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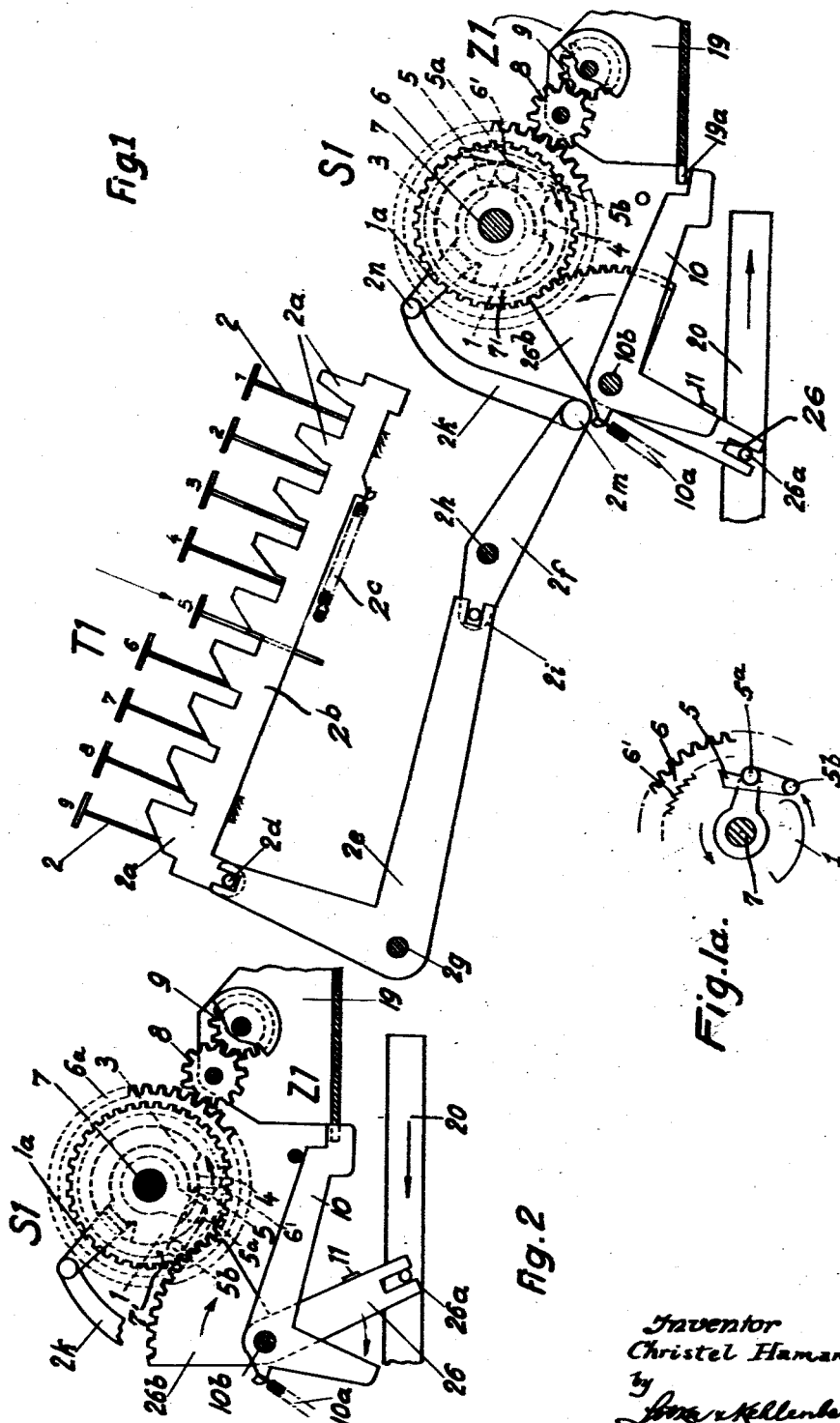
C. HAMANN

2,081,008

CALCULATING MACHINE

Filed Nov. 4, 1932

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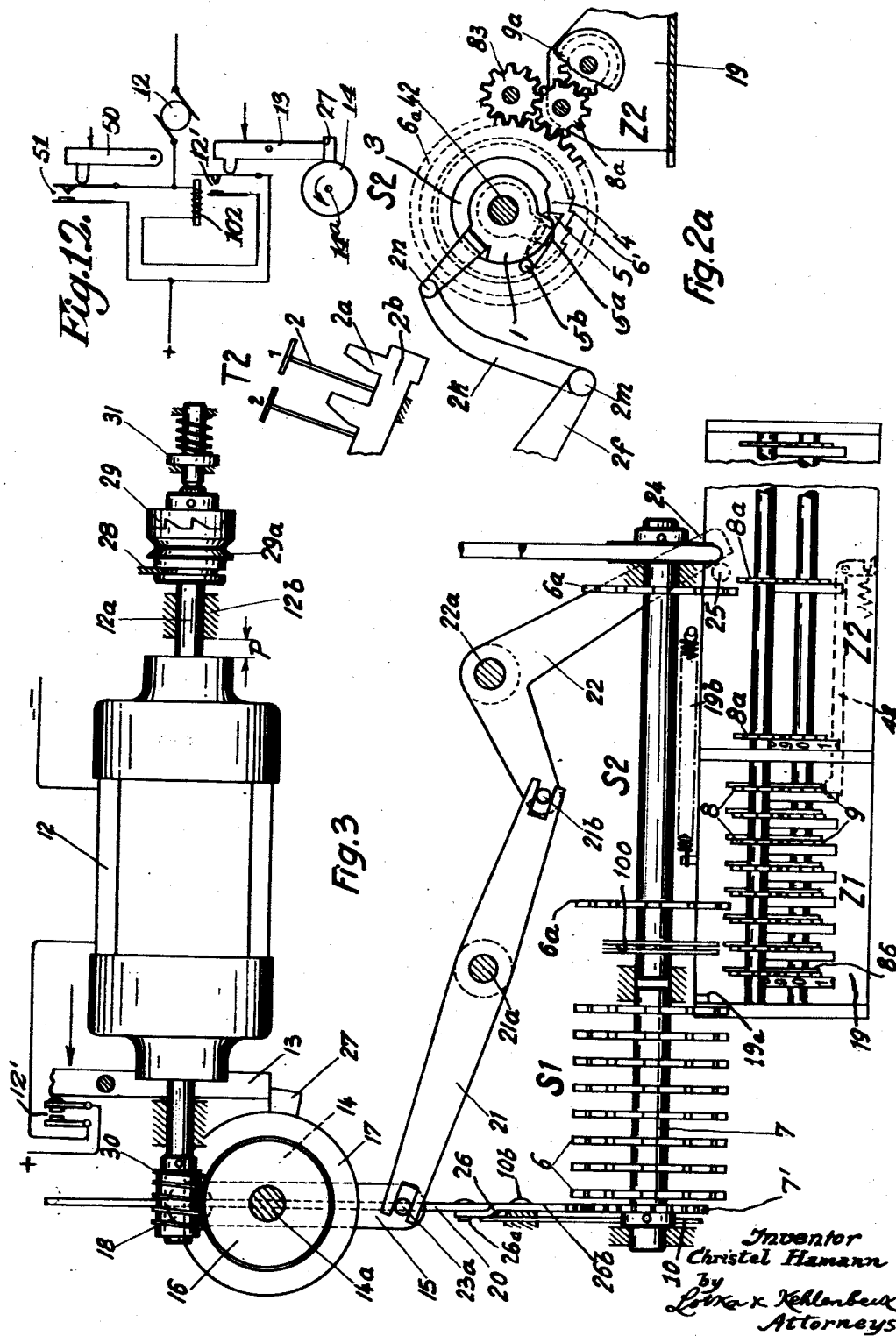
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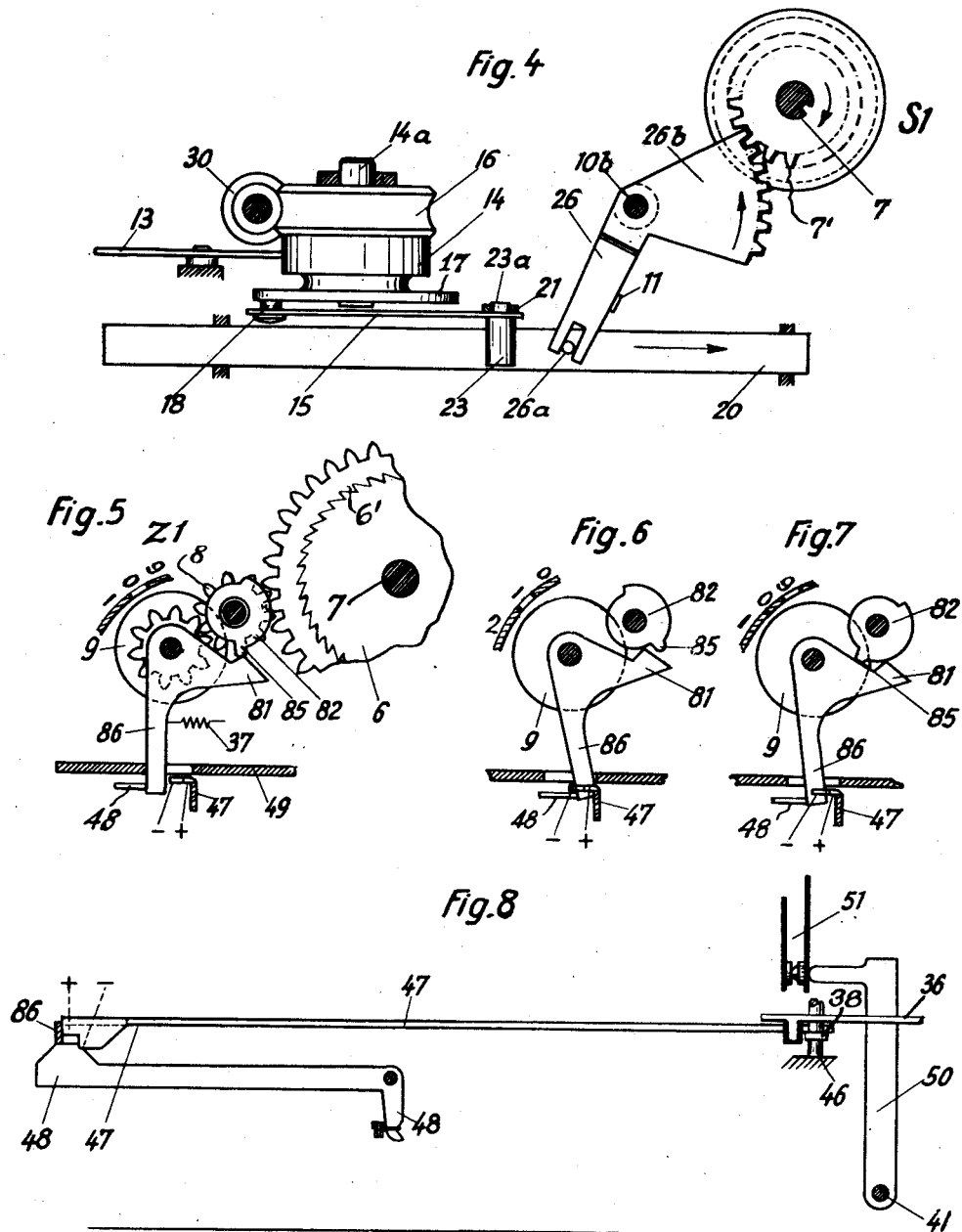
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CALCULATING MACHINE

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4 Sheets-Sheet 3



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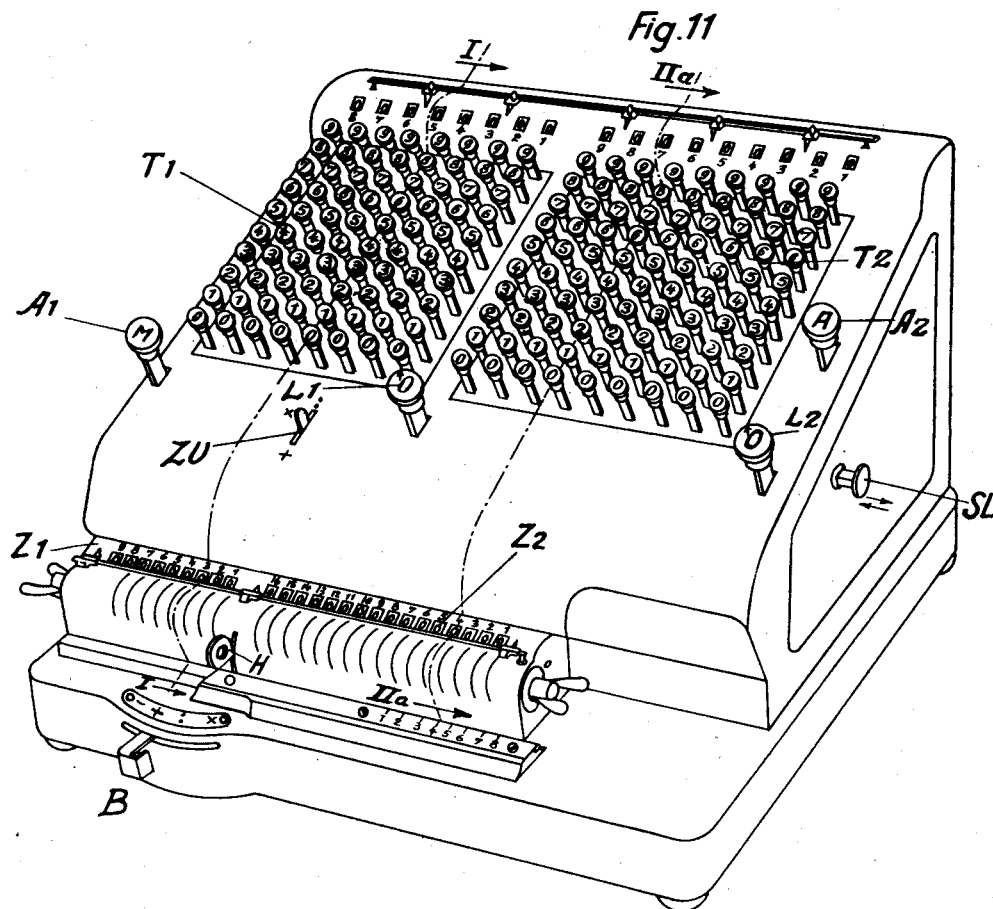
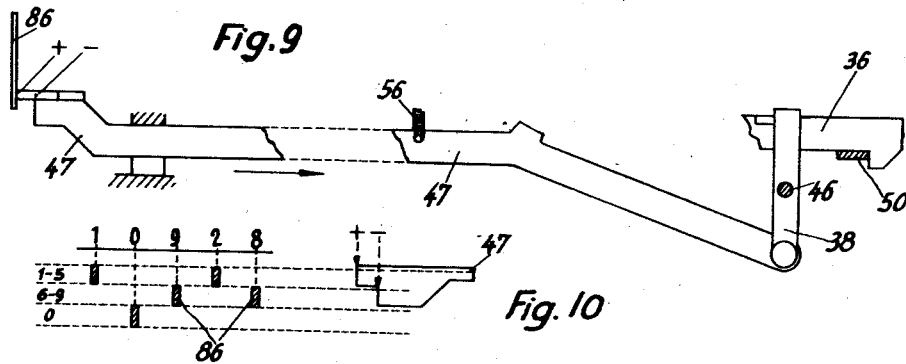
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,081,008

CALCULATING MACHINE

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Application November 4, 1932, Serial No. 641,165
In Germany November 11, 1931

3 Claims. (Cl. 235—79)

The subject matter of the invention is an automatic calculating machine in which the multiplicand and the multiplier are set before the machine begins to operate on separate setting mechanisms, and these mechanisms then co-operate automatically with counting mechanisms of the carriage. According to my present invention, in the first place, one of the setting mechanisms transfers the multiplier to a digit mechanism of the carriage, the so-called rotation counting mechanism, and after this the other mechanism enters the multiplicand in the result mechanism of the carriage.

For entering the multiplier and the multiplicand in the machine there are preferably employed two complete keyboards which each contain in known manner ten keys for each digit place to be entered. This has the advantage that the complete multiplier can be visibly set before it is entered in the carriage. The entry of the multiplier in the carriage is effected in this case, in accordance with the invention, by simultaneously transferring all places of the multiplier from the setting mechanism to the rotation counting mechanism of the carriage, which necessitates only one revolution of the main machine shaft. This simultaneous transfer is, however, also possible in the case when there is only one row of keys, and the places of the multiplier are entered one after another in the setting mechanism, the keys being displaced for this purpose. The pre-setting of the complete multiplier, in accordance with the invention, during which process the rotation counting mechanism of the carriage is not yet acted on by the setting mechanism, has the advantage that, even while the machine is working, the multiplier for the next calculation can be altered or a new multiplier can be set in the machine.

The entry of the multiplier in the rotation counting mechanism of the carriage takes place automatically, and the subsequent calculating operation also takes place automatically, as is well known in the art, see for instance United States Patent No. 1,968,201 of July 31, 1934. Both operations are carried out in a single operating stage, which is effected by pressing a key or by a similar manipulation. In a preferred form of construction of the machine this operation is effected by a to and fro movement of the carriage in front of the two keyboards. This to and fro movement is of such character that the carriage suddenly jumps from the end position, in which it stands after the completion of a multiplication (right hand position), completely

to the left into the multiplier setting position and thereafter jumps to the right into the position for beginning the multiplication, and then progresses by a step-by-step movement further to the right. Between the two jumping movements of the carriage the transfer of the multiplier from the setting mechanism to the rotation counting mechanism of the carriage takes place automatically. In this arrangement the multiplier setting mechanism is located at the left of the machine, and the multiplicand setting mechanism at the right of the machine. If both mechanisms be constructed, as previously mentioned, with complete keyboards, then these keyboards are located one beside the other, and the carriage moves backwards and forwards in front of both of them.

The setting mechanism of the multiplier can be constructed similarly to that of the multiplicand. A known multiplicand setting mechanism which can advantageously be used consists of gapped discs arranged along a shaft, in the gaps of which rotary pawls engage, which also simultaneously engage a toothed wheel and thus adjust the result mechanism of the carriage according to the size of the gaps. A form of construction of this mechanism is described, for example, in United States Patent 1,968,201 of July 31, 1934. In this mechanism the length of the gaps required at any time is produced by a covering sector which can be adjusted to different positions by means of the keys.

A constructional embodiment of the invention is illustrated by way of example in the accompanying drawings, in which:

Figure 1 is a section along the line I—I of Figure 11.

Figures 1a and 2 are detail views of a part of Figure 1.

Figure 2a is a part section along the line IIa—IIa of Figure 11.

Figure 3 shows a jump mechanism for moving the carriage.

Figure 4 is a side view of the driving mechanism of Figure 3.

Figures 5 to 7 show the apparatus for contracted multiplication.

Figure 8 shows a control mechanism for controlling the movement of the carriage step by step.

Figure 9 is a front view of the controlling mechanism of Figure 8.

Figure 10 is a diagrammatic illustration showing the action of the parts shown in Figures 5 to 7.

Figure 11 is a perspective view of the complete machine, and Fig. 12 is a diagram of the electric circuit connections.

The multiplier register mechanism

Figure 1 shows in section along the line I—I of Figure 11 an element of the new multiplier register mechanism T1, S1. The complete multiplier mechanism consists of nine such elements arranged side by side at distances apart equal to the distance apart of the digit rollers in the carriage 19. Each of these elements consists of a row of keys of the keyboard T1, a gapped disc or cam disc 3 having a gap 4, and a wheel 6, surrounding such disc. Said wheel has internal teeth 6' engaged by a pawl 5 which is fulcrumed at 5a and oscillates with the shaft 7 of this mechanism. The pawl carries a roller 5b and a spring (not shown) acts on the pawl to keep said roller in contact with the periphery of the cam disc 3. The external teeth of the wheel 6 engage an intermediate wheel 8 of the carriage (see also Figure 2), which wheel drives a digit roller 9, permanently belonging thereto, of the rotation counting mechanism Z1 of the carriage 19. For the purpose of entering the multiplier on the digit rollers 9 the carriage is, according to my invention, adjusted in front of the mechanism S1 in such a manner that a wheel 8 of the carriage is opposite each of the nine wheels 6 of the mechanism S1. At each setting of a multiplier the carriage is located in the same position in front of the setting mechanism S1.

The known setting mechanism S2 for the multiplicand is arranged, as shown in Figure 3, in an axial continuation of the system S1. It also consists of elements which are similar to those of the mechanism S1. Figure 2a, in comparison with Figure 2, shows the similarity between the elements of the two mechanisms. In Figure 2a the keyboard T2 of the mechanism S2 is also partially shown. This keyboard is exactly similar to the keyboard T1 of the mechanism S1. The shaft 42 of the mechanism S2 (see also Figure 3) is situated in line with the shaft 7 of the mechanism S1, but is revoluble, however, independently of the shaft 7. The details of the setting mechanisms correspond in general with those shown in United States Patent 1,968,201, and in particular the gapped discs 3 correspond to the gapped discs 77 of said patent, the covering sectors 1, which are adjusted in a circle about the shaft 7 (Figure 2) or about the shaft 42 (Figure 2a) by pressure on the keys through 2k, 2n, correspond with the covering discs 78 and hand levers D of the said patent, and the pawls 5 correspond to the pawls 75 of said patent.

The keys 1 to 9 (Figure 1), the bearings of which are omitted, act by means of their pins 2 on the more or less steeply inclined portions of the teeth 2a of a longitudinally movable rail 2b, so that this rail experiences a greater or less longitudinal movement against the action of a spring 2c according to the key selected. By means of the pivot 2d and the double armed levers 2e, 2f, which are pivoted about 2g and 2h, respectively, and are coupled together by a slot and pivot at 2i, as well as by means of the connecting rod 2k (which is pivoted at 2m and 2n), the arm 1a of one of the sectors 1 is displaced to a greater or less extent in a circle about the shaft 7 and a gap 4 in the fixed disc 3 is thereby opened to a greater or less extent. When the pawl 5, which oscillates with the shaft 7, being spring pivoted at 5a, moves in an anti-clockwise direc-

tion and its roller 5b engages in the gap 4, the other end of the pawl engages in the internal teeth 6' of the wheel 6 and rotates this wheel in accordance with the length of the gap. The wheel 6 drives the digit roller 9 of the rotation counting mechanism Z1 of the carriage 19 through the agency of the wheel 8 and sets this in accordance with the multiplier digit.

The movement of the pawl 5 in the clockwise direction occurs on the return of a rocking or oscillating movement of the shaft 7. This rocking or oscillating movement of the shaft 7 is effected by means of the drive of the machine to be hereinafter described. When the shaft 7 moves in a clockwise direction the pawl 5 has no driving effect on the wheel 6, as it clicks over the teeth 6' of the wheel 6. On the counterclockwise movement of the pawl it partially rotates the wheel 6 with it in the manner described. The rocking or oscillating movement of the shaft 7 differs from the form of drive described in United States Patent 1,968,201, in which the shaft, instead of making a rocking or oscillating movement, makes a rotary movement. Consequently, said patent is concerned not with the entry of the multiplier in the carriage but only with the drive of the result mechanism corresponding to the multiplicand. In Figure 2a, therefore, the pawl 5 is to be considered as rotating with the shaft 42 instead of making a rocking or oscillating movement.

For the described transfer of the multiplier to the digit rollers 9 of the carriage, this, as previously mentioned, must be situated in front of the setting mechanism S1. In this position (extreme left hand position) the carriage is held by a pivoted lever 10, which can turn about the pivot 10b and which, under the action of the spring 10a, engages in a slot 19a, in the base plate of the carriage. This position of the lever 10 is illustrated in Figure 2. This figure shows the pawl 5 in one phase of the backward movement (anti-clockwise direction), namely, shortly before its roller 5b engages in the gap 4 and its front end engages in the teeth 6' of the wheel 6. The lever 10 was able to move into the locking position because the projection 11 of the lever 26, which has been swung to the right about the pivot 10b (Figure 2), has released it.

After the multiplier has been set on all the digit rollers 9 of the carriage, which is effected simultaneously for all digit places by the oscillating movement of the shaft 7 and by means of the wheels 6 the lever 26 swings backwards (as hereinafter described). Its projection 11 thereby removes the lever 10 from the slot 19a of the carriage. The latter, consequently, responds to the pull of a spring 19b (Figure 3) towards the right and, therefore, jumps into the initial position for carrying out the multiplication. During the multiplication the carriage gradually moves towards the right.

As will be seen by comparing Figs. 1 and 2 with Figs. 2a and 3, the construction of the setting mechanism S1 is of substantially the same character as that of the setting mechanism S2. The toothed wheels 6, 6a are located in axial alignment, but in two groups movable independently of each other and co-operating with two corresponding groups of digit rollers or number wheels, arranged in alignment upon the carriage. The set Z1 of number wheels, mounted on the carriage, co-operates with the setting mechanism S1 and is provided, at each number wheel, with a lever 86 (Fig. 3) adjustable to three different positions, 75

such lever being of the type disclosed in United States Patent 1,968,201. As described in said patent, these levers come into co-operation, one after the other, with a rail 47 (Fig. 8) and with a pressure lever 48, in order to control or regulate the movement of the carriage during the performance of contracted or short-cut multiplication. The setting mechanism S1 co-operates with the set Z1 of number wheels in substantially the same manner that the setting mechanism S2 co-operates with the set Z2 of number wheels, but at a different time, as explained above.

The carriage driving means

When the carriage has completed the multiplication it remains in the last right hand position at which it arrives. When a further multiplication (either by the same number or by a different number) is to take place, the carriage according to my invention is first returned to the extreme left hand position. The return of the carriage to the left and the following jump movement to the right is effected suddenly and automatically. It is produced by a key A1, illustrated in Figure 11, which when depressed engages a double-armed stop lever 13 (Figures 3 and 4) in such a manner as to swing it in the direction indicated by the arrow in Fig. 3 and thereby move such lever temporarily out of the way of a stop 27 on the part 14 of a clutch 14, 16. Said clutch may conveniently be of a form conventional in the art, and more particularly be such as shown in the patent to Kettering No. 1,144,418, June 29, 1915. The part 14, the shaft of which is visible at 14a (Figure 4), is thereby coupled with the part 16 which belongs to a worm wheel drive 30 of the motor 12.

The key A1 does not remain in its depressed position, but when released returns to its normal position under the influence of a spring (not shown). Said key operates a motor circuit of the type shown in the patent to Kettering No. 910,690, January 26, 1909, which is applied to the instant invention as follows: The lever 13 when rocked as just described, closes a contact or switch 12' controlling the circuit of the electric motor 12. After the return movement of the stop lever 13, the contact or switch 12' remains closed by the action of a self-holding relay 102. As the part 14 performs a complete revolution, the carriage 19 is brought to its extreme left-hand position in the manner explained below and by operating the mechanism S1 the multiplier is set up in the set of number wheels Z1. At the end of such revolution, the stop 27 on the part 14 strikes against the lever 13 and causes the clutch 14, 16 to assume the disconnected condition. The switch 12' is brought back to the open position as follows: The bar 47 (Figs. 8 and 9) is moved lengthwise as described below, through the medium of the lever 36, and swings the lever 50 (Figs. 8, 9, and 12) in such a manner as to close the switch 51. This will short-circuit the relay 102, so that the current still flowing through the coil of the relay will not energize it sufficiently to keep the movable member of switch 12' in the closed position. This switch will therefore open under its customary spring action. At the same time, the switch 51 will close the upper motor circuit indicated in Fig. 12, so that the motor 12 will receive current for operating the machine during multiplication proper.

The motor 12 is employed for the drive of both the setting mechanisms S1 and S2. For this purpose, according to the present invention the rotor

of the motor or only the shaft of the rotor is axially displaceable by an amount p (Figure 3). On the shaft 12a of the rotor there is mounted so as to be freely movable a driving member 29a (belt pulley, toothed wheel or the like) which is prevented from being axially displaced by a projection 28, which is fixed in position. Fast on the rotor shaft is fitted a claw coupling or clutch 29, which ordinarily couples the rotor shaft with said driving member 29a; so that ordinarily the motor drives the multiplicand setting mechanism S2. When the parts 14, 16 are coupled together, and the motor shaft 12a is rotating, the worm wheel 16 will at first remain stationary owing to the resistance which the spring 19b and the weight of the carriage and its adjuncts oppose to the movement of the carriage and of the parts connected therewith, including said worm wheel 16. As the worm 18 rotates with the shaft 12a, the engagement of the rotating worm with the stationary worm wheel 16 will produce a longitudinal movement of the worm and of the motor shaft by an amount equal to the distance p to the right against the action of the spring actuated pin 31, so that the claw coupling 29 is disconnected. The motor drive is thereby disconnected from the mechanism S2. When at the end of the travel p a shoulder of the shaft 12a abuts against the bearing 12b, the shaft can no longer move to the right, the opposing force of the spring 19b is overcome by the power of the motor and the motor shaft now rotates the worm wheel 16. Consequently, the carriage now jumps into its extreme left hand position and the setting of the multiplier in the carriage at Z1 now takes place automatically. This is effected as follows. On the part 14 there is mounted a disc 17 to which a bar 15 is pivoted at 18. The other end of the bar 15 is linked at 23 to a rod 20, so that, when the part 14 makes a rotation, the rod 20 carries out a backward and forward movement in a straight line. During this the pivot 23a moves in a slot of the double lever 21, which, consequently, makes a backward and forward movement about the point 21a. Since the lever 21 is connected at 21b by means of a slot and pivot with the double lever 22 which is pivoted at 22a, this lever also swings backwards and forwards. The other arm 24 of the lever 22, therefore, meets a pin 25 mounted in the carriage 19 (Figure 3) and the carriage which is in its right hand position (Figure 3) is thus suddenly moved to the left into its extreme left hand position against the pull of the spring 19b. The movement of the carriage to the left is complete when the pivot 18 of the disc 17 has reached its extreme forward position in Figure 3, that is to say after a half-revolution of the disc 17.

During the movement of the carriage towards the left the bar 20 is in the course of its movement towards the right (see the arrow in Figure 4). During this it carries with it by means of the pin 26a the lever 26, the projection 11 of which at once frees itself from the lever 10 (Figure 2). The lever, therefore, enters as previously described into the gap 19a in the plate of the carriage when the carriage has reached its extreme left hand position. The carriage is now held fast in this position against the pull of the spring 19b and, as above described, the entry of the multiplier in the carriage takes place. During this operation the disc 17 makes its second half-revolution and the bar 20 moves to the left (see the arrow in Figure 2). When the bar 20 has reached its position of rest at the

extreme left, the locking lever 10 is removed by means of the projection 11, as previously described. This happens shortly before the stop 27 again strikes against the lever 13, that is to say at the end of a rotation of the disc 17. At this moment the multiplier setting is completed.

While the lever 26 swings, its sector 26b first rotates the toothed wheel 7' and the shaft 7 to which said wheel is secured rigidly in a clockwise direction (see the arrow in Figure 4) and afterwards in the reverse direction. During the latter movement, as previously described, the multiplier is set in the carriage, which already stands in its left hand position (Z1 in front of S1). This setting takes place in the second half rotation of the disc 17. At the end of this rotation the lever 10, owing to the projection 11 striking against it, unlocks the carriage 19, as previously described, and this now springs to the right under the action of the spring 19b into the position for beginning the multiplication. The carriage 19 is stopped in this position by the first shifted lever 86, as described below under the heading "Multiplication". At the same time, owing to the stop 27 striking against the lever 13, the clutch 14, 16 is disconnected, and, therefore, at the completion of the setting of the multiplier the resistance of the carriage disappears, which resistance has until then held the shaft 12a of the motor in its extreme right-hand position. The spring-actuated pin 31, therefore, presses the rotor shaft 12a back towards the left, whereby the claw coupling 29 is engaged. The drive (pulley 29a) of the multiplicand mechanism S2 is connected with the motor shaft, so that this mechanism now rotates on the further rotation of the motor, which remains switched in at this time.

Multiplication

In the first multiplication position the first right hand intermediate wheel 8a (Figure 3) of the result mechanism Z2 of the carriage is in engagement with that wheel 6a of S2 which belongs to the lowest multiplicand position. The multiplication then proceeds with the progression of the carriage towards the right as described in United States Patent No. 1,968,201. Multiplication takes place by the abbreviated or short cut method, namely when a digit of the multiplier is higher than 5, not with this figure as usual by adding, but with the complementary value of this figure by subtracting and then in the higher tens adding a unit. The carrying mechanism employed for this purpose may be of any usual or approved construction, and I have therefore deemed it unnecessary to illustrate such mechanism in its entirety. Thus, for example, instead of multiplying by 7 the multiplier used is (10-3). With respect to the known mechanism employed for this purpose, in United States Patent 1,968,201, it will be sufficient to state here that to each digit roller of the counting mechanism Z1 there is attached a swinging lever 36 (Fig. 3) which is loosely mounted on the axle of the said rollers and may be positioned in three positions corresponding to three ranges of figures of the multiplier, namely 1 to 5, 6 to 9, and zero, as is described in United States Patent 1,968,201. The parts of this apparatus, which enters into the combination of my present invention, are illustrated in Figs. 5 to 10 and consist of cam discs 82 which are each connected fast with a toothed wheel 8 of the rotation counting mechanism Z1 of the carriage, of their pertaining swinging

levers 86 of which one arm 81 is influenced by the three steps of the disc 82 and the other arm assumes three corresponding positions (see Figures 5, 6, 7), of a bar 47 which is mounted in bearings in the machine frame 49 so as to be longitudinally displaceable and has a stepped head, and of a spring-actuated pressure lever 48, which is pivoted in the machine frame 49 and presses each passing swinging lever 86 against the edge of the cam disc 82. The position of the latter corresponds with the setting of the digit roller in such a manner that the lever 86 pressed against the disc 82 passes freely by the head of the bar 47 when the digit roller is set at zero, and strikes against the first step (+) of the head of the bar 47 when the digit roller is set at a number from 1 to 5 and against the second step (-) of the head of the bar 47 when the digit roller is set to a number from 6 to 9. The carriage, therefore, jumps into a "positive" or "negative" position respectively. In the positive positions the counting mechanism Z1 is driven backwards (or subtracting) by means of counter fingers 100 (Fig. 3) which are driven in a manner well-known in the art (see for instance United States Patent 1,968,201, where the counter fingers are shown at 25, 26 in Figs. 9, 10 and 11) from the shaft 42 which always rotates in the same direction, while in the negative positions on the other hand said counting mechanism Z1 is driven forwards (or adding). The striking of the lever 86 on the head of the bar 47 lasts until the digit roller is rotated forwards or backwards by the respective counter finger as far as 0. Then the lever which was in the position according to Figures 6 or 7 is pressed by the cam disc into the position according to Figure 5, and is thereby freed from the head of the bar 47. The carriage thereby loses its holding means and is suddenly drawn towards the right by the spring 19b (Figure 3) until the next lever 86 strikes against the head of the bar 47. During this movement of the carriage the bar 47 is temporarily released from the pressure of the carriage and it, therefore, makes a small longitudinal movement towards the left under the action of a motor-controlling contact or switch 51 and of a lever 50 fulcrumed at 41 and operatively connected with the movable member of said switch, which member by its spring action tends to take the contact-opening position; this lever actuates a longitudinally movable bar 36 (Figs. 8 and 9) which has a projection to swing the lever 38 clockwise about its fulcrum 46 to shift the bar 47 toward the left. In the right hand position (see the arrow in Figure 9) the bar 47 holds, by means of the said lever 38, the bar 36 in the left hand position in which this bar, through the agency of said lever 50 acts on an electrical contact 51 in such a manner that this is closed and the circuit of the electric motor 12 which drives the machine shaft 7 is closed as hereinbefore referred to. When the bar 47, after being released from load, makes the above-mentioned small movement towards the left the contact 51 is opened and the motor disconnected until a following lever 86 strikes against the head of the bar 47. The said bar 47 is then again moved towards the right and thereby again connects the motor.

Under the control of the lever 86 the carriage, after it has made the above mentioned second jump movement, carries out the multiplication, during which it moves step by step towards the right. During this procedure the toothed wheels 8a of the result mechanism Z2 are in part (in the

positive positions of the carriage) directly driven by the toothed wheels 6a (Figure 3) i. e. adding, and in part (in the negative positions of the carriage) are driven through the agency of the intermediate wheels 83 (Figure 2a) i. e. subtracting, whereas, as shown in Figure 3, at this time the toothed wheels 8 of the mechanism Z1 are not in engagement with other wheels, but are only advanced positively and negatively by the aforesaid counter fingers. After multiplication is complete, none of the levers 86 is any longer within range of the bar 47 and the carriage can now be moved by hand freely to right and left. It can also be driven towards the left, as described, by pressure on the key A1 in order to carry out a fresh multiplication.

Division

With this machine, as in the case of most similar machines (see for instance United States Patent 1,968,201), division takes place by a movement of the carriage from right to left, that is, in the opposite direction to that required for multiplication. For this purpose the device described in United States Patent No. 1,912,133 may for example be employed. In performing division with this device, first the dividend is set by keyboard T2 in the setting mechanism S2 and then, by a revolution of the shaft 42, that is of the mechanism S2, in the mechanism Z2 of the carriage. Then the dividend is cancelled and the divisor is set by keyboard T2 in the setting mechanism S2 and the lever B (Fig. 11) is set to the mark "Div." Thereafter the carriage is drawn from the extreme left hand position shown in Fig. 11 to the extreme right hand position by the operator moving a handle H (Fig. 11) and is then released. The carriage then at once begins to move step by step toward the left to its initial position, whilst the quotient appears in the mechanism Z1 of the carriage, the remainder appearing in the mechanism S2 of the carriage.

Addition and subtraction

In the case of subtraction and addition, no drive is necessary for the carriage, as only a single transfer of the numbers to be added or subtracted from the mechanism S2 to the result mechanism Z2 takes place.

For adding, the first number is set on the digit rollers of the result mechanism Z2 of the carriage, and the second number is then set on the keyboard T2. The lever B is then set to addition, the carriage is adjusted to the correct position in front of the mechanism S2 by pulling on the handle H to the right and the key A2 (Figure 11) is pressed. The setting of the lever B (Fig. 11) to addition is necessary for reasons set forth in the above-mentioned United States Patent No. 1,968,201.

Subtracting is done by setting the minuend in the mechanism Z2, setting the number to be subtracted in the keyboard T2, setting the lever B to subtraction, adjusting the carriage in the correct position in front of the mechanism S2 by pulling on the lever H to the right and pressing the key A2. The setting of the lever B to subtraction is required for reasons explained in the above-mentioned United States Patent No. 1,968,201.

When performing addition or subtraction, an auxiliary switch or knob SL (Fig. 11) is pulled out to insure that the mechanism S2 will perform only one revolution during addition and subtraction. The knob SL for this purpose projects

somewhat from the casing of the machine. For division and multiplication, which both require the mechanism S2 to perform several revolutions, the knob SL is pushed inwards into the casing. These movements of the knob SL are indicated by arrows in Figure 11.

A lever ZU (Figure 11) is used for the purpose of setting correctly for the different calculations the counter fingers. Beside the lever ZU there is indicated by signs that for addition (positive revolution) it must be drawn forwards while for division, subtraction and multiplication (negative revolution) it must be pushed backwards.

Cancellation

The setting of a new multiplier in the keyboard T1 is effected either by the complete cancellation of the multiplier present by pressing on a key L1 (Figure 11) and setting the new multiplier in the keyboard T1, or by at once undertaking this last setting, in which case the new key utilized in a row of keys releases the key previously locked in this row. A total cancellation key L2 for the keyboard T2 is arranged on the right hand side of the machine (Figure 11).

The construction of the calculating machine in accordance with the invention, as will be clear from the example given, enables calculations to be made with great rapidity, since (1) the setting of the two keyboards proceeds very quickly, (2) only a single operating key A1 has to be pressed which causes the calculating process to take place entirely automatically, (3) the whole multiplier is transferred by a single rotation of the machine shaft to the carriage, (4) contracted multiplication can be carried out, (5) the setting of a further multiplier can take place even while the calculating operation is still proceeding, so that after one multiplication has taken place the carrying out of the next operation only requires the above mentioned operating key again to be pressed. These various tasks are carried out by an extremely simple form of drive, so that the cost of manufacture of the machine having a high capacity is low. In the event of successive multiplications of one and the same factor by different factors (for instance, if we wish to form successively the products 365 times 108, 365 times 247, and 365 times 913), it will not be necessary, with my improved machine, to enter this constant factor (such as 365) in the multiplying mechanism each time a new product is to be formed. But having once been set up in the multiplying mechanism of my machine, such constant factor may be allowed to remain in the set-up condition as long as desired, as during successive multiplications by said factor.

It will be noted that on the slide or carriage there are two number wheel mechanisms, Z1 and Z2. In the use of the machine for multiplication, the multiplier is transferred from the setting mechanism S1 to the number wheel mechanism Z1, which in this case acts as a control device determining the number of successive additions (or additions and subtractions) required to perform the multiplication and to show the product in the number wheel mechanism Z2, which is thus the result mechanism. When using the machine for division, one part of the result (the remainder) is indicated by the mechanism Z2, and the other part (the quotient) by the mechanism Z1. Addition and subtraction likewise will indicate the result in the number wheel mechanism Z2.

I claim:—

1. In a calculating machine, a revolution counter and a result mechanism, a multiplicand setting mechanism, a separate multiplier setting mechanism, both of said setting mechanisms being adapted to display the digits set, separate keyboards for actuating said setting mechanisms, a unitary carriage shiftable transversely in front of said setting mechanisms and carrying said revolution counter and said result mechanism positioned with said revolution counter aligned with said multiplier setting mechanism, means for simultaneously transferring the digits of the multiplier from the multiplier setting mechanism to the revolution counter of the carriage, a device for bringing said transferring means into action, a device for moving said carriage to disengage said revolution counter from said multiplier setting mechanism and to engage said result mechanism with said multiplicand setting mechanism, a device for bringing said multiplicand setting mechanism into action for carrying out the multiplication, and means operative to operate said first device, to render said second device effective and to operate said third device.

2. In a calculating machine, a motor, an axially displaceable motor shaft, a multiplier setting mechanism, a multiplicand setting mechanism, a carriage, a result mechanism and a counter mechanism mounted thereon, said carriage being slidable transversely in front of said setting mechanisms, a clutch driven from said motor shaft, means to set said carriage in front of said multiplier mechanism, means for driving said multiplier setting mechanism, both of said means being driven from said clutch, means to move said carriage to said multiplicand setting mechanism, a second clutch driven by said motor shaft, said axially displaceable motor shaft being controlled by said first clutch when engaged to disable said second clutch, and conversely to enable said second clutch, when said first clutch becomes disengaged, to drive said multiplicand setting mechanism.

3. In a calculating machine as in claim 2, said second clutch being mounted upon said motor shaft to be driven thereby.

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