanisms inside the casing are connected with the base plate **1** so as to permit the opening of the casing by lifting off the upper cover **3** after loosening connecting screws (not illustrated) by which the cover **3** is fastened on the base plate **1** and render the inner mechanisms of the machine accessible for repair or adjustment. Further details about the openings in the cover **3** will become evident from the following description of the different mechanisms of the mechanism enclosed within the casing.

Setting mechanism

The setting mechanism comprises a block of frames **4, 9, 88** and **89** attached together to form a rectangular body by means of screws bolts passing through holes in the corners of each frame. The block of frames rests on the base plate **1** and is attached to it by any suitable means, such as screws (not illustrated) inserted from the underside of the base plate through this into one or more of the frames. The inner openings **6** of the frames have the form illustrated in Fig. 3 with two rectilinear parallel sides and semicircular ends. The edge of the opening in each of frames designated by **4** has a groove **7** extending through a portion of the thickness of the frame and forming a guide for stop members **8**, more clearly illustrated in Figs. 12 and 13.

These stop members have their outer end **10** turned away from opening **6**, arched according to the radius of the outer edge of the groove **7** at the semi-circular outer ends of the opening **6**, two sides **11** parallel with each other in their main outer part and converging towards each other at the inner end of the stop member. The inner end surface **12** of the stop member turned towards the opening **6** is straight and its distance from the outer end **10** is approximately the same as the radial depth of the groove **7**. The thickness of the stop member is approximately the same as the depth of the groove **7** measured in a direction transverse to the main plane of the frame **4**. At the rear face **13** of the stop members there are two grooves **14** and **15** arched concentrically with the outer end **10**. The arched sides of the inner groove **14** are parallel while the outer groove **15** has an outer side at right angles to the rear face **13** and an inner side, turned towards the inner groove **14** inclined towards the latter, as clearly illustrated in Fig. 13. On the front face **17** of the stop member **8** there is a cylindrical knob **18**.

In the groove **7** of each frame **4** there are guiding lists for the stop members, which guiding lists, as illustrated in Fig. 11, consist of a fixed guiding list **20** extending from the left end of the lower straight portion of the groove **7** along said straight portion and through the right arched end of the groove to the right end portion of the upper straight part of the groove **7**. This guiding list runs parallel with the edge of the opening **6** of frame **4** at a distance of the outer edge **22** of the groove **7** equal to the distance between the outer end **10** of the stop member and the inner groove **14** therein. Another fixed guiding list **24** extends through the upper half of the left arched end portion of the groove **7**. A resilient guiding list **26**, extending from the left end of the upper straight portion of the groove **7** along said groove to a distance of the nearby end of the fixed guiding list **20** equal to a little more than one and a half times the width of the stop members between their side surfaces **11**, consists of the bent edge **26** of a steel strip **27**, extending a distance past the ends of the guiding list **26** and fixed to the frame by screws **28**. The depth of the groove **7** in the transverse direction of the frame, i. e. in the longitudinal direction of the machine, is somewhat larger behind the resilient guiding list **26** so as to permit it to be pushed back from its engagement with one of the grooves in the stop members. The straight portions of the guiding lists **20** and **26** have a width, which is so much less than the width of the arched grooves **14** and **15** of the stop members, that the stop members can be guided to slide easily along the groove **7** in any position.

The rear face of the frames **4** situated in front of such frames, that have grooves **7** and stop members guided therein, are provided with another groove **73**, as indicated in dotted lines in Fig. 11 and as shown in Fig. 5. This groove **73** is to make place and serve as guiding for the knobs **18** projecting from the front faces of the stop members **8**.

In the example illustrated the machine is designed for nine decades. In this case the resilient guiding list **26** must extend over a length such that nine stop members **8** can be situated side by side on said guiding list.

Through the centers of the right arched end portions of the openings **6** of all the frames **4** in the block of frames extends a longitudinal shaft **30**, on which are fixedly mounted a number of cog-wheels **32**, each of them engaging the knobs **18** on the stop members **8** situated in the arched end portion of the groove **73** surrounding the cog-wheel **32**.

Each frame **4** in the block of frames has recesses on its lower edges which recesses together form channels extending through the block of frames in the longitudinal direction of the machine, i. e. one narrow channel **34** for a rack **35** to be described and one broad channel **36** for an operating slide **38** also to be described, the rack **35** and the slide **38** being guided within said channels between the frames and the base plate **1**. The frames **4** are further provided with recesses at their upper edges so as to form an upper space **39** in the upper part of the block of frames.

The block of frames is at its front face and rear face covered with plates **40** and **41** respectively having rectangular openings corresponding with the openings **6** of the frames and recesses corresponding to the recesses **34** for the racks **35** and **36** for the slide **38** but closing the front and rear end of the upper space **39**.

The top of the block of frames is covered by a plate **43** forming the key-board of the machine. In this key-board **43** are fixed tubular vertical guides **45** for the stems **46** of keys **47** and **48** of which ten numeral keys **47** marked from 0 to 9 are arranged in the manner usual for machines of the reduced key-board type, i. e. with the numeral keys 1 to 9 in three rows of three keys each and a larger 0-key in front of the front row as illustrated in Fig. 18. There are further, in the example illustrated, four control keys **48** along the left side of the key-board **43**, these being a correction key **50**, a subtraction key **51** and a grand total key **52** and a sub-total key **53**. There is, however, further space on the right side of the key-board for other control keys, f. ex. a repeat key **54**, as indicated with mixed lines in Fig. 18.

The keys are maintained in their upper position by springs **55**, and, if desired, some of the control keys **48**, may be provided with known means, not illustrated, to keep the key in the depressed position until it is released by an appropriate function of the machine or by hand.

The frames **4** are at their front and rear sides adjacent to the lateral side edges of the space **39** provided with half-cylindrical recesses **57**, which, when the frames are joined together to a block, together form cylindrical recesses, in which the ends of transverse bars **59** are journalled. These transverse bars **59** have crank-like bent ends. The transverse bars are by springs not shown in the drawings, resiliently maintained in a posiiton, in which their median portion is kept adjacent to the under side of the key board **43**. Each of these transverse bars **59** corresponds to one of the numeral keys except the 0-key and are thus in the number of nine. Each of the numeral keys 1 to 9 has a pin **56** projecting from the head of the key downwards through a hole in the key-board **43** so as to rest against the upper side of the transverse bar **59** corresponding to the numeral key in question.

Extending through the space **39** longitudinally of the machine, i. e. at right angles to the transverse bars **59** and below these there is a feed-bar **60**, the crank-shaped ends of which are journalled in the front and rear plates **40** and **41**, the forward end extending outside the front plate **40** as illustrated in Fig. 4. This bar is also actioned towards its upper position by a spring not illustrated. The numeral key "0" has a pin **58** projecting downwards through the key board **43** and resting on the feed bar **60** (Fig. 5). On each transverse bar **59** there is a projection **62**, engaging an inclined slot **63** in one of a number of pushing members **65** each pivotally mounted in a recess **66** in the front face of the frames between the groove **7** and the space **39**. At one end of the pushing member **65** there is a finger **68** pivotally mounted on said member and extending downwards through a second recess **69** of the frame so as to engage the outer end of the stop member **8** situated in the right part of the space between the fixed guiding list **20** and the resilient guiding list **26**. The finger **68** is kept resiliently from rocking motion in a clockwise direction by a spring **70** tensioned between the push-member **65** and a projection **71** on the finger **68**.

On the end of the feed bar **60** extending outside the front plate **40** (see Fig. 4) is fixedly mounted an arm **75** on the end of which is pivotally mounted a fixture **77** for a pawl member consisting of two bent steel wires **77** and **78** forming together a generally U-shaped member. The upper ends **80** of the wires are bent at right angle towards the block of frames and by these bent ends journalled in

corresponding lodgements in the fixture 77 and maintained in said lodgements by the head of a screw 82. The downwardly extending legs or wires 77, 78 of the U-shaped pawl member are connected by a spring 84 striving to move the lower ends of said legs towards each other. The lower ends of said legs are bent towards the block of frames and engage a ratchet wheel 86 of special design clearly illustrated in Fig. 4. This ratchet wheel 86 is fixedly mounted on the forward end of the shaft 30 which is journalled in the front plate 40 and rear plate 41 and which forward end projects outside the front plate 40.

The block of frames comprises in all thirteen frames, of which ten are of the type designed by 4 and described above, i. e. provided with guide grooves 7 for stop members 8. Counted from the front plate 40 the block comprises the following frames, one frame 9 without stop members on its front face but with a groove for the knobs 18 on the stop members 8 in the following frame on its rear face, one frame 4 of the type above described, one frame 88 of special design to be described in the following, one frame 89 of the same type as the first frame and nine frames 4 of the previously described type.

The stop members of the second frame 4 in the above named row of frames are operated by a push member 91 which differs from the push members 65 above described and operated by the projections 62 on the transverse bars 59. This special push member 91 is illustrated in Figs. 9 and 10 and is operated by a longitudinal bar, called 0-stop bar 93 and disposed parallel with the feed bar 60. This 0-stop bar 93 has its ends fixed to the ends of arms 95 pivotally mounted on the journalled ends of the feed bar 60 adjacent to the inside of the front plate 40 and the rear plate 41. The 0-stop bar 93 is actioned upwards by a spring not illustrated and can thus be swung downwards independently of the feed bar 60 by any of the transverse bars 59 when operated by any of the numeral keys except the "0"-key which only operates the feed bar 60. The arm adjacent to the front plate 40 has a pin 98 extending rearwards and resting against the upper edge of the push member 91. This further differs from the push member 65 by the fact, that it has no groove 63. Otherwise push member 91 is similarly with the push member 65 provided with a rockable spring-operated finger 68.

Driving mechanism

All the operations of the machine for performing a computing operation as described in description of the working of the machine following the description of its construction, are operated by two driving members of which one is the slide 38 above mentioned and the other is the rack 35 also mentioned before.

These two driving members are operated by the driving mechanism illustrated in Figs. 1 and 2. In the front portion of the machine there are two vertical supports 100 fixed onto the base plate 1 on either side of the slide 38. A transverse shaft 102 is journalled in the upper ends of said supports. The forward ends of the slide 38 and of the rack 35 projecting in front of the block of frames are each by a link 104 connected with the lower end of an arm 106 and 108 respectively. The arm 106 connected with the rack 35 is fixed on the right end of the transverse shaft projection on the outside of the right support 100. Adjacent the inside of the same right support 100 there is fixedly mounted on the transverse shaft 102 a shorter arm 109, having a roller 110 journalled on its end. At distances from both supports 100 between these the second arm 108 is pivotally mounted on the shaft 102 and held in axial position on the shaft by distance tubes 112 and 114 surrounding said shaft. This second arm 108 has an extension supporting a pin 116, on which is journalled a roller 118. An actuating lever 120 having the form of a flat iron piece bent into the form of an U-shaped stirrup, is by means of journalling pins 122 fixed on its legs journalled in holes provided in the supports 100 below the shaft 102. The legs of said U-shaped stirrup lever 120 are shaped in the manner illustrated in Fig. 1 to form driving cams 124 and 125, with which the rollers 110 and 118 cooperate, so that when the actuating lever 120 is depressed, the arms 106 and 108 are free to be rocked according to the form of the respective cam to pull the rack 35 and the slide 38 towards the operator under the action of springs illustrated in Fig. 1 only. A spring 127, strives to return the actuating lever 120 to its normal upper position, while springs 128 keep the rollers 110 and 118 independently of each other against the cams 124 and 125. As shown in Fig. 1, the active surface of the cam cooperating with the roller 118 mounted on the lever 108 connected with the slide 38 begins to cooperate with the roller 118 at an earlier stage of the rocking motion of the lever 120 than the beginning of cooperation between the roller 110 and the active surface of cam 124, which, however, because of its steeper inclination relatively to its direction of motion brings the roller 110 to the end of its moving stroke earlier than the cam 125 brings the roller 118 to the end of its stroke. Thus the slide begins to move earlier than the rack 35 and continues its forward movement after the rack 35 has reached the end of its stroke. Also during the return stroke of the actuating lever 120 under the action of the spring 127 exceeding the action of both springs 128 together the slide 38 begins its return stroke towards the rear of the machine earlier and ends it later than the rack 35.

Rearwardly of the block of frames there is a support 130 for the totalizer 132 illustrated in Fig. 1 as a pinion with ten teeth but comprising in reality a number of coaxially arranged pinions equal to the number of decades of the machine, i. e. nine decades in the example illustrated. The totalizer forms no part of the invention and may be of any known design. Below the totalizer 132 there are a number of driving pinions 134 equal to the number of pinions in the totalizer, said pinions 134 being connected to their common shaft 136 by springs permitting of resilient rotation of the pinions 134 in either direction from a normal position in relation to the shaft 136. Fixedly mounted on the right end of the shaft 136 of the driving pinions 134, which end extends above the rack 35, is fixedly mounted a pinion 138 engaging said rack. The totalizer 132 is mounted on a vertical slide permitting to displace the totalizer vertically by means to be described in the chapter "Control mechanism."

The slide 38, which extends through nearly the whole length of the machine rests on the base plate 1 and is guided sideways by the supports 100 of the driving mechanism at its forward end, by the sides of the lower recess 36 in the frames of the block of frames and by further supports rearwardly of said block as described further on. This slide is provided with different projections and recesses serving to operate different parts of the machine during the forward and rearward reciprocating motion of the slide during a machine operation. The arrangement and shape of these projections and recesses will become clear from the description of the control mechanism and of the working of the machine.

Actuator mechanism

To transmit the motion from the driving mechanism to the totalizer dependent in each decade from the figures set on the numeral keys, there are nine actuator bars 140 having three main parts, i. e. abutment means 142 at their forward ends adapted to cooperate with the stop members 8 when pushed down to active position when depressing a corresponding numeral key 47, a rack portion 149 cooperating with both the driving pinion 134 and the totalizer 132, and a printing type bar 364 at their rearward end.

As illustrated in the drawings, these actuator bars 140 are made of one single strip of sheet steel of just sufficient thickness not to be subject to undue elastic deformations by longitudinal compression.

The forward end of the actuator bars or strips **140** is bent upwards to form an abutment **142** as clearly illustrated in Fig. 5. In the sides of this upward bent end abutment **142** there are two recesses **143**, by which the forward end of the bars is guided along the edges of longitudinal slots **144** in a guiding plate **146** passing horizontally through the openings **6** of the frames in the block of frames and supported at its ends outside said block in a manner to be described later on. Below the guiding plate **146** the bars run horizontally and parallel with said plate and have, counted from the abutment end **142** first a straight portion **148** and then a rack portion **149** formed by sine-curved bends of the strip, thus presenting teeth and interstices on both the upper and the lower face. This sine-curved rack portion of the bar **140** extends between the driving pinions **134** and the pinions of the totalizer **132**. They are constantly engaged with the driving pinions **134** but are only engaged by the totalizer wheels when the totalizer is in its lower position. Below the forward abutment end **142** of the actuator bars or strips there is fixed thereto an abutment **150**, having a forwards and upwards inclined front surface and a vertical rear surface. This abutment, hereinafter called the locking abutment **150**, has for its purpose to permit the cooperation of each bar with a locking pawl **152** adapted to retain the actuator bar in its initial position when the figure to be transmitted by it is "0," i. e. when no stop member is set in active position in the corresponding decade so as to prevent the bars in these decades to slide idly to and fro during the operation of the machine. The locking pawl **152** is actioned by a spring **154** lodged in a bore **156** in the third frame **88** from the front plate **40** of the block of frames and keeps normally engaged with the locking abutment **150**. The locking pawls **152** are pivotally mounted on a transverse shaft **158** mounted at the forward end of the central channel formed by the openings **6** of the frames in the block of frames and are maintained in their place in alinement with each actuator bar **140** by distance washers **160**. The locking pawls **152** present each a portion **162** extending upwardly to near the upper edge of the openings **6** and a portion **164** extending forwardly to the outside of the front plate **40**. A plate **166** slidably mounted on the outside of the front plate **40** cooperates with projections **168** on the slide when the slide **38** is in its normal rest position and cooperates with its upper edge with the portions **164** of the locking pawls **152** so as to keep them out of engagement with the locking abutments **150** as long as the slide is in its rest position. The plate **166** is slidably guided on the front side of the front plate **40** by means of grooves **168** engaging pins **170** in the front plate and is actioned by springs **172** striving to move the plate **166** downwards in engagement with the slide **38**. The projections **168** have a rearward surface inclined downwards towards the slide so as to permit the progressive lowering of plate **166** at the beginning of the reciprocating motion of the slide **38** and the progressive lifting of the plate **166** at the end of the return motion of the slide.

Means to return the stop members to their inactive position either after having performed their function or for correction of a figure set on the numeral keys, form really a part of the setting mechanism, but have not been described in the corresponding chapter because the previous description of the driving and actuator means was necessary for their comprehension.

These means are formed by the guide plate **146** being movable upwardly to press all the stop members **8** lowered to active position and within the reach of the end abutments **142** of the actuator bars, back to their inactive position, which is made possible by the guiding list **26** of the corresponding portion of the rows of stop members being resilient and capable to be pushed back by the inclined inner side of the outer grooves **15** of the stop members **8**. For this purpose, the forward edge of the guiding plate **146** (Fig. 4) has a projection **175** having a recess **176** engaged by a restricted portion **177** of a vertical slide bar **178** guided by means of a slot **180** on two screws **182** projecting on the outside of the front plate **40**. This sliding bar **178** is by means of a pin **184** and an arm **186** connected with a shaft **188** journalled in a bore passing through the whole of the block of frames including the front and rear plates **40** and **41** and having rearwardly of the rear plate **41** (see Fig. 6) fixed thereon a second arm **200**, which is connected with the downwardly bent rear end **202** of the guiding plate **146**. To permit the passage of the actuator bars through said rear end portion **202** of the guiding plate **146**, said portion has a corresponding opening **204**. Outside the front plate **40** the shaft **188** has an upwardly extending arm **206** fixed thereon and provided with a bevelled end surface **208**. This bevelled surface cooperates with the bent out end of a pin **210** fixed in the head of the correction key **50**, so that when said key **50** is depressed, the arm **206** is swung counterclockwise, as seen in Fig. 4, and by means of shaft **188**, arms **186** and **200** and by the slide bar **178** lifts the guiding plate **146** towards the upper surface of the channel formed by the openings **6** in the frames in the block of frames, thus pressing all the stop members previously brought into active position back to their idle position. The forward abutment ends **142** of the actuator bars **140** are also lifted by this movement of the guiding plate **146**, which is made possible by a special groove **212** in the frame **88** forwardly of the groove provided for the knobs **18** of the stop members **8** guided in the first of the nine frames **4** corresponding to the nine numeral keys "1" to "9."

To obtain an automatic return of the stop members to their idle position at the end of a computing operation, i. e. towards the end of the return stroke only of the slide **38**, the lower end of slide bar **178** is hinged to a shutter-like member **214** which can be turned towards the front end of the machine but in the opposite sense cannot be turned further than to the prolongation of the slide bar **178**. A projection **216** on the slide **38** situated near the forward end of the channel formed by the recesses **36** of the frames in the block of frames has a steep forward surface and an inclined rearward surface, so that said projection **216**, when moving forwardly with the slide **38** turns the shutter-like member **214** out of its way, but on the return of the slide **38** to the rest position lifts said shutter-like member **214** and thereby the slide bar **178** upwards, thus lifting the front portion of the guiding plate **146**, the rear part of which is then also lifted by transmission of the motion of the forward end through pin **184**, arm **186**, shaft **188** and arm **200**.

To return those of the stop members, which have not been returned to their idle position while in position opposite the guiding plate **146**, there is a special bar **216** extending longitudinally through the left side portions of the channel formed by the openings **6** of the frames in the block of frames. This bar **216** has a surface which is eccentric in relation to the arched edges of the openings **6** so as to form a guide surface, which from the upper to the lower end of the opening between the guiding lists **24** and **20** comes progressively nearer the edges of the openings **6**.

Control mechanism

On the upper face of the key-board **43** longitudinally of the row of control keys **48** and besides these is journalled a shaft **220**. This shaft as shown in Fig. 3 is provided with radially extending pins **222** and **224**, which in the normal position of the shaft extend to about the middle between the heads of the adjacent control keys **51**, **52** and the key-board respectively to the underside of the head of key **53**. Thus, when depressing key **51** or **52** the shaft is rocked only about half the angle, through which it will be rocked by depression of key **53**.

As illustrated in Fig. 6 an arm **226** is fixedly mounted on the rear end of the shaft **220** rearwards of the rear plate **41** and the end of said arm **226** is pivotally con-

nected with the upper end of a link bar **228**, the lower end of which is linked to one arm of an angle lever **230**, which is pivotally mounted on an extension **232** of a vertical support plate **234** shown in Fig. 16. The other arm **236** of the angle lever **230** is pivotally connected to an eye **238** on a transverse control slide **240** guided in slots in the support plate **234** and another support plate **242** mounted on the base plate at the opposite side of the slide **38**. It is understood, that the control slide **240** thus depending of the control key depressed or the absence of depression of any control key can take any of three different positions, one (shown in Fig. 16) being the rest position, a second position being taken when any of keys **51** or **52** are depressed and a third position being taken when key **53** is depressed.

The control slide **240** has a vertical flange **243** projecting from its rear edge and provided at its upper edge with three rectangular recesses **244**, **245** and **246**. A shaft **248** is journalled in the support plates **234** and **242**. Three pins **250**, **252** and **254** are fixed radially on the shaft **248** in such positions, that pin **250** is opposite recess **244** in the first position of control slide **240**, pin **252** is opposite recess **245** in the second position of control slide **240** and pin **254** is opposite recess **246** in the third position of control slide **240**. Each of the three pins **250**, **252** and **254** (see Fig. 17) engages a peripheral slot **256** in a bushing **258** rotatable on shaft **248** within the limits of the slot **246**. Each of the three bushings **258** has a spade-shaped radially extending flange **260** with a straight outer edge **262**. Springs **264** fastened with one end to the shaft **248** and having their other ends resting on the spade-shaped flanges **260** keep said flanges and their bushings **258** in the position limited by the pin **252** abutting the end of the slot **256**, which is most remote from the flanges **260**.

On the under sides of the flanges **260** and bushings **258** are abutments **280** extending radially from the bushing over the upper edge of flange **243** on the control slide **240** and having a width in the axial direction of shaft **248** which is slightly less than the width of the recesses **244**, **245** and **246** respectively in the flange **243**. From the foregoing it will thus be clear, that in any one of the three positions of control slide **240** above described, f. ex. the first position, only one of the abutments **280** will be able to engage the corresponding recess, f. ex. **244**, while the two other abutments will abut against the upper edge of the flange **243** besides the corresponding recesses, f. ex. **245** and **246**.

An arm **266** is fixedly mounted on the right end of the shaft **248** and is linked to a bar **268**, the lower end of which is guided by a pin **270** extending at one side of the bar **268** through a vertical slot **272** in the support plate **242** and projecting on the other side of the bar **268** to form a pivot for a roller **274**. In the rest position of the slide **38**, roller **274** engages a recess **276** in said slide, which recess has an inclined side **278** (Fig. 14) ascending rearwardly progressively to the top surface of the slide **38**.

Behind the control slide **240** there is another transverse slide **282**, hereinafter called the shift slide, which is guided by its ends **284** in corresponding recesses **286** in forwardly projection portions **288** of the sides of the fixed support **130** of the totalizer, as illustrated in Figs. 14, 15 and 16. Two pins **290** project rearwards from said shift-slide **282** and engage inclined grooves **292** provided in a front plate **294** of the vertical slide in which the totalizer is mounted. Thus, considering Fig. 16, when the shift slide **282** is shifted to the left, said front plate **294** and the vertical slide will be displaced downwards to bring the pinions **132** of the totalizer into engagement with the rack-portions **149** of the actuator bars **140**.

The shift slide **282** has three vertical bores **296** adjacent the right end of the edge **262** of each of the spade-shaped flanges **260**. Three pins **298**, **299** and **300** are slidably guided one in each of said bores **296**. Said pins have near their upper ends a recess engaged by the corresponding flange **260**. The flanges **260** have sufficient width transversely of the machine to keep engaged with the recesses in the pins **298**, **299**, **300** during the whole lateral displacement of the shift slide **282**.

Guide grooves **310**, **320** and **330** are provided in the operating slide **38**. Groove **310** has a straight portion **312** which considered in the rest position of the slide **38** extends from under the lower end of pin **298** rearwardly on a length corresponding to the stroke of the slide **38** when operated. This straight portion **312** has a depth, which is decreasing rearwardly. From the rear end of said straight portion extends a curved portion the depth of which at its rear end is greater than the depth of the adjoining rear end of the straight portion **312**. This curved portion has an inclined portion **314** forming a pointed angle with the straight portion **312**, a longitudinal portion **316** parallel with the straight portion **312** and an inclined portion **318** rejoining the straight portion **312** at a little distance from the forward end of the groove. The depth of portions **314**, **316** and **318** is decreasing from the rear to the forward end, so that portion **318** at the locus where it rejoins the straight portion **312** has less depth than the latter.

The guide groove **320** has, considered in the plane view of Fig. 17 the same shape as groove **310** but the depth of the straight portion **322** is decreasing from the rear end to the point at which the inclined portion **328** is rejoining the straight portion, while the forward end of the straight portion and the last mentioned inclined portions **328** have greater depth, which is decreasing rearwards along the inclined portion **328**, the longitudinal portion **326** and the inclined portion **324**.

The groove **320** has uniform depth and extends from below pin **300** a short length **332** rearwards, then obliquely along an inclined portion **334** and then along a longitudinal portion **336** extending to a point in transverse alinement with the rear ends of grooves **310** and **320**.

Printing mechanism

As usual in machines of the kind concerned there is a support **350** for a supply reel **352** of paper strip **354** at the upper rear end of the casing **2** and journalled within the cover **2** of the casing there is a printing plate **356**, cooperating in known manner with pressure rollers **358** and paper guide strips **360** at its underside.

The rear ends of the actuator bars **140** are formed with a straight portion **362** supporting a type bar **364** with printing characters **365** at their upper side. The rear end of said supporting portion **362** is guided in a stirrup-shaped guide member **366** guided for vertical motion by slots **368** engaged by a transverse bar **370** supported by two arms **372** and guided by its ends in vertical slots in supports **374** mounted on the base plate **1** on either side of the slide **38**. The lower ends of the arms **372** are pivotally connected with another pair of arms **376** mounted for rotation about pins **378** journalled in the supports **374**. The arms **372** and **376** are at their adjacent ends provided with rearward extensions presenting an arched abutment edge **380**. The rearmost end of the slide **38** is bent upwards and forwards to form an abutting edge **382** at the level of the arched edges **380**. The distance between these edges **380** and the abutment edge **382** of the slide **38** is such, that the slide **38** at the end of its forward stroke presses against edge **380** by its edge **382** and thereby presses the rear end of the actuator bar **140** together with the type bar **364** upwards so that the type **365** thereon facing the lowermost portion of the platen **356** is pressed against said platen. Any known means to apply printing dye to the characters or to guide and feed an inking ribbon between the types and the platen may be used in connection with this printing means and has not been illustrated in the drawings.

In order to render the figures printed on the strip **354** at the underside of the platen **356** visible immediately after printing and until the following printing operation

is performed, I provide means to rotate the platen **356** counter-clockwise immediately before printing and to return the platen to its initial position immediately after printing. Thus the place of the strip, on which the printing is to be effected, is first turned downwardly to the lowermost portion of the platen and thereafter returned to a place visible from the front side of the machine.

For this purpose I provide a cam-like projection **384** on the slide **38** having a slowly ascending surface on its front side. A roller **386** disposed in the path of motion of said cam **384** due to the motion of the slide **38**, is journalled on an arm **388** of a double lever, the second arm **390** of which extends upwards and by a slot **392** engages a pin **394** on a member connected with the platen **356**, preferably a ratchet wheel or the like forming part of the line feeding means for the platen. Other known means for feeding the paper strip one step besides the above described turning to disclosing position may of course be provided and are not illustrated.

In the foregoing description of the construction of my machine I have for clearness sake omitted such details, which are not necessary for the fundamental functions of the machine, but it is clear that this construction is capable of developments and additions increasing the possibilities of different operations to be performed with my machine. Concerning the totalizer, which forms no part of the invention, I have also omitted all the control means necessary for the correct function of said totalizer, such as the transfer of one unit from a totalizer pinion passing from the position corresponding to the Figure "9" to the Figure "0" or vice-versa to the totalizer pinion to the left thereof, the control stop means for the totalizer pinions in the position "0" for the extraction of a positive total, the operation of such stop means in dependance of the positive or negative character of the amount accumulated in the totalizer for obtaining a correct disclosing of a negative total, means permitting the successive entering of the same amount several times into the totalizer without necessitating a re-setting of the amount on the numeral keys and other functions generally capable of being performed in machines of the kind described and obtainable by means so generally known, that they need not be described in this connection.

To facilitate the understanding of the construction above described, I have, in the following described the function of the machine.

The most ordinary operation performed on machines of the kind described is an adding operation, which is effected in the following manner:

Addition

Starting from the rest position of all the parts described, as they are shown in the accompanying drawings, with the exception of Fig. 8 and of the stop members **8***a* and **8***b* in Fig. 5, the amount to be entered into the totalizer is set on the numeral keys starting from the left figure in said amount. Let us admit, that the figure "102" is to be entered as a positive post into the totalizer, i. e. is to be added. For this purpose numeral key "1" is first depressed. Thereby the corresponding transverse bar **59** i. e. the first transverse bar **59** from the left in Fig. 5 is swung downwards by the pin **56** fixed in the head of the key and the projection **62** on said transverse bar **59** operates the push member **65** as illustrated in Fig. 8, thereby displacing the stop member situated below finger **68** of said push member to its lower active position. Simultaneously the feed bar **60** is swung downwards by the transverse arm **59**, whereby arm **75** (Fig. 4) is swung upwards and by means of the pawl member **78, 79** rotates the ratchet wheel **86** one sixteenth of a revolution, which corresponds to half the angular distance between two adjacent teeth or in other words half the rotation step necessary to displace all the rows of stop members **8** along their grooves **7** in the frames **4** one step, i. e. one time the width of the stop members by means of shaft **30**, cog wheels **32** and the knobs **18** of the stop members engaged by the said cog-wheels. This displacement of the stop members **8** takes place within the space between the fixed guiding list **20** (Fig. 11) and the resilient guiding list **26**. When the pawl **78, 79** has performed this half step of the rotation of the ratchet wheel **86**, the opposite pawl member **79** has reached past the following tooth of the ratchet wheel, and engaged the recess behind said following tooth. When the numeral key depressed is released, the transverse bar **56** is returned by its spring (not shown) whereby the projection **62** thereon returns the push-member **65** to its initial position specially illustrated in Fig. 7. Simultaneously the feed bar **60** is returned to its initial upper position by its spring (not shown) whereby arm **75** (Fig. 4) is swung downwards and the leg **79** of the pawl rotates the ratchet wheel **86** the second half of its rotation step, thus displacing all the rows of stop members **8** the second half of their displacement step, thus bringing the depressed stop member above the first actuator bar **140** from the right as seen in Fig. 3.

By the downward-swinging motion of the transverse bar **59** the 0-stop bar **93** (Figs. 3, 9 and 10) is also swung downwards, thus operating the special push member **91**, which by its finger **68** displaces the corresponding stop member **8***b* downwards, which stop member of course simultaneously with all the other stop members is displaced one step along its guide groove in its frame.

Thereafter the numeral key "0" is depressed, and as this key by means of pin **58** operates the feed bar **60** alone, all the rows of stop members are displaced one step by means of arm **75**, pawl **78, 79**, ratchet wheel **86**, shaft **30** (Fig. 4), cog wheels **32** and knobs **18** (Fig. 3), but without displacing any stop member to its lower position. As the 0-stop bar **93** is not operated by any transverse bar **52**, no stop member is either displaced to its active position in the foremost row of stop members.

Finally the numeral key "2" is depressed thus depressing a stop member **8** in the second row from the front of the nine rows of stop members corresponding to the numeral keys "1" to "9," i. e. in the row immediately to the right of the depressed stop member **8***a* shown in Fig. 5, all the stop members being simultaneously fed one step towards the front in the upper part of the rows. Simultaneously a stop member **8***b* will be set to active position by means of the 0-stop bar **93** and the special push member **91**.

When the settling operation thus has been performed the stop member **8***a* of the first of the nine rows of stop members corresponding to the numeral key "1," has been displaced to a position facing the third actuator bar **140** from the right in Fig. 3 in its active position, and the stop member of the second of the nine rows corresponding to numeral key "2" is in its active position facing the first actuator bar from the right in Fig. 3. In the foremost row of stop members **8***b* (to the left in Fig. 5) the stop members facing the third and the first actuator bars **140** from the right in Fig. 3 are in their active position. All the other stop members are in their idle position, i. e. have their inner guide groove **14** (Fig. 13) engaged by the guiding lists **20, 24** or **26** (Fig. 11), except the stop members within the space between the fixed guiding lists **24** and **20**, which may be in any position without disturbing the function of the machine. All the stop members thus set into active position are engaged by the resilient guiding list **26**. If a correction of the amount set on the keys is desired, the correction key **50** (Figs. 4 and 18) is depressed. Its pin **210** swings arm **206** to the left, rotates shaft **188** and by means of the arm **186** and the slide bar **178** (Fig. 4) and the arm **200** (Fig. 6) lifts the plate **146** in which the actuator bars are guided.

The abutment ends **142** of the actuator bars (Fig. 5) enter the groove **212** so that the plate **146** can be lifted against the upper edges of the openings **6** in the frames and press all the stop members **8** set to active position back to their idle position, the resilient guiding list **26** being pushed back by the sloping surfaces of the outer

grooves 15 in the stop members. Then the correct amount can be set as described.

As an addition has to be performed, none of the control keys 51, 52 or 53 is depressed.

To perform the adding operation, the actuating lever 120 is swung downwards by depressing it with the palm of the hand, with which the amount has been set on the keys. The roller 118 (Fig. 2) first reaches the cam surface 125 (Fig. 1) on the left leg of the U-shaped actuating lever 120, permitting the arm 108 to be swung in clockwise direction (Fig. 1), thus displacing the slide 38 a certain distance forwards before the roller 110 reaches the cam surface 124 on the right leg of the actuating lever 120 and permits the forward displacement of the rack 35. These displacements are performed under the action of springs 128 acting on the arms 108 and 106 respectively.

During this first portion of the displacement of the slide 38, before the rack 35 starts its first forward stroke, the following functions are performed:

The projections 168 on the slide 38 (Fig. 5) travel past the plate 166, which by the springs 172 is displaced downwardly and thereby permits the locking pawls 152 which are not retained in their inactive position illustrated in Fig. 5 by a stop member 8*b* set simultaneously with the stop members set to active position in the rows corresponding to the numeral keys "1" to "9," to rock counterclockwise as seen in Fig. 5. In the example illustrated above, in which the figure "102" has been set, the locking pawls 152 facing the first and the third actuator bar 140 from the right in Fig. 3 are retained in idle position, while all the other locking pawls 152 are rocked to engage the locking abutment 150 on the underside of the corresponding actuator bars.

The projection 216 on the slide also travels past the shutter-like member 214 at the lower end of the slide bar 178 and swings it forwards without actioning the slide bar. In the control mechanism (Figs. 14, 15 and 16) the sloping side 278 of recess 276 pushes the roller 274 upwards, which through the bar 268, and the arm 266 turns the shaft 248 in the clockwise sense as seen in Figs. 14 and 15. Thereby the bushings 258 are released by their respective pins 250, 252 and 254 respectively for rotation with the shaft 248, but only the bushing 258 near the right end of the said shaft is permitted to rotate with the shaft by its abutment 280 entering the recess 244 of flange 243 on the control slide 240, while the other two bushings are maintained in their initial positions by their abutments 280 resting on the upper edge of the flange 243 besides the corresponding recesses 245 and 246. Thereby the flange 260 on the bushing 258 which is free to rotate under the action of the spring 264 presses the corresponding pin 298 downwards, so that its lower end engages the forward end of the groove 310 in the slide 38 illustrated in Fig. 17. The two other pins 299 and 300 are maintained in their upper positions by the flanges 260 of the bushings 258 retained in their initial position by their abutments 280. Thereafter pin 298 is guided by the straight portion 312 of groove 310 to a point in transverse alinement with the points where the longitudinal portions 316 and 326 of grooves 310 and 320 meet the inclined portions 318 and 328 of said grooves. As long as pin 298 cooperates with the straight portion 312 of groove 310 the shift slide 282 remains in its initial rest position thereby maintaining the vertical slide 294, supporting the totalizer in its upper position and thus with the totalizer pinions 132 out of engagement with the rack portions 149 of the actuator bars 140.

At this moment of the travel of slide 38 the roller 110 in the driving mechanism (Figs. 1 and 2) reaches the cam surface 124 and the rack 35 begins its forward stroke in the manner above described, while the slide 38 continues its forward stroke. During the forward stroke of the rack 35 the pinion 138 and the shaft 136 are rotated one complete revolution. The driving pinions 134, resiliently operated by shaft 136 strive to displace

the actuator bars 140 rearwards. Those actuator bars which are retained by the locking pawls will, however, not move, and the other bars will be stopped by the set stop members 8 after a travel corresponding to one digit set in the corresponding decade of the machine. During this travel, the actuator bars do not actuate the totalizer pinions, which are out of engagement with the actuator bars. Thus, in the numeric example given above, only the first and the third actuator bars from the right will move, the first bar until it is stopped in the second of the nine rows of stop members corresponding to the numeral key "2" and the third bar until it is stopped in the first row of stop members corresponding to the numeral key "1." Thereafter the actuator bars are retained by their respective abutments and the driving pinions 134 are thus also retained, while pinion 138 continues its rotation until it has performed an entire revolution, which is possible because of the resilient connection between the driving pinions 134 and shaft 136.

When roller 110 has reached the inner end of cam surface 124, i. e. when the rack 35 has fulfilled its forward stroke, the slide 38 has reached a position, in which pin 298 is situated in the portion 312 of the groove 310 (Fig. 17) in transversal alinement with the points, at which the longitudinal portions 316 and 326 of the grooves meet the rear oblique portions 314 and 324 respectively. During the rest of the forward stroke of slide 38 the rack does not move. During this last portion of the forward stroke of the pin 298 slides in the rearmost portion of the straight part 312 of the groove 310 and at the end of said stroke falls down in the deeper end portion of the inclined part 314 of the groove. During this last portion of the forward stroke of the slide 38 the cam-like projection 384 (Fig. 1) lifts the roller 386 and by means of arms 388 and 390 and pin 394 turns the platen 356 to bring the part of the tape situated in the disclosing position outside the cover 2 to the printing position at the lowermost generatrix of the platen. Thereafter the abutment edge 382 of the slide hits the curved edges 380 of the arms 372 and 376 and presses the characters 365 of the type bars 364 situated in position vertically below the axis of the platen 356 against the paper strip to print the signs corresponding to the figure set on the numeral keys and corresponding to the displacement of the actuator bars in the different decades of the machine.

When the actuating lever 120 is released and swung back to its initial rest position by the spring 127, the slide starts its return or rearward stroke and after a portion of this rearward stroke of the slide the rack 35 starts its return or rearward stroke. During this first portion of the rearward stroke of the slide 38 the pin 298 now engaging the portion 314 of the groove 310 is displaced to the left, whereby the slide bar 282 also is displaced to the left and by means of pins 290 presses the vertical slide 294 supporting the totalizer pinions 132 downwards, bringing said pinions into engagement with the rack portions 149 of the actuator bars 140. During said first portion of the rearward stroke of the slide 38 the printing means are also returned to their initial positions and the platen is turned so as to bring the figure printed at the underside of the platen within view range of the operator.

When, after this first portion of the rearward stroke of the slide 38 the rack 35 begins its rearward stroke, the pinion 138 and shaft 136 are turned counterclockwise (seen as in Fig. 1) and after the rotation of the shaft 136 to the respective positions, in which the driving pinions had been stopped during the forward stroke of the rack 35, the said driving pinions are rotated counterclockwise to their initial position, thereby returning the actuator bars to their initial or rest positions. During these displacements of the driving pinions 134, the totalizer pinions, now in engagement with the rack portions 149 of the actuator bars 140 are rotated in correspondence to the

displacement of the actuator bars, whereby the figure originally set on the numeral keys is entered in the positive sense into the totalizer.

When the rack **35** has performed its rearward return stroke, the pin **298** is returned to the right by the inclined portion **318** of the groove **310**, the slide bar **282** is thereby also returned to its rest position to the right and the vertical slide **294** is by means of pins **290** and slots **292** returned to its upper rest position with the totalizer pinions **132** out of engagement with the actuator bars **140**. Thereafter, when pin **298** has sunk down in the deeper portion of the straight part **312** of the groove **310**, the roller **274** rolls down the sloping side **278** of recess **276** in the slide (Fig. 14) and turns the shaft **248** back to its initial position, whereby pin **298** is lifted out of engagement with groove **310** to its initial rest position. During this last portion of the rearward stroke of the slide **38** the projection **216** (Fig. 5) on the slide reaches the shutter-like member **214**, which cannot be swung rearwards and thereby shifts the slide bar **178** upwards, thereby lifting the guide plate **146** at its forward end and by means of arm **186**, shaft **188** and arm **200** also at its rearward end. Thereby the stop members set into active position at the beginning of the adding operation are returned to their upper position and the setting mechanism is thus emptied. Last in the rearward stroke of the slide **38**, the projections **168** thereon cooperate with the guide plate **146** to lift the same, thereby rocking all the locking pawls **152**, to their inactive position illustrated in Fig. 5.

Thus all the parts have been returned to their initial rest positions except the totalizer pinions, which have been turned corresponding to the entering in adding sense of the amount set on the numeral keys at the begining of the adding operation.

Subtraction and total taking

To operate a subtraction the figure to be subtracted is set on the numeral keys in the manner described in connection with the adding operation. After setting the figure on the numeral keys **47**, the subtraction key **51** is depressed. Thereby the pin **224** on shaft **220** (Fig. 3) is depressed and turns the shaft **220** an angle corresponding to about half the distance between the head of key **51** and the key-board. This rotation of shaft **220** is transmitted through arm **226** (Fig. 6), bar **228** and lever **230** to the control slide **240** (Fig. 16) whereby said slide **240** is displaced to the right with the recess **245** facing the abutment **280** on the bushing **258** disposed about in the middle of the shaft **248**. Thereby the recess **244** is displaced away from the abutment on the right hand bushing **258**. Subtraction key **51** or any other part in the transmission between key and control slide **240** is maintained in this position by any known type (not illustrated) maintaining the slide **140** in the shifted position at least until the subtracting operation has begun and is released thereafter by any appropriate means or by hand.

When the actioning lever **120** then is depressed, all the functions previously described in connection with the adding operation are repeated with the exception, that pin **299** (Fig. 17) and not pin **298** is depressed so as to be guided by groove **320**. Thus, during the forward stroke of the slide, pin **299** will slide along the inclined portion **328** of the groove **320**, displacing the shift-slide **282** at the beginning of the forward stroke and thus bringing the totalizer pinions into engagement with the actuator racks **149** before they move rearwards. At the end of the forward stroke of the slide **38**, when pin **299** has reached the rearmost end of the groove **320**, the totalizer pinions are again out of engagement of the actuator racks and remain out during the return rearward stroke of the slide, during which pin **299** slides along the straight portion **322** of the groove **320**. Thus the amount set on the numeral keys has been entered into the totalizer in a sense opposite to the sense, in which the figure was entered during the adding operation.

For total taking, the total key **52** is depressed. As this key actions a pin having the same position on shaft **220** (Fig. 3) as pin **224** for the subtraction key **51**, or this latter pin being placed between keys **51** and **52** and extending under the heads of both keys **51** and **52**, the control mechanism is actioned in the same manner as for subtraction. Key **52** is however connected with means not shown to maintain all the locking pawls **152** in the inactive position, f. ex. by locking plate **166** in the upper position or by lifting the guide plate **146** a little distance, sufficient to lift the locking abutments **150** out of reach of the locking pawls **152** but not sufficient to engage the abutment ends **142** of bars **148** into the groove **212**. Key **52** further operates means not shown but generally known to prevent the totalizer pinions to turn past their 0-position. When the actioning lever **120** then is operated without any figures having been set on the numeral keys, all the actuator bars are free to move rearwards in engagement with the totalizer pinions and are stopped by these when they reach their respective 0-position. Thus each actuator bar has been displaced a distance corresponding to the number contained in the respective decade of the totalizer, which amount is printed at the end of the forward stroke of the slide. During the return stroke, the totalizer pinions **132** are not engaged and remain in their 0-position while the totalizer bars are returned as described herebefore.

When a sub-total is to be taken, the sub-total key **53** is depressed. This turns by means of pin **222** the shaft **220** (Fig. 3) an angle corresponding to the whole distance between the head of key and the key-board **43**, thereby the control slide **240** is displaced to the right with its left recess **246** facing the abutment **280** on the left of the bushings **258**, so that now only pin **300** will cooperate with its groove **330**. During the forward and rearward stroke of the slide **38** the shift slide **282** will be displaced to the left at the beginning of the forward stroke and returned to the right only at the end of the rearward return stroke of the slide **38**. Thus the totalizer pinions will be kept in engagement with the actuator bars during both the forward and the rearward strokes of the rack **35**. The subtotal key operates the same means as the total key **52** to keep the locking pawls **152** out of action and to stop the totalizer pinions **132** in the 0-position. Thus, when performing a subtotal-taking operation the amount accumulated in the totalizer will be taken out by the actuator bars during their rearward stroke, printed at the end of said rearward stroke corresponding to the forward stroke of the slide **38**, and then reentered into the totalizer pinions during the return stroke of the rack **35** and the slide **38**, at the end of which all parts are returned to their rest positions and the totalizer pinions to the same positions as before the sub-total taking operation.

What I claim is:

1. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher demoninational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating herewith, in which said stop members of each of said rows are loosely alined to each other and guided in a fixed guide along at least a portion of which the stop

members are guided for stepwise displacement in either inactive position, the stop members situated in a limited portion of each of said guides being adapted for cooperation with driving means for their simultaneous stepwise displacement to a higher denominational order and the stop members situated outside said limited portion being displaceable along said guides by the pressure exerted thereon by the stop members cooperating with said driving means.

2. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members of each of said rows for their stepwise displacement are guided in a fixed guide in direct contact with each other, the stop members situated in a limited portion of each of said guides being operable by a driving member common for all of said rows for synchronous stepwise transverse displacement to a higher decade and the stop members situated outside said limited portion being displaceable along said guides by the pressure exerted thereon by the stop members cooperating with said driving means.

3. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number or rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members of each of said rows for their stepwise displacement are guided in a fixed guide in direct contact with each other, the stop members situated in a limited portion of each of said guides being operable by a driving shaft extending transversely of said rows and having feeding members engaging the stop members within said limited portions of each of said guides for synchronous stepwise transverse displacement to a higher decade and the stop members situated outside said limited portion being displaceable along said guides by the pressure exerted thereon by the stop members cooperating with said driving means.

4. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members of each of said rows for their stepwise displacement are guided in a fixed guide in direct contact with each other, the stop members situated in a limited portion of each of said guides being operable by a driving shaft extending transversely of said rows and having feeding members engaging the stop members in said limited portion of each of the guides, a ratchet wheel on said driving shaft being operable by a step-feed-mechanism actuated or released by any of the numeral keys when depressed for setting a stop member into active position and for stepwise rotation of said driving shaft for synchronous displacement thereof to a higher decade and the stop members situated outside said limited portion being displaceable along said guides by the pressure exerted thereon by the stop member engaged by said feeding members.

5. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members of each of said rows for their stepwise displacement are guided in a fixed guide in direct contact with each other through an operative portion of said guides in which the stop members are capable of cooperation with the actuator members and within an inoperative portion of said guides outside said operative portion, said inoperative portion being situated above or below said operative portions, the stop members situated in a limited portion of each of said guides being adapted for cooperation with driving means for their stepwise displacement to a higher decade and the stop members situated outside said limited portion being displaceable along said guides by the pressure exerted thereon by the stop members cooperating with said driving means.

6. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the

direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members of each of said rows for their stepwise displacement are guided in a fixed, closed or endless guide in direct contact with each other through an operative transverse portion of said guide in which the stop members are capable of cooperation with the actuator members and through the remaining inoperative portion of said endless guide, the stop members situated within a limited portion of each of said guides being adapted for cooperation with driving means for their stepwise displacement to a higher decade and the stop members situated outside said limited portion being displaceable along said guides by the pressure exerted thereon by the stop members cooperating with said driving means.

7. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members of each of said rows for their stepwise displacement are guided in a fixed endless guide in form of loop with two straight portions and two semicircular portions joining the ends of said straight portions, the stop members in each of said guides being in direct contact with each other and are displaceable through a straight, operative portion of each of said guides, in which the stop members are capable of cooperation with the actuator members, and through the remaining inoperative portions of said guides, the stop members situated within a semi-circular portion of said guies being adapted for cooperation with driving means for their stepwise displacement to a higher decade and the stop members situated within the other portions of said guides being displaced by the pressure exerted thereon by the stop members cooperating with said driving means.

8. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members of each of said rows for their stepwise displacement are guided in a fixed endless guide in form of a loop with two straight portions and two semicircular portions joining the ends of said straight portions, the stop members in each of said guides being in direct contact with each other are displaceable through a straight, operative portion of each of said guides, in which the stop members are capable of cooperation with the actuator members, and through the remaining inoperative portions of said guides, the stop members within one or both of the semicircular portions of each of said endless guides being engaged by toothed wheels rigidly fastened onto a shaft, extending transversely of said guides through the centers of said semi-circular portion or portions of each of said endless guides, said shaft being operable by a pawl mechanism actuated by the numeral keys for stepwise rotation of said shaft and for synchronous stepwise displacement of the stop members engaged by said toothed wheels and of the other stop members in each of said rows by the pressure exerted thereon by the stop members thus displaced, the actuator members being displaceable through the space between said two straight portions of said guides.

9. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members in each of said rows are displaceable in a fixed guide in direct contact with each other, stop members in a limited portion of each of said guides being operable for stepwise displacement to a higher decade and the stop members in the remaining portions of each of said guides being displaceable by the pressure exerted thereon by the stop members thus operated, the stop members having two guiding means selectively to cooperate with guiding means on said guides for the stepwise displacement of the stop members selectively in one or another position in relation to said guides, the guiding means of which have an interruption at which the stop members, when operated by a numeral key may be displaced from an inactive position, in which one of their guiding means is capable of cooperation with the guiding means of the guide, to an active position, in which the other of their guiding means is capable of cooperation with the guiding means of the guides.

10. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members in each of said rows are displaceable in a fixed guide in direct contact with each other, the stop members in a limited portion of each of said guides

being operable for stepwise displacement to a higher decade and the stop members in the remaining portions of each of said guides being displaceable by the pressure exerted thereon by the stop members thus operated, the stop members having two guiding means selectively to cooperate with guiding means on said guides for the stepwise displacement of the stop members selectively in one or another position in relation to said guides, the guiding means of which have an interruption at which the stop members, when operated by a numeral key may be displaced from an inactive position, in which one of their guiding means is capable of cooperation with the guiding means of the guide, to an active position, in which the other of their guiding means is capable of cooperation with the guiding means of the guides, at least one of the guiding means on the stop members having a bevelled surface permitting to displace a stop member from the active position to the inactive position outside said interruption in the guiding means of the guide.

11. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, all of said stop members being further adapted at each depression of a numeral key to be simultaneously displaced one step to the next higher denominational order of the machine transversely of the direction of their individual displacement when set by depression of a numeral key and of the direction of displacement of reciprocable actuator members cooperating therewith in which said stop members of each of said rows are displaceable in direct contact with each other in a fixed guide, through an operative portion of said guides, in which the stop members are capable of cooperation with the actuator members and through inoperative portions of said guides outside said operative portion, the stop members within a limited portion of each of said guides being adapted for cooperation with driving means for their stepwise displacement to a higher decade and the other stop members in each of said rows being displaceable by the pressure exerted thereon by the stop members thus operated, the stop members having two guiding means, selectively to cooperate with guiding means on said guides for the stepwise displacement of the stop members selectively in one or another position in relation to said guides, the guiding means of which have an interruption immediately preceding the operative portion of the guide, at which the stop members when operated by a numeral key may be displaced from an inactive position, in which one of their guiding means is capable of cooperation with the guiding means of the guides, to an active position for cooperation with the actuator members, in which position the other of their guiding means is capable of cooperation with the guiding means of the guides, said guiding means of said guides within the operative portion of said guides being resilient and the guiding means of the stop members cooperatng with the guiding means of the guides in the active position of the stop members having on their side turned towards the other of their guiding means a bevelled surface, capable of pushing aside the resilient guiding means of the operative portion of the guide when the stop member within said portion is forced back from the active position to the inactive position.

12. In a computing machine as defined in claim 11, a resilient guiding means of the guides formed of a strip of sheet steel having the cross-sectional form of an L of which one leg forms a guiding list engaging guiding grooves in the stop members and of which the other leg extends beyond the ends of the guiding list and are fastened to the fixed guiding.

13. In a computing machine as defined in claim 12, a resilient guiding means of the guides consisting of a steel strip with a bent out edge portion forming a guiding list engaging one of two guiding grooves in the stop members one end of said steel strip being fastened to the guide beyond one end of the guiding list and the other end of said strip forming a pressure member retaining the stop members by friction at the place of their displacement from the inactive position to their active position.

14. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, in which said stop members in each of said rows are displaceable in endless guide grooves in the edges of elongated openings with arched ends of fixed frames, one for each of said rows, the stop members in each row being in direct contact with each other and being at one arched end of the frame in engagement with driving means for stepwise displacement of the stop members longitudinally of said guide grooves, the stop members within the other portions of said grooves being displaced by the pressure exerted thereon by the stop members thus displaced, the stop members being further at a determined place of the guide grooves displaceable transversely of said grooves from an inactive position within said guide grooves to an active position projecting into the opening of the frame, through which reciprocatable actuator bars with abutments for cooperation with the stop members set into active position are extending.

15. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, in which said stop members in each of said rows are displaceable in endless guide grooves formed between the edge portions of elongated openings with arched ends of fixed frames joined together to a block with the openings forming a channel through said block, the stop members in each of said grooves being in direct contact with each other and having knobs capable of engagement with toothed wheels fixedly mounted on a driving shaft extending through said channel at the locus of the centers of one of the arched ends of said openings, and adapted for stepwise rotation by a pawl mechanism for stepwise displacement of the stop members in engagement with said toothed wheels, the other stop members in the remaining portions of said grooves being displaced by the pressure exerted thereon by the stop members thus displaced, the stop members being further at one place of each of the guide grooves displaceable transversely of the guide grooves by a push member in each frame actioned by a corresponding numeral key of the key-board mounted above said frames from an inactive position within said grooves to an active position projecting within said channel, in which actuator bars longitudinally reciprocatable transversely of said frames

through said channel have abutments capable of cooperation with the stop members set into active position.

16. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, in which said stop members in each of said rows are displaceable in endless guide grooves in the edges of elongated openings with arched ends of fixed frames joined to a block, there being at least one frame for each of said rows, the stop members in each row being in direct contact with each other and being at one arched end of the opening of each frame in engagement with driving means for stepwise displacement of the stop members longitudinally of said guide grooves, the stop members within the other portions of said guide grooves being displaced by the pressure exerted thereon by the stop members thus displaced, the stop members being further at a place at the beginning of their stepwise travel through a straight portion of the guide grooves operable by push members, actioned by numeral keys of the key-board mounted on top of said block of frames, by means of transverse bars rockably journalled at their crank-shaped ends in said block of frames and engaging inclined slots in the push members by pins projecting from said transverse bars, each of them operably connected with one of said numeral keys, for displacement of the stop members facing said push members transversely of said grooves from an inactive position to an active position projecting into the opening of the frames, through which openings the actuator bars, having abutments for cooperation with the stop members set into active position, are guided for reciprocating motion transversely of said rows of stop members.

17. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, in which said stop members in each of said rows are displaceable in endless guide grooves in the edges of elongated openings with arched ends of fixed frames, one for each of said rows, the stop members in each row being in direct contact with each other and being at one arched end of the frame in engagement with driving means for stepwise displacement of the stop members longitudinally of said guide grooves, the stop members within the other portions of said grooves being displaced by the pressure exerted thereon by the stop members thus displaced, the stop members being further at a determined place of the guide grooves displaceable transversely of said grooves from an inactive position within said guide grooves to an active position projecting into the opening of the frame in which reciprocatable actuator bars with abutments for cooperation with the stop members set into active position are guided for longitudinal reciprocating motion, a plate being mounted within the openings of the frames parallel with the actuator bars and with the straight portions of the edges of said openings and capable of displacement transversely to its plane against at least one of said straight edges for pressing back the stop members set into active position projecting within said openings back into the guide grooves and to their inactive position.

18. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, in which said stop members in each of said rows are displaceable in endless guide grooves in the edges of elongated openings with arched ends of fixed frames, one for each of said rows, the stop members in each row being in direct contact with each other and being at one arched end of the frame in engagement with driving means for stepwise displacement of the stop members longitudinally of said guide grooves, the stop members within the other portions of said grooves being displaced by the pressure exerted thereon by the stop members thus displaced, the stop members being further at a determined place of the guide grooves displaceable transversely of said grooves from an inactive position within said guide grooves to an active position projecting into the opening of the frame, in which reciprocatable actuator bars with abutment for cooperation with the stop members set into active position are guided for longitudinal reciprocating motion in slots provided in a plate being mounted within the openings of the frames parallel with the actuator bars and with the straight portions of the edges of said openings and capable of displacement transversely to its plane against at least one of said straight edges for pressing back the stop members set into active position projecting within said openings back into the guide grooves and to their inactive position.

19. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, in which said stop members in each of said rows are displaceable in endless guide grooves in the edges of elongated openings with arched ends of fixed frames, one for each of said rows, the stop members in each row being in direct contact with each other and being at one arched end of the frame in engagement with driving means for stepwise displacement of the stop members longitudinally of said guide grooves, the stop members within the other portions of said grooves being displaced by the pressure exerted thereon by the stop members thus displaced, the stop members being further at a determined place of the guide grooves displaceable transversely of said grooves from an inactive position within said guide grooves to an active position projecting into the opening of the frame, in which the one ends of reciprocatable actuator bars having an abutment on said end for cooperation with the stop members set into active position are guided for longitudinal reciprocating motion and very slight rocking motion in slots provided in a plate, which is mounted within the openings of the frames parallel with the actuator bars and with the straight portions of the edges of said openings and capable of displacement transversely to its plane against at least one of said straight edges for pressing back the stop members set into active position projecting within said openings back into the guide grooves and to their in-

active position, the other ends of said actuator bars having printing characters adapted to be printed on a paper supported by a printing platen by lifting said other ends of the actuator bars after a displacement of the actuator bars from a rest position to a position limited by the abutment on said one end hitting a stop member set into active position.

20. A computing machine with a number of setting or numeral keys corresponding to the number of digits in each denominational order of the machine and having stop members controlled by said numeral keys and adapted at depression of said numeral keys for individual displacement from an inactive position to an active position for cooperation with reciprocable actuator members for one or more totalizers, said actuator members being displaceable relatively to said stop members, said stop members being arranged in a number of rows corresponding to the number of digits in each denominational order of the machine, in which said stop members in each of said rows are displaceable in endless guide grooves in the edges of elongated openings with arched ends of fixed frames, one for each of said rows, the stop members in each row being in direct contact with each other and being at one arched end of the frame in engagement with driving means for stepwise displacement of the stop members longitudinally of said guide grooves, the stop members within the other portions of said grooves being displaced by the pressure exerted thereon by the stop members thus displaced, the stop members being further at a determined place of the guide grooves displaceable transversely of

said grooves from an inactive position within said guide grooves to an active position projecting into the opening of the frame in which actuator bars are displaceable longitudinally in the transverse direction of said guide grooves, said actuator bars being formed of strips of metal having one end bent to form an abutment for cooperation with the stop members set into active position, said bent end having guiding means cooperating with slots provided in a plate mounted within the openings of said frames parallel with the actuator bars and the straight portions of the edges of said openings, said strip-formed bars having further an intermediate portion bent in form of a sine-curve to form a rack adapted for cooperation on one side with resilient driving means for the longitudinal reciprocating displacement of the actuator bars and on the other side with totalizer pinions displaceable in and out of engagement with said rack portions of the actuator bars the other ends of said actuator bars having printing characters adapted to be printed on a paper supported by a printing platen by lifting said other ends of the actuator bars after a displacement of the actuator bars from a rest position to a position limited by the abutment on said one end hitting a stop member set into active position.

References Cited in the file of this patent

UNITED STATES PATENTS

605,909	Peters	June 21, 1898
924,320	Cheape	June 8, 1909
1,531,041	Stinson	Mar. 24, 1925