A. S. DENNIS.

CALCULATING MACHINE.

APPLICATION FILED JUNE 9, 1919.

1,383,607.

Patented July 5, 1921.

3 SHEETS—SHEET 1.

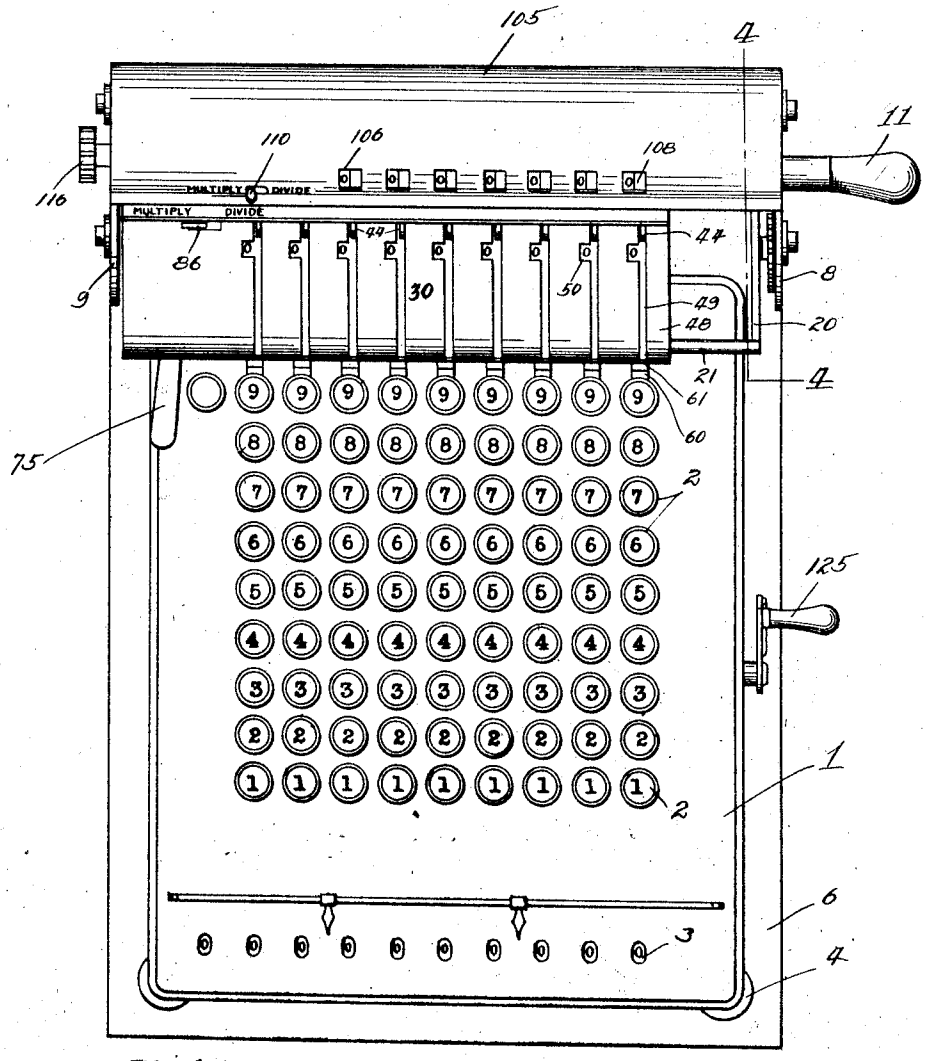


Fig. 1.

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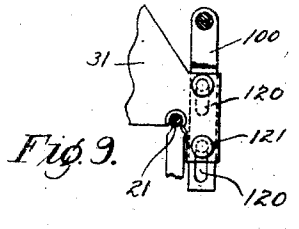


Fig. 9.

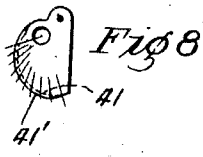


Fig. 8

Fig. 2.

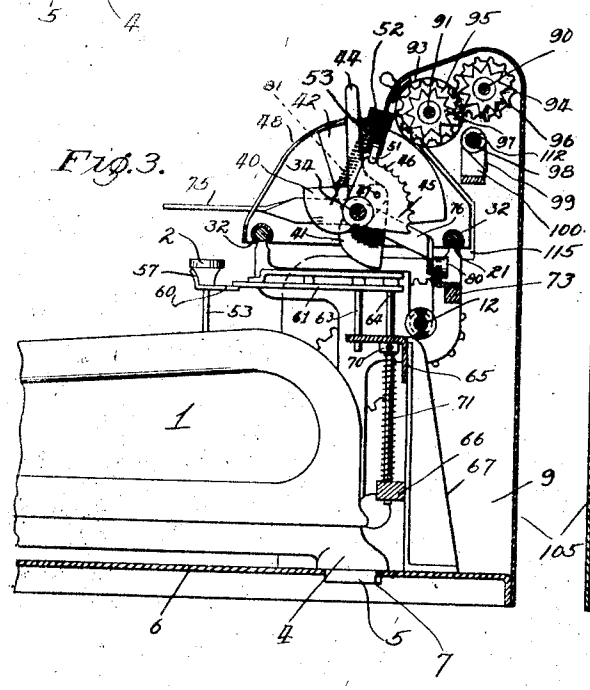


Fig. 3.

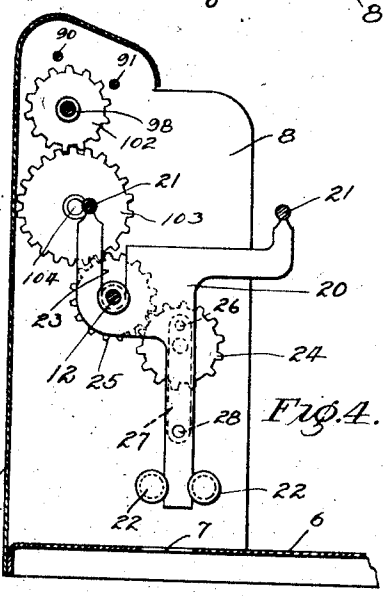


Fig. 4.

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3 SHEETS—SHEET 3.

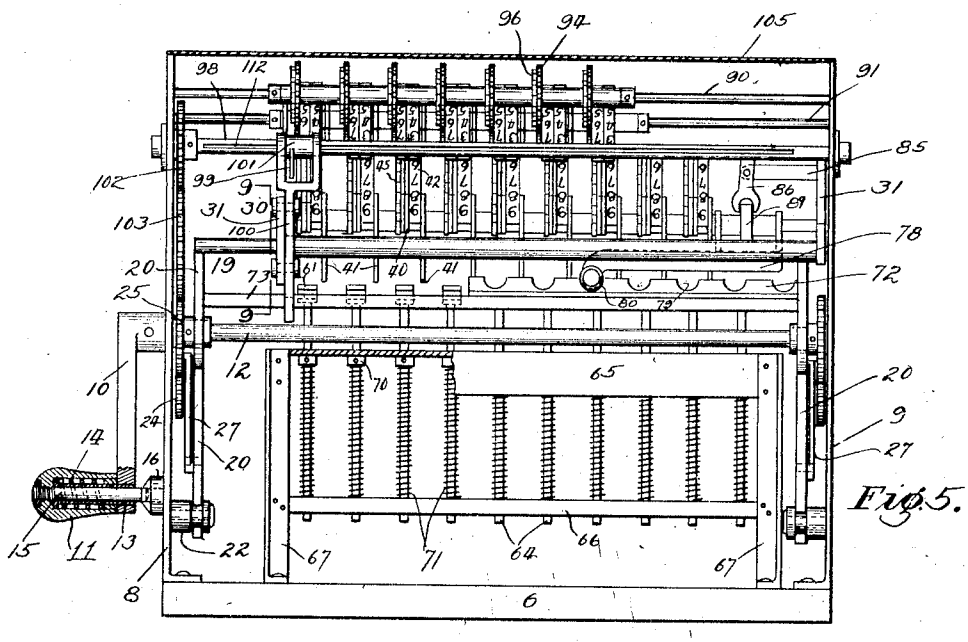


Fig. 5.

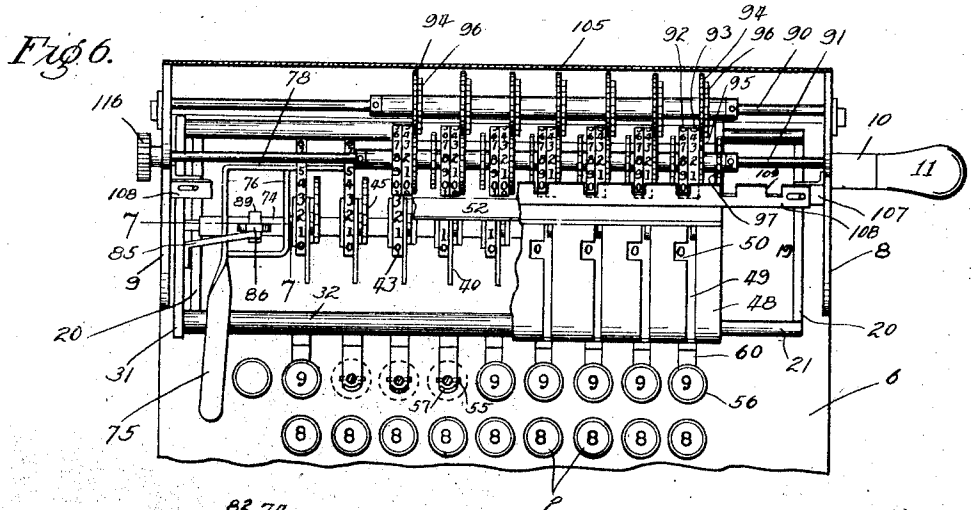


Fig. 6.

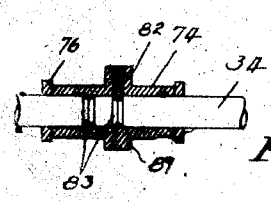


Fig. 7.

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UNITED STATES PATENT OFFICE.

ADOLPHUS S. DENNIS, OF OAKLAND, CALIFORNIA.

CALCULATING-MACHINE.

1,383,607. Specification of Letters Patent. Patented July 5, 1921.

Application filed June 9, 1919. Serial No. 302,964.

To all whom it may concern:

Be it known that I, ADOLPHUS S. DENNIS, a citizen of the United States, residing at the city of Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Calculating-Machines, of which the following is a specification.

This invention relates to improvements in calculating machines of the type wherein the movement of the operating keys cause a corresponding movement of the indicating wheels and wherein the effective movement of the key is proportional to the value of the digit which that key represents.

My invention is in the nature of an addition to machines of this type and may be used in combination with standard machines or embodied in a separate machine. It may be used with existing machines without interfering with their ordinary operation whereby they may be used in the conventional way for problems involving small numbers, while the mechanism comprising my invention may be used where the computations involve numbers having a large number of digits in the multiplier and multiplicand or the dividend and divisor. While I have shown my invention as being applied to a type of standard machine, it will of course be apparent that the invention may be embodied within a machine itself with corresponding results.

The principal object of my present invention is to provide a machine for performing multiplication or division which not only will indicate at the end of each operation the product or quotient but will also indicate the multiplier or divisor.

The further object of my invention is to provide relatively simple mechanism by which this invention may be caused to operate in connection with calculating machines of the "comptometer" type, and means by which the operating connection may be made between the two. The calculating machine may be used alone or in combination with my invention, or if desired the calculating machine itself may be readily removed from the mechanism comprising my invention by simply lifting it from the base thereof.

With these and other objects in view the invention consists in certain novel features of construction, combinations and arrangements of parts herein illustrated and more specifically pointed out in the appended claims, it being understood that changes in form and details of construction, within the scope of these claims, may be made without departing from the spirit of the invention, sacrificing any of the advantages thereof.

Reference being had to the accompanying drawings, forming a part of this specification,

Figure 1 is a view in plan showing the application of my improved invention to a standard calculating machine.

Fig. 2 is a view in side elevation of the same.

Fig. 3 is a vertical section through the mechanism comprising my invention showing its application to the rear end of a calculating machine.

Fig. 4 is a view in section on the line 4—4 Fig. 1.

Fig. 5 is a view in rear elevation.

Fig. 6 is a view in plan with the cover plates removed showing the mechanism comprising my invention.

Fig. 7 is an enlarged sectional view on the line 7—7 Fig. 6.

Fig. 8 is a detail view of the unit operating cam.

Fig. 9 is a view in section on the line 9—9 Fig. 5.

Referring to corresponding parts in the several views by the same numerals of reference, 1 denotes a calculating machine of the type in which the depression of the number keys 2 causes the operation of the indicating mechanism to an amount corresponding to the value of the key depressed. For use in connection with my invention the keys for the digits 9 must be made without a key lock so that several of these keys or any one of them can be partly depressed to operate the indicating mechanism a corresponding amount and they will then return to their normal position.

This calculating machine is removably positioned on a flat base 6 on which is also mounted the mechanism comprising my invention. As here shown the method of locating the calculating machine consists of providing the base with openings 7 which have the same diameter as the rubber pads 5 on the feet 4. The pads being smaller than the feet, there is thus provided a shoulder which rests on the surface of the base to support the machine while the pads extending

into the holder accurately position the machine.

The mechanism comprising my invention is mounted on the base 6 and consists of the vertically extending side plates 8 and 9 in which is revolubly mounted the drive shaft 12. The latter is turned by means of the crank 10 which is provided on its outer end with an operating handle 11. In connection with this handle I provide means for holding the crank in a predetermined position consisting of a tubular sleeve 13 extending outwardly and on which the handle is axially movable. A spring 14 is interposed between a flange on the outer end of the sleeve and an interior shoulder on the handle and tends to move the handle toward the crank. A pin 15 extends through the sleeve and is attached to the handle and movable therewith. On the outside of the plate 8 is a conical faced lug 16 having an opening in which the end of the pin is adapted to seat.

Between the end plates 8 and 9 is a vertically movable frame 19 composed of end plates 20 which are positioned just inside of the end plates 8 and 9 and are connected across their upper ends by means of the bars 21. These plates are substantially T-shaped, and have the lower ends of the stems guided between the grooved rollers 22. The upper ends of the plates have vertical slots 23 that embrace grooved collars on shaft 12 and so guide the upper ends of the plates. Pivotally mounted inside of the end plates are toothed gears 24 which are driven by gears 25 that are keyed to shaft 12. Gears 24 and 25 have corresponding pitch diameters so that for each revolution of shaft 12 the gear 24 also makes one revolution. To each of the gears 23 on one side of the center as shown at 26 is pivotally connected one end of a link 27 the other end of which is pivotally connected to the end brackets 20 as shown at 28. These links thus form connecting rods which cause the entire frame 19 to move in a vertical direction when the shaft 12 is rotated.

Slidably mounted on the rods 21 is a carriage denoted generally by 30 which consists of end plates 31 connected by the tubular members 32 which are open on the bottom and form guideways which embrace the rods 21. Extending between the end plates is a shaft 34 on which is oscillatively mounted the setting mechanism for the operation of the computing machine keys. This setting mechanism consists of units each of which is substantially similar in construction and which are spaced apart a distance equal to the distance between the keys of the computing machine. Each unit comprises two spaced cam members denoted by 40 and 41 the cam 40 being used for operations involving addition and cam 41 for operations involving subtraction. Between these members is a segmental disk 42 on the outer edge of which is provided the indicating numerals 43 and alongside of cam member 40 is an operating lever 44 and adjacent the latter is a segmental disk 45 having notches 46 on its outer edge which notches are an angular distance apart corresponding to that of the numerals 43. The various numbers just described are assembled and held in fixed relation by a rivet or pin 47 extending through the assembly.

Extending between the end plates 31 is a segmental cover 48, which is provided with slots 49 for the levers 44 and also openings 50 through which the numerals 43 may be viewed. Above the holding segment 42, on a bar 52 extending between the end plates 30, are holding devices for the setting mechanism, which devices consist of sleeves 53 attached to the under side of the bar and spring extended pawls 51 which engage the notches 46.

Each of the calculating machine keys in the rear row is provided with a rearwardly extending arm 60 which is adapted to be engaged by the mechanism forming my invention. As here shown, these arms consist of flat strips having an opening for the pin on the upper end of the key stems 55. Each strip is held by the key-button 56 on the shoulder formed between this pin and the stem. An upward extension 57 is provided which fits closely the curved side surface of the key-button and acts as a brace for the arm.

The members which engage arms 60 are denoted by 61 and one of these members is spaced under each of the setting units. Extending downwardly from each member 61 are rods 63 and 64 which enter corresponding openings in a guide bar 65. The rod 64 is continued downwardly through openings in a parallel guide bar 66. Underneath the guide bar 65 each of the rods 64 is provided with a collar 70 which serves to limit the upward movement of the rods and also serves as an abutment for the light coiled spring 71 which surrounds the rod and has its opposite end abutting against guide bar 66. Bars 65 and 66 are attached to brackets 67 which in turn are attached to the base 6.

Below the rear bar 21 on frame 19 and extending between the end plates 20 is a support 73 to which is attached the notched member 72. Oscillatively mounted on shaft 34 is a release mechanism which comprises a sleeve 74 from which extends an arm 75 in a forward direction and which projects through the cover plate 48. Extending rearwardly from the sleeve are arms 76 which are connected by a longitudinal bar 78 on the end of which is a roller or other device

80 for engaging the notches 79 in member 72. A spring 81 tends to draw the arm 75 upwardly and thus to hold the roller in the above mentioned notches.

The cam members 40 and 41 are spaced apart a distance slightly greater than the width of the contact bar 61 and I provide means whereby either set of cams may be positioned directly over the member 61. As here illustrated this means consists of a lever 86 the upper end which extends through the cover plate 48 and the lower end of which is bifurcated and engages an annular collar 89 on the sleeve 74. The lever itself is pivotally mounted intermediate its length on a bracket 85 extending outwardly from the end plate 31. The sleeve itself held in a fixed position by the engagement of the roller 80 in the notches of bar 72 so that the shifting of the lever will correspondingly shift the whole frame on the guides 21. To hold the carriage in either position, I provide the shaft 34 with grooves 83 which are spaced apart the distance which the carriage is shifted. Extending through the collar 89 is an opening in the bottom of which is a spring depressed ball 82. This ball drops into one or the other of the grooves 83 and so holds the carriage in either operating position.

To provide means for visually indicating the multiplier or quotient, I provide a counting mechanism which consists of shafts 90 and 91 mounted in the end plates 8 and 9. On shaft 90 are star wheels 96 and revoluble therewith toothed gear wheels 94. The various pair of star and gear wheels are spaced apart on shaft 90 a distance equal to the spacing of the notches 79, which in turn are spaced the same as the members 61. On shaft 91 are toothed gears 95 which mesh with the gears 94. Revoluble with each of the gears 95 are two indicating disks 93 and 92 and a star wheel 97. The latter is spaced axially with respect to the star wheel 96 an amount equal to the distance which the carriage is shifted by lever 86.

Revolubly mounted in the end plates 8 and 9 is a shaft 98 which is driven by gear 25 through the toothed idler gear 103 and the gear 102 on shaft 98. The shaft is provided with a keyway 112 and splined thereto is a sleeve 101 which has a finger 99 that is adapted to engage the star wheels 96 and 97. This sleeve is movable with the frame 30 by being held between the bifurcated end of a member 100 extending therefrom.

The gear and upper portion of the mechanism is provided with a cover plate 105 which is curved to fit closely over the disks 92 and 93. Above the latter, the plate is provided with openings 106 the width of the two disks. These disks are numbered from 0 to 9, in opposite directions one set of figures being used for division and the other set for multiplication. In order that the wrong set may not be read, I provide a slidable strip 108 which is mounted on brackets 107 on the inside of the end plates 8 and 9. The upper edge of this strip has notches 109 which are substantially half the width of the openings 106 and uncover one half at a time. This strip is shifted by a knob 110 which projects through a slot in the plate 105.

As the carriage 30 is moved toward the left on the guide bars 21, the left handed end will be extended outside of the frame and I provide the end plate 9 with an opening 115 for this purpose.

As the end frame 19 moves vertically while the shaft 98 is fixed on the end plates 8 and 9 it is necessary to provide means in connection with the member 100 to take care of this movement. As shown in Fig. 9 the lower end of the member is provided with slots 120 and extending through the end plate 31 are guides 121 which have enlarged heads and thus hold the member in vertical alinement while allowing a relative movement between the parts.

In this machine division or continuous subtraction is performed by adding the codigits of the numbers, which makes it necessary in the unit position to add the codigit plus 1, or the complement of the number. For this reason the division cam of the first unit, which I have denoted by 41′ is constructed as shown in Fig. 8. The dotted line shows the configuration of cams 41 and the cam 41′ for any position is one space greater.

Thus when the arm 44 associated with this unit is turned to "4," the position of cam 41′ will be the same as the "5" position of the cams 41.

In use the calculating machine 1 is placed on the base 6 and accurately positioned by the means herein described or equivalent instrumentalities. Each key of the rear row is provided with an arm 60 as previously described and the mechanism of my invention is arranged that when the machine 1 is thus positioned the forward ends of members 61 will rest on these arms. The machine is then ready to operate.

If multiplication is to be performed the lever 86 and knob 110 are moved to indicate this operation and the arms 44 pulled down through slots 49 until the multiplier is read through the openings 51. As a concrete illustration suppose the product of 125 by 346 is required. The carriage 31 is preferably positioned so that the first slot 49 from the right is in alinement with the first row of keys 2. Then the first lever 44 from the right is pulled down until the number 6 is visible through the associated opening 5, the second lever 44 is moved to indicate 4 and

the third lever to indicate 3. The movement of each of these levers rotates the cams associated with that unit, and the cams 40 are positioned directly over the corresponding contact strips 61.

Next the handle 11 is pulled out to release the operating crank and the latter rotated five times, corresponding to the "5" in the units place of the multiplicand. Each time the crank is rotated the frame 19 is moved downwardly by the connecting links 27 and the cams 40 push down the members 61. The latter in turn press down the associated calculating machine keys 2. The curvature of these cams is such that for a given setting they move the corresponding members 61 in the ratio of which that setting is to 9. In our example the cam of the first unit will move the key 2 associated therewith 6/9 the total distance which this key is movable, the second and third cams will move their associated keys 4/9 and 3/9 of the total distance which they are movable.

As previously explained the calculating machine is so constructed that when a key is only partly moved down a corresponding movement of the indicating dials viewable through the openings 3 takes place. Hence in our example on the first revolution of the crank the number 346 will appear in these openings which number will be increased by itself on each subsequent revolution of the crank.

The rotation of shaft 12 by crank 10 rotates the shaft 98 at a corresponding speed and the finger 99 engages the star wheel 96 and moves it 1/10 of a revolution. This movement is transmitted to the associated devices on shaft 91 causing the disk 92 to be moved to indicate "1" through the first opening 106. For each rotation of the crank the disk is advanced 1/10 of a revolution so that when the crank has been turned five times the dial will indicate "5".

Next the lever 75 is depressed to release the roller 80 and the carriage 30 moved one position to the left. In making this movement the sleeve 101 is carried along and positioned under the next star wheel 96. The crank 10 is then turned two times which causes the set cams to contact with the member 61 of orders ten times the value of those of the previous position. In like manner the finger 99 will move the second disk 92 so that the numeral "2" is readable.

The carriage is then shifted another space to the left and the handle turned once, and restored to its normal position. At the end of this process the number "125" is visible through openings 106. The multiplier 346 shows through the openings 50 and the product is read in the openings 3.

In performing division which is continuous subtraction the dividend is set up in the openings 3 and the divisor in the openings 50. The carriage is then moved to the left until the number set up in openings 50 will be subtractable for the number in the alining openings 3 one or more times.

Arm 86 is moved to the right which shifts the whole carriage sufficient to bring the cams 41 over the member 61 and in like manner the finger 99 opposite one of the star wheels 97.

Assuming that the divisor is 346 then as before the first three setting levers 44 are moved until this member appears in the openings 50. But cams 41 are arranged that when the carriage is moved vertically, the amount of movement which they impress on the corresponding members 61 will be the codigits of these numbers or for the first and second cams for the left the amount of movement will correspond to "6" and "5" respectively. On the extreme right cam or 41′ the movement impressed will be the codigit plus 1 or "4".

In performing subtraction by addition of the codigit it is well known that it is necessary to add one in the unit position and to throw away "1" from the last position on the left. These operations are automatically performed on my machine the first by the use of the special cam 41′ and the second due to the fact that a row of 9's are added to the "1", which clears the indications visible through openings to the left hand side.

As the machine thus accurately performs subtraction it will perform division, the process being to rotate the crank 10, as many times as necessary to clear the number in the alining openings 3 and then to move the carriage to the right and repeat the process.

Each time the crank is rotated the disk 93 will be moved by finger 99, contacting with star wheel 97 and when the carriage is shifted the indication will take place in the corresponding opening 106 to the right. Thus when the number set up in openings 3 is entirely cleared the number appearing on disks 93 will be the quotient. To view this number it is necessary to first shift the strip 108 to open the other side of openings 106.

The indications in openings 106 are cleared by rotating a wheel 116 and those in openings 3 by the lever 125.

In case division is being performed and the divisor is subtracted too often causing a row of 9's to appear at the extreme left of openings 3, the mistake is rectified by moving lever 86 to the position for multiplication giving the crank one turn and shifting the lever 86 back to the division position.

With this attachment numbers may be handled on a calculating machine of this character which cannot be spanned by the fingers of the ordinary operator. Also an absolute check is secure as all three terms of the operation are visible. The device in

no way interferes with the ordinary operation of the calculating machine, for the keys may be depressed as if the attachment was not in position.

Having thus described my invention, I claim as new and wish to cover by Letters Patent:—

1. A device of the character described comprising the combination with the actuating parts of a calculating machine, of members for moving said parts, cams adapted to be set according to the numeral being used, means for reciprocating said cams to cause them to move said members an amount proportional to the cam settings.

2. A device of the character described comprising in combination with a calculating machine of the key operated type, members for depressing the nine keys of said machine, pivotally mounted cams adapted to set according to the number to be placed in said machine, means for reciprocating said cams to cause them to contact with said members, and means for counting the reciprocations of said cams.

3. A device of the character described comprising in combination with a calculating machine of the key operated type, members adapted to depress the nine keys of said machine, cams oscillatively mounted for the purpose of setting the same, curved surfaces on said cams for contact with said members the radii of the points of contact of said curved surfaces being proportional to the setting of said cams, means for reciprocating said cams to contact with and move said members and means for counting the reciprocations of said cams.

4. A device of the character described comprising in combination with a calculating machine of the key operated type, reciprocable members adapted to depress the nine keys of said machine, oscillatively mounted setting cams adapted to contact with said members, means for reciprocably moving said cams and causing them to move said members an amount proportional to the setting of said cams.

5. A device of the character described comprising in combination with a calculating machine of the key operated type, reciprocable members adapted to depress the nine keys of said machine, a pair of oscillatively mounted setting cams for each of said members, means for bringing either cam of said pairs into position to contact with said members, means for reciprocating said cams to cause them to move said members an amount proportional to the setting of the contacting cams.

6. A device of the character described comprising in combination with a calculating machine of the key operated type, reciprocable members adapted to depress the nine keys of said machine, a pair of oscillatively mounted connected setting cams for each of said members, adapted to contact therewith, one of said cams having contact points the radii which are as the digits for which the cam is set, the other of said cams having contact points the radii of which are as the codigits of the numbers for which the cam is set, means for bringing either cam of said pairs into a position to contact with the corresponding member, and means for reciprocating said cams to cause them to move said members an amount proportional to the setting of the contacting cams.

7. A device of the character described comprising in combination with a calculating machine of the key operated type, reciprocable members adapted to depress the nine keys of said machine, setting devices and means for causing said setting devices to depress said members an amount proportional to the settings thereof.

8. A device of the character described comprising in combination with a calculating machine of the key operated type, reciprocable members adapted to depress the nine keys of said machine, setting devices, means for causing said setting devices to simultaneously depress said members an amount proportional to the settings thereof and means for counting the depression of said members.

9. A device of the character described comprising in combination with a key operated calculating machine, setting devices, means operable by said devices for depressing the nine keys of said machine an amount proportional to the setting of said devices, and means for counting the depressions of said keys.

10. A device of the character described comprising in combination with a key operated calculating machine having a plurality of depressible keys, members for moving the nine keys thereof, setting devices, means for reciprocating said setting devices a uniform amount in the direction of movement of said key moving members, and means carried by said setting devices for contacting with said key moving member and moving the same an amount proportional to the setting of said devices.

11. A device of the character described comprising in combination with a calculating machine having a plurality of depressible operating keys, members adapted to contact with the nine keys for the purpose of depressing the same, setting devices movable traversely of said members, means for uniformly reciprocating said setting devices, contact means on each of said devices adapted to be set in proportion to the digit of the number set up, a second contact means on each setting device adapted to be set according to the codigit of the same number, and means whereby either contact means of

each device may be positioned to engage one of the key depressing members to move the same proportionally to the indication of said setting devices.

12. A device of the character described comprising in combination with a key operated calculating machine having a plurality of depressible operating keys, members adapted to contact with the nine keys for the purpose of depressing the same, setting devices movable transversely of said members, means for uniformly reciprocating said setting devices, contact means on each of said devices adapted to be set in proportion to the digit of the number set up, a second contact means on each setting device adapted to be set according to the codigit of the same number, means whereby either contact means of each device may be positioned to engage one of the key depressing members to move the same proportionally to the indication of said setting devices and indicating devices for counting the reciprocation of said setting devices.

13. A device of the character described comprising in combination with a calculating machine having a plurality of depressible operating keys, members adapted to contact with the nine keys for the purpose of depressing the same, setting devices movable transversely of said members, means for holding said devices in fixed transverse relation to said members, means for uniformly reciprocating said setting devices, contact means on each of said devices adapted to be set in proportion to the digit of the number set up, a second contact means on each setting device adapted to be set according to the codigit of the same number, means whereby either contact means of each device may be positioned to engage one of the key depressing members to move the same proportionally to the indication of said setting devices, and indicating devices for counting the reciprocations of said setting devices.

14. A device of the character described comprising in combination with a key driven calculating machine having a plurality of depressible nine keys, members contacting with said keys for depressing the same, a traversely movable carriage above said members, setting devices mounted in said carriage, means for holding said setting devices in a selected transverse position, means for reciprocating said carriage in the direction of said members, means carried by said setting devices for contact with said members, said means being adapted to depress said members when said carriage is reciprocated, an amount proportional to the indications of the said setting devices.

15. A device of the character described comprising in combination with a key driven calculating machine having a plurality of depressible nine keys, members contacting with said keys for depressing the same, a traversely movable carriage above said members, setting devices mounted in said carriage, means for reciprocating said carriage in the direction of said members, two cams carried by each of said setting members for depressing said members an amount proportional to the setting thereof and means for shifting said carriage to bring either set of said cams into position for contacting with said members.

16. A device of the character described comprising in combination with a key driven calculating machine having a plurality of depressible nine keys, members contacting with said keys for depressing the same, a traversely movable carriage above said members, setting devices mounted in said carriage, means for reciprocating said carriage in the direction of said members, means carried by said setting devices for contact with said members, said means being adapted to depress said members when said carriage is reciprocated an amount proportional to the indications of the said setting devices.

17. A device of the character described comprising in combination with a key driven calculating machine having a plurality of depressible nine keys, members contacting with said keys for depressing the same, a traversely movable carriage above said members, setting devices mounted in said carriage, means for holding said setting devices in a selected traverse position, means for reciprocating said carriage in the direction of said members, two cams carried by each of said setting members for depressing said members an amount proportional to the setting thereof and means for shifting said carriage to bring either set of said cams into position for contacting with said members.

18. A device of the character described comprising in combination with a key driven calculating machine having a plurality of depressible nine keys, members contacting with said keys for depressing the same, a traversely movable carriage above said members, setting devices mounted in said carriage, means for holding said setting devices in a selected traverse position, means for reciprocating said carriage in the direction of said members, two cams carried by each of said setting members, means for shifting said carriage to bring either set of cams into position for contacting with said members, contact points on one of said cams which are adapted to depress the corresponding key operating member in accordance with the digit set up, contact points on the other of said cams adapted to depress said key operating members in accordance with the codigit of the number set up.

19. A device of the character described

comprising in combination with a key driven calculating machine having a plurality of depressible nine keys, members engaging said keys for the purpose of depressing the same, a vertically movable frame having traversely disposed guides, a carriage slidably mounted on said guides, means for reciprocating said frame, means for holding said carriage in a selected traverse position, setting devices oscillatively mounted in said carriage, two cam members carried by each of said setting devices, means for bringing either of said cams into position to contact with said key depressing members and contact surfaces on said cams, one of which is adapted to move said key depressing members an amount corresponding with the digit set up, the other of which is adapted to depress said key depressing members an amount corresponding with the codigit of the number set up, and means for counting the reciprocations of said frame.

20. In a calculating machine, the combination with the actuating parts thereof of digital and codigital cams arranged in pairs, members adapted to move said actuating parts, means for bringing either cam of each pair into operative relation with said members and means for moving said cams to operate the actuating parts of the calculating machine according to the number being used.

21. In a calculating machine, the combination with the actuating parts thereof of digital and codigital cams arranged in pairs and adapted to be set according to the number being used, means for reciprocating said cams, and means operable by the reciprocation of said cams for moving said actuating parts.

22. In a calculating machine, the combination with the actuating parts of the machine of pairs of digital and codigital cams, setting devices therefor, and means for operatively connecting either set of cams with the actuating parts of the calculating machine.

23. In a calculating machine, the combination with the actuating parts of the machine of members adapted to be brought into operative relation to said parts, a carriage movable transversely in relation to said parts, pairs of digital and codigital cams carried by said carriage, means for moving said cams to bring either set into operative relation with said members, and means for moving the cams into engagement with said members to cause the latter to operate said actuating parts.

24. In a calculating machine, the combination with actuating parts for the machine movable proportionately to the number being used, of pairs of digital and codigital cams for moving said parts, a laterally shiftable carriage carrying said cams, means for laterally shifting said cams so as to bring either the digital or codigital cam of the pairs into operative relation with said actuating parts, and means for shifting said carriage to bring the corresponding cams of the pairs into operative relation with a selected group of said actuating parts.

25. In a calculating machine, the combination with actuating means for the machine of members for moving said actuating means, a carriage laterally movable with respect to said members, pairs of digital and codigital cams carried by said carriage, means for bringing either set of cams into operative relation with said members, setting levers for said cams, indicating devices for showing the setting of the cams, a spring holding pawl for each set of cams, means whereby said carriage may be laterally shifted to bring the selected set of cams into successive operative relation with said members and means for reciprocating the carriage to cause said cams to contact with said members.

26. In a calculating machine, the combination with the actuating parts thereof, of members unconnected with said parts for moving the same, a laterally movable carriage, a plurality of pairs of connected digital and codigital cams, means for selectively positioning either set of cams in operative relation to said members, setting devices for each set of cams, a holding pawl for each set of cams, means permitting the shifting of the carriage to bring a given set of cams into operative relation with any group of said members, means for reciprocating said carriage to cause the selected set of cams to move said members proportionately to the cam settings, a plurality of pairs of indicating disks, a finger for operating said disks, said finger being shiftable with said carriage to actuate successive pairs of disks and shiftable with the cams to actuate the disk of any pair corresponding to the digital or codigital cams selected.

27. In a calculating machine, the combination with actuating mechanisms therefor, of number setting devices, cams carried by said devices for moving said actuating mechanisms, and means for laterally shifting said devices to bring the cams into operative relation with successive orders of said actuating mechanisms.

28. In a calculating machine, the combination with actuating mechanisms therefor, of number setting devices, cams carried by said devices for moving said actuating mechanisms, means for laterally shifting said devices to bring the cams into operative relation with successive orders of said actuating mechanisms, means for successively moving said cams to operate the actuating mecha-

nisms and means for indicating the number of operating movements of the cams for each order position.

29. In a calculating machine, the combination with actuating mechanisms therefor, of number setting devices, digital and codigital cams carried by said devices for moving said actuating mechanisms, means for moving said cams to bring either set into operative relation with said actuating mechanisms, means for lateraly shifting said devices to bring the selected set of cams into operative relation with successive orders of said actuating mechanisms, means for successively moving said cams to operate the actuating mechanisms and means for indicating the number of operating movements of the cams for each order position.

30. In a calculating machine, the combination with actuating mechanisms therefor, of number setting devices, digital and codigital cams carried by said devices for moving said actuating mechanisms, means for moving said cams to bring either set into operative relation with said actuating mechanisms, means for laterally shifting said devices to bring the selected set of cams into operative relation with successive orders of said actuating mechanisms, means for reciprocating said cams to cause them to move said actuating mechanisms, and means for separately indicating the operative movements of the actuating mechanism for either set of cams.

31. In a calculating machine, the combination with actuating mechanisms therefor, of number setting devices, digital and codigital cams carried by said devices for moving said actuating mechanisms, means for moving said cams to bring either set into operative relation with said actuating mechanisms, means for laterally shifting said devices to bring the selected set of cams into operative relation with successive orders of said actuating mechanisms, means for reciprocating said cams to cause them to move said actuating mechanisms, counting mechanism for indicating the operative movements of said digital cams for each order, other counting mechanism for the codigital cams, a finger for operating said counting mechanisms said finger being shiftable from order to order with the cams and movable as the digital or codigital are used to engage the corresponding set of counting mechanisms.

32. A device of the character described comprising in combination with a calculating machine of the key operated type, reciprocable members adapted to depress the nine keys of said machine, a pair of oscillatively mounted connected setting cams for each of said members, adapted to contact therewith, one of said cams having contact points the radii of which are as the digits for which the cam is set, the other of said cams having contact points the radii of which are as the codigits of the numbers for which the cam is set, means for bringing either set of cams into a position to contact with the said members, means for reciprocating said cams to cause them to move said members an amount proportional to the setting of the contacting cams, means for laterally shifting said cams for engagement with different orders of said members and means for counting the reciprocation of said cams for each order position.

33. A device of the character described comprising in combination with a calculating machine having a plurality of depressible operating keys members adapted to contact with the nine keys for the purpose of depressing the same, setting devices movable transversely of said members, means for holding said devices in fixed transverse relation to said members, means for uniformly reciprocating said setting devices, contact means on each of said devices adapted to be set in proportion to the digit of the numbers set up, a second contact means on each setting device adapted to be set according to the codigit of the same number, means whereby either contact means of each device may be positioned to engage one of the key depressing members to move the same proportionately to the indication of said setting devices and means for separately indicating the number of reciprocations of said setting devices when either set of contact means is in operative position.

34. A calculating machine comprising the combination with actuating members therefor, of a laterally shiftable carriage, pairs of digital and codigital cams oscillatively mounted in said carriage, setting devices for said cams, means for laterally shifting the carriage to position the digital or codigital cams in operative relation with the actuating members, means whereby said carriage may be moved to position the cams in operative relation with different orders of actuating mechanism, means for moving said carriage to cause the set cams to engage the actuating members, a counting mechanism for each order position of the carriage, a finger for engaging said counting mechanisms and laterally movable with said carriage, indicating means for the counting mechanisms viewable when the digital cams are used, and separate indicating means viewable when said codigital cams are used.

In testimony whereof I affix my signature.

ADOLPHUS S. DENNIS.