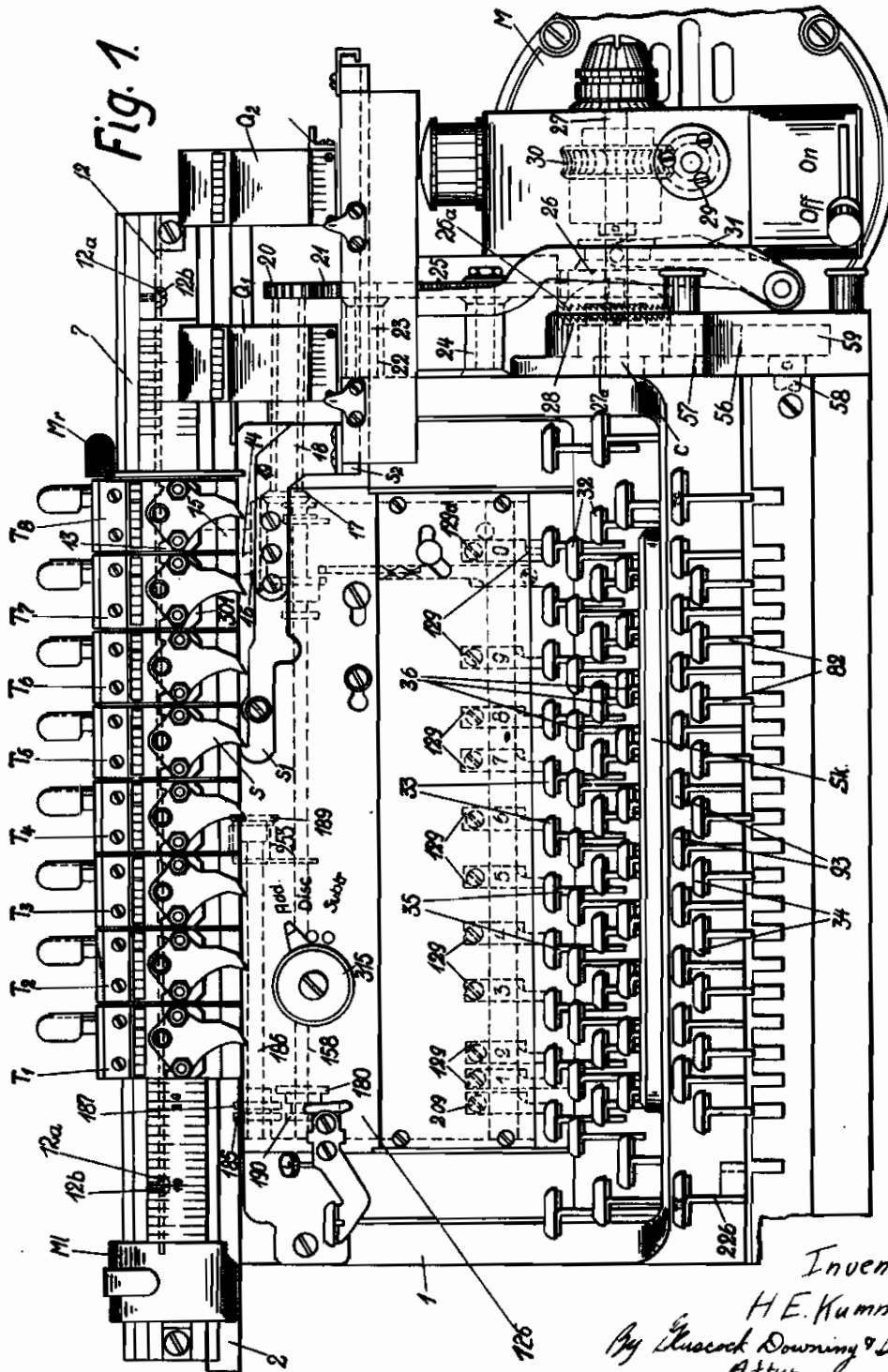


PUBLISHED
MAY 25, 1943.
BY A. P. C.

H. E. KÄMMEL
COUPLING DEVICE FOR TYPEWRITING
CALCULATING MACHINES
Original Filed May 14, 1934

Serial No.
287,668

11 Sheets-Sheet 1



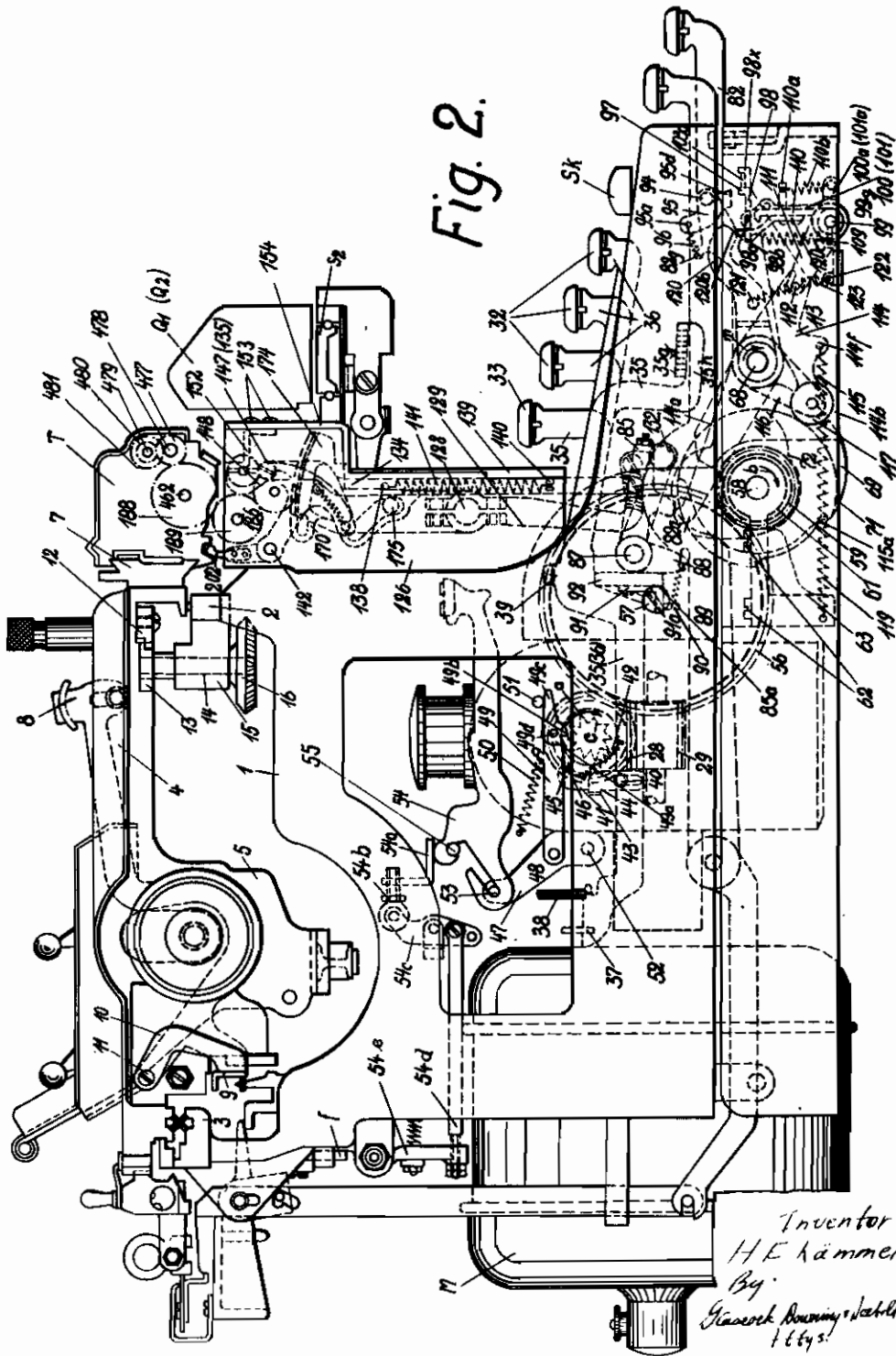
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11 Sheets-Sheet 3

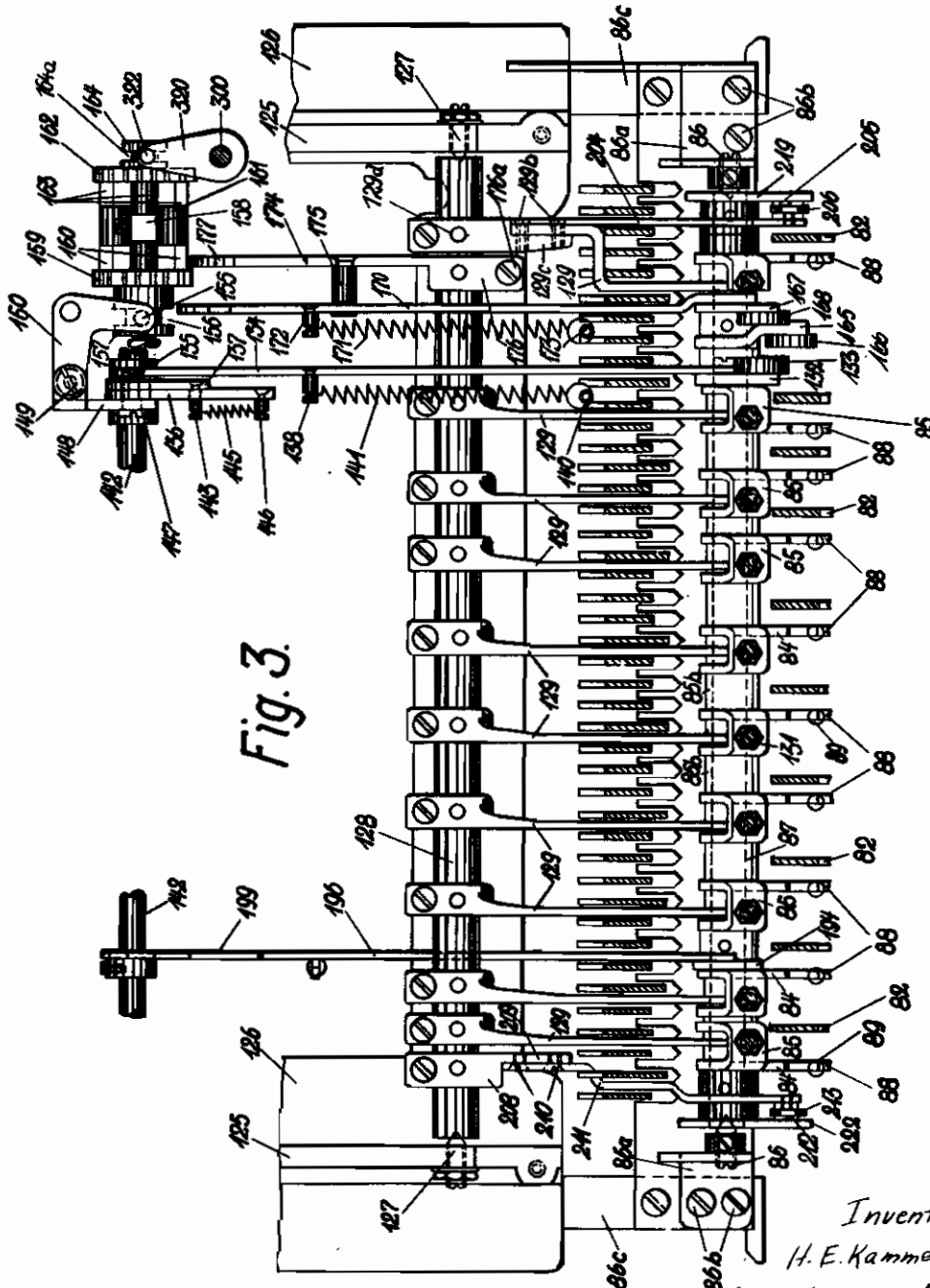


Fig. 3.

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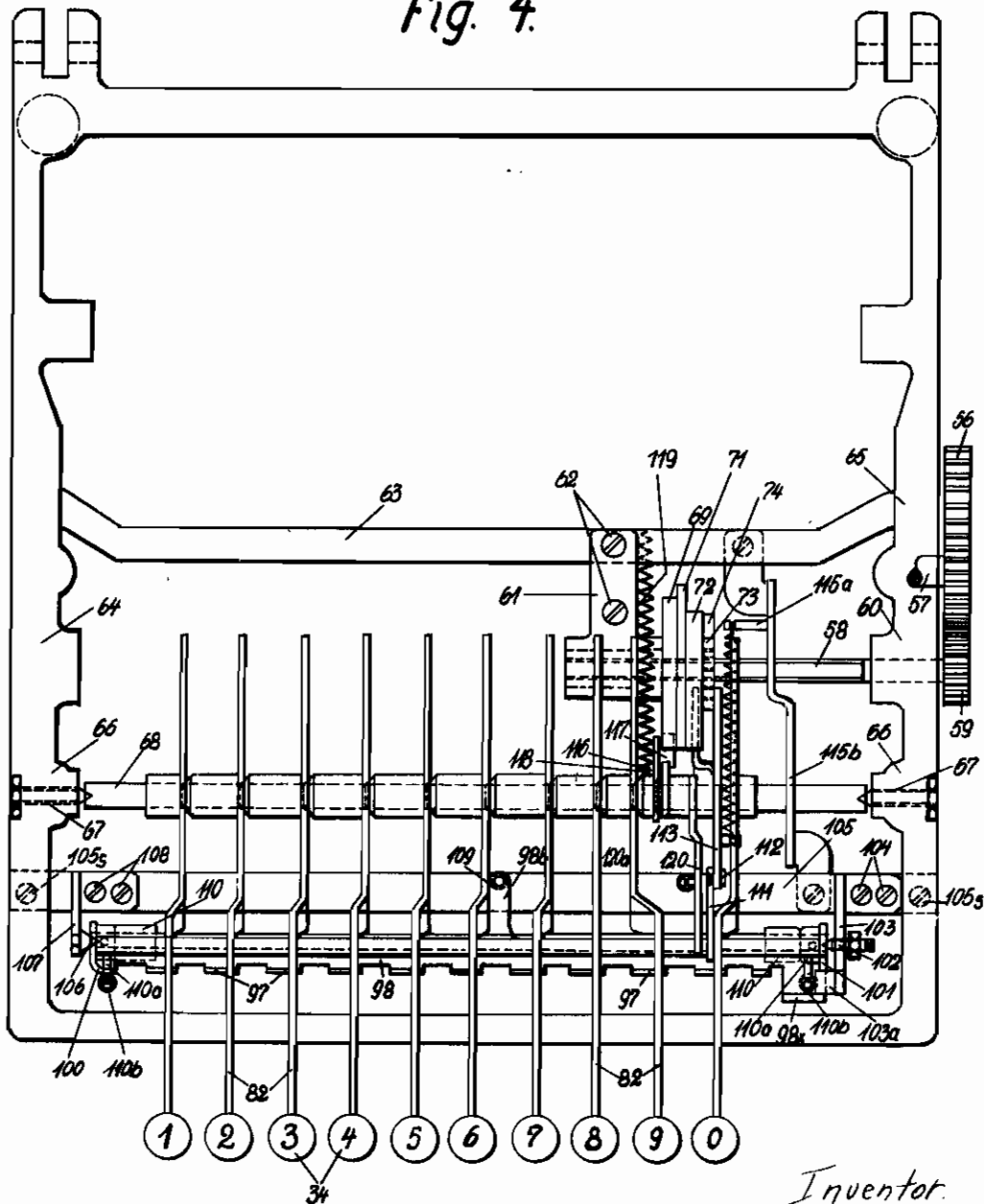
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11 Sheets-Sheet 4

Fig. 4.



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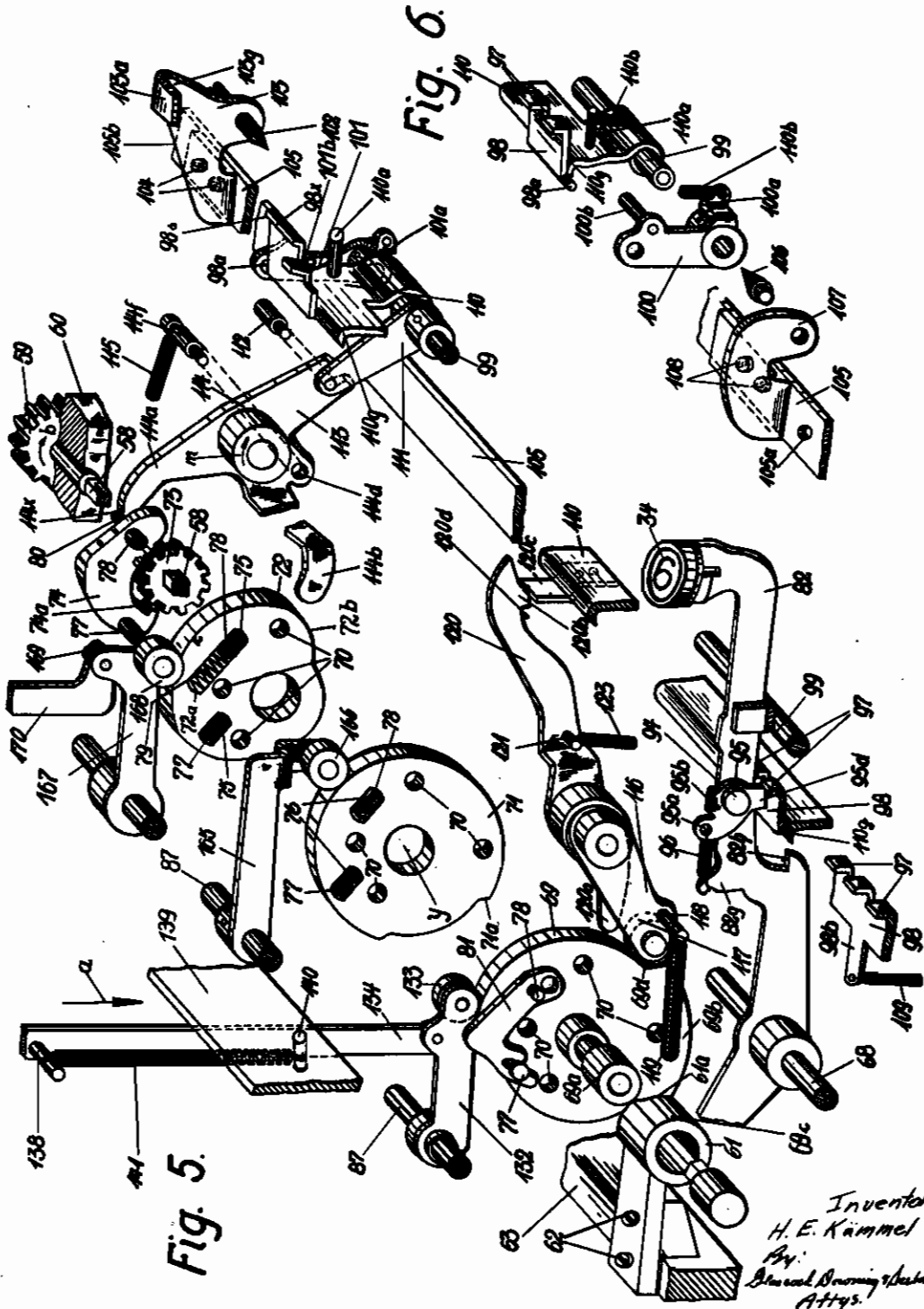
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COUPLING DEVICE FOR TYPEWRITING
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Original Filed May 14, 1934

Serial No.

287,668

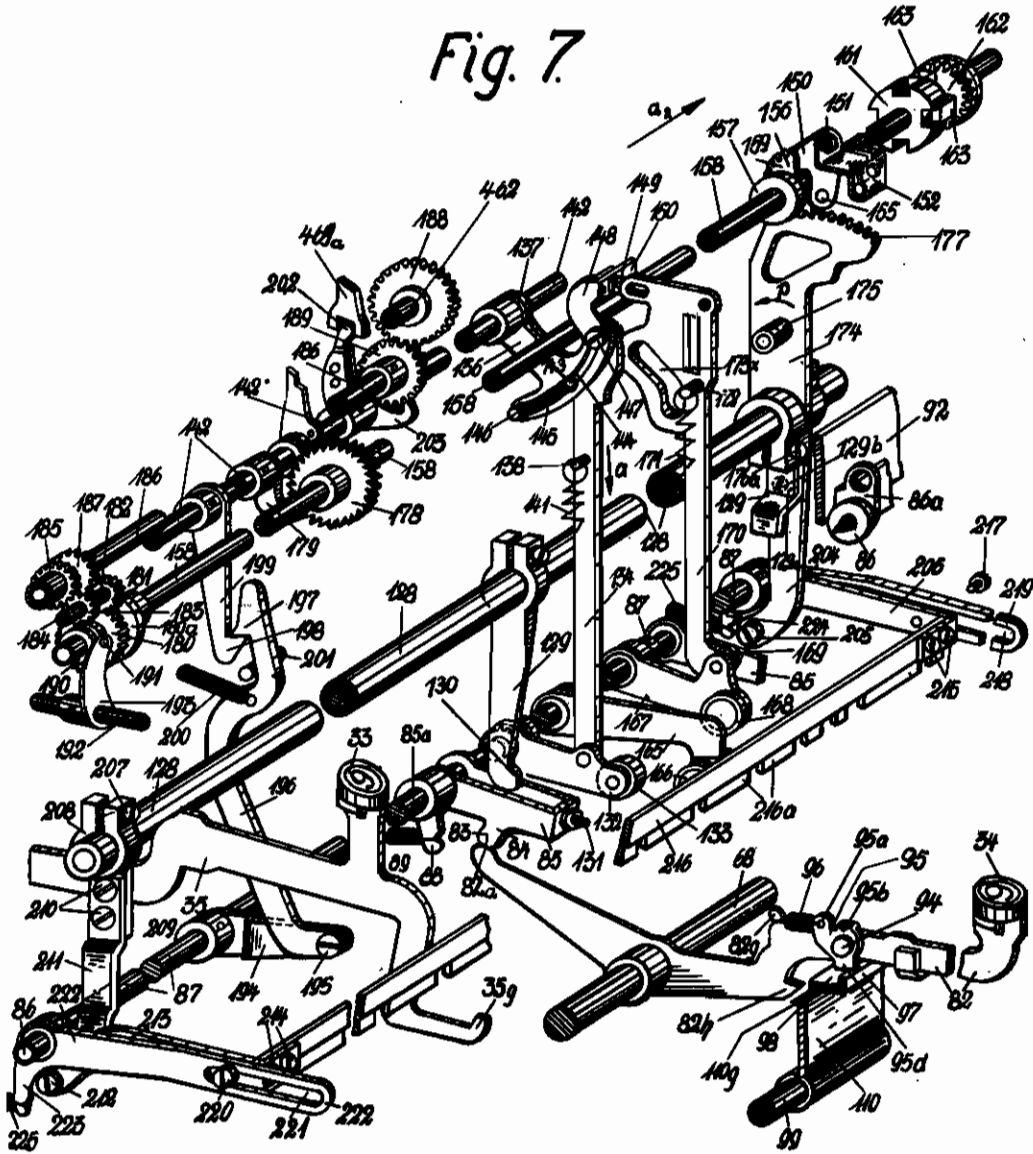
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11 Sheets-Sheet 7

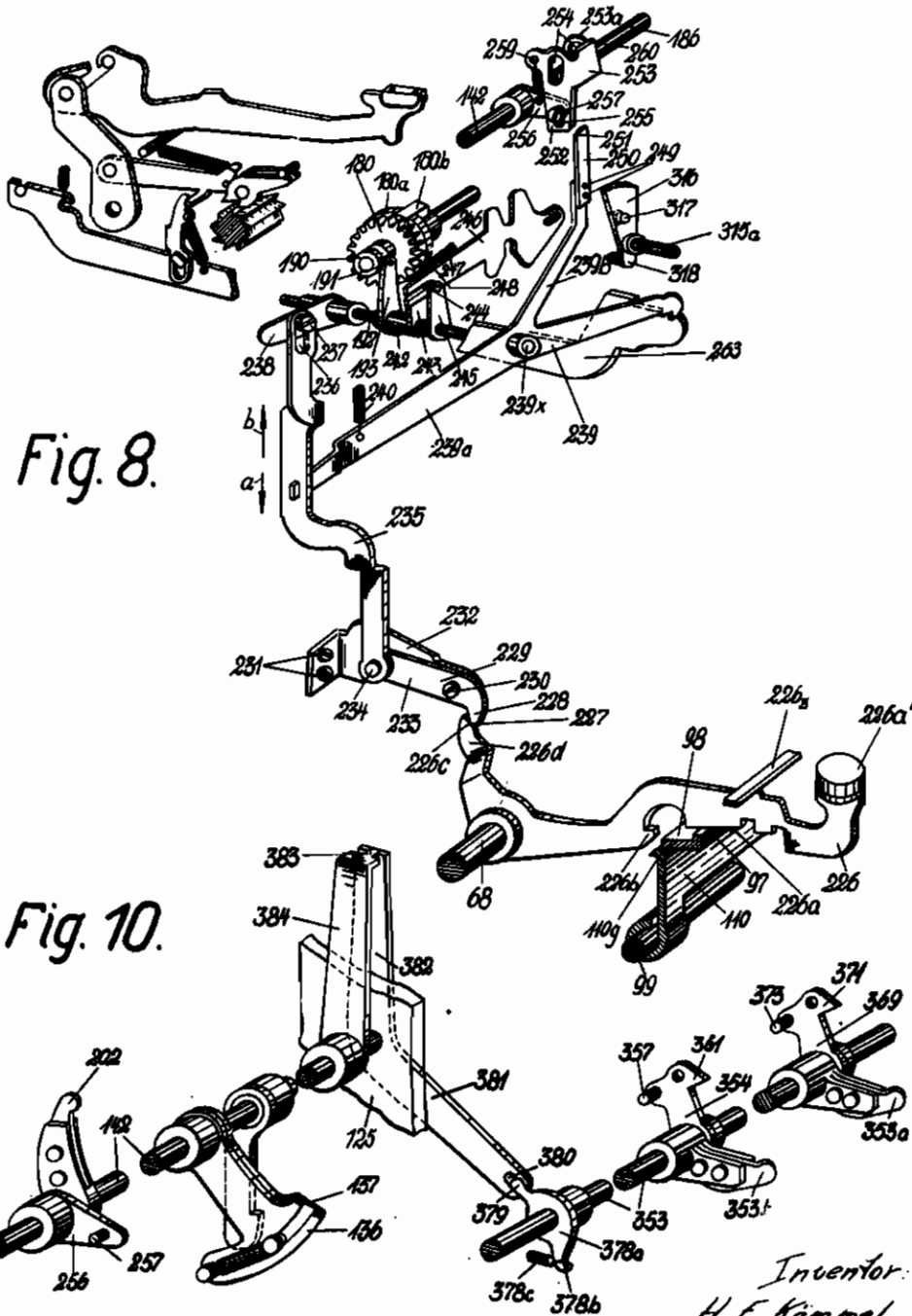


Fig. 8.

Fig. 10.

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287,668
11 Sheets-Sheet 8

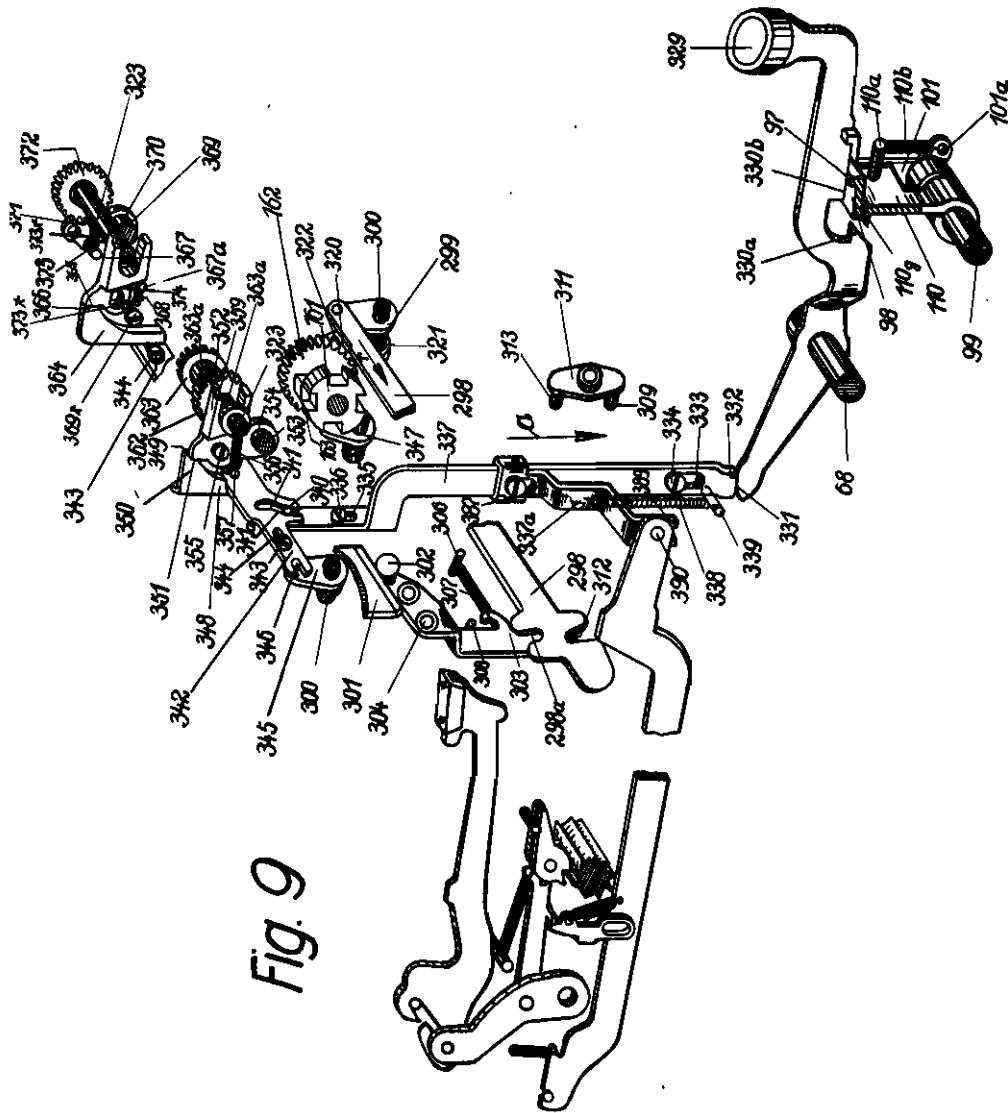


Fig. 9

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287,668

11 Sheets-Sheet 9

Fig. 14. Fig. 13.

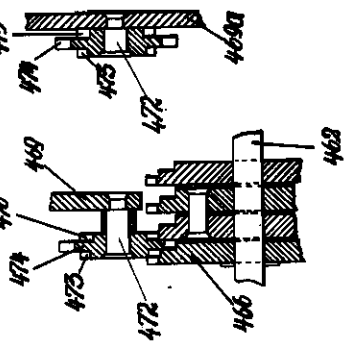


Fig. 12.

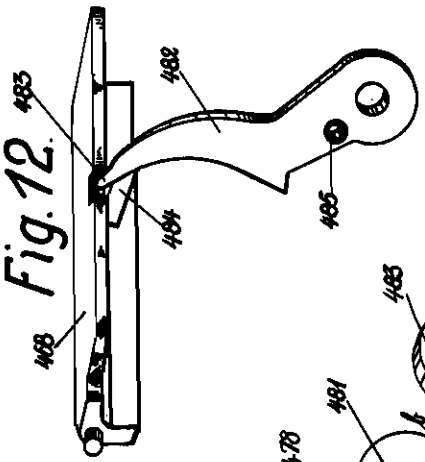
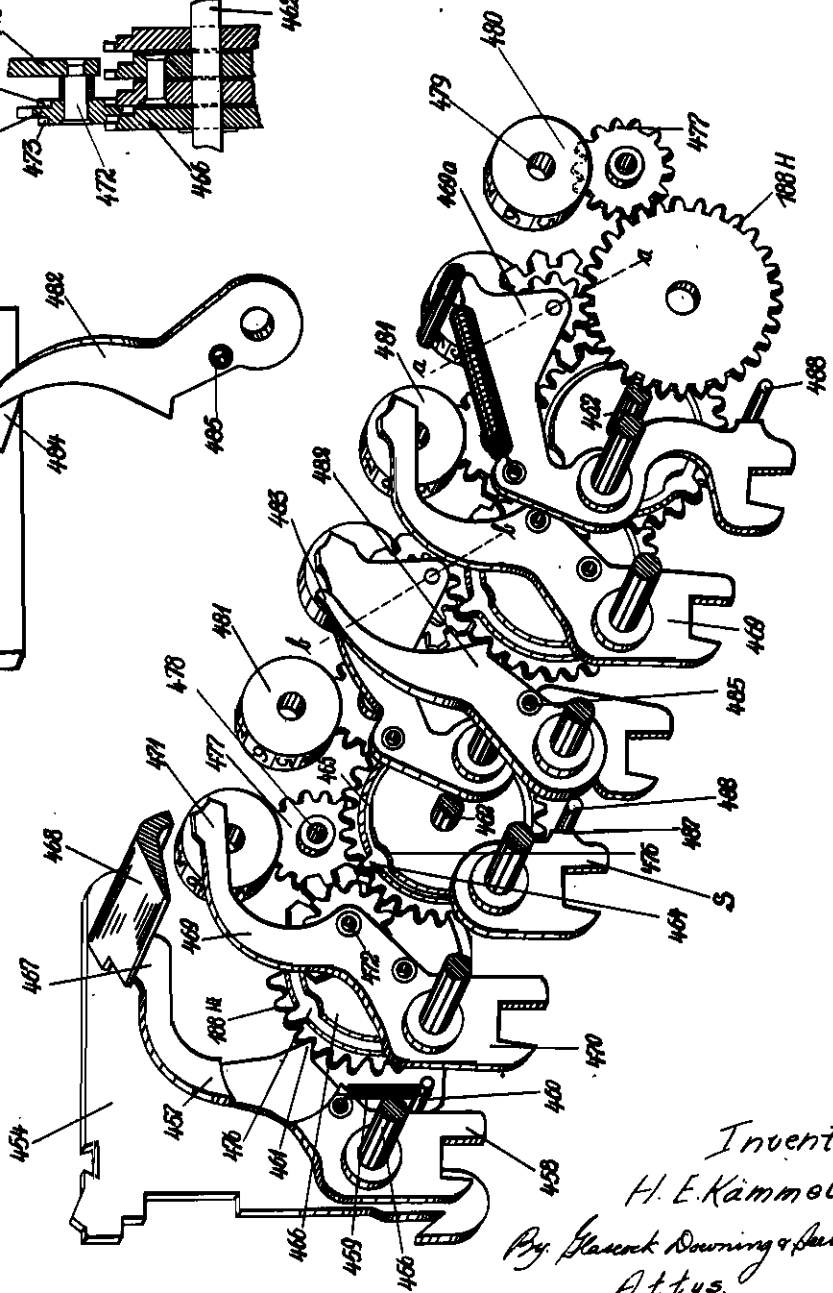


Fig. 11.



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287,668

11 Sheets-Sheet 10

Fig. 15

	1	2	3	4	5	6	7	8	9	10	11
	Name	No	Month	Gross salary	Taxes	Sick fund	Assurance employees	Supplements	Remainder	Net-salary	Sum of all supplements
I	O Schmidt	15	May	200-	10.00	6.00	4.00	3.75	0.55	184.30*	4.30*

Fig. 16.

Typing line	Col.	No. Column Totalizer	Reading Column Totalizer	Type of Calc. Cross-Totlr. Q1	Type of Calc. Cross-Totlr. Q2	Reading Cross Totalizer Q1	Reading Cross Totalizer Q2	Clear sign from Cross Totalizer	
I	1 to 3	Name number and month have to be registered							
I	4	T1	200.00	A	E	200.00	Zero		
I	5	T2	10.00	S	E	190.00	Zero		
I	6	T3	6.00	S	E	184.00	Zero		
I	7	T4	4.00	S	E	180.00	Zero		
I	8	T5	3.75	A	A	183.75	375		
I	9	T6	0.55	A	A	184.30	430		
I	10	T7	184.30	S	E	comes to ZERO	430	Q1	
I	11	T8	4.30	E	S	Zero	comes to ZERO	Q2	

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Serial No.
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11 Sheets-Sheet 11

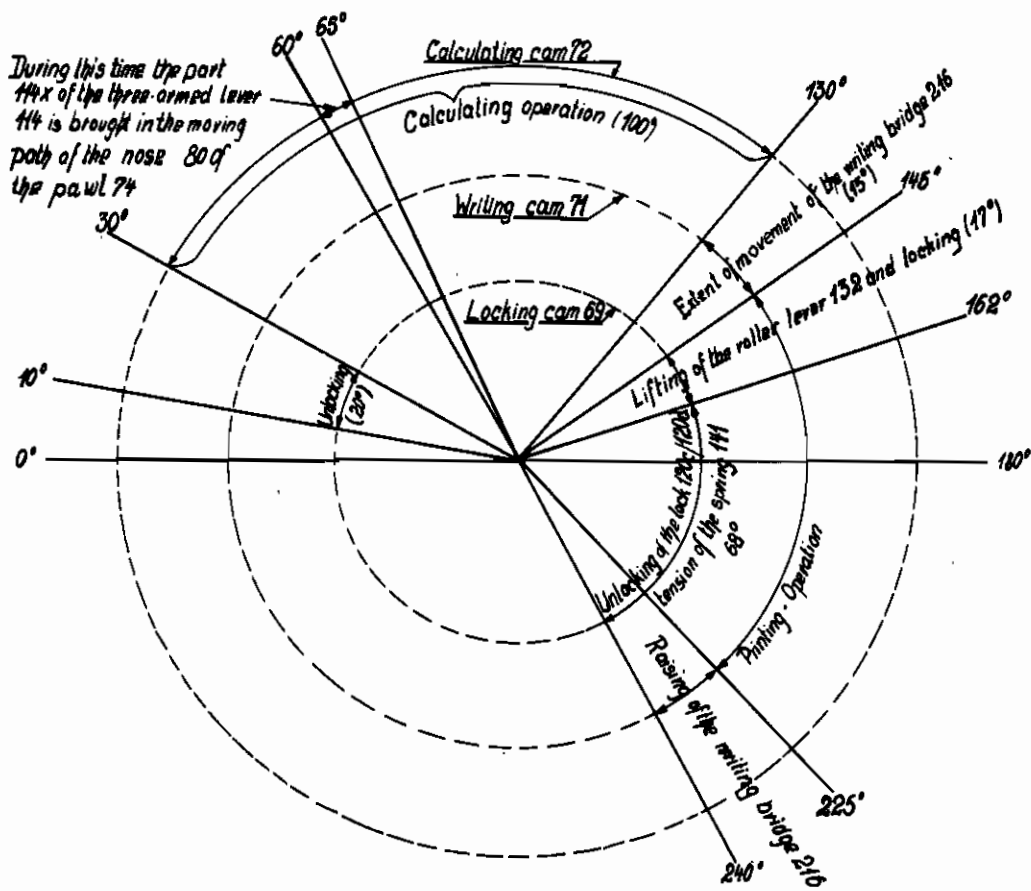


Fig. 17.

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ALIEN PROPERTY CUSTODIAN

COUPLING DEVICE FOR TYPEWRITING CALCULATING MACHINES

Hugo Ernst Kämmel, Zella-Mehlis, Germany;
vested in the Alien Property Custodian

Application filed July 31, 1939

The invention relates to a coupling device for typewriting calculating machines of the type exemplified in my co-pending application Ser. No. 725,636, filed May 14, 1934 and of which the present application is a division.

Such devices have previously been known.

They had however, the disadvantage that their whole construction was more or less complicated since for each of the calculating keys were provided a coupling mechanism for the control of the calculating or total taking process.

According to the invention these disadvantages are now obviated by providing a universal coupling device which is inserted between the calculating mechanisms, total taking mechanism respectively and the number typing keys, total taking keys respectively common to each numeral key, total key respectively and control the calculating operations, total taking operations respectively in the registration and withdrawal of values.

In the drawings, one example of construction of the subject of the invention is illustrated as applied to a Mercedes Addelektra typewriting calculating machine.

Fig. 1 shows a front elevation of the whole typewriting calculating machine.

Figure 2 shows a left-hand side elevation of the machine.

Figure 3 shows a front elevation towards the calculating members together with the calculating segment and a part of the change-over gear for the cross totalizers, in which view the number typing keys and the letter typing keys are represented in section.

Figure 4 shows a plan of the drive frame together with the calculating keys and the drive coupling.

Figure 5 shows a perspective illustration viewed from the front left-hand side of the machine, of the drive coupling with the setting member, common to all the calculating keys, for the coupling, in which view the individual parts for the sake of better insight are represented drawn out from one another.

Figure 6 shows in perspective, details of the setting member, the parts of which are likewise drawn out from one another.

Figure 7 shows a perspective illustration of the transmission and control mechanisms arranged between the typing and calculating keys, viewed from the front left-hand side of the machine, together with the change-over gear for the column totalizers and a part of the change-over gear for the cross totalizers, in which view the individual

parts are illustrated drawn out from one another.

Figure 8 shows a perspective illustration of the total taking mechanism for the column totalizers viewed from the front left-hand side of the machine, together with a part of the change-over gear for the column totalizers and the printing mechanism for the sign for taking totals from the column totalizers, in which view the parts are illustrated partially drawn out from one another.

Figure 9 shows a perspective illustration of the total taking mechanism for the cross totalizers, with the printing mechanism for the sign in addition thereto and a part of the change-over gear including both the driving wheels for the cross totalizers, the view being taken from the front left-hand side of the machine and various parts being illustrated drawn out from one another.

Figure 10 shows in perspective the unlocking mechanisms for the column and cross totalizers, viewed from the front left hand side of the machine.

Figure 11 shows a perspective arrangement of a totalizer viewed from the rear, in which view the detail parts are illustrated in a condition separated from one another.

Figure 12 shows a perspective illustration of a locking lever with locking flap, viewed from the left-hand edge of the rear side of the totalizer.

Figure 13 shows a section according to the line *a-a* of Figure 11.

Figure 14 shows a section according to the line *b-b* of Figure 11.

Figure 15 shows a partially illustrated sheet, filled in with an example of calculation with is to find application later in the explanation of the manner of operation.

Figure 16 shows in the form of a table the shift procedure of the kind of calculation for the cross totalizers according to the example of calculation illustrated in Figure 15.

Figure 17 is an operation time diagram.

The machine housing 1 (Figures 1 and 2) carries by means of rails 2 and 3 the paper carriage 4, in which a platen 5 (Figure 2) is arranged. To the front side of the paper carriage, there is fixed a supporting rail 7, for carrying the column totalizers T, which will be hereinafter described in detail.

To the right-hand side of the paper carriage 4, the carriage release lever 8 (Figure 2) is swingably mounted, and to an extension of this lever a carriage release bar 9, is fixed. This bar is rigidly connected at its other side with a lever 10, which is swingably mounted on the left hand side of the paper carriage, on a screw 11.

The carriage release lever 8, release bar 9 and lever 10 form part of mechanism for releasing the usual carriage escapement in the usual manner which mechanisms being well known in the art have not been illustrated in detail and need not be further described.

For the purpose of the mechanical line-shift and for the return of the paper carriage there is, further, on the carriage 4, a rack 12 (Figures 1 and 2) which is displaceably mounted by screws 12b engaging with the slots 12a. With the rack 12, engages a toothed wheel 13, which is pinned on a shaft 14. This shaft is mounted in a stationary bearing 15, and carries a rigidly mounted bevel wheel 16 on its end, remote from the toothed wheel 13. With the bevel wheel 16, engages a bevel wheel 17 (Figure 1) which is fixed on a shaft 18. The shaft 19 is rotatably mounted in a bearing 19, rigidly connected to the machine frame, and on its other end is provided with a spur wheel 20, which on its part, engages with a spur wheel 21, which is rotatably mounted on a shaft 23, arranged in the bearing 22. The spur wheel 21, again, is in engagement with the spur wheel 25, which is rotatably mounted on the shaft 24, the spur wheel 25, on its part meshing with a spur wheel 26, formed as part of a coupling 26a. The wheel 26, is loosely rotatable and axially displaceable on a part 27 (Figure 1) of a cam shaft C (Figure 2) which drives the type levers. On the part 27, further, a second coupling half 27a is fixed which is formed similarly to the spur wheel 28, but is not axially displaceable. The shaft 27 is rotated in the direction of the arrow "a" (Figure 2) by means of a screw 29 (Figures 1 and 2), and a worm wheel 30, driven by a motor M which is arranged on the right-hand side of the machine.

The line shift and the carriage return is effected by bringing the coupling half 20a into engagement with the coupling half 27a, by means of a lever 31, which is operated by the right-hand margin stop Mr, (Figure 1). Such engagement of said halves and operation of said lever 31 operates the hereinbefore described wheel drive 13 to 28, and the rack 12, to effect line spacing of the platen 5 and the return of the carriage to the right in a manner and by associated means fully described in U. S. Patent No. 1,582,788 to which attention is directed. The opening of the coupling 28, 28 is effected by the left-hand margin stop Ml, as the paper carriage 4 runs into its extreme right-hand position to uncouple said halves 28a and 27a.

The typewriter mechanism proper comprises letter keys 32, number keys 33 and calculating keys 34 (Figs. 1, 2, 7) mounted upon key levers 36, 35 and 82, respectively, movable downwardly around pivot 37 against the action of springs 38. The calculating keys 34 act indirectly on the number key levers 35 in a manner and by means hereinafter described on pages 30 and 31 beginning with line 26 of the former and ending in line 4 of the latter, also on page 36 lines 4 to 26 and page 37 lines 22 to 28. In their normal positions the key levers 36, 35, 82 rest against a stop 39 (Fig. 2). By means of a pin, 40, a driving pawl 41, is mounted on each key levers, 35, 36 and this pawl is so acted upon by the tension spring 42, that its lug, 43 rests against a nose 44, of a key lever, 35, 36. The nose 45, of the driving pawl, 41, engages over a nose 46, of the draw hook 49, jointed to the intermediate lever 47, by a pin 48, and the draw-hook is acted upon continually round its pin 46 in the anti-clockwise direc-

tion by means of a tension spring, 50, and presses upwards against a stop 51, whereby its normal position is determined.

On the draw-hook 49, the control tooth 49c, provided with two teeth 49a and 49b, is rotatably mounted on the pin 49d. If one of the typing keys 35 or 36 is depressed, the associated control tooth 49c moves into engagement with the cam shaft as described in the patent to Schulze No. 1,789,661 dated Jan. 20, 1931. The control tooth 49c is first of all rotated slightly and then takes the draw-hook 49 along with it to the right so that the intermediate lever 47 is swung round the shaft 52, in the clockwise direction. Accordingly, the type lever 54, is swung in the anti-clockwise direction round the shaft 55, and strikes against the platen 5.

The spur wheel 28 (Figures 1 and 2) which is non-rotatably mounted on the shaft 27 (Figure 1) engages with a spur wheel 56, which is rigidly mounted on the shaft 57. The spur wheel 56 again is in engagement with the spur wheel 59, rigidly mounted on the shaft 58 (Figures 1, 2, 4, 5).

The above described mechanisms do not belong to the invention but have been briefly described for the better understanding of the parts to be hereinafter described, belonging to the invention.

The calculating mechanism drive shaft 58 (Figures 2, 4 and 5), on one hand, is rotatably mounted in the bearing eye 60, arranged in the right hand side of the machine housing 1, and on the other hand, the part 56a of the shaft 56, is rotatably mounted in a bearing 61, which is fixed by means of the screws 62, to a bridge 63 connecting the two side walls, 64 and 65. Another shaft, 68 (Figures 2, 4, 5, 7, 8 and 9) is rigidly mounted by means of set screws 67, screwed into bosses 66 (Figure 4) on the left and right hand side walls 64 and 65 of the machine housing 1, and on this shaft, members to be hereinafter described, are swingably mounted.

In the bearing eye 61 (Figures 2 and 5), a cam, 69, (Figures 2, 4, 5) is rotatably mounted by means of the sleeve, 69a, rigidly fixed to the cam. The cam 69, is rigidly connected to the cams 71 and 72, by means of screws (not illustrated) which pass through holes 70, of the cams. The shaft, 58, however, remains without any action on the cams, since the cams 69, 71 and 72, as well as the sleeve, 69a, have greater bores "y" (Fig. 5) than the diameter of the shaft, 58. The cams, 69, 71 and 72 are prevented from lateral displacement, on the one hand, by contact of the side 69b, of the cam 69, with the edge 61a, of the bearing eye, 61 and, on the other hand, by contact of the cam, 72, with the toothed wheel, 73, non-rotatably mounted on the square shaft, 68. The toothed wheel, 73, participates in the rotation of the square shaft, 58, which continually rotates in the arrow direction "b" (Fig. 5). On the cam 72, a pawl, 74 (Figures 4 and 5) is displaceably arranged by means of pins, 77 and 78, which engage in elongated slots 75 of the cam 72, in elongated slots 76, of the cam 71, and in elongated slots (not illustrated) in the cam 69. The pawl 74, is acted on continually in the direction of the arrow "c" (Figure 5) by a compression spring 76, which, on the one hand, abuts against the pin 78, fixed to the pawl 74, and, on the other hand, abuts against the face 72a, of the slot 75, in the cam 72. Moreover, a stud, 80 formed on the pawl 74, co-acts with a part, to be hereinafter described in detail, by means of which the tooth 74a, of the pawl 74, is held out of en-

gagement with the toothed wheel 73. In ring grooves (not illustrated) in the ends of the pins, 77 and 78 of the pawl 74, which project from the left-hand side of the cam 69, a locking member 81, is fixed, in the manner illustrated in Figure 5, so that the pawl 74, always remains in connection with the cams 69, 71 and 72 and the pawl 74 is prevented from falling out. It may be remarked at this point that for the whole ten calculating keys 34, only one coupling as just described, is necessary.

The ten calculating key levers 82 (Figures 1, 2, 4, 5 and 7) which carry the calculating keys 34, are swingably mounted on the shaft 68, already mentioned. The rearwardly directed limbs of the calculating key levers 82, are somewhat upwardly bent at their ends, and have arched surfaces 82a (Figures 2, 7) of the downwardly directed projections 84, of the U-shaped stop members 85. The latter are swingably mounted on a shaft 87 (Figures 2, 3 and 7) rotatably mounted by means of two set screws 86 (Figures 3 and 7). Each of the set screws, 86, is screwed into a corresponding angle member 86a (Figure 3), the angle members being fixed by means of screws 86b to both side members 86c of the cradle housing. The stop members, 85, moreover, are held in position in the axial direction by means of distance pieces 85b (Figure 3), arranged on the shaft 87.

On the left-hand limbs of the stop members 85, which correspond to the values "1" and "9", and on the right-hand limbs of the stop members 85 (Figure 3) which correspond to the values "2" to "8", projections 88 (Figures 2, 3 and 7) are arranged with which engage springs 89, the springs on the other hand being connected to pins 90 (Figure 2). The pins 90, are riveted into angle members 91 (Figure 2) which, again are screwed by means of screws 91a, to a bar 92 (Figures 2 and 7) attached to the two side walls of the machine frame in any suitable manner. By means of these springs, 89, the stop pieces 85, are acted on in the clockwise direction round the shaft 87, so that they rest with their faces 85a, (Figure 2) against the bar 92, whereby the normal position of these stop members 85, is determined. Since the calculating key levers, 82, are acted upon by their own weight in the clockwise direction round their pivot shaft 68, and consequently rest with their arched faces 82a, against the arched faces 83, of the stop members, so the normal position of the calculating key levers 82, is hereby determined. A depression simultaneously of two calculating keys 34, or of a calculating key 34 and a decimal tabulator key 93 (Figure 1) is rendered impossible by a generally known roller key lock of the Mercedes Addelektra machine, not illustrated.

On each calculating key lever 82, a pawl, 95 is swingably mounted by means of a rivet 94 (Figures 2, 5 and 7). With the nose 95a of this pawl, a spring 96, engages which, on the other hand, is connected to a nose 82g, arranged on the key lever 82. By means of this spring 96, the pawl 95, is acted on in the anti-clockwise direction round its rivet 94. The normal position of the pawl 95, is determined by the contact of the right-angled bent nose 95b, on the upper edge of the key lever 82. The downwardly directed end 95d of the pawl 95, is capable of co-acting with the right-angled upwardly-bent nose 97, of a bar 98. On the right and left hand ends of the bar 98, pins 98a (Figures 5 and 6) are formed, one pin being arranged at each end. By means

of these pins, the bar 98, is swingably mounted on the levers 100 and 101, rigidly mounted on both ends of the shaft 99. The shaft, 99, at its right hand side, is rotatably mounted by means of a set screw 102 (Figure 5) in a bearing member 103, which is fixed to a bar 105, by means of screw 104. On the left-hand side of the machine, the shaft 99, is rotatably mounted by means of a cone bearing 108 (Figure 6) in a bearing member 107, which is fixed with screws 108, to the bar 108, already mentioned. The bar 105 is fixed to both side walls 84 and 85 of the machine housing 1, by means of screws 105a (Figure 4) which pass through holes 105a and 105b (Figures 5 and 6) of the bar 105.

By means of a spring 109, which, on the one hand, engages with a lug 88b of the bar 98, and, on the other hand, is connected to a pin 99g (Figure 2) rigidly fixed to the shaft 99, the bar 98, is acted on in the anti-clockwise direction round its pins 98a, so that its upper surface presses upwards against a bent lug 103a on the bearing block 103, whereby the normal position of the bar 98, is determined.

A locking bar 110 (Figures 2, 5 and 6) is swingably mounted at both its ends on the shaft 99, in the manner indicated in Figures 5 and 6. At the right-hand and left-hand ends of the locking bar 110, further pins 110a are fixed, with each of which a spring, 110b (in Figure 5 this has not been illustrated for the purpose of rendering other parts visible), engages, which spring on the other hand, is connected to bent lugs 100a or 101a of the levers 100 and 101. By means of these springs 110b the locking bar is always acted upon round the shaft 99 in the clockwise direction, whereby its normal position is determined, on the one hand, by contact with the pin 100b, riveted to the lever 100 and, on the other hand, by contact with the pin 101b riveted to the lever 101. The right-angled limb 110g, is capable of co-acting with the noses, 82h (Figure 5) formed on the calculating key levers 82, in a manner to be hereinafter described.

On the shaft 99 (Figures 2, 5, 6) further, a lever 111 is rigidly mounted to the free end of which a pin 112 is riveted (in Figure 5 for the sake of illustration the same is indicated in the withdrawn position). The pin 112 of the lever 111, co-acts with the fork-shaped end of an arm 113, of a three-armed lever 114, which is swingably mounted on the shaft 88. The arm 114a of the three-armed lever 114, co-acts with the stud 80, already mentioned, of the pawl 74, while the arm 114b, of the same, co-acts with the cam 72, in a manner hereinafter described. A spring 115 engages with a pin 114f (in Figure 5, the pin 114f is shown removed from the lever 114 for purposes of illustration) riveted to the nose 114d (Figure 5), the spring at its other end being connected to a pin 115a (Figure 4) on a stay 115b, which is fixed to the part 63 and to the cross stay 105. By means of this spring, the three-armed lever 114, is acted on in the clockwise direction round the shaft 68, in consequence of which the lever 111 connected to it, the shaft 99, and the levers 100 and 101 pinned to it, the locking flap 110, and finally the bar 98, are acted upon in the anti-clockwise direction, whereby on the one hand, the upper face of the lug 90z, under the action of the spring 109, and on the other hand, its edge, 98s under the action of the spring 115, contacts with the edge 103g of the lug 103a of the bearing member 103, whereby

the normal position of the parts 114, 111, 99, 100, 101, 110 and 98, is determined.

Further, on the shaft 68, a lever 118, (Figures 2, 5) is swingably mounted, at the free end of which a roller 117 is arranged, which is capable of co-acting with the cam 69. By means of the spring 119, which, on the one hand, engages with the pin, 118 of the lever 116, and on the other hand, is connected to the part 63, the roller 117, is always maintained in contact with the cam 69.

The lever 120, which similarly is swingably mounted on the shaft 68, is likewise capable of co-acting by means of its rearwardly directed arm 120a (Figure 5) with the cam 69. By means of the spring 123 which, on the one hand, engages with the pin 121, and, on the other hand, is connected to a pin 122 (Figure 2) of the bridge 105, the lever 128, is acted on in the clockwise direction round the shaft 68, whereby the projection 120b of this lever contacts with a part 120c, fixed to the locking bar 110, and the normal position of the lever is thereby determined.

By means of the set screws 127, screwed into the two side walls 125 (Figure 3) of the calculating mechanism 126 (Figures 1, 2, 3 and 7) a shaft 128 is freely rotatable. To this shaft, 128, feeler fingers 129, are mounted so as to be capable of being adjusted and fixed in position, and these fingers are forwardly bent at right angles at their downwardly-directed ends and are capable of co-acting by means of their slightly arched faces 130, with the stop pins 131, (as best shown in Figure 7) arranged on the stop members 65. The stop pins 131, are mounted so as to be adjustable. The right-angled forwardly-bent parts of the feeler fingers 129, are formed of different lengths (Figure 2) to correspond to the values "1" to "9", and the right-angled bent part, corresponding to the value "1" of the feeler finger 129, lying farthest to the left (Figure 3) is the longest, and the right-angled bent part corresponding to the value "9" of the feeler finger 129, which is located on the shaft 128 at the right hand side of the machine to the left of the feeler finger 129 corresponding to the value "0" is the shortest.

The feeler finger 126, corresponding to the value "0" is arranged so as to be capable of being fixed by means of screws 128b (Figures 3 and 7) to a part, hereinafter described in detail, fixed to the projection 126c of a clamping member 129d. As the feeler finger 128, corresponding to the value "0" may not be allowed to execute any swinging movement, calculating sector 174 would be swung therewith and in this manner a wrong value would be registered in one of the right angled bent part of the feeler finger 129 corresponding to the value "0" is still longer than the right-angled bent part of the feeler finger 126, corresponding to the value "1".

A roller lever 132, is loosely rotatable on a shaft 67 (Figures 5 and 7) and on the free forwardly directed end of this lever, a roller 133, is mounted, which is capable of co-acting with the cam, 69, hereinbefore described. To the roller lever 132, is jointed a draw-bar 134 which, at its upwardly directed free end, is jointed by means of a screw 138 (Figures 2, 3 and 7) to the lever 137, which is loosely rotatable on the locking shaft 142. By means of a spring 141, which on the one hand, engages with the pin 136, rigidly mounted on the draw-bar and, on the other hand, is connected to a pin 140, rigidly mounted on the front wall 138 (Figures 2 and 5) of the

calculating mechanism 126, the draw-bar 134, is acted upon always in the direction of the arrow "a" (Figures 5 and 7), so that the roller 133, is always maintained in contact with the cam 69.

The locking shaft 142, is arranged so as to be loosely rotatable by means of set screws (not illustrated) on the two side walls 125 of the calculating mechanism 126. To the lever 137, a pin 143, is fixed, which projects through an elongated hole 144, of a lever 136, rigidly mounted on the locking shaft 142. A spring 145, engages with the pin 143, of the lever 137, the other free end of the spring being connected to a pin 146, fixed to the lever 138, whereby both levers 136 and 137 are yieldingly connected to one another.

To the lever 136, a connecting member 149, is jointed by means of a screw 147, and this member is jointed to an angle lever 150 (Figures 3 and 7) by means of a screw 149. The lever 150, again, is swingably mounted by means of a screw 151, on an angle member 152, which is fixed by means of screws 153 (Figure 1) to the front wall 154. To the angle lever 150 (Fig. 7) is fixed a pin 155, which projects into a ring groove 158, of a sleeve 157 and this sleeve is arranged so as to be axially displaceable on a shaft 156, mounted in any suitable manner in the two side walls 125, of the calculating mechanism 126. With the sleeve 157, a wheel 159, likewise mounted so as to be axially displaceable on the shaft 156, is in fixed connection. Pins 160 (Figure 3) are arranged on the toothed wheel 159, and these pins are always in engagement with a claw 161 (Figs. 3 and 7) rigidly mounted on the shaft 156. Further, on the shaft 156, is arranged a toothed wheel 162, the pins 163 of which are likewise in engagement with the claw 161 (Figs. 3, 7, 9). The toothed wheel 162, is rigidly connected to a ring grooved sleeve 164 (Figure 3) which is arranged so as to be axially displaceable on the shaft 156.

On the shaft 67, (Figures 3, 5 and 7) there is rigidly mounted a lever 165, on the free downwardly projecting end (Figure 5) of which a roller 166, is arranged, and this roller is capable of co-acting with the cam 71, hereinbefore described. The lever, 165 is, moreover, fixed on the shaft 67, in such a manner that its roller 166, is normally in contact with the cam 71.

Besides, on the shaft 67 (Figures 3, 5, 7) a lever 167, is arranged, so as to be loosely rotatable thereon. To the lever 167 a roller 168, is attached, so as to be rotatable, and this roller is capable of co-acting with the cam 72, hereinbefore described, in a manner to be hereinafter described in detail. To the lever 167, a slide 170, is jointed by means of a headed screw, 169. By means of a spring 171, which, on one hand, is connected to a pin 172, arranged on the slide 170 and, on the other hand, engages with a pin 173 (Figure 3), arranged on the front side of the calculating mechanism, the slide 170, is always acted upon downwards in the arrow direction "a", whereby the roller 168 of the lever 167, is always held in contact with the cam 72. The slide 170 is provided with an elongated hole 173a, formed correspondingly to that in Figure 7, into which hole projects a roller 175, mounted on the calculating sector 174. The calculating sector 174 is arranged so as to be capable of adjustment and of being fixed in position on the shaft 128, by means of a screw 176a. The upwardly directed part of the calculating sector 174, is provided with teeth 177, with which the main driving wheel 159, hereinbefore described, is capable of being moved into engagement.

The toothed sector 174 (Figures 2, 3, 7) which is actuated on striking a calculating key 34, in a manner to be hereinafter described, transmits the swinging movement corresponding to the value of the struck key, by way of the toothed wheel 159, and shaft 158, to a locking wheel 178 (Figure 7) rigidly mounted on the shaft 158, which locking wheel is always in engagement with a guide and locking tooth 179. Further, on the shaft 158, a toothed wheel 180 is mounted so as to be capable of axial displacement. This is normally in engagement with a toothed wheel 181, which is integrally formed with a hollow shaft 182, and a toothed wheel 183. The unit 181, 182 and 183 is rotatably mounted on a shaft 184, fixed in the left-hand wall 125 (Figure 3) of the calculating mechanism. The toothed wheel, 183, again, is in engagement with a toothed wheel 185, which is rigidly mounted on a shaft 186. The shaft 188, is rotatably mounted in the left-hand side wall 125 of the calculating mechanism and in a bearing member (not illustrated) arranged approximately at the centre.

Beside the toothed wheel 185, there is a further toothed wheel 187, mounted so as to be non-rotatable on the shaft 188. Further, on the shaft 186, a master wheel 189 (Figure 7) is rigidly mounted, which comes into engagement with the toothed wheels 188 (Figure 2) of the column totalizers T, in the working position.

On the wheel 180, a ring grooved sleeve 190 is rigidly mounted, into which projects a pin 191, of a lever 193, rigidly mounted on the shaft 192, which is rotatably mounted in the calculating mechanism. The driving of the toothed wheel 180 (Figures 7 and 8) on a rotational movement of the shaft 158, is effected by a coupling disc 180a, pinned to the shaft 158, into which disc engage claws 180b, rigidly connected with the toothed wheel 180.

On the shaft 87 (Figures 2 and 7) there is rigidly mounted a lever 194, to the free upwardly directed end of which, a draw-bar 196, is jointed by means of the screw 195. A nose 197, of the draw-bar 196, engages over a nose 198, of a lever 199, rigidly mounted on the shaft 142. By means of a spring 200, which engages with the draw-bar 196, and which on the other hand is connected in the calculating mechanism in any suitable manner, the lever 196, is normally swung about the screw 195, in the anti-clockwise direction, whereby, the lever 196, is normally positioned so that its nose 197, always remains in engagement with the nose 198, of the lever 199. The lever 198 rests against a pin 201, arranged in any suitable manner in the calculating mechanism.

On the shaft 142 (Figures 3 and 7) there is fixed a release finger 202 which is capable of acting on a locking lever 461, arranged in the totalizers T1 to T8 in a manner to be hereinafter described. Further on the shaft 142, there is a locking tooth 203, rigidly mounted, which is capable of co-acting with the main driving wheel 189, rigidly mounted on the shaft 186.

On the clamp 129d (Figures 3 and 7), as already hereinbefore described, a member 204, is also mounted by means of screws 129b, and to the free downwardly projecting part of the member 204, which is somewhat bent at the rear, a member 206 is jointed by means of a screw 205. On the left-hand side of the machine, a clamp 208, is arranged, so as to be capable of adjustment and to be clamped in position by means of a screw 207. To the projection 209 of the clamp 208, a part 211, correspondingly formed to that in Figure 7 is

fixed by means of screws 210, and to the free downwardly projecting end of the part 211, there is attached a part 213, by means of a screw 212. A bar 216, correspondingly formed to that in Figure 7, is fixed to the part 213, by means of screws 214, and to the part 206, located at the right hand side of the machine by means of screws 215, so that a frame consisting of the parts 208, 211, 213, 216, 206, 204 and 129d, is formed.

The part 288 (Figure 7) located on the right-hand side of the machine, moreover, is guided by means of a headed screw 217, which projects through an elongated slot 218, of a lever 219, rigidly mounted on the shaft 87, and the part 213, arranged on the left hand side of the machine of the frame, is guided by means of a headed screw 220, which projects through an elongated slot 221, of a lever 222, rigidly mounted on the shaft 87, so that the frame 213, 218, 206, is prevented from swinging downwardly round the screws 212 and 205. With the arm 223 of the lever 222, and with the arm 224 of the lever 219, engage springs, 225, one spring with each arm, which springs are connected at their free ends in any suitable manner in the machine housing and these springs act upon the levers 222 and 219, and consequently upon the frame 213, 218, 206 in the clockwise direction. The swinging movement in the clockwise direction, however, is normally prevented by the draw-bar 196, the nose 197 of which engages over the nose 18 of the lever 189. The bar 216 of the frame 213, 216, 206, in a manner to be described later, is capable of co-acting with the noses 35g formed on the downwardly and forwardly extending number key levers 35 (Figure 2). Moreover the noses 35g are arranged on horizontal parts 35h of different lengths of the number key levers 35, the lengths of these parts corresponding to their values "0" to "9", and the horizontal part 35h corresponding to the value "0" (Figure 2) is formed as the shortest and the horizontal part corresponding to the value "9" as the longest.

On the left-hand side of the machine is arranged the total key 226a' indicated by TV (Figure 8) for taking the total of the column totalizers T. The key 226a' is attached to the key lever 228 (Figure 8), which is swingably mounted on the shaft 88. On the key lever 226 there is no pawl 95, mounted, as in the case of the calculating key levers 82 (Figure 7) in which the downwardly directed part of the pawl acts on the bar 97, but the key lever 226 (Figure 8) is provided with a wide projection 226a, which is capable of acting on the bar 97, 98 in the manner to be later described. The nose 226b of the key lever 226 is capable of co-acting with the nose 118g of the part 110. The rearwardly and somewhat upwardly projecting arm 228d of the key lever 226, is capable of acting with its somewhat arched face 226c on the somewhat arched face 227 of an arm 228 of a two-armed lever 229. The two-armed lever 229 is swingably mounted by means of a headed screw 230 on a supporting member 232, which is mounted by means of screws 231, in suitable manner on the machine housing. To the free rearwardly directed arm 233, of the two-armed lever 229, a draw-bar 235, formed correspondingly to that in Figure 8, is jointed by means of a screw 234, which draw-bar is provided with an elongated hole 236, in its free upwardly directed end. Through this hole a screw 237 projects, which is screwed into a lever 238, fixed on the shaft 192, whereby the draw-bar 235 is held loosely in connection with the lever 238.

The draw-bar 235, is connected, in the manner illustrated in Figure 8, with a three-armed lever 239, which is swingably mounted in a suitable manner at 239x on the rear wall of the calculating mechanism 126. With the arm 239a of the three-armed lever 239, a spring 240 engages, which at its other free end is connected to a pin mounted in the calculating mechanism, but not illustrated. In consequence of the action of the spring 240, the draw-bar 235 is acted on in the direction of the arrow "b", whereby its normal position is determined by striking of the key lever 226 against a stop 226s arranged on the machine housing.

On the shaft 192 (Figure 8) mounted in the front wall 154 (Fig. 2) and in the back wall (not illustrated) of the calculating mechanism 126, the swingable lever 193, (Figure 8) already described, is rigidly mounted, and is rigidly connected by means of a sleeve 242, with the lever 243, which is likewise swingable with the shaft 192. The lever 243, again is connected by means of a pin 244, with the lever 245, which is swingably mounted on the shaft 192. The pin 244 is embraced by a fork-shaped end of a control lever 248 (Figure 8). With the pin 244, a spring 248 engages, which is connected to the pin 247, mounted on the control lever 246, whereby the control lever 248 is acted on towards the left and the levers 245, 243, towards the right, so that the same are always held in contact with the control lever 246.

On the supporting rail 7 (Figures 1 and 2) of the paper carriage 4, has already stated, the column totalizers T are removably mounted. On the column totalizers T, pre-setting plates 301 (Figures 1 and 9) are mounted by means of which the control of the type of calculation of the associated column totalizer located in the working position is effected for addition or subtraction. The pre-setting plate 301 of one of the column totalizers T (Fig. 1) which is directly in the working position, moreover, acts on a part 302 (Fig. 9) of an angle lever 303, which is mounted, by means of a screw 304, on the front wall 154, of the calculating mechanism 126. By means of a spring 307, which engages with the lever 303, and is connected to a pin 306, fixed in the front wall 154 of the calculating mechanism 126, the parts 303 and 268, are held in their normal position, the normal position being determined by striking on a pin 308, arranged in the front wall 154 of the calculating mechanism. The lever 303 is of fork-shape at its lower end and embraces with the same a pin 309, of a control lever 311, swingably mounted, by means of a screw (not illustrated) on the front wall 154 of the calculating mechanism 126. While the pin 309 is capable of co-acting with the V-shaped recess 312 of the control lever 298, the pin 313 fixed to the control lever 311, co-acts with the upwardly directed V-shaped recess 298a, but the pin 313, on its part is in no way connected with the angle lever 303.

On the front wall 154 of the calculating mechanism 126, is arranged a knob 315 (Figure 1) which is capable of being set on "Add.", "Subtr." or "Disc." corresponding respectively with Addition, Subtraction and Disconnected and this knob is rigidly connect to the lever 316 at 315a (Figure 8). On the control member, 316, pins 317, 318 (Figure 8) are arranged, which co-act with the control lever 246 in detail.

Further on the shaft 300 (Figure 9) there is mounted a lever 320, which is rigidly connected to the lever 299, by means of a sleeve 321 (Figure

9). A pin 322, arranged on the lever 320, engages in a ring groove 164a (Figure 3) of a sleeve 164, rigidly mounted on the toothed wheel 162.

The toothed wheel 162 may be brought in engagement with a corresponding change-gear not illustrated to determine the kind of calculation of the cross totalizers Q1 and Q2.

On the right-hand side of the machine, the key 329, for taking totals of the cross totalizers Q1 and Q2, is arranged. The key 329, is attached to the key lever 330 (Figure 9) swingably mounted on the shaft 68, the key lever being correspondingly formed to that in Figure 8. The nose 330a, of the key lever 330, is capable, in a manner to be later described, of co-acting with the nose 110g of the member 110, and the projection 330b of the key lever 330 is capable of coacting with the bar 98. The rearwardly directed part of the key lever 330, is somewhat arched at 331, on its upwardly directed edge. This arched face 331, is capable of co-acting with an arched face 332, of a slide 337, vertically displaceable by means of the screw-slot connection 333, 334 and 335, 336, arranged in suitable manner on the right-hand side of the machine and the front wall of the housing. With the projection 337a, engages a spring 338, which, on the other hand, is connected at its free end to a pin 339 (Figure 9). To the upwardly-directed end, formed correspondingly to that in Figure 9, of the rod 337 there is riveted a pin 340, which projects into a curved slot 341 of a slide 342. The slide 342 is displaceably mounted by means of screws 343, which pass through the elongated holes 344 of the slide 342. The left hand end of the slide 342 is of fork-shape construction. With this fork-shaped part, there engages the pin 346 of a lever 345, rigidly mounted on the shaft 300. Another lever 347, which is rigidly mounted on the shaft 300, has likewise a pin (not illustrated) which is capable of projecting into the ring groove 164a (Figure 3) already referred to, of the sleeve 164.

On the slide 342 (Figure 9) there is a bent-off lug 343 (Figure 9) which is capable of being positioned so that the face 349 of its nose 350, lies in front of the face 351 of a locking or aligning tooth 352. On the shaft 353 which, on the one hand is rotatably mounted in the right-hand side wall 125 of the calculating mechanism and, on the other hand, in a bearing member (not illustrated) suitably mounted in the machine housing, a lever 354 (Figures 9 and 10) is rigidly mounted. The locking and aligning tooth 352, as is evident from Figure 9, is fork-shaped at its forwardly directed end and its fork-shaped part embraces a sleeve 363a, loosely rotatable on the shaft 323, whereby the locking and aligning tooth 352 is guided at one of its ends. At its other end, it is guided by means of a screw, 355, fixed to the lever 354, and the screw projects through an elongated hole (not illustrated) in the locking or aligning tooth 352. By means of a spring 356, which, on the one hand, engages with a pin 357, fixed to the lever 354 and, on the other hand, is connected to a pin (not illustrated) arranged on the locking or aligning tooth 352, the parts 352 and 354 are so acted upon that the stem of the screw 355 is moved against the right-hand edge of the elongated hole in the locking and aligning tooth 352, whereby their normal position in relation to each other is determined. On the locking and aligning tooth 352 is arranged a tooth-like part 359 (Figure 9) which, in a manner to be hereinafter

described in detail, is capable of co-acting with the toothed wheels, arranged on the left-hand cross totalizer Q1. A nose 361 (Figure 10) provided on the lever 354, is normally in engagement with the master wheel 362 loosely rotatable on the shaft 323. With the master wheel, 362 and the sleeve 362a, a coupling half 363 (Figure 9) is rigidly connected.

A lug 364, correspondingly formed so that in Figure 9, on the bar 342, is capable of co-acting, by means of a face, 365 (Figure 9), with a face 366 of a locking and aligning tooth 367. This is fork-shaped at its forwardly directed end and embraces with this end a sleeve (not illustrated) arranged so as to be loosely rotatable on the shaft 323. By means of a screw 368x which projects into the elongated hole 368 (Figure 9) of the locking and aligning tooth 367, and which is screwed into the lever 369, rigidly mounted on the shaft 353, the locking and aligning tooth 367, is guided. This is of tooth-like construction at its forked part 370, and this part is capable of co-acting with the toothed wheels (not illustrated), arranged in the cross totalizer Q2. The tooth 371 of the locking lever 369 (Figures 9, 10) is in engagement with the teeth of the master wheels 372, which are loosely rotatable on the shaft, 323. By means of a spring 373x, which, on the one hand, engages with a pin 373, arranged on the lever 369, and, on the other hand, is connected to a pin 367a (Figure 9), fixed to the locking and aligning tooth 367, the parts 367 and 369 are so acted upon that the stem of the screw 369x, which is screwed into the lever 369, lies against the edge 374 of the elongated hole 368, of the locking and aligning tooth 367, whereby its rest position is determined

With the master wheel 372, the sleeve (not illustrated) is in fixed relation. To the sleeve, a coupling half (not illustrated) is fixed. As will be evident from the above, the sleeve 363a, the master wheel 362, the sleeve 362a and the coupling half 363, are connected with one another and are loosely rotatable on the shaft 323, but are not axially displaceable thereon. The same holds for the part 372.

On the shaft 353 (Figure 10) a lever 378a is rigidly mounted, which by means of its part 378, formed correspondingly to that in Figure 10, acts in a mouth 380 of a two-armed lever 381, swingably mounted on the shaft 142. With the nose 378b of the lever 378a, a spring 378c, engages, which acts on the shaft 353, in the clockwise direction and thus holds the parts 354 and 369 in engagement with the master wheels 362 and 372. The lever, 381, is arranged on the outside of the right-hand side wall 125 of the calculating mechanism. This lever is constructed with its upper end of fork-shape. With this fork-shaped part 382 engages a nose 363 of a lever 384, rigidly mounted on the shaft 142 and having its upper end bent-off at right angles. The lever 384, moreover, is arranged at the left of the right-hand side wall 125 of the calculating mechanism.

The individual parts of a totalizer of usual type used up to Mercedes Addelectra machine will now be described in detail.

On a shaft 456 (Figure 11) rigidly mounted in the two side walls 454 (Figure 11) and 455 (not illustrated), a lever 457 is swingably mounted in the lowest decimal place, and is formed with its lower end of fork-shape. The release lever, 202 (Figure 7) hereinbefore described, is capable of engaging in the fork-shaped part 458, and of

acting on the lever 457. With the lever 457 there engages a spring 459, which on the other hand is connected to a shaft 460 mounted in the two side walls 454 and 455 of the column totalizer T. The spring 459 acts on the lever in the clockwise direction round the shaft 456, whereby its normal position is determined by the tooth 461 of the lever 457 being in engagement with the 30 tooth toothed wheel 188 Ht (Fig. 2, 7) rotatably mounted on the shaft 462.

With the toothed wheel 188 Ht of the lowest decimal place, a disc 465 provided with three tens-shift teeth 464, and a disc 466, are rigidly connected. The three parts 188 Ht, 465 and 466, are produced from a single piece and consequently represent a single element. The nose 467 provided on the upwardly-directed free end of the lever 457 (Figure 11) is capable of acting on a flap 468 rockably mounted in the two side walls 454 and 455.

To the right of the lever 457 (as seen in Figure 11) there is a lever 469 swingably mounted on the shaft 456. The downwardly directed limb 470 of the lever 469, is of fork-shape, and is capable of co-acting likewise with the release finger 202 above mentioned. The nose 471, of the lever 469, co-acts likewise with the flap 468. On the lever 469, a transfer wheel is rotatably mounted by means of a headed rivet 472 (Figure 11), the transfer wheel consisting of a ten-tooth toothed wheel 473, a ten-toothed Maltese wheel 474 (Figs. 13 and 14) and a ten-tooth toothed wheel 475, produced from a single piece, of which the toothed wheel 473, is capable of co-acting with the three-toothed tens-shift disc 465, and the Maltese wheel 474, with the locking disc 466. The disc 466 is provided with three notches 476, for the free passage of the teeth of the Maltese wheel.

The toothed wheel 188 Ht is, further, in engagement with a toothed wheel 477 (Figure 11) which is loosely rotatable on a shaft 478, rigidly mounted in the two side walls 454 and 455 of the column totalizer T. The toothed wheel 477, again, is in engagement with the toothed wheel 480, loosely rotatable on the shaft 479, which is rigidly mounted in the two side walls 454 and 455 of the column totalizer. A number roller 481 is rigidly connected with the toothed wheel 480. The toothed wheel, 475, associated with the lowest decimal place of the hundredths decimal place, is in engagement with the wheel 188 Zt of the tenths decimal place. The parts above described for the hundredths decimal place are similar for the tenths, units, tens etc. decimal places. In the following therefore only the differences will be pointed out.

By means of a lever 482 (Figures 11 and 12) swingably mounted on the shaft 456, of which lever the nose 483 (Figure 12) acts on a part 484, arranged on the flap 466, the flap 468 is held swung in the anti-clockwise direction (seen in Figure 11), whereby its rest position is determined by contact of the noses 467 of the levers 457, 480 on the one hand, and, on the other hand, by contact of the nose 461 of the lever 457, in the tooth spaces of the toothed wheels 188. The lever 482, moreover, is held swung in the clockwise direction (seen in Figure 11) by means of a spring (not illustrated) which engages with the hole 485, of the lever 482.

Since in the pointing off-place of the column totalizer, which is in working position, no transfer into this column totalizer is permitted to take place, the locking shaft 142 (Fig. 7) and the parts

located on it are prevented from being unlocked by the release finger 202, which when the pointing-off-place of the column totalizer is opposite the master wheel 189 co-acts with the part S (Fig. 11) swingably mounted on the shaft 458 of the column totalizer T, in such a manner that the projection 407 of part S comes to lie against the shaft 408, fixed in the side walls 454, 455 of the totalizer T. Consequently from swinging outwardly the release finger 202 is prevented.

The method of operation of the subject of the invention shall now be explained by the aid of an example of a calculation.

After the form is inserted, to commence with the name "O. Schmidt" (Figure 15) is typed in the column indicated by "1" by striking the letter keys 32 (Figures 1 and 2) whereby the paper carriage 4 is traversed stepwise to the left and the column of the sheet indicated by "2" has moved into the typing position. In the column "2", the number "15" is now entered by striking the corresponding number typing keys 33 (Figures 1 and 2).

After the number "15" has been typed and by utilizing the space key Sk (Figures 1 and 2) the paper carriage 4 has been brought into a position in which the column indicated by "3" is in the typing position. By means of the letter keys 32, the "months" column "3" is now filled in, whereby the paper carriage 4 is brought so that the column of the sheet indicated by "4" is in the typing position.

In order to facilitate the survey of the eight totalizers T1 to T8, necessary for filling up the sheet illustrated in Figure 15, and the type of shift of the cross totalizers Q1 and Q2 (Figures 1 and 2) which the known control plates 301 (Figures 1, 9) of the column totalizers T1 to T8 are set for the kind of calculation of the cross totalizers Q1 and Q2, a table is illustrated in Figure 16.

As already stated, the paper carriage 4 is located so that the column "4" of the sheet is in the typing field, whereby the totalizer T1 is also in the working position. Moreover, the carriage s2 carrying both of the cross totalizers Q1 and Q2 has been taken so far to the left by the column totalizer T1 and the coupling device s, s1 (Figure 1) that the corresponding decimal places of the totalizers lie opposite to the master wheels 362 (Figure 9) and 372. Now the calculating keys 34, corresponding to the amount of "RM 200" are depressed after one another, the key corresponding to the value "2" being struck first. It may be first remarked that in consequence of the positioning for addition of the change-over gear (not shown) by the setting plate 301, of the totalizer T1 this amount is added in the cross totalizer Q1. On the depression of the calculating key lever corresponding to the value "2", the rearwardly-directed limb on the calculating key lever 82 (Figures 5 and 7) is swung round the shaft 68 in the clockwise direction, whereby the associated U-shaped stop member 85, the downwardly-directed limb 84 of which contacts on a face 82a of the calculating key lever 82, is swung in the anti-clockwise direction round its shaft 67. The contact pin 131, provided on the stop piece 85, thereby moves into the path of movement of the arm 130 of the feeler finger 129, corresponding to the value "2." Further, on the further depression of the already mentioned calculating key 34, the pawl 95 (Figures 2, 5 and 7) arranged on the key lever 82, acts on the right-angled upwardly bent nose 97, of the bar 98,

mounted on the pins 98a (Figures 5 and 6) and swings this in the clockwise direction against the action of the spring 109. Moreover the edge 98s of the lug 98x (Figure 5) of the bar 98, slides from the edge 103g of the bearing member 103, which is formed as a stop 103a whereby the levers 100, 101 and 111 rigidly mounted on the shaft 99, and further the three-armed lever 114, mounted on the shaft 88, and in engagement with the lever 114, by means of the pin-slot connection 113, 112, can follow the pull of the spring 115.

On the swinging of the parts 100, 99 and 101 in the anti-clockwise direction, the nose 87 of the bar 98 slides underneath the nose 85d of the pawl 85. The locking bar 110, swingably arranged on the shaft 98, which, at its ends on account of the pull of the spring 110b, lies against pins 100b and 101b respectively, likewise participates in the movement through the release of the bar 98 by the stop 103a, and is swung in the anti-clockwise direction. By the movement of the locking bar 110, the upwardly-directed right-angled bent bridge 118g, slides over a nose 82h (Figure 5) of the depressed key lever 82, and locks the same in the depressed position. Further, a part 120c, fixed to the locking bar 110, participates in the swinging movement and slides along on the under edge of a two-armed lever 120 (Figure 3) swingably mounted on the shaft 88 and, in consequence of the pull of the spring 123, attached to the lever 120, is held in the recess 120d until after a revolution of the coupling consisting of the cams 59, 71, 72, the lever 120, the part 120c, as well as the locking bar 110, are released again in a manner to be later described. A depressed calculating key lever, therefore, is not released again, owing to the locking means, 120c and 120d, until the corresponding value has been transferred. Further simultaneous depression of two calculating keys 34, cannot take place owing to a roller lock (not illustrated). As already explained, on striking the calculating key 82, corresponding to the value "2," the system of levers 100, 101 and 111, attached to the shaft 99, as well as the three-armed lever 114, swingably mounted on the shaft 88, have been released, whereby the latter lever under the pull of its spring 115, has been swung in the direction of the arrow "m" (Figures 5 and 2). The nose 114x of the upwardly-directed arm 114a, of the lever 114, moves out of reach of the nose 80, of the pawl 74. The downwardly-directed arm 114b, on the other hand, has moved into the path of movement of the cam 72. Since the pawl 74 is displaceable in relation to the cam 72, by means of the pin-slot connection 75, 76, 77, 78 and of the compression spring 79, and was locked by the nose 114x of the lever 114, the pawl 74 will follow in the arrow direction "c" under the pressure of the spring 79, on swinging out of the lever nose 114x, whereby the tooth 74a of the pawl 74, moves into engagement with the toothed wheel 73, continually rotated by way of the parts 58 (Fig. 1) 59, 58, 57 and 20 to 30, whereby all three cams 69, 71 and 72, are coupled with the toothed wheel 73, so that they participate in the rotational movement of the toothed wheel and in the arrow direction "b" (Figures 2 and 5).

In the rotation of the three cams, after the nose 60 of the pawl 74, has just moved past the nose 114x of the three-armed lever 114, the cam 72 first acts at 60 degrees (Fig. 17) on the arm 114b of the three-armed lever 114 lying in the path of movement, and brings the upper arm 114a of the lever 114, in the anti-clockwise direction.

into the path of movement of the nose 80 of the pawl 74, and acts on the pawl 74 in the raising sense in a manner to be later described. By the return of the lever 114, the tension spring 115, is again tensioned and the bar 98, mounted on the levers 100 and 101 is returned by the arm 111 connected to the lever 114, and by the resulting swinging movement of the shaft 99, in the clockwise direction, whereby the nose 98x of the bar 98, moves behind the bend 103a of the stationary support 103, by means of the pull of the spring 109. In consequence of the rocking movement of the bar 98 in the clockwise direction, the nose 95d of the pawl 95 falls behind the nose 97 of the bar 98 since at this moment the key lever follows the movement of the flap 98, and rests behind the nose 97 of the flap 98, since at this moment the key lever 82 concerned, is still depressed and is held by the locking bar 110 which is held by the part 120c through the lever nose 120d. Although the locking bar 110 is held swung in its position in the anti-clockwise direction, the part 100, 98 and 101, in consequence of the resilient connection of the springs 110b, are still capable of swinging in the clockwise direction.

On the further rotation of the three arms 69, 71, 72 the roller 133 on lever 132, which by means of the pull of the spring 141, is held in contact with the cam 69 (Figure 5) first follows at 10 degrees (Fig. 17) the depression of the same, whereby the draw-bar 134, jointed to the roller lever 132, following its spring 141, is drawn in the direction of the arrow a. The part 137, pivotally connected with the draw-bar 134 (Figure 7) by means of the screw 135, is thereby moved downwards along with the draw-bar. The pin 143, fixed to the part 137, which passes through the slot 144, of the lever 136, takes the latter and the shaft 142 along with it in the clockwise direction. The angle lever 150, which on the one hand is jointed to the lever 136 through an angle member 148, is likewise, through the movement of the draw-bar, swung round its point 151 in the anticlockwise direction. Consequently the downwardly going arm of the lever 150 displaces the toothed wheel 159, non-rotatably mounted on the shaft 158 in the arrow direction a2, by means of its grooved connection 155 and 158, whereby the teeth of the same are coupled with the teeth 177 of the calculating sector 174. The pins 160 (Figure 3) arranged on the toothed wheel 159, which are continually guided in the grooves of the claw 161, rigidly mounted on the shaft 158, ensure that the teeth of the toothed wheel 159, slide securely into the teeth of the calculating sector 177 (Figure 7). As already mentioned, the shaft 142 is rotated in the clockwise direction by the lever 136, whereby the finger shaped lever 202 rigidly mounted on the shaft 142, is swung and the locking lever 469a, partially illustrated in Figure 7 (see also Figure 11) unlocks the corresponding decimal place of the totalizer T1 located in the working position.

Further, on the one hand, the adjusting tooth 203 which is rigidly mounted on the shaft 142, releases the master wheel 189, and the shaft 186 connected with it, and, on the other hand, the adjusting tooth 179 likewise rigidly mounted on the shaft 142, releases the toothed wheel 178 and the shaft 156 connected with it.

Further, the arm 256, mounted on the shaft 142 (Figure 8), thereby acts by way of its spring 258 on the aligning tooth 253. This is now in engagement with some of the next higher decimal places lying adjacent to the decimal place located

in the working position in relation to the master wheel 189 (Figure 7) of the column totalizer. Consequently, the aligning tooth, 263, is moved in the direction of the arrow a whereby the driving wheel or driving wheels of the higher decimal places which are not in the working position, are released so that these wheels 188, in the event of tens transfer ensuing, can freely rotate.

The locking lever 199, pinned to the shaft 142, swings in the clockwise direction and releases the nose 197 of the lever 196 jointed to the lever 194, by means of a screw 195.

By the swinging movement of the shaft 142 (Figs. 9, 10) in the clockwise direction, the levers 384 and 381 are also swung in the clockwise direction, whereby the part 378a is swung together with the shaft 353 and the two locking teeth 354 and 369, in the anti-clockwise direction. Accordingly, these two locking teeth also release the master wheels 362 and 372 of the cross totalizers Q1 and Q2. Moreover, the release fingers, 353a and 353b, attached to the shaft 353, are also swung with this shaft in the anti-clockwise direction, whereby the locking lever of the corresponding decimal places of the cross totalizers Q1 and Q2 are released. Since, as stated, the locking levers 354 and 369 mounted on the shaft 353, are also swung in the anti-clockwise direction, so they take along with them, by means of their associated springs 356 (in Figure 9 only one is illustrated) the aligning teeth 352 and 367, whereby in a similar manner as by the aligning tooth 253, (Figure 8) the driving wheels of the cross totalizers Q1 and Q2 are released for possible tens transfer occurring.

After these movements have taken place, the cam 72, meanwhile, on further rotation has moved so that its lower curved part has arrived in the vicinity of the roller 163 on lever 167 whereby the lever 167 at 30 degrees (Fig. 17) following the pull (Figure 7) of the spring 171 engaging with the slide 170 and the correspondingly formed cam 72, is swung round its shaft 87 and, accordingly the slide 170 jointed by means of the screw 169 (Figure 5) is drawn in the direction of the arrow a. By the downward movement of the slide 170, the slot 173x (Figure 7) acts on the roller 175 (Figures 3 and 7) arranged on the calculating sector 174, 177 and projecting through the slot 173x and swings the sector 174, 177 in the direction of the arrow p. Since the latter is rigidly connected to the shaft 128, by means of the clamping device 176, this shaft participates in the rotational movement in the direction of the arrow p. The feeler fingers 129, rigidly mounted on the shaft 128 and designed for the values "0" to "9", are thereby swung together in the anti-clockwise direction and so far until the feeler finger 128 corresponding to the value "2" strikes on the pin 131 of the stop-piece 85, which has been swung upwards by depression of the calculating key 34, corresponding to the value "2". The stroke of the feeler finger 129, is thereby transmitted to the calculating sector 174, 177, and accordingly the toothed wheel 159 (Figure 7) which is in engagement with the sector, is rotated through two units, whereby the value is transmitted by way of the shaft 158, and the change-over gear 180 (Fig. 7) 187, which was previously set for addition, through the knob 315 (Figure 1) and the shaft 188, to the main driving wheel 189, which on its part, registers the value "2" in the corresponding totalizer decimal place of the column T1.

Moreover, the rotational movement of the shaft 158 (Figure 7) is transmitted by way of the

change-over gear only to the cross totalizer Q1, whereby the value "2" is registered only in this cross totalizer.

By the contact of the feeler finger 129, corresponding to the value "2", with the stop member 131, the slide 170, together with the roller 168 on lever 167 was prevented from further downward movement and since the formation of the cam 72 (Figure 5) is adapted for the greatest stroke, namely for the stroke of the feeler finger 129, corresponding to the value "9", so the roller 168 on lever 167, 168 remains for a short time freely suspended and on the further rotation of the cam 72, is engaged and brought back. Before, however, the return of the roller 168 on the lever 167 and the slide 170 connected with it occurs, the arms 204 and 211 (Figures 3 and 7) rigidly mounted on the ends of the shaft 128, participate in the swinging movement of the feeler fingers 129 (or of the calculating sector 174, 177) and of the shaft 128. Accordingly the frame 213, 216 and 208, jointed at the points 212 and 205 and guided on the slide bars 219, 222 by means of screws 220 and 217, will slide forwards through an amount corresponding to the value "2". The lower edge 216a of the front bridge 218, thereby reaches a position over the nose 35g (Figures 2, 7) of the number key lever 35, corresponding to the value "2".

Shortly, thereafter, the roller 166 which is mounted on lever 165, 166, rigidly connected with the shaft 87 (Figures 5 and 7) falls into the depression of the cam 71 at 130 degrees (Fig. 17) whereby the arms 219 and 222, rigidly connected to the shaft 87, are swung in the clockwise direction by the springs 225 engaging with their short arms 223 and 224, and with them also the frame 213, 218, 208 guided by them. This frame thereby strikes on the nose 35g (Figure 7) of the number typing key lever 35, corresponding to the value "2" and presses this lever downwards against the action of its spring 38 (Figure 2). The control tooth 48c of the draw-hook 48, is moved by the coupling lever 41, into engagement with the cam shaft C. This now draws the draw-hook 49 forwards, which by way of the intermediate lever 47, causes the type lever 54 to strike on the platen 5, whereby during the striking movement the control tooth 48c moves out of engagement with the cam shaft C. Through the striking movement of the type lever, the paper carriage has been moved by way of the parts 54a to 54f one step to the left under the pull of the carriage draw-spring so that the next lower place of the column totalizer T1 now lies opposite to the main driving wheel 189 (Figure 7).

After the termination of the calculating operation and before the commencement of the paper carriage shift (in which the time for registration of the value "10" is to be taken into consideration) the raising of the roller 133 on lever 132, which is loosely mounted upon the shaft 87, is effected at 145 degrees (Fig. 17) by the elevated part of the cam 68, which is indicated by 68c. The slide 134 (Figure 7) is thereby raised in the opposite direction of the arrow a. It thereby takes along with it the lever 137, by means of the screw 135, in the anti-clockwise direction whereby by way of the parts 143, 145 and 146, the lever 136 is swung in the anti-clockwise direction. In consequence of this swinging movement of the lever 136, on the one hand, the shaft 142 is swung in the anti-clockwise direction, and, on the other hand the wheel 159, is brought out of engagement again (Figure 3) with the calcu-

lating segment 174, by means of the parts 148 and 150 (Figures 7 and 3). By the swinging movement of the shaft 142 in the anti-clockwise direction, the releasing finger 202 (Figure 7) has released the locking lever (in Figure 7 illustrated broken off), lying opposite to it, so that the calculating place of the totalizer T1, in which the value "2" was registered is again locked. By the swinging movement of the shaft 142, in the anti-clockwise direction, the lever 199 (Figure 7) has also been swung along with it and has swung the lever 188 against the action of its spring 200.

Further, the arm, 258 (Figure 8) has raised the aligning tooth 253, into its position illustrated in Figure 8, whereby the wheel 188 (Figures 2 and 7) possibly rotated by a tens transfer is aligned. This is advantageous for the reason that with wide totalizers, in consequence of unavoidable slight play in manufacture, the numbers visible in the inspection aperture are liable to be disposed in spiral fashion, whereby the numbers located in the higher places are occasionally not completely shown. This is avoided by the aligning tooth 253.

Further, by the swinging movement of the shaft 142, in the anti-clockwise direction (Figure 7) the release fingers 353b, 353a of the two cross totalizers Q1 and Q2, are swung, by way of the parts 384, 383, 382, 381, 378a and 353 in the clockwise direction, whereby the corresponding locking levers were also released and consequently the associated calculating places were locked. Further, the teeth 179 and 283, fixed on the shaft, 142 (Figure 7) and also the teeth 354 and 369 fixed on the shaft 353 (Figures 9 and 10) have entered again into their wheels 178 and 188 and also 362 and 372, whereby the calculating mechanism also is again locked. Moreover, the aligning teeth 352 and 387 have been moved by the levers 354 and 368 back into their wheels lying opposite to them, whereby the same object is attained as by the aligning tooth 253 (Figure 8). As soon as these locking operations are completed, the carriage shift operation effected by the typing operation as above described follows.

After the locking operation is effected, the roller 188 on the lever 185, which is rigidly mounted on the shaft 87, is raised at 225 degrees (Fig. 17) by the raising edge 71a (Figure 5) of the cam 71. The shaft 87 is thereby swung in the anti-clockwise direction. Accordingly, the arms 222 and 219, fixed on the shaft 87, are also swung in the anti-clockwise direction, whereby the frame 213, 218, 208 mounted in them, is raised into its upper position. In consequence of this, the nose 35g (Figures 2, 7) of the number key lever 35, corresponding to the value "2" is released. This now returns into its rest position under the action of its spring 38 (Figure 2), whereby the coupling lever 41, mounted on the key lever again engages over the nose 45 of its co-operating draw lever 48.

In the swinging movement of the shaft 67 (Figure 7) in the anti-clockwise direction, the arm 184 has also raised the lever 188, whereby under the action of the spring 200, the nose 187 of this lever snaps over the nose 198 of the lever 198 already located in its rest position.

After the raising of the frame 213, 216, 208, the rising face 72b (Figure 5) has come at 240 degrees (Fig. 17) into operation on the roller 188 mounted on lever 187 which is loosely mounted on the shaft 87, and has brought this lever into its rest position. The slide 170 was thereby

raised against the action of its spring 171, whereby the inclined slot 173x of the slide, acts on the roller 175 of the calculating sector 174, which has meanwhile been released from the wheel 159, and swings this sector in the opposite direction to the arrow p. In consequence of this, on the one hand, the shaft 128 rigidly connected to it, is brought back together with the feeler fingers 129 into their rest position, while on the other hand, the number key striking frame 213, 216, 206 is returned to its rest position illustrated in Figure 7, by way of the arms 204 and 211 jointed to it and rigidly mounted on the shaft 128, in which position the frame is held by the elevated part of the cam 72 (Figure 5).

Further, before the return movement of the number key striking frame 213, 216, 206, into its rest position illustrated in Figure 7 has taken place the rising edge 69c (Figure 5) of the cam 69, has come into operation at 162 degrees (Fig. 17) on the end 120a of the lever 128, whereby this lever is swung against the action of its spring 123. Consequently the nose 120b, of the lever 128, releases the part 120c of the locking bar 110, whereby this bar under the action of its spring 110b (Figure 6) tensioned by the previous return of the bar 98 into its rest position, likewise moves back into its rest position. Accordingly, the nose 82h (Figure 5) of the calculating key lever 62 corresponding to the value "2" is released, which lever under the action of the spring 89 engaging with its associated stop member 85 (Figure 7) now returns along with the stop member 85 into the rest position illustrated in Figure 7, whereby the pawl, mounted on the calculating key lever 82, also rests again over the edge 97 of the bar 98.

Finally, the nose 88 of the pawl 74, mounted on the coupling disc 72 (Figure 5) pushes against the nose 114x of the three-armed lever 114, already located in its rest position, whereby the pawl 74 is brought out of engagement against the action of its spring 79, with the wheel 73 of the continually rotating shaft 58. In order to prevent the cam series 69, 71, 72 from springing back at the moment when the pawl 74 is raised out of engagement with the toothed wheel 73, the roller 117 of the roller lever 116, snaps at 200 degrees (Fig. 17) into the depression 69d of the cam 69 under the action of its strong spring 119, whereby the cam series 69, 71, 72 on the pawl 74 being raised, is held in their position illustrated in Figure 5.

It would be too exhaustive a matter to repeat the process already described for the registration of the value "2", for the values to be registered in the totalizers T2 to T6, since the operations are exactly the same.

In order to pass from the comma place into the next lower decimal place, the space key S_k (Figures 1 and 2) is struck, so that the totalizer T1 is now located with its tenths decimal place in the working position.

If the numerical example given in Figure 15 is now considered, so it should be clear without further explanation that for the further columns, including the column 9, the same procedure is followed only with the difference that in the columns 5 to 7, inclusive, the cross totalizer Q1 is changed over to subtraction controlled by the corresponding column totalizers T2 to T4. The values shown in the columns 8 and 9 (Fig. 15) are added in both of the cross totalizers Q1, Q2 controlled by the totalizers T5 and T6.

The amount "184,30" is then visible in the cross

totalizer Q1 and the amount "4,30" in the cross totalizer Q2.

In order to withdraw these amounts from the cross totalizers Q1 and Q2, and register them automatically in the column totalizers T7 and T8, it is necessary first to depress the tabulator key 93 for the hundreds decimal place (Figure 1) in order to bring the hundreds decimal place of the column totalizer T7 into the working position, whereby the cross totalizers Q1 and Q2 are also moved by means of the coupling devices s1 and s2 (Figure 1), so that their hundreds decimal places also are brought into the working position.

As soon as the column totalizer T7 arrives in the working position, the pre-setting plate 301 (Fig. 1, 9), which has been set on subtraction, of the column totalizer T7, acts on the nose 302 of the angle lever 303, and swings the same round the shaft 304 in the clockwise direction, against the action of the spring 307.

In this movement, the fork-shaped part of the lever 303, acts on the pin 309 riveted to the part 311, whereby the same is swung in the clockwise direction. Since the pin 309 is in engagement with the recess 312 of the part 298, the control rod 299 is displaced in the direction of the arrow r, indicated in Figure 9. In consequence of this, the lever 299, the shaft 300, the lever 320 and the lever 347 are swung in the anti-clockwise direction, whereby the toothed wheel 162 is displaced to the left. By this movement the direction of the rotation of the main driving wheel 362 of the cross-totalizer Q1 has been reversed to subtractive calculation.

Now, the key 329 for total-taking (TC) of the cross totalizer is depressed. With this operation the face 330b of the lever 330 acts on the nose 97 of the flap 99 and swings this in the clockwise direction against the action of the spring 109 (Figure 5). In this movement the lug 98x (Figure 5) of the flap 99, slides from the edge 103g of the bearing member 103, which is formed as a stop, whereby the levers 100, 101, 111, rigidly mounted on the shaft 99 and the lever 114 mounted on the shaft 68 follow the pull of the spring 115, which engages with the three armed lever 114.

The face 331, of the key lever 330, moreover, now acts on the depression of the key 329, on the face 332 of the slide 337, so that this slide moves upwards in the opposite direction of the arrow a (Figure 9) and against the action of its spring 338. With this, its pin 340, acts on the incline 341a of the slot 341 of the slide 342, whereby the slide 342 is displaced to the left (seen in Figure 9).

Now, should it have been forgotten by inadvertence to change over the cross totalizer Q1 for subtraction, because the pre-setting plate 301 of the column totalizer concerned, in this case T7 has not been set, this is not a disadvantage since, when the slide 342 moves to the left it acts on the pin 348 fixed to the lever 345, and rotates the lever 345, the shaft 300, the levers 347 and 320 in the anti-clockwise direction, so that the driving wheel 362 is changed over automatically for subtractive operation.

In the movement of the slide 342 (Figure 9) to the left, the nose 350 of the part 348 of the slide 342 moves in front of the face 351 of the aligning tooth 352 of the cross totalizer Q1, and the nose of the part 364 of the slide 342 moves in front of the face 366 of the aligning tooth 367 of the cross totalizer Q2, so that the teeth 359 and 378 of the aligning teeth are held in engagement with the four toothed wheels (not shown) of the cross totalizers Q1 and Q2, lying to the left of the driv-

ing wheel 362 or 372, so that the toothed wheels thus engaged are locked. The wheels of the cross totalizers Q1 and Q2 correspond, moreover, to the wheels 188 of the column totalizer.

In the rotation of the three cams 69 (Figure 5) 71 and 72, the roller 133 on lever 132, moves under the action of the spring 141 engaging with the rod 134, from the elevated part of the cam 69, on the lower part of the same, whereby the draw-bar 134 moves in the direction of the arrow *a*. Hereby, the toothed wheel 159 is brought into engagement with the teeth 177 of the calculating sector 174, by way of the above-described part 137 (Figure 7) 143, 136, 148, 150, 155 and 156. Further, on the displacement of the draw-bar 134 in the direction of the arrow *a*, the shaft 142, and the parts 199, 179, 203, 256 (Figure 8) 202, and 382 rigidly connected to it are swung by way of the parts 137, 143, 136, in the clockwise direction (seen in Figure 7) whereby by means of the release finger 202, the locking lever 469, (Figures 7 and 11) lying opposite to it, is raised and accordingly the calculating place located in the working position of the column totalizer T7 is unlocked.

In the swinging movement of the shaft 142 in the clockwise direction (Figure 10) the lever 384 fixed to it, is likewise swung in the same direction. As a result of this, the lever 384 acts, by means of its nose 383, on the lever 382, whereby the latter is swung in the clockwise direction. The lever 378a, which is in articulated connection with the lever 382, is hereby swung in the anticlockwise direction against the action of its spring 378c in which swinging movement the shaft 353 and the levers 354 and 869, as well as the release fingers 353b and 353a participate, whereby the master wheels 362 and 372 are unlocked, and the toothed wheels located in the cross totalizers Q1 and Q2 are released.

In the further rotation of the three cams 69 (Figure 5) 71, 72, the roller 189, rotatably mounted on the lever 167, moves from the elevated part of the cam 72, on to the lower part of the same. As a result of this, the drawbar 170 (Figure 7) is displaced in the direction of the arrow *a* under the action of its spring 171. The incline 173a, of the slot 173x of the rod 170, hereby acts on the roller 175 of the calculating sector 174, whereby this is swung in the anti-clockwise direction. Since the teeth 177 of the calculating sector 174, are in engagement with the toothed wheel 159, the driving wheel 362 of the cross totalizer Q1 is rotated in the subtractive direction. Until the number roller of the hundreds place of the cross totalizer Q1, which shows a "1," has moved from "1" to "0" in which case, as already mentioned, a further rotation of this number roller is not possible since the wheel 360 of the next higher decimal place (thousands place) is held fast by the aligning tooth 352 which is locked by the nose 350 (Figure 9) of the slide 342. The calculating segment 174 (Figure 7) will be able, therefore, only to rotate through one unit. Accordingly, the master wheel, 189 is also rotated, by way of the parts 158, 180, 187, 186 likewise only through one unit, whereby in the hundreds decimal place of the column totalizer T7 a "1" is registered.

By the swinging out movement of the calculating segment 174 through one unit, the lower arm 204 of this segment moves the number key striking yoke 206, 216, 213 forwards through one unit, whereby the number typing key lever 35, corresponding to the value "1" is selected which key is depressed by the cam 71 (Figure 5) by way

of the roller 166, shaft 87 and arm 222, 218 as hereinbefore described. As a result of the operation of the type bar the paper carriage moves one step to the left.

Consequently, the units decimal place of the column totalizer T7 and of the cross totalizer Q1, are in the working position in which the operations are again repeated. After the clearing of the units decimal place has been completed the paper carriage is moved one step to the left by means of the space key, whereby the tenths decimal place of the column totalizer T7 and of the cross totalizer Q1 has arrived in the working position.

Now, the same operations are repeated in the tenths decimal place of the column totalizer T7 and of the cross totalizer Q1—as the key 329 is still held depressed—whereby the tenths decimal place of the cross totalizer Q1 moves to zero, and in the tenths decimal place of the column totalizer T7 a "3" is visible.

When in the manner already described, the column totalizer T7 and the cross totalizer Q, are now moved so that their hundredths decimal places are in the working position and the "zero" is typed on the paper, a further carriage step follows.

According to the foregoing description, therefore, a totalizer on the machine is automatically cleared at one operation in which the key 329 (S. Q) is automatically held depressed during the clearing operation, and at the termination of the total-taking operation is automatically released again.

As soon as the key, 329 (Figure 9) is released, the bar 98 (Figure 5) under the action of its spring 109, swings in the anti-clockwise direction round its own pivot axis, whereby the nose 98x rests again in front of the projection 183g.

The machine therefore clears a totalizer in one operation whereupon the coupling 69, 71, 72 automatically comes to rest.

Now, the amount "4.30" registered in the cross totalizer Q2, is written out of the same and transferred into the column totalizer T8. To this end, it is again necessary first to depress the corresponding tabulator key in order that the units decimal place of the column totalizer T8 and the units decimal place of the cross totalizer Q2 move into the working position. Then, the TC-key 329 (Figure 9) is again depressed and held depressed until the zero of the hundredths decimal place has been typed on the paper. In the depression of the TC-key and the writing out of the amount "4.30" from the totalizer Q2 and the registration of the same amount in the column totalizer T8 the same procedure takes place, as in the writing out of the amount "184.30" from the cross totalizer Q1, for which reason this will not be described in detail. If the zero of the hundredths place has been typed on the paper, then a carriage step results whereupon the coupling 69, 71, 72 automatically comes to rest.

Now, let it be assumed that at the end of the week or at the end of the month, the amounts registered in the column totalizers T1 to T8 are to be written out. To this end, the carriage return key is first depressed, whereby the paper carriage moves into its extreme right-hand position. Then, by means of the tabular key, the carriage is moved to the left until the hundreds place of the column totalizer T1 is located in the working position. It may still be remarked that the cross totalizers Q1 and Q2 are held by a locking lever 508 in their left-hand position and are

thereby prevented from participating in the movement of the column totalizers concerned, by way of the coupling device S1 and S2 (Figure 1).

Now, the TV-key, 226a' (Figure 8) is depressed whereby, by way of the parts hereinbefore described, the pawl 74 (Figure 5) moves into engagement with the toothed wheel 73, and the three cams 69, 71, 72, participate in the revolutions of the shaft. In this case, also the pawl 74, remains in engagement with the toothed wheel 73, as long as the key lever 226 is held depressed, since in consequence of the face 226a (Figure 8) of the key lever 226, the part 114x (Figure 5) of the lever 114, cannot enter into the path of movement of the nose 80 of the pawl 74, and the nose 74a of this pawl cannot be brought out of engagement with the toothed wheel 73.

On the depression of the key lever 228 (Figure 8) the face 226c, acts on the face 227 of the lever 229, and swings the same in the anti-clockwise direction, whereby the rod 235 is moved downwards in the direction of the arrow a against the action of the spring 240, which engages with the arm 239a of the lever 239. Since the lever 239 is in connection with the rod 235, the three-armed lever 239 is swung round its axis 238x in the anti-clockwise direction. In this movement, the locking member 250, fixed to the arm 239b, moves so that it lies under the part 252 of the aligning tooth 253, so that this is held in engagement with the teeth of the driving wheels 188 of the column totalizer T1 to 8 lying opposite to it for the time being.

In consequence of the downward movement of the rod 235, the lever 238 connected with it and rigidly mounted on the shaft 182, as well as the shaft 192, are swung in the anti-clockwise direction. Since the lever 193 is likewise rigidly mounted on the shaft 182, this is also swung in the same direction. By the swinging movement of the lever 193, the toothed wheel 180 (Figures 8 and 7) is moved out of engagement with the toothed wheel 187, whereby the rotational movement, in consequence of cutting out the intermediate drive 181, 183, is transmitted directly on to the main driving shaft 168, and accordingly, the column totalizers T1 to T8 are acted on in the subtractive sense.

On the rotation of the three cams 68 (Figure 5) 71, 72, first the toothed wheel 159 is moved into engagement with the teeth 177 of the calculating sector 174, by way of the parts 69, 132, 133, 134, 137 (Figure 7) 143, 138, 140, 150 and 156. Further the shaft 142, and the parts 199, 179, 203, 256, 202 and 382, rigidly mounted thereon, are rotated in the clockwise direction by way of the parts 134, 137, 143, 136.

Moreover, in the swinging movement of the shaft 142, in the clockwise direction (Figure 10) the lever 384 is swung in the same direction, whereby the levers 354 and 389 as well as the release fingers 353b and 353a, are swung in the anti-clockwise direction by way of the parts 381, 378a. This is, however, unimportant, since the cross totalizers Q1 and Q2, as previously mentioned, are not located in the working position.

On the further rotation of the three cams 69, 71 and 72, the calculating sector 174 is swung in the anti-clockwise direction by means of the cam 72 and by way of the parts 188, 167, 170 (Figure 7) 173, 175 and since the toothed wheel 159 is in engagement with the teeth 177 of the calculating sector 174, the master wheel 189, of the column totalizer T1 is rotated from "2" to "0" by way of the parts 158, 180, 187 and 188. Further rotation of the wheel 188 of the hundreds place is not possible for the reasons hereinbefore described. By the swinging-out of the calculating segment 174, the number key striking yoke 206, 216, 213, is simultaneously moved forwards through two units whereby the number key lever corresponding to the value "2" is moved downwards by the cam 71 (Fig. 5) by way of the roller 166 and lever 165 and the "2" is typed on the paper. Hereupon, follows a carriage step to the left.

On writing out the remaining figures from the column totalizer T1 and the values out of the remaining column totalizers T2 to T8, the same operations take place. The typing of the comma is here effected in the same manner as was described on writing out the values from the cross totalizers Q1 and Q2. If one of the column totalizers T1 to T8 is to be cleared, so the coupling 68, 71, 72 comes automatically to rest in the manner described on taking the total from the cross totalizer Q1. If the TV-key 226a' (Figure 8) is then released so the slide 235, under the action of the spring 240, engaging with the lever 239, is moved upwards, whereby the lever 238, is swung in the clockwise direction round its pivot. In this movement, the lever 239, acts on the key lever 263, and swings the same downwards against the action of its spring. The corresponding tabulator key is then depressed, whereby the next totalizer T2 is brought into the working position. Thereupon, the TV-key is again depressed, whereby the same operations, as already described, are repeated. This procedure is carried out until all the column totalizers T1 to T8.

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