

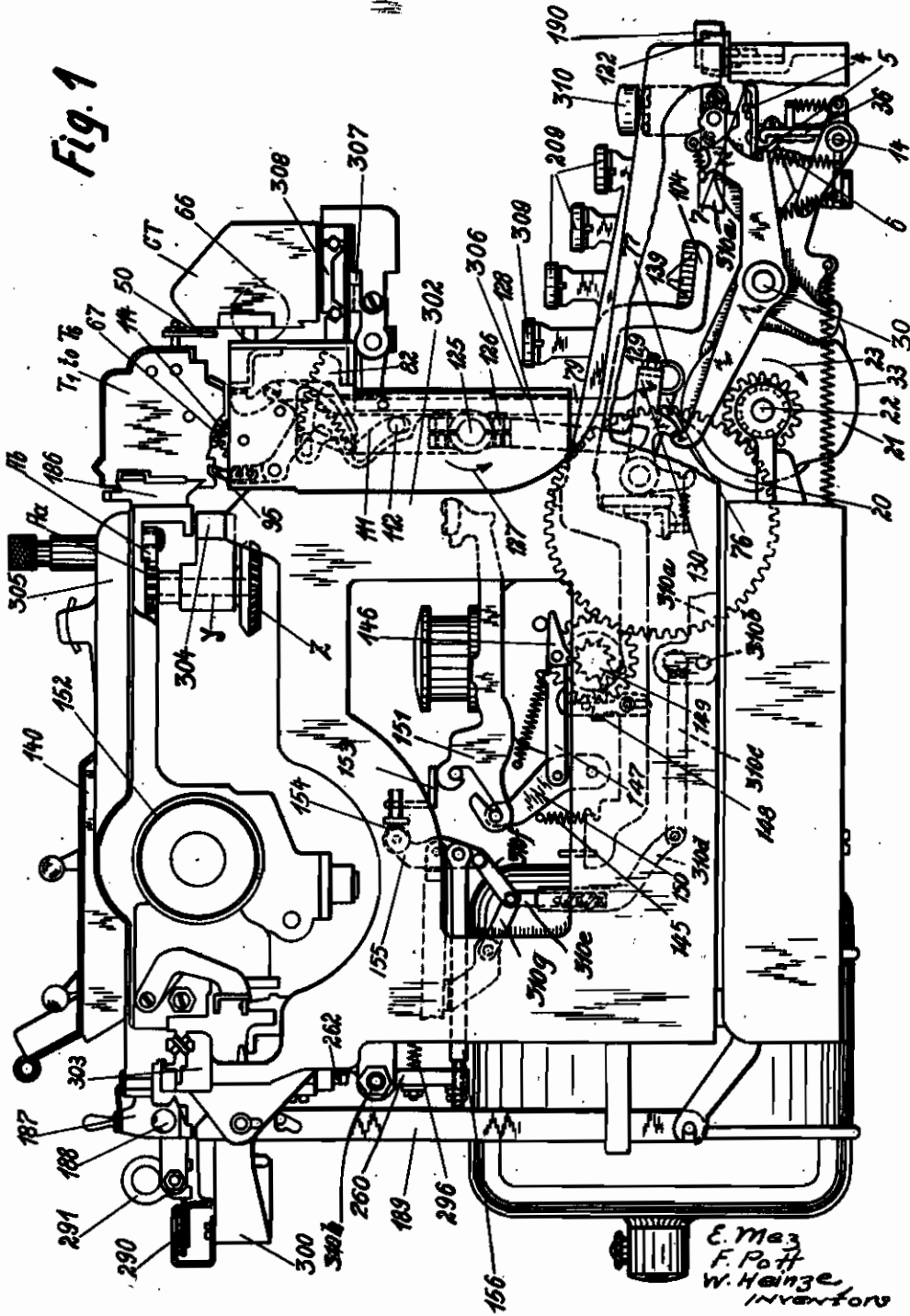
PUBLISHED  
MAY 25, 1943.  
BY A. P. C.

E. MEZ ET AL  
PROCESS FOR THE REGISTRATION  
OF BUSINESS TRANSACTIONS  
Filed June 22, 1936

Serial No.  
86,664

23 Sheets—Sheet 1

Fig. 1



E. Mez  
F. Pott  
W. Heinge  
INVENTORS

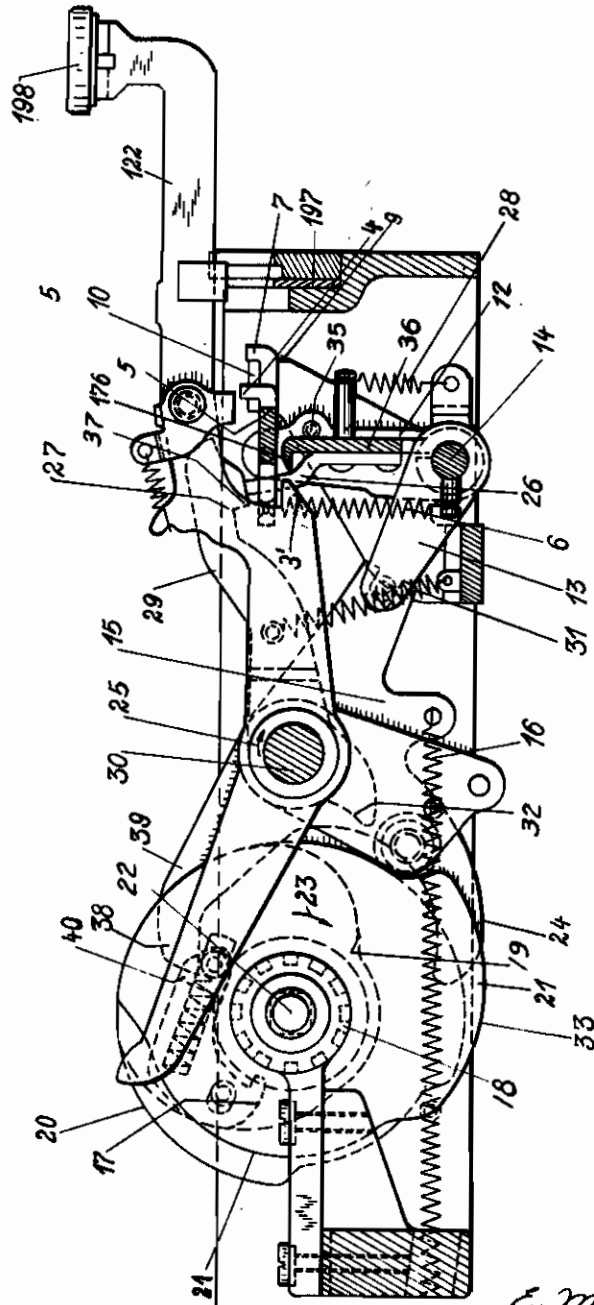
By *Glascopp, Downing & Deebold*  
ATTY. IN CHARGE

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23 Sheets-Sheet 2

Fig. 2



E. Mez  
F. Pott  
W. Heinze  
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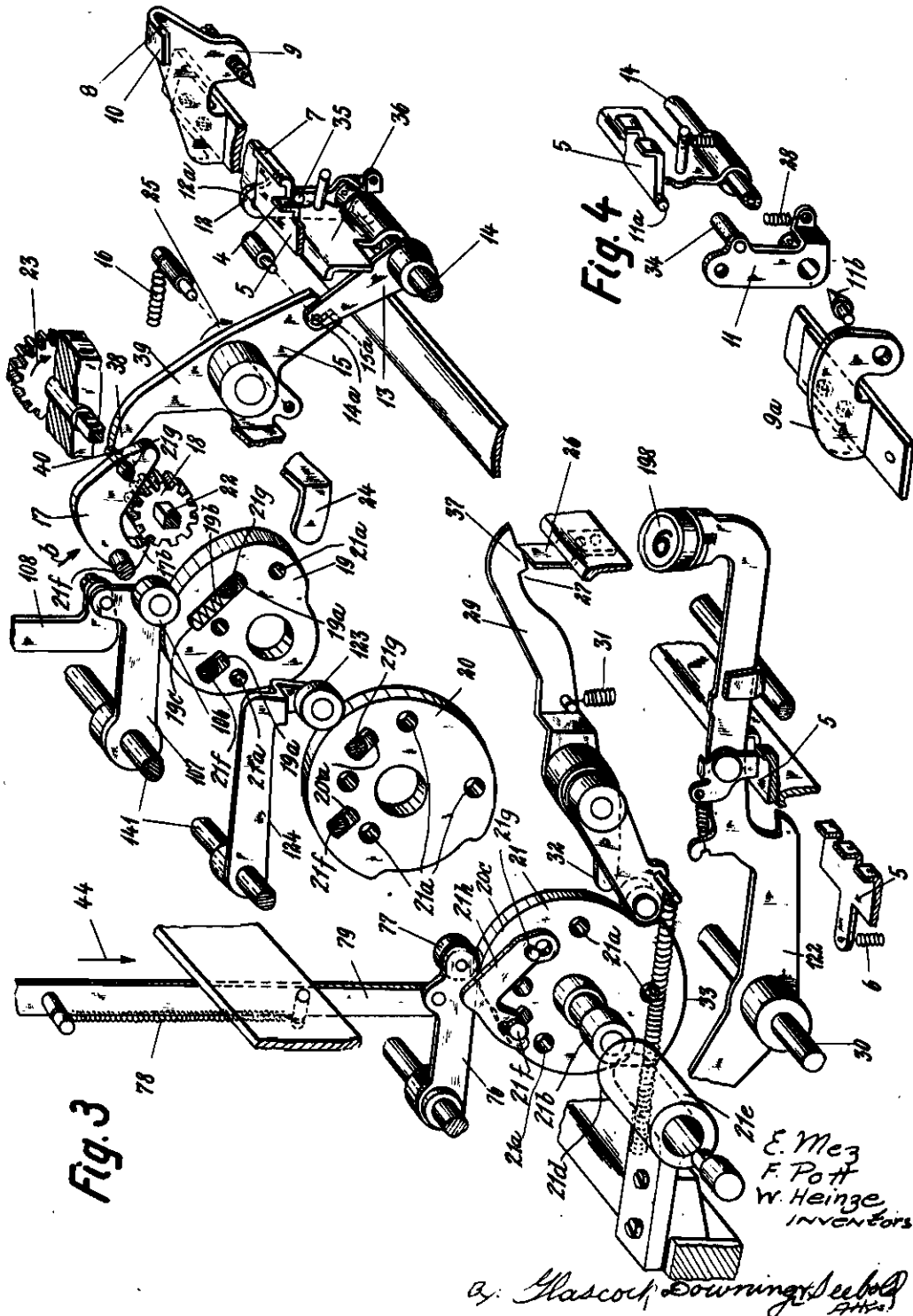
By *Glascop, Downing & Sebold*  
Attys.

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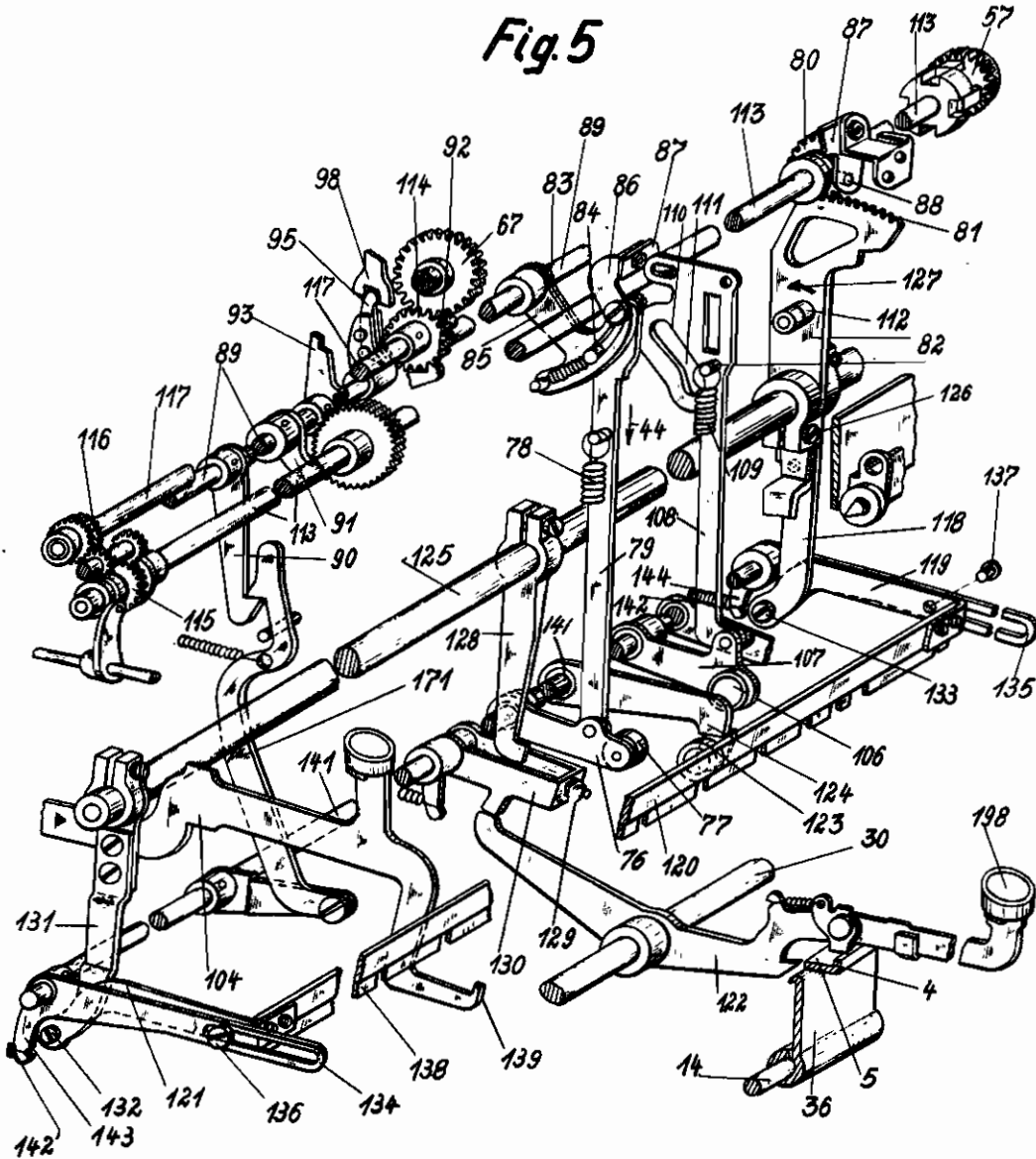
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86,664

23 Sheets-Sheet 4

Fig. 5



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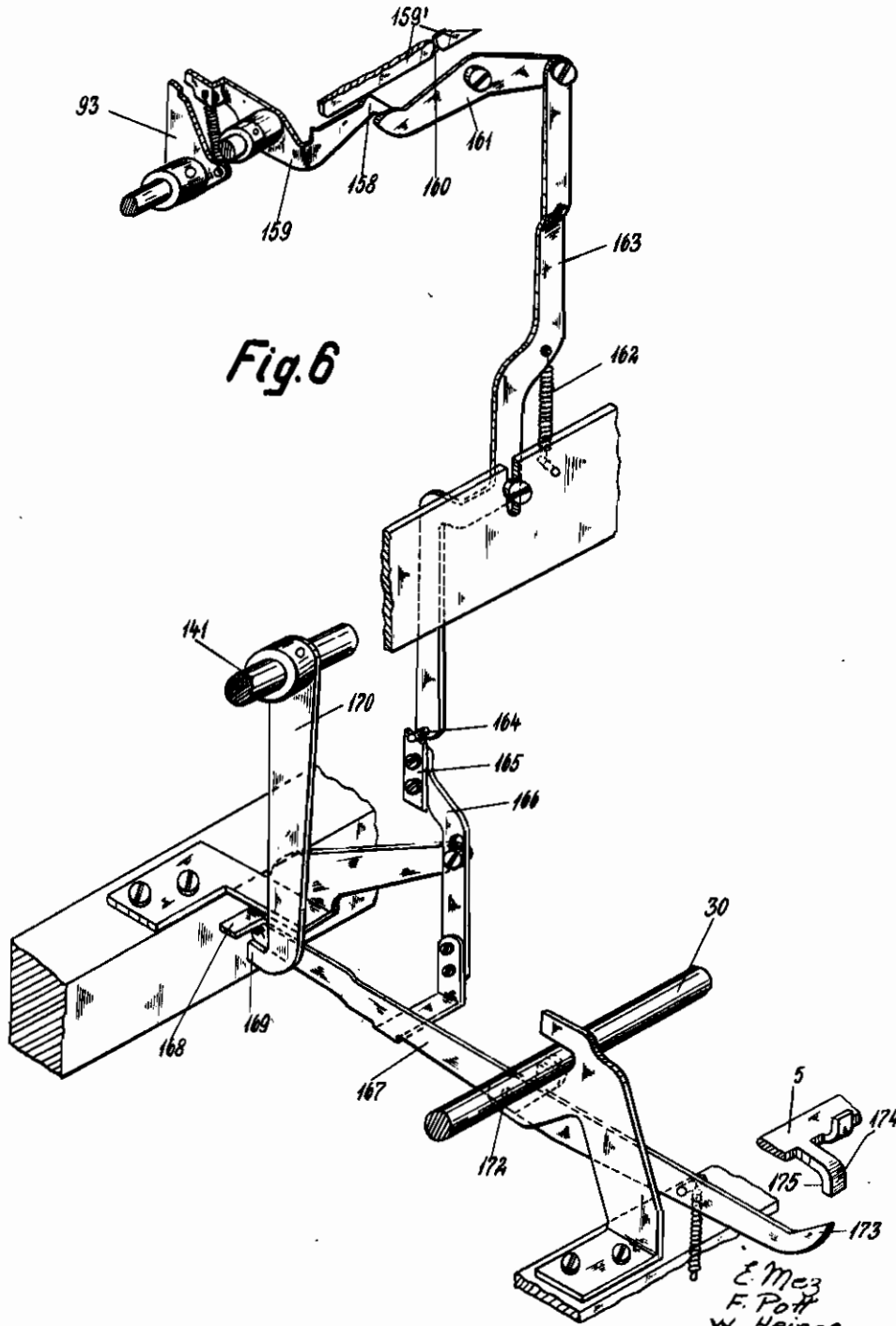


Fig. 6

E. Mez  
F. Pott  
W. Heinge  
INVENTORS

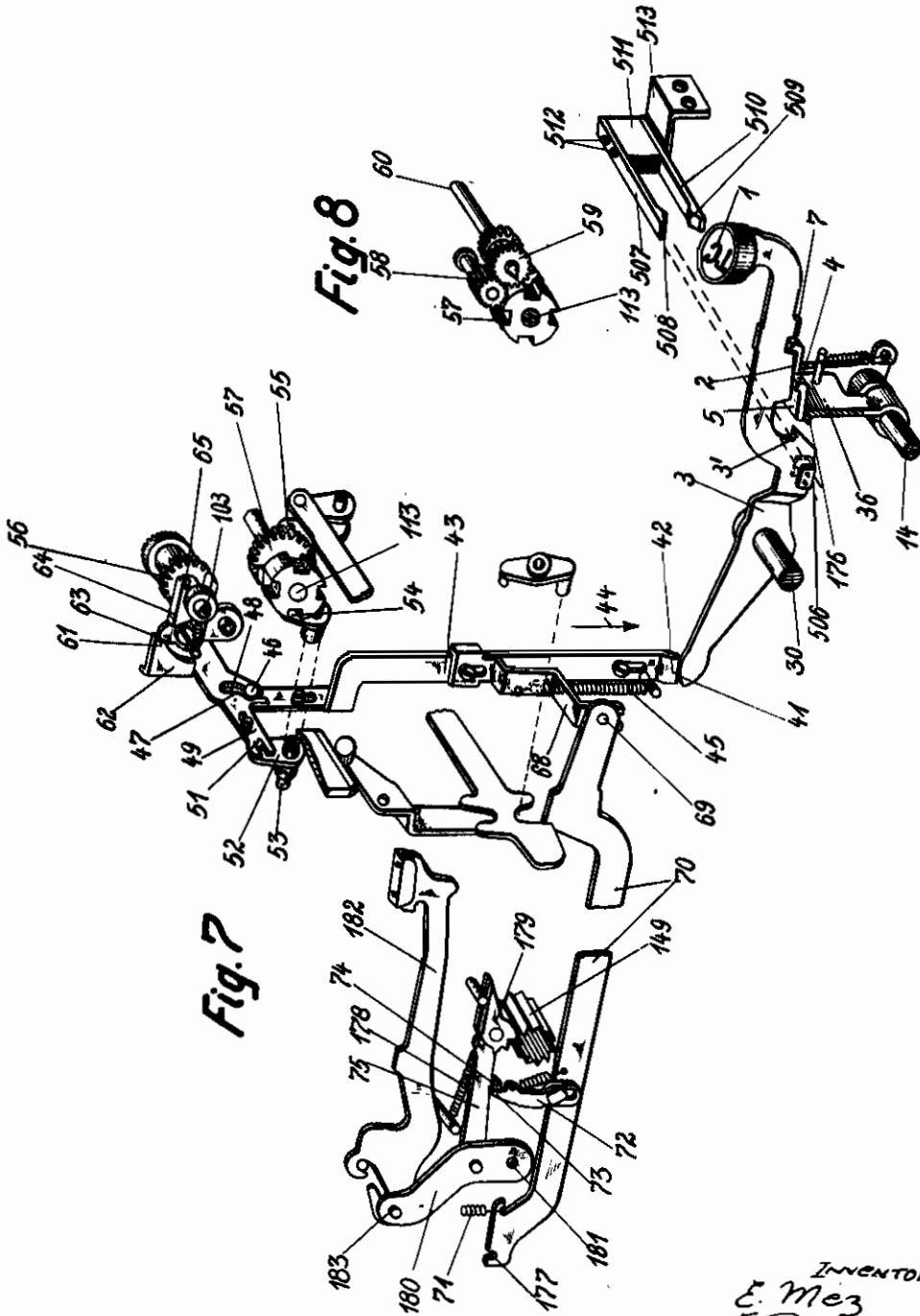
By: Glasgow Downing & Bold  
ATTY.

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23 Sheets-Sheet 6



INVENTORS:  
E. Mez  
F. Pott  
W. Heinge

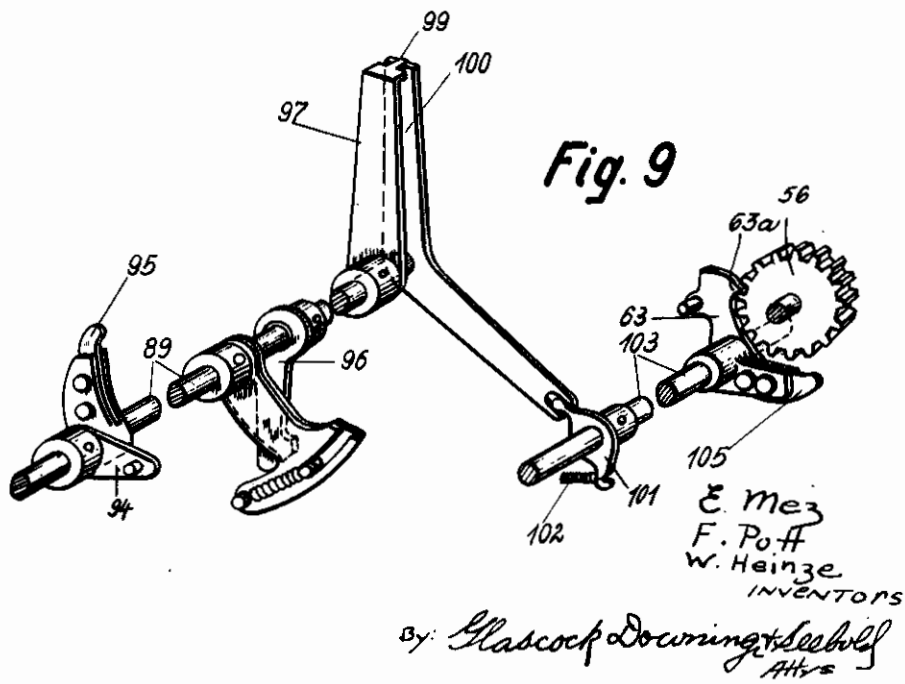
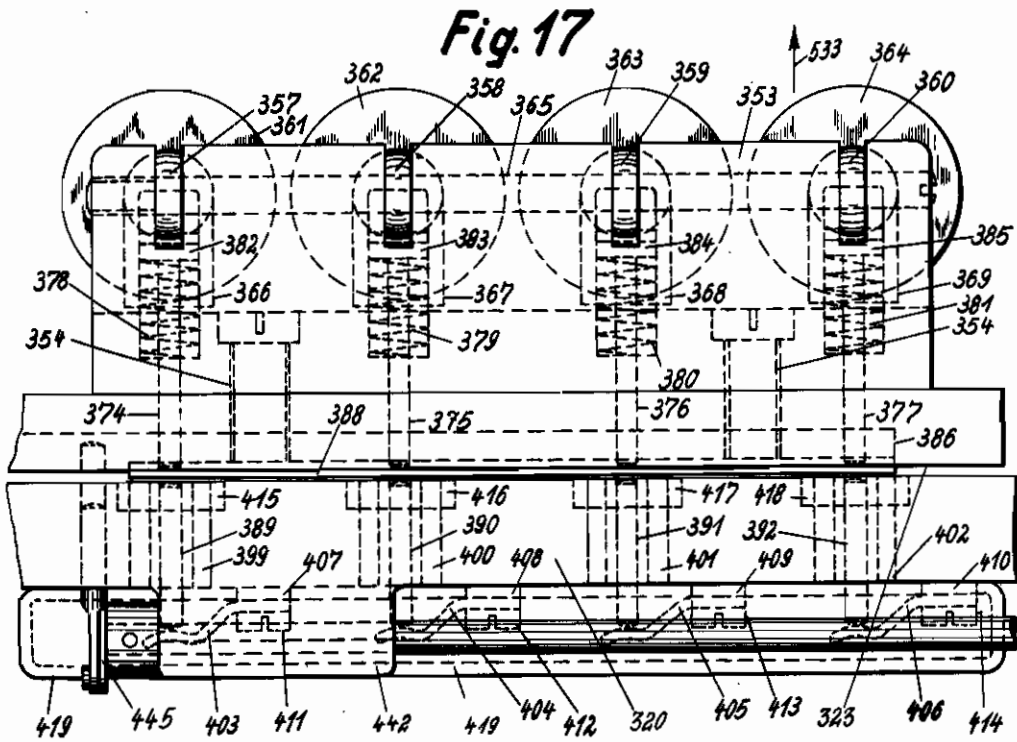
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23 Sheets-Sheet 7

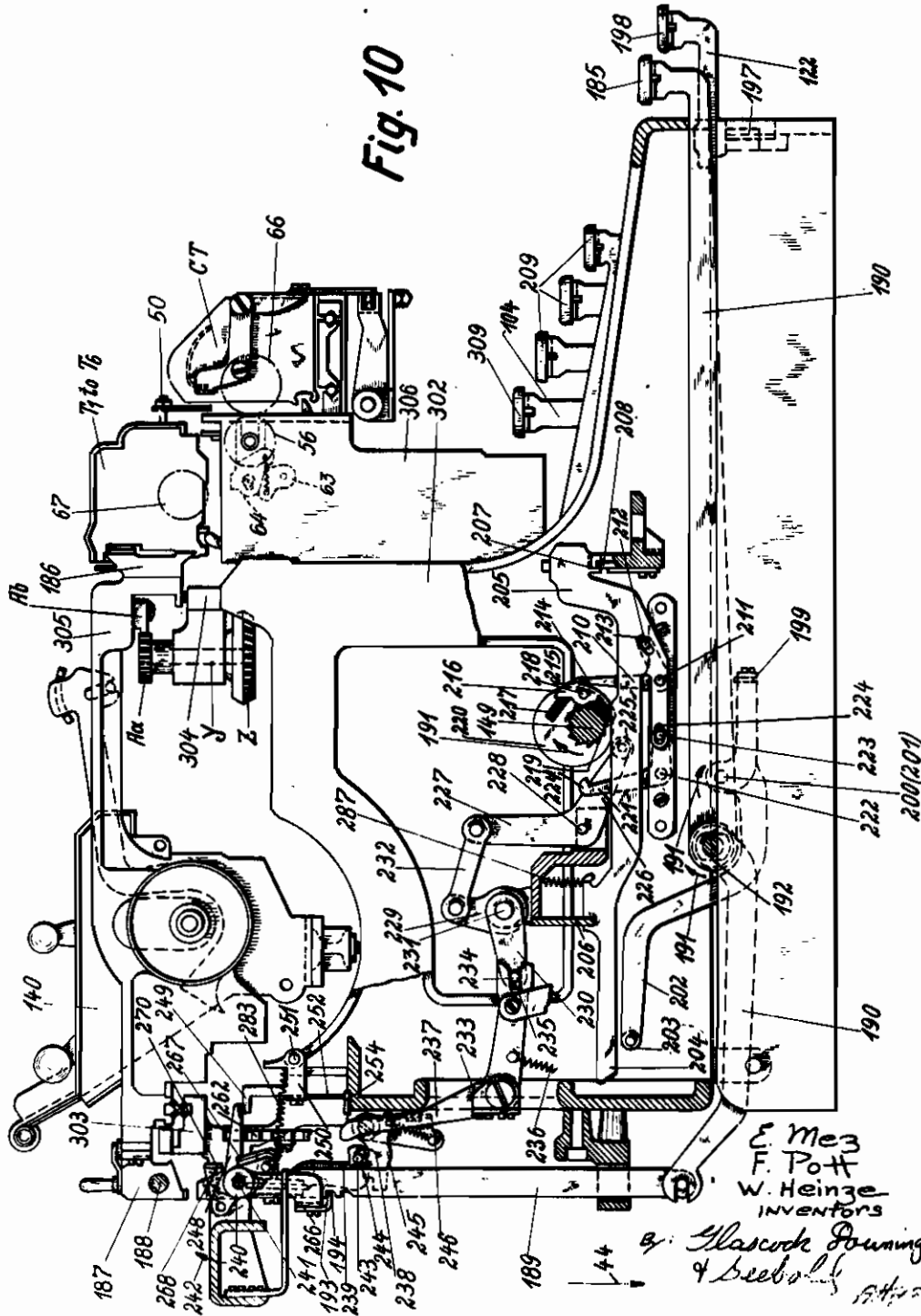


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23 Sheet- Sheet 8





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23 Sheets—Sheet 9

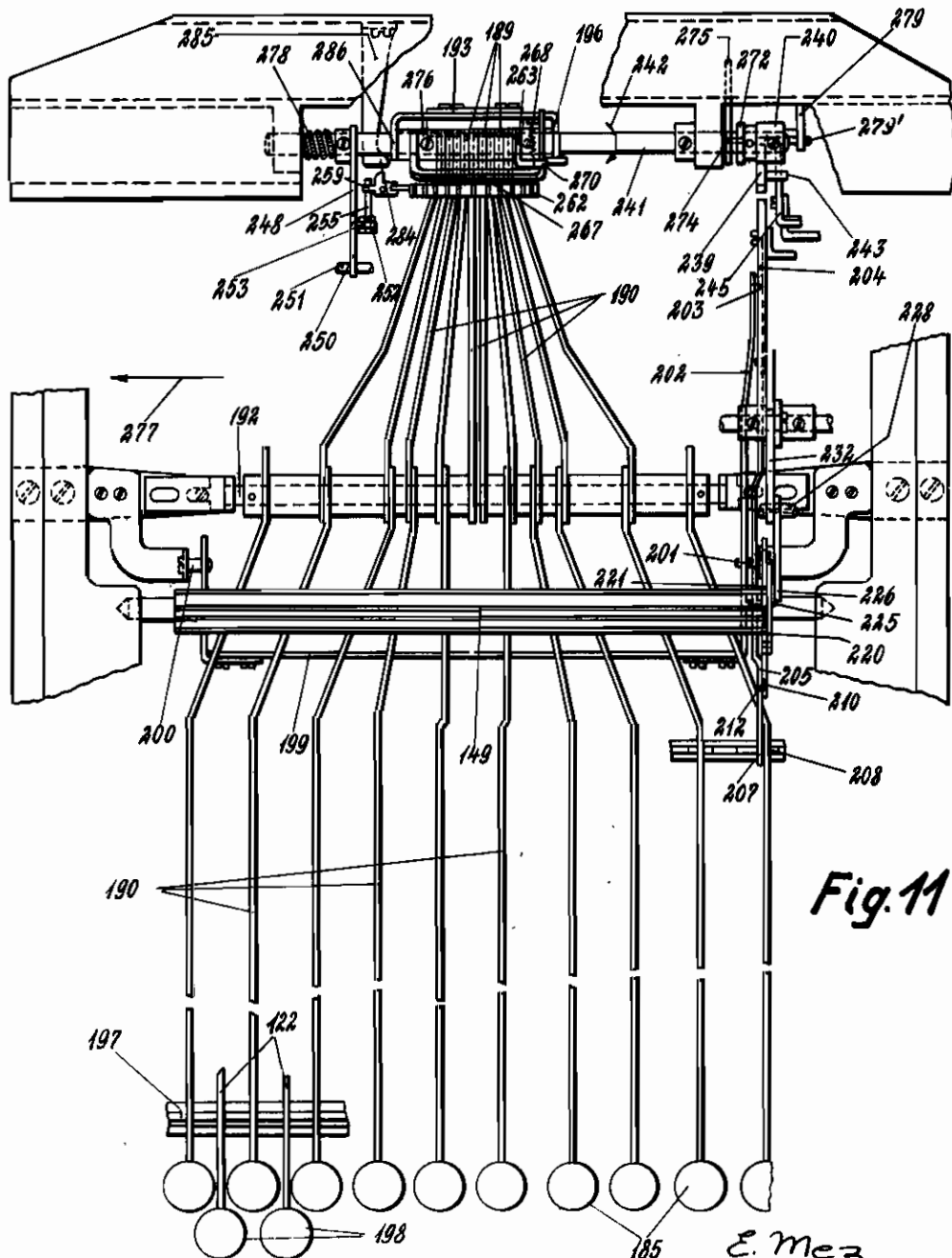


Fig. 11

E. Mez  
F. Pott  
W. Heinze  
INVENTORS

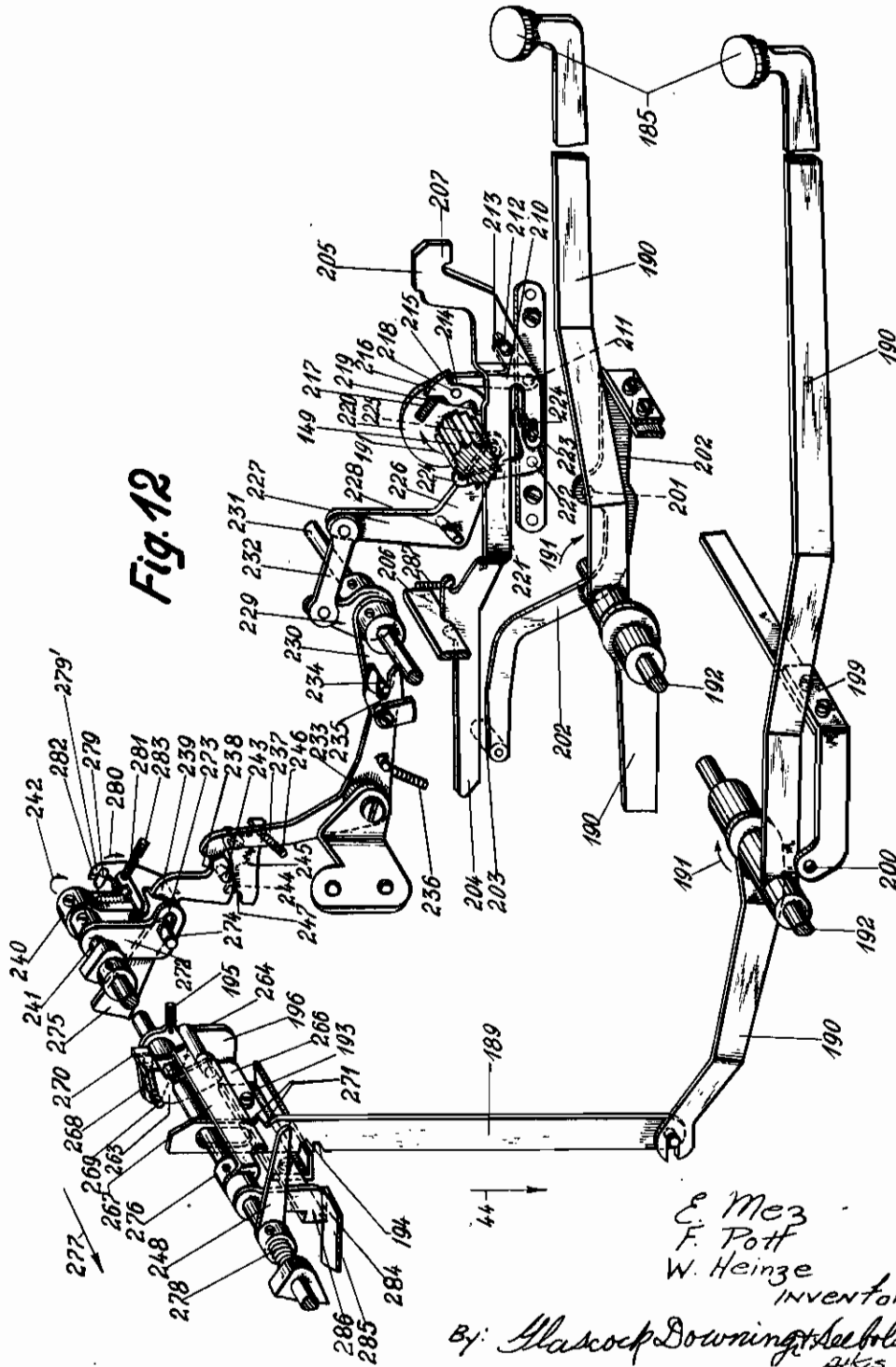
By: *Glascopf Downing Deaboll*  
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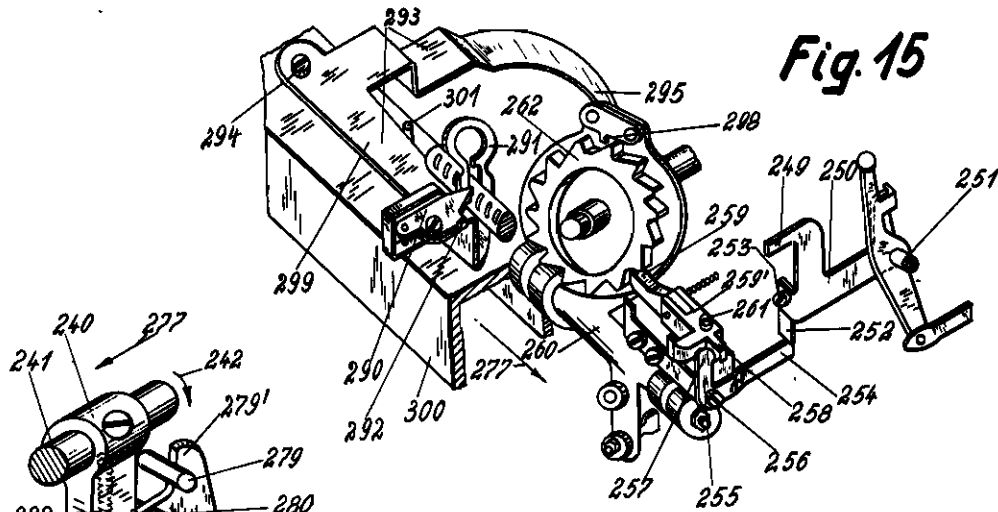


Fig. 15

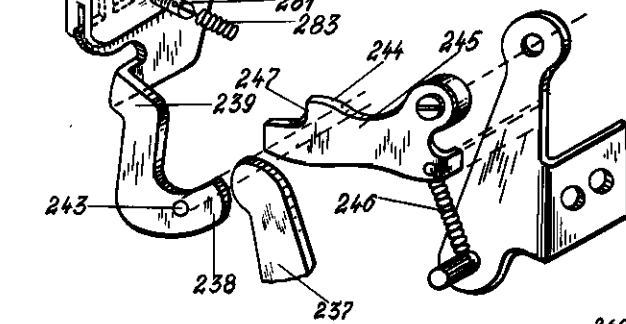


Fig. 13

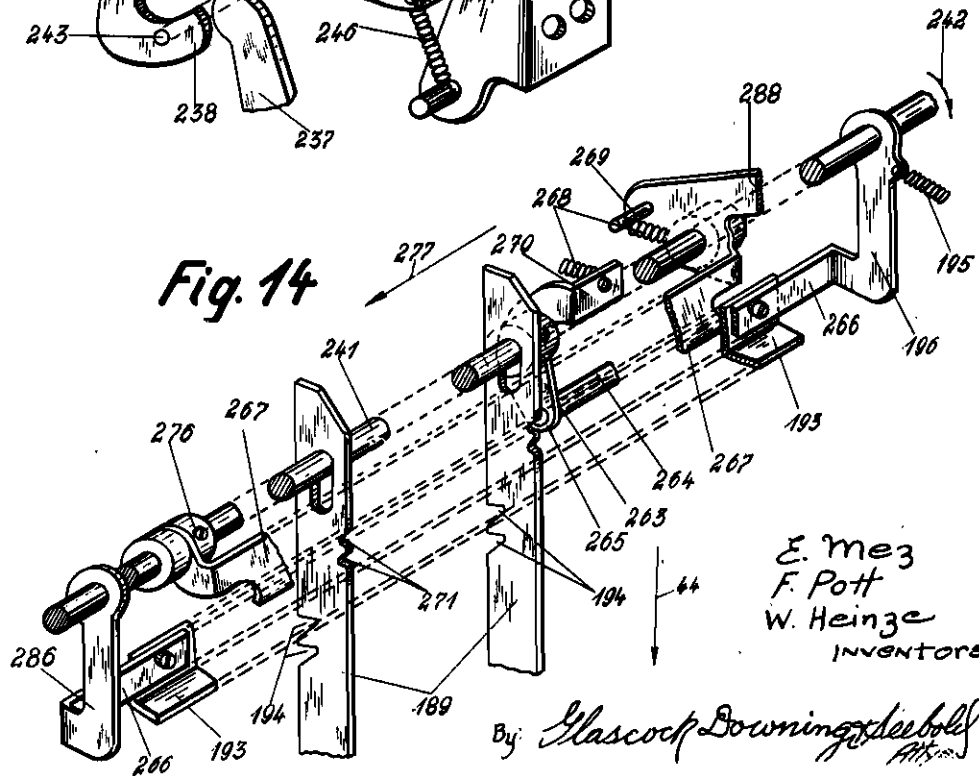


Fig. 14

E. Mez  
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By *Glascott Downing & Debold*  
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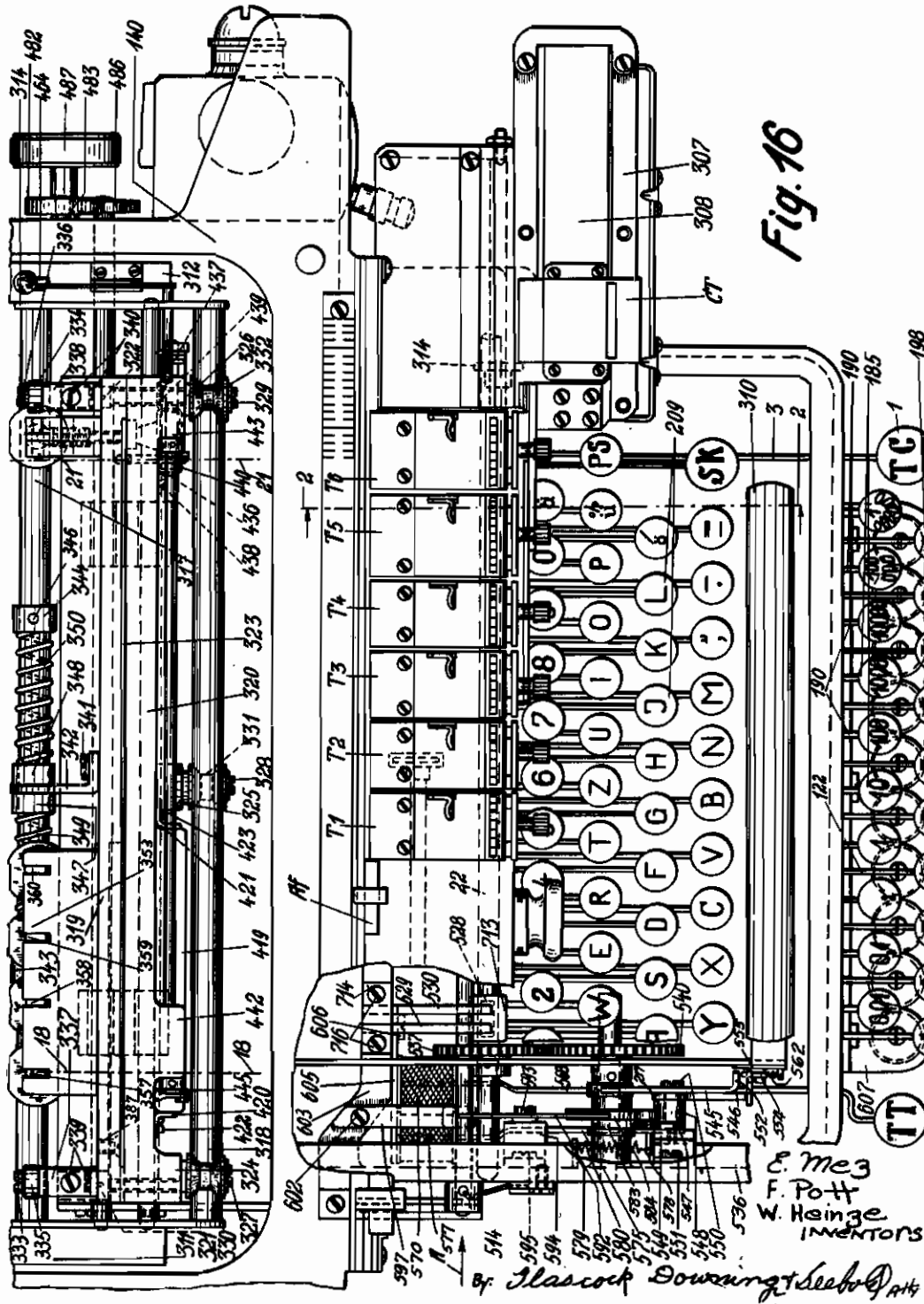


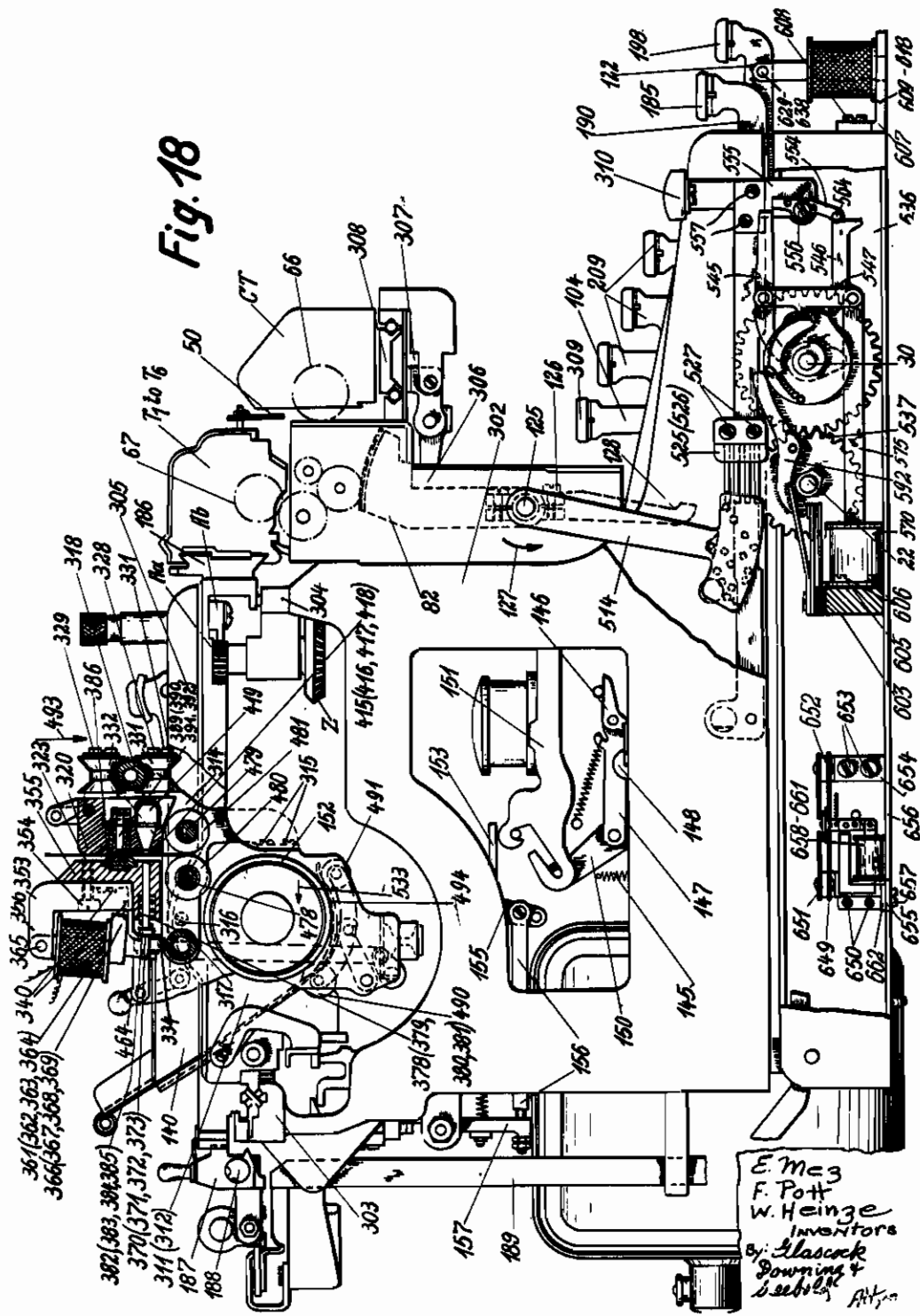
Fig. 16

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23 Sheets-Sheet 13



E. Mez  
F. Pott  
W. Heinge  
Inventors  
By: Glascock  
Downing &  
Seebach  
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23 Sheets-Sheet 14

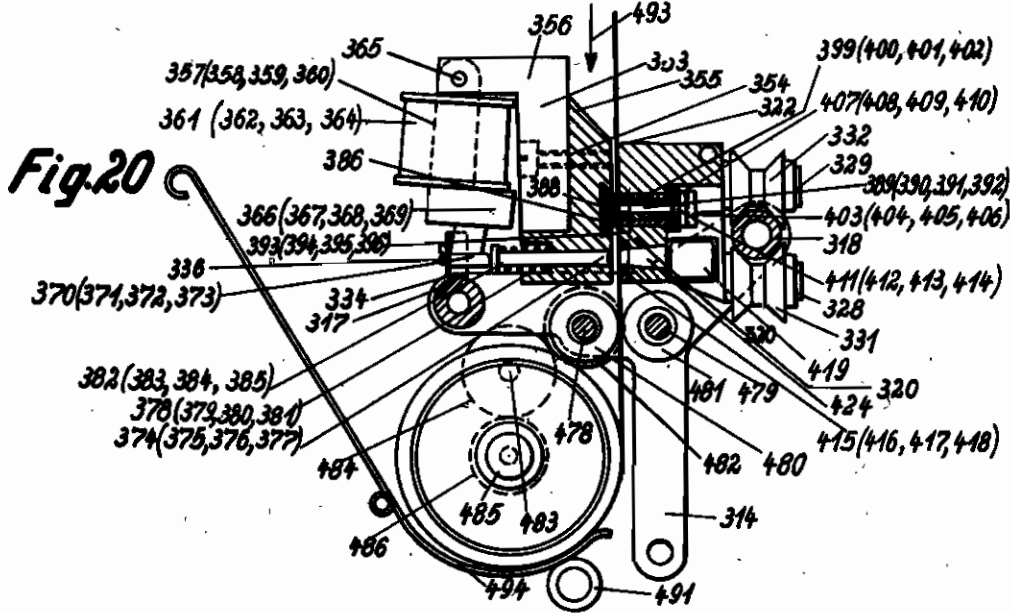


Fig. 20

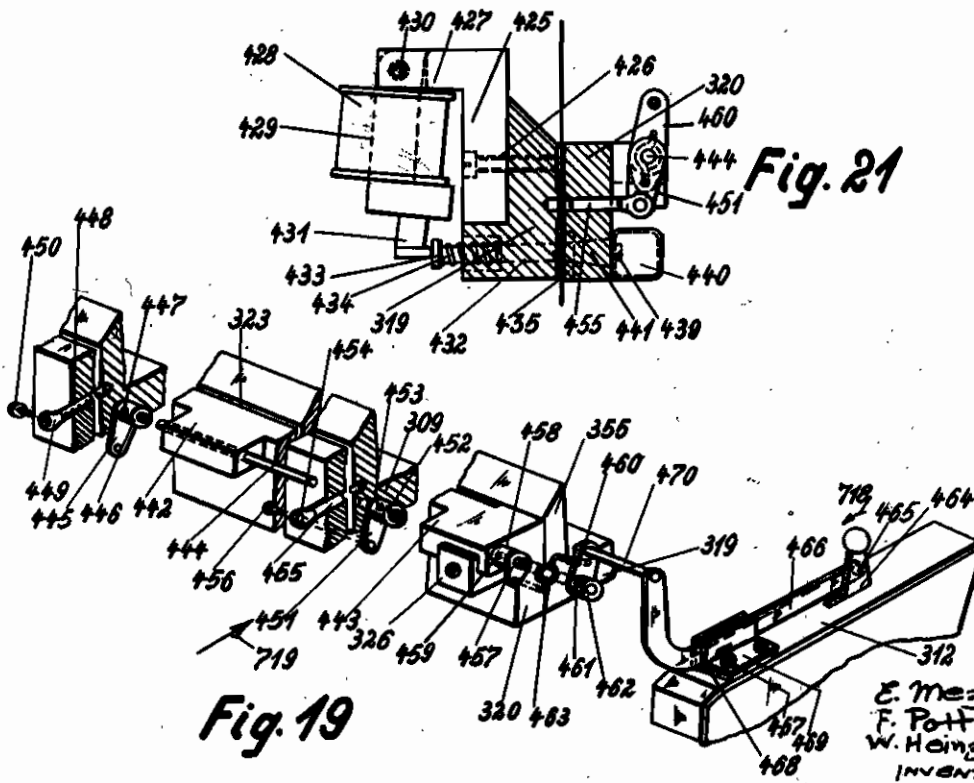


Fig. 21

Fig. 19

E. Mez  
F. Pott  
W. Heinge  
Inventors

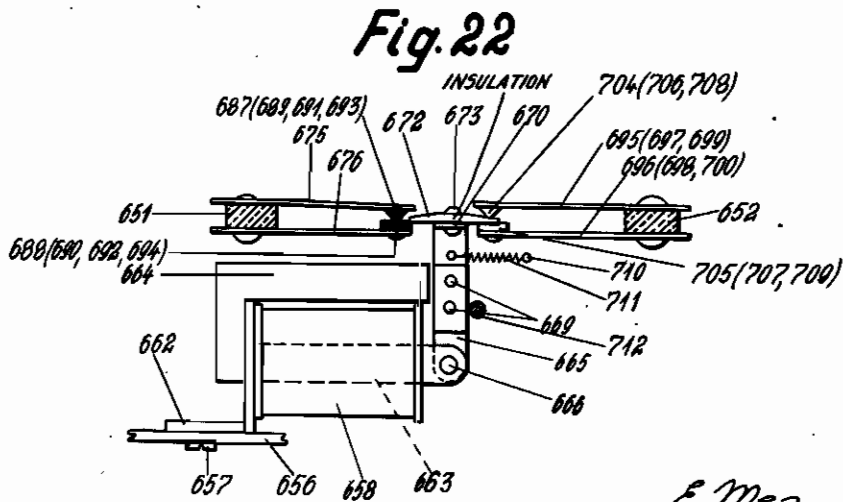
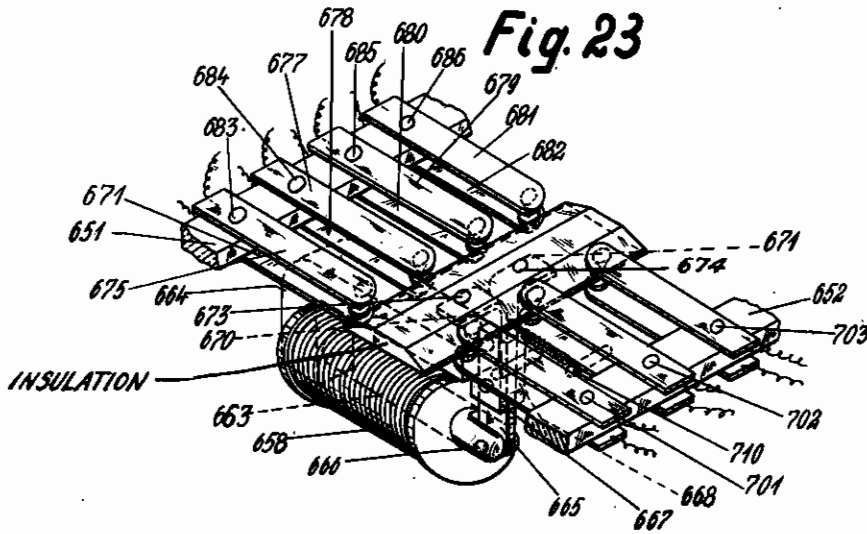
By *Glascopp Downing & Co.*

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86,664

23 Sheets-Sheet 15



E. Mez  
F. Pott  
W. Heinze  
Inventors.

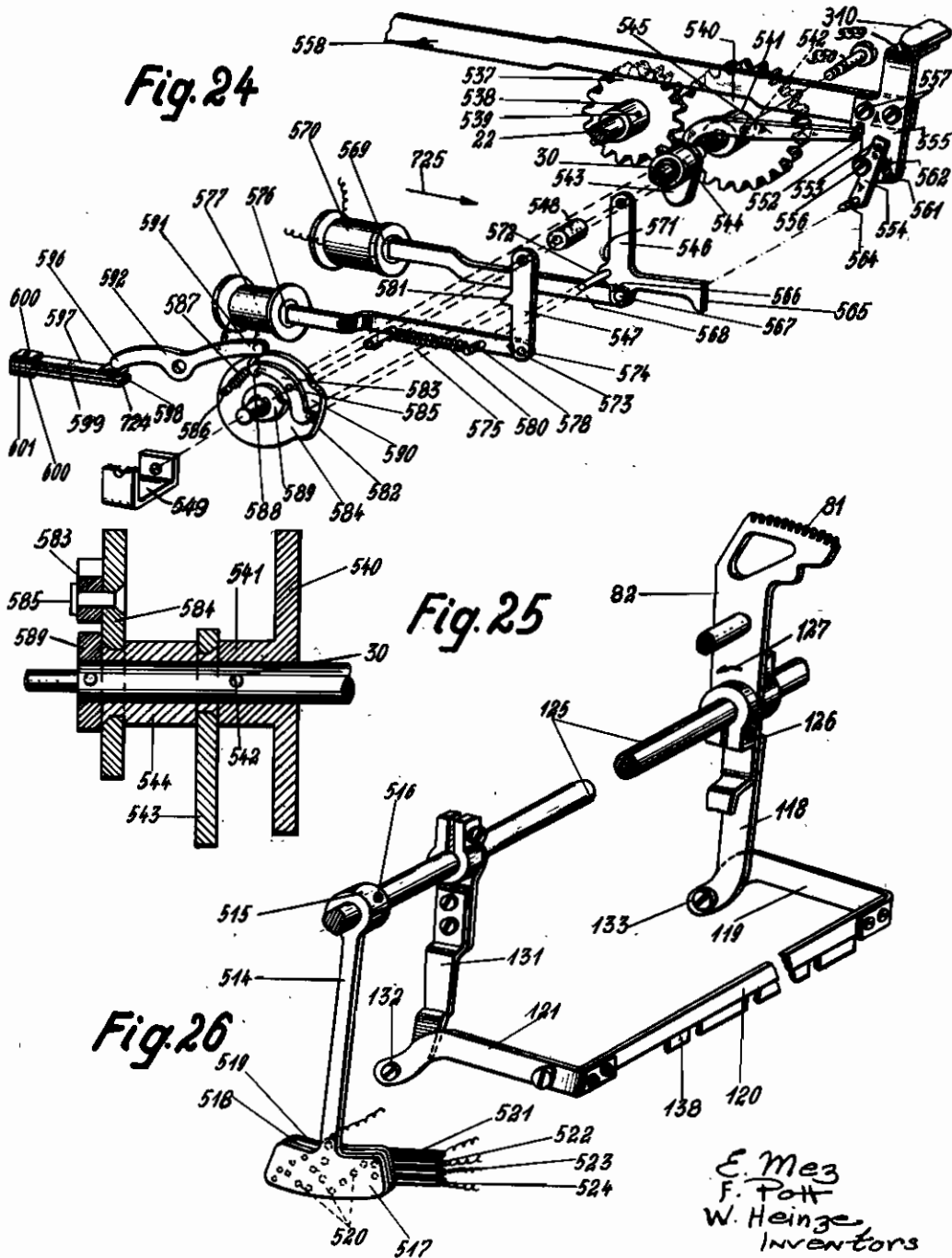
By: *Glascop Downing & Seebold*  
Attys.

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Filed June 22, 1936

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23 Sheets—Sheet 16



E. Mez  
F. Patt  
W. Heinge  
Inventors

By *Glascop Downing & Seelye*  
Attys.

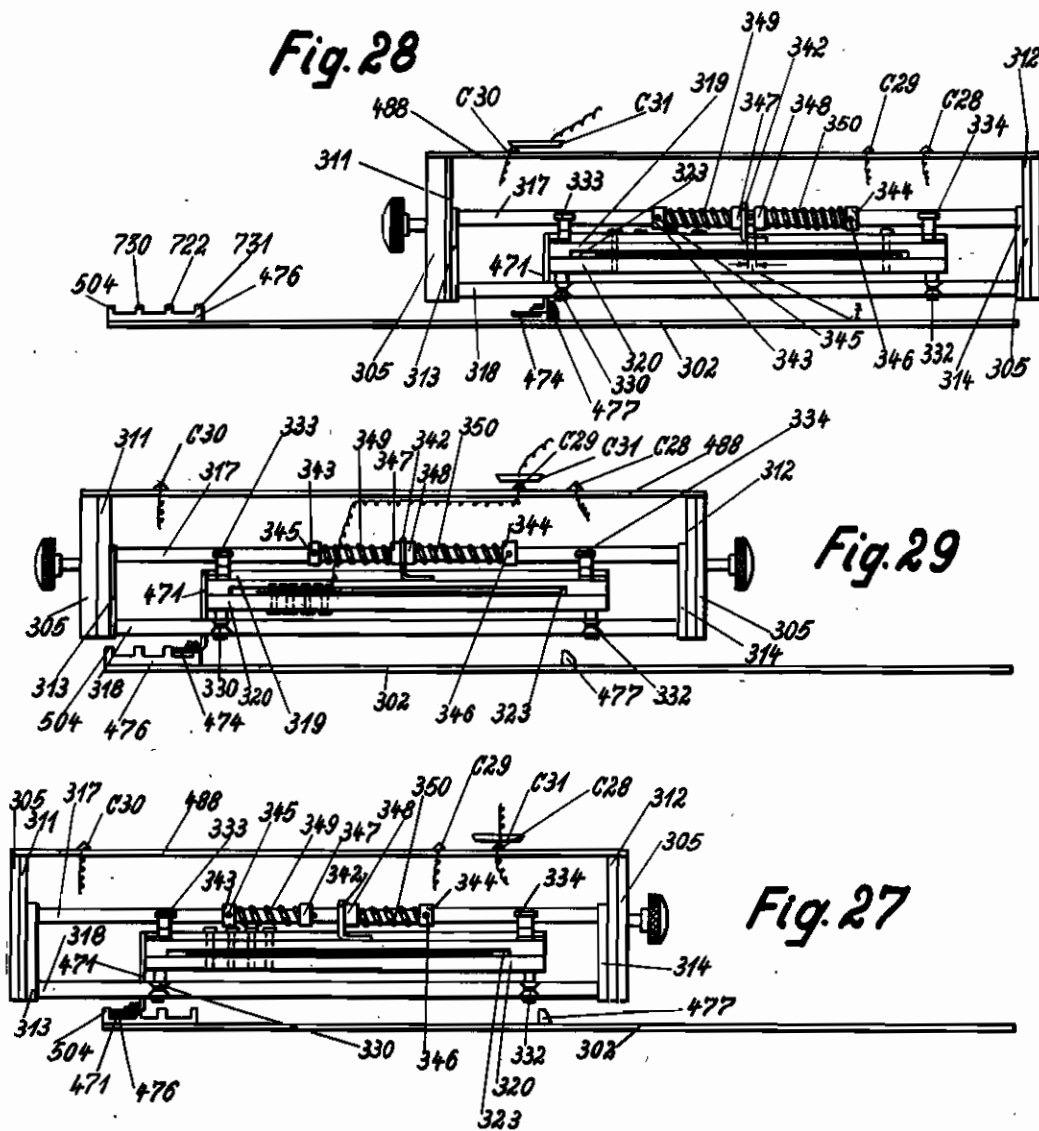


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23 Sheets—Sheet 17



E. Mez  
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W. Heine  
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By: *Glascop Downings Seebold*  
Attys

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23 Sheets-Sheet 18

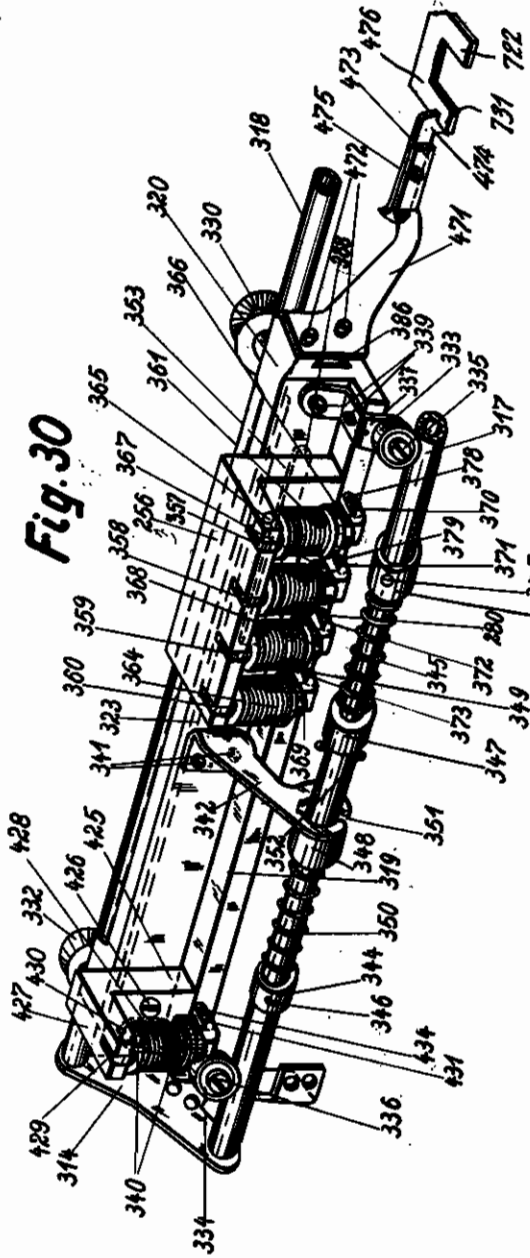


Fig. 30

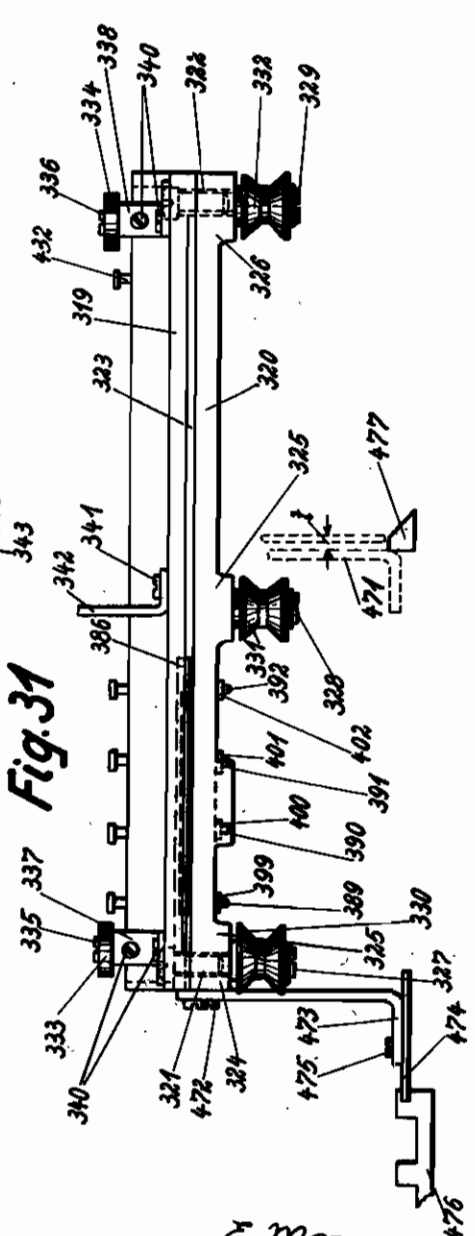


Fig. 31

E. Mez  
F. Pott  
W. Heinge  
INVENTORS

By: Glascock Downing & Co.  
ATTY'S

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OF BUSINESS TRANSACTIONS  
Filed June 22, 1936

Serial No.  
**86,664**  
23 Sheets-Sheet 19

**Fig. 32**

Residence: Hamburg      Account Nr.: 32

Name: Hermann Müller      Mercedes-Adalektra-Buchhaltung

Account Nr.	Date	Designation	Turnover		Old balance		New balance	
			Debit I	Credit II	Debit III	Credit IV	Debit I	Credit II
375	12. 3	Per cash account in bore		30750,00			30750,00	
215	9. 3	On cash account	750,00		30750 00		30000,00	
130	1. 4	On cash account	2800,00		30000 00		27200,00	
38	2. 4	On account 36	20100,00		27200 00		7100,00	
25	3. 5	On account 241	99900,00		7100 00	2800,00		
23	12. 6	Per cash account		3000,00			200,00	
2431	17. 7	Per cash account		16552,75			16552,75	
435	26. 8	On account 434	20300,50		16552 75	3747,75		

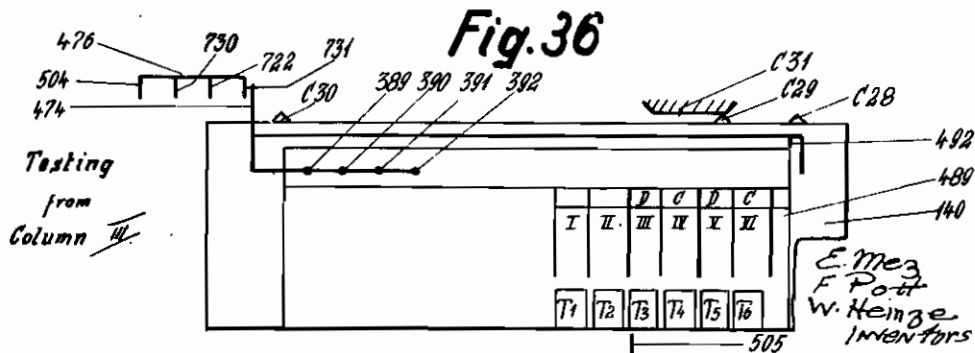
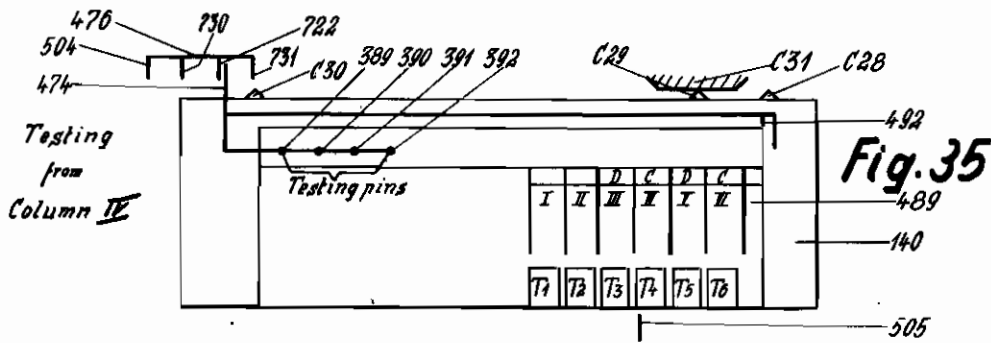
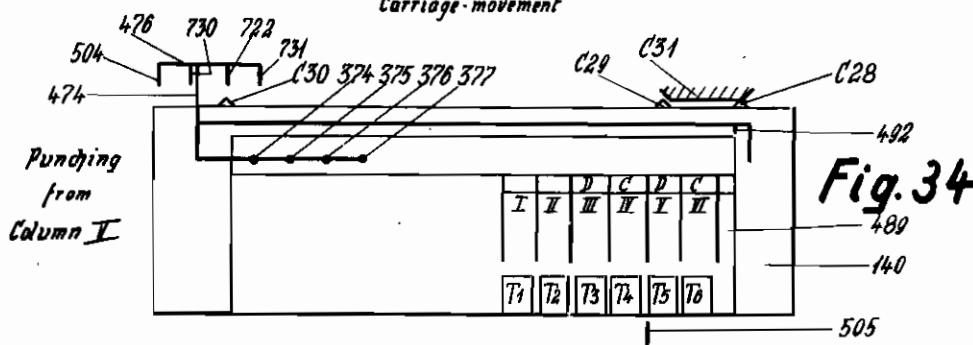
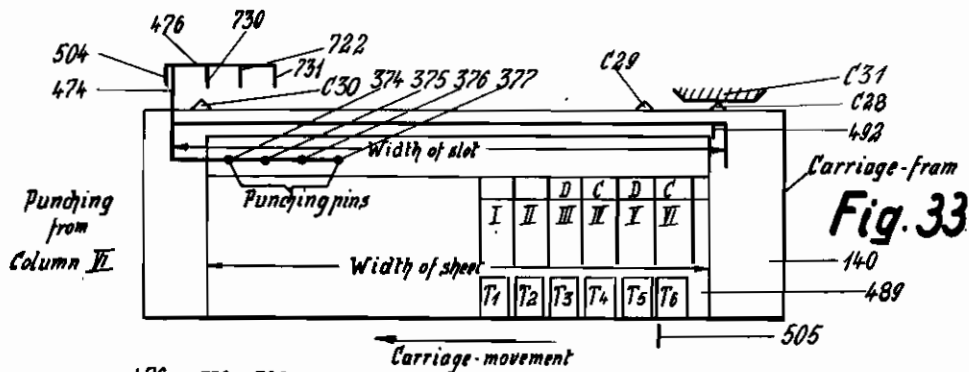
E. Mez  
F. Pott  
W. Heinge  
INVENTORS  
By: Glascock  
Downing &  
Bebb  
Atty's

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23 Sheets-Sheet 20



By: *Alvisop Downing & Seebold*

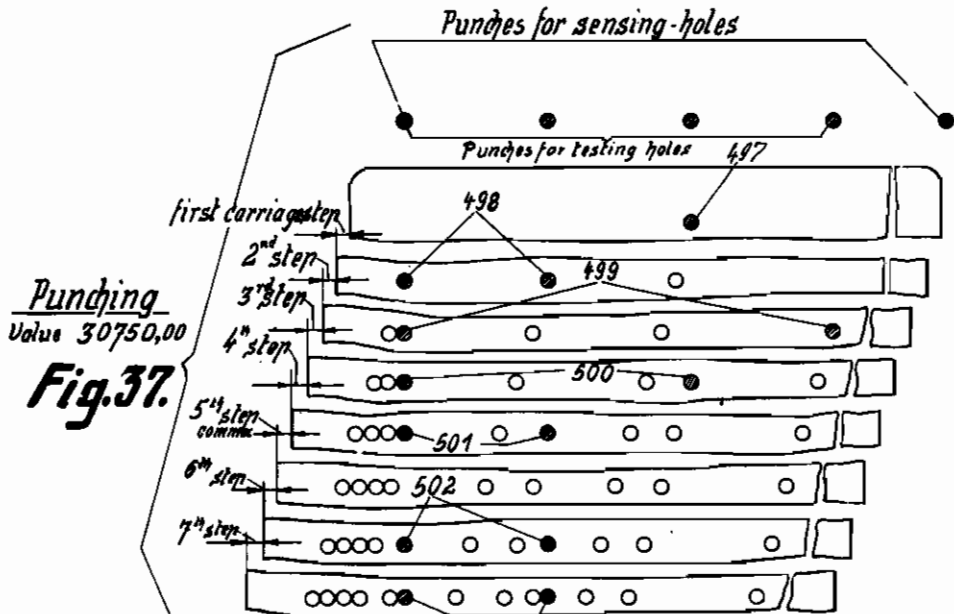
E. Mez  
F. Post  
W. Heime  
Inventors

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23 Sheets—Sheet 21



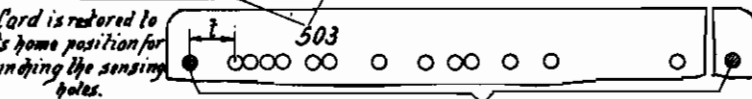
Punching  
Value 30750,00  
**Fig. 37.**

**Fig. 39**

Card is returned to its home position for punching the sensing holes.

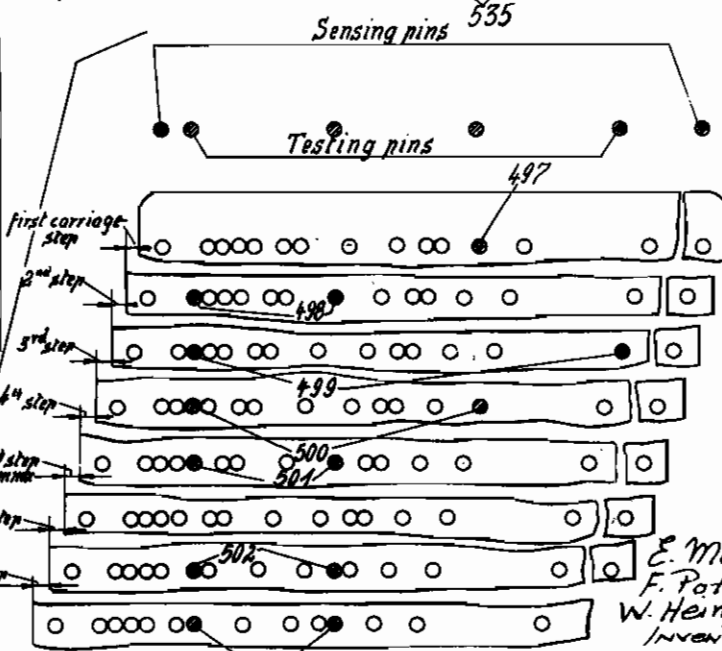
Key for the combination of holes

Punches and pins	
0 = 374 a. 375 389 a. 390	
1 = 374	389
2 = 375	390
3 = 376	391
4 = 377	392
5 = 374 a. 376 389 a. 391	
6 = 375 a. 377 390 a. 392	
7 = 374 a. 377 389 a. 392	
8 = 375 a. 376 390 a. 391	
9 = 376 a. 377 391 a. 392	



Testing  
Value 30750,00

**Fig. 38**



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By: *Glascock Downing & Seabolt*

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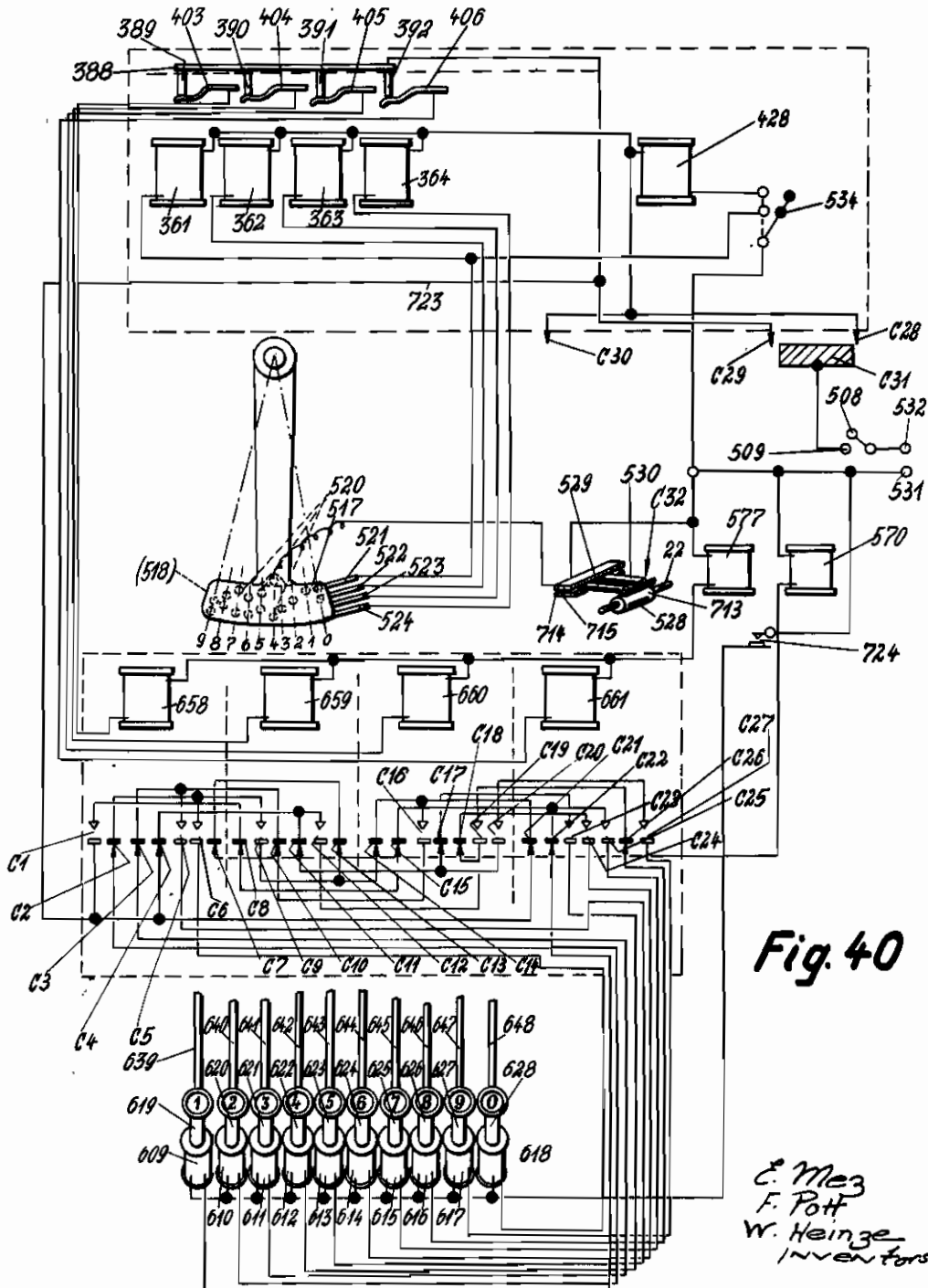


Fig. 40

E. Mez  
F. Pott  
W. Heinze  
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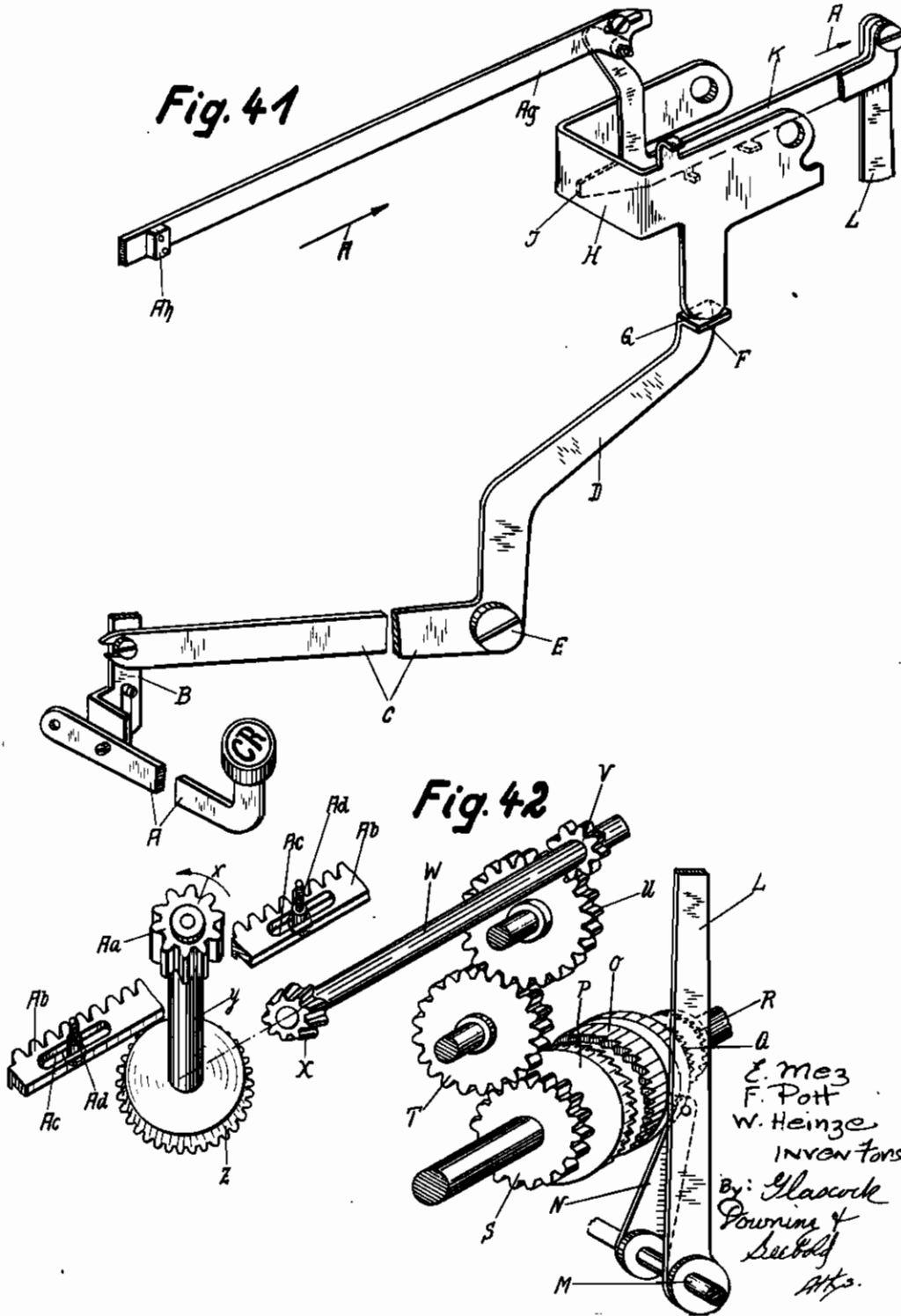
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23 Sheets-Sheet 23



# ALIEN PROPERTY CUSTODIAN

## PROCESS FOR THE REGISTRATION OF BUSINESS TRANSACTIONS

Erich Mez, Berlin-Charlottenburg, and Friedrich Pott and Werner Heinze, Zella-Mehlis, Germany; vested in the Alien Property Custodian

Application filed June 22, 1936

The invention relates to a process for the registration of business transactions, e. g., the ascertaining of balances and the carrying forward of balances.

Up to the present the newly ascertained balance was printed numerically and on being carried forward as an old balance this numerically represented amount was read off and by striking of the corresponding figure keys was introduced into the machine. In these operations errors in reading off of the amount of typing errors could easily occur and sometimes remained undiscovered for a long time and thus necessitated a troublesome investigation and thereby a great loss of time.

According to the invention this disadvantage is now overcome, in that the newly ascertained balance in writing out e. g. in total-taking, is represented by symbols serving for the performance of the control operations, whereby these symbols on the next bookkeeping operation for the purpose of carrying forward this value as an old balance, automatically control the registration and printing mechanisms. An automatic writing-out of the new balance and an automatic bringing-in of the same as an old balance is thus rendered possible, so that typing errors are completely excluded.

In the drawings one form of construction of the subject of the invention is illustrated by way of example.

Figures 1 to 15 illustrate well-known mechanisms and are merely included in this specification for a better understanding of the invention proper.

Fig. 1 shows a side elevation of a typewriter calculating machine.

Fig. 2 shows on an enlarged scale a section to the line 2—2 of Figure 16 viewed from the left-hand side of the figure.

Fig. 3 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 4 shows in perspective, details of the setting member, the parts of which are likewise drawn out from one another.

Figure 5 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 footer, in which view the individual parts are illustrated drawn out from one another.

Fig. 6 shows a perspective illustration of a locking mechanism controlled by the column totalizer.

Fig. 7 shows a perspective illustration of the total taking mechanism for the cross footer, 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 footer, the view being taken from the front left-hand side of the machine and various parts being illustrated drawn out from one another.

Fig. 8 shows in perspective the change over gear for the cross footer viewed from the front left-hand side of the machine.

Fig. 9 shows in perspective the unlocking mechanisms for the column totalizer and the cross footer, viewed from the front left-hand side of the machine.

Fig. 10 shows a side elevation of a typewriter calculating machine in which the tabulating mechanisms are enclosed by a casing.

Fig. 11 shows a partial plan view of the machine according to Fig. 10.

Fig. 12 shows in perspective details of the tabulating device according to Fig. 10 viewed from the front left-hand side of the machine.

Fig. 13 shows in perspective a detail of Fig. 12, in which view the detail parts are illustrated in a condition separated from one another.

Fig. 14 shows in perspective a further detail of Fig. 12, whereby different parts are represented drawn out from one another.

Fig. 15 shows a perspective illustration of parts of the shift mechanism and the comma-skipping mechanism.

Fig. 16 shows a plan of a part of a Mercedes Addelektra Typewriting-Calculating machine in which parts of the mechanism according to the invention are incorporated, and in which individual parts are shown broken off in order to expose other parts.

Fig. 17 shows a plan of a part of the mechanism according to Fig. 16 on an enlarged scale.

Fig. 18 shows a side elevation according to Fig. 17, in which for the purposes of better illustration some parts are broken off, and other parts are indicated in section according to the line 18—18 of Fig. 16 viewed in the arrow direction A.

Fig. 19 shows a perspective illustration of a detail of Fig. 18 viewed from the right-hand in front of the machine.

Fig. 20 shows a detail of the mechanism, according to the invention in section according to



the line 18—18 of Fig. 16 viewed in the arrow direction A.

Fig. 21 shows likewise a detail of the invention in section according to the line 21—21 of Fig. 16 viewed in the arrow direction A.

Fig. 22 shows a side elevation of one of the control elements of the subject of the invention.

Fig. 23 shows a perspective elevation of the parts represented in Fig. 22 viewed from the left-hand in front of the machine.

Fig. 24 shows a perspective elevation of further control elements of the subject of the invention likewise seen from the left-hand in front of the machine in which view for better illustration individual parts are illustrated drawn out from one another.

Fig. 25 shows a detail according to Fig. 24, in section.

Fig. 26 shows further control parts of the present mechanism viewed in perspective elevation from the left-hand in front of the machine.

Figs. 27, 28 and 29 shows a plan of a detail of the invention in different positions.

Fig. 30 shows parts of the mechanism according to Fig. 27 in perspective elevation viewed from the right-hand at the rear of the machine.

Fig. 31 shows a plan of parts of the mechanism according to Figs. 27 and 28.

Fig. 32 shows a part of a card for a card book-keeping system on which entries are examined with the assistance of the present mechanism.

Figs. 33 to 36 show diagrammatically the different positions of the paper carriage, cards and of the symbol-producing and symbol-sensing mechanism.

Figs. 37 and 38 show diagrammatically the bookkeeping cards in the different positions during the working operations determined by the registrations.

Fig. 39 shows the key for a perforation assembly for the numbers "0" to "9" perforated by way of example with four perforating punches.

Fig. 40 shows a shift diagram in relation to the control elements for the mechanism according to the invention.

Figs. 41 and 42 show the known carriage return in perspective.

For the sake of better understanding of the present invention it seems advisable to briefly set forth:

1. Total-taking.
2. Tabulating device.
3. Comma-skipping device.
4. Carriage return-mechanism.

#### Total taking

The clearing of a value for instance 184:30, calculated and registered in the cross footer CT and the transmission into one of the totalizers T1 to T5 (Figs. 1, 10, 15, 21 and 23) takes place automatically in a manner hereinafter described.

On the depression of the total taking key 1 (Figs. 8 and 16) for the cross footer CT (Figs. 1, 10, 16 and 18) the face 2 (Fig. 7) of the lever 3 acts on the nose 4 (Figs. 1, 2, 5, and 7) of the flap 5 and swings this in the clockwise direction against the action of the spring 6 (Fig. 2). The lug 7 (Figs. 2 and 3) of the flap 5 thereby slides off the edge 8 of the bearing 9 which is formed as a stop 10, whereby the levers 11, 12, 13 (Figs. 2, 3 and 4) rigidly mounted on the shaft 14 and the three-armed lever 15 follow the pull of the spring 16 engaging with the three-armed lever 15.

Through the resulting swinging out of the lever 15 in the clockwise direction is closed the

coupling 17 and 18 (Figs. 2 and 3), whereby the cams 19, 20, 21 participate in the rotation of the shaft 22 in the arrow direction 23. The depressed key 1 for total taking of the cross footer CT is hereby held automatically so long in the depressed position until the cross footer CT is cleared whereby the coupling 17, 18 for the cams 19, 20, 21 also remains closed for this period.

When, consequently, the shaft 22 (Figs. 1, 2, 3) and therewith the cam element 19, 20, 21 are rotated in the arrow direction 23 the cam 19 acts first on the arm 24 of the lever 15 and swings this in the opposite direction to the arrow 25 against the action of its spring 16, whereby the parts 13, 14, 11, 12 and 5 swing in the clockwise direction while the locking flap 26 at this point is still held in its out-swung position in the anti-clockwise direction by the lock 26, 27.

On the swinging of the flap 5 (Fig. 3) in the clockwise direction its nose 4, however, slides along on the face 2 (Fig. 7) of the T. C. key lever 3, whereby the lug 7 (Fig. 5) of the flap 5 cannot be gripped by the lug 10 of the support 9. Consequently the parts 13, 11, 12, 5 (Fig. 3) are not stopped at the end of their swinging movement in the clockwise direction, but in the further rotation of the cam 19 follow the action of the tensioned spring 16 and 20 so that the lever 15 is therefore swung in the arrow direction 25 (Figs. 2 and 3) again and the parts 13, 11, 12, 5 swing again in the anti-clockwise direction, whereby the tension of the springs 16 and 20 is decreased.

If now shortly before the completion of the first revolution of the cam element 19, 20, 21 (Figs. 1, 2 and 3) that is, shortly before the completion of the calculating process in the hundreds denomination the lever 29 swings round the shaft 30 against the action of the spring 31, by the cooperation of its arm 32 with the curved projection 33 of the cam disc 21 the lock 26, 27 is released. Since, however, at this moment the parts 13, 14, 11, 12, 5, have been swung so far in the anti-clockwise direction under the action of the spring 16 engaging with the lever 15 that the pins 34 (Fig. 4) and 35 (Figs. 2 and 3) lie on the locking flap 36 (Figs. 2, 3, 5, 7) held up to this point by the lever 29 in the locking position so these parts are held by their pins 34 (Fig. 4) and 35 (Fig. 3) until the lever 29 (Figs. 2 and 3) snap with its nose 37 again behind the lug 26. Since according to the foregoing the parts 15, 13, 11, 14, 12, 5, have been brought again by means of the spring 16 into the working position, the nose 38 of the arm 39 of the lever 15 has moved again out, of the working position in relation to the nose 40 (Figs. 2 and 3) of the coupling pawl 17, whereby the cam element 19, 20, 21 after the resulting revolution is not uncoupled but a further revolution of the same and consequently a new calculating process begins previous to which as hereinafter described, a carriage step has taken place so that the cross footer CT is then located with its tens denomination in the calculating position.

This working process is repeated in each denomination of the cross footer CT so that the T. C. key, therefore according to the foregoing, is automatically held depressed until the cross footer CT has been cleared.

After, therefore, having set forth the locking of the T. C. key in its depressed position, the operations which further take place on the depression of the T. C. key will be described.

The key lever 3 (Fig. 7) acts, further on depression with its face 41 on the face 42 of the slide 43 so that the same travels upwards in the op-

posite direction of the arrow 44 against the action of its spring 45. It thereby acts with its pin 46 on the incline 47 of the slot 48 of the slide 48, whereby this is displaced to the left (seen in Fig. 7).

If now it should be inadvertently omitted to shift the cross footer CT for subtraction while the pre-setting plate 50 (Figs. 1, 10 and 18) of the column totalizer concerned has not been set, this is not disadvantageous since when the slide 48 (Fig. 7) travels to the left, the same acts on the pin 51 fixed to the lever 52 and rotates the lever 52, the shaft 53, and the levers 54 and 55, in the anti-clockwise direction, so that the driving wheel 58 is changed over by means of the change over gear 57, 58, 89 and shaft 80, 82, 83 automatically for subtractive operation.

On the travel of the slide 49 (Fig. 7) to the left the nose 61 of the part 62 of the slide 49 is laid in front of the face 63 of the aligning tooth 64 of the cross footer CT so that the aligning tooth 64 with its tooth 65 is held in engagement with the four toothed wheels 66 (Figs. 1, 10 and 18) of the cross footer CT lying to the left of the driving wheel 56 (Fig. 8) and lock this wheel. The wheels 66 of the cross footer CT thereby correspond to the wheels 67 (Figs. 1, 10 and 18) of the column totalizers.

Further in the upward movement of the slide 43 (Fig. 7) the part 68 has been carried upward along with it. This hereby released the pin 68 of the lever 70, so that this follows under the action of its spring 71, the part 68 in its movement. Moreover, the coupling lever 72 jointed to the lever 70 moves so that its nose 73 lies over the nose 74 of the draw lever 75.

In the rotation of the three cams 19 (Figs. 2 and 3) 20 and 21 the roller 77 on the lever 78, first slides under the action of the spring 78 engaging with the rod 79 from the elevated part 33 of the cam 21 on the lower part of the same, whereby the draw bar 79 moves in the direction of the arrow 44. Hereby, the toothed wheel 80 (Fig. 5) is brought into engagement with the teeth 81 of the calculating sector 82 by way of the above described parts 83 (Fig. 5), 64, 85, 66, 87 and 86. Further, on the displacement of the draw bar 79 (Figs. 3 and 5) in the direction of the arrow 44 the shaft 89, and the parts 90, 92, 93 (Figure 5) 94, 95, 86 (Fig. 9) and 97 rigidly connected to it are swung by way of the parts 83, 84, 85 (Fig. 5) in the clockwise direction (seen in Fig. 5) whereby by means of the release finger 95, the locking lever 96 lying opposite to it, is raised and accordingly the calculating place located in the working position of the column totalizer is unlocked.

In the swinging movement of the shaft 89 in the clockwise direction (Fig. 9) the lever 97 fixed to it, is likewise swung in the same direction. In virtue of this, the lever 97 acts, by means of its nose 98, on the lever 100, whereby the latter is swung in the clockwise direction. The lever 101 which is in articulated connection with the lever 100, is hereby swung in the anti-clockwise direction against the action of its spring 102 in which swinging movement the shaft 103 and the lever 63, as well as the release finger 105 participate, whereby the driving wheel 56 (Fig. 7) is unlocked, and the toothed wheel 66 located in the cross footer CT is released.

In the further rotation of the three cams 19 (Figs. 2 and 3) 20, 21 the roller 106, rotatably mounted on the lever 107 moves from the elevated part of the cam 19, on to the lower of the same.

In virtue of this, the draw bar 108 (Fig. 5) is displaced in the direction of the arrow 44 under the action of its spring 108. The incline 110, of the slot 111 of the rod 108, hereby acts on the roller 112 of the calculating sector 82, whereby this is swung in the anti-clockwise direction. Since the teeth 81 of the calculating sector 82 are in engagement with the toothed wheel 80, so the driving wheel 56 (Fig. 7) of the cross footer CT is rotated in the subtractive direction, by way of the parts 113, 57 (Fig. 8) 56, 58, 80 (Figs. 7 and 8) and until the number roller of the hundreds place of the cross footer CT, which shows a "1" has moved from "1" to "0" in which case, a further rotation of this number roller is not possible since the wheel 88 (Figs. 1, 10 and 18) of the next higher decimal place (thousands place) is held fast by the aligning tooth 84 (Fig. 7), which is locked by the nose 81 (Fig. 7) of the slide 49. The calculating segment 82 (Fig. 5) will be able, therefore, only to rotate through one unit. Accordingly the driving wheel 114 is also rotated, by way of the parts 113, 115, 116, 117, likewise only through one unit whereby in the hundreds decimal place of the corresponding column totalizer a "1" is registered.

Since the segment 82 (Fig. 5) is rigidly connected to the shaft 125, by means of the clamping device 126, this shaft participates in the rotational movement in the direction of the arrow 127. The feeler fingers 128 rigidly mounted on the shaft 125 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 "1" strikes on the pin 128 of the stop piece 130, which has been swung upwards by depression of the calculating key lever 122, corresponding to the value "1".

By the swinging out movement of the calculating segment 82 (Figs. 5 and 26) through one unit, the lower arm 118 of this segment 82 and the arm 131 rigidly mounted on the shaft 125 participate in the swinging movement of the feeler fingers 128 (or of the calculating sector 82, 118). Accordingly the frame 119, 120, 121 jointed at the points 132 and 133 and guided on the slide bars 134 and 135 by means of screws 136 and 137, will slide forward through an amount corresponding to the value "1." The lower edge 138 (Fig. 5) of the front bridge 120, thereby reaches a position over the nose 139 (Figs. 1 and 5) of the number key 104, corresponding to the value "1."

Shortly, thereafter, the roller 123 (Fig. 3) which is mounted on the lever 124 rigidly connected with the shaft 141 (Figs. 3 and 5) falls into the depression of the cam 20 whereby the arms 134 and 135 rigidly connected to the shaft 141 are swung in the clockwise direction by the springs 142 engaging with their short arms 143 and 144, and with them also the frame 119, 120, 121 guided by them. This frame thereby strikes on the nose 139 (Fig. 5) of the number typing key lever 104, corresponding to the value "1" and presses this lever 104 downwards against the action of its spring 145 (Figs. 1 and 18). The control tooth 146 of the draw-hook 147, is moved by the coupling lever 148 into engagement with the cam shaft. This now draws the draw-hook 147 forward, which by way of the intermediate lever 150, causes the type lever 151 to strike on the platen 152, whereby during the striking movement the control tooth 146 moves out of engagement with the cam shaft 149. Through the striking movement of the type lever 151, the paper carriage has been moved by way of the parts 153

to 157 (Figs. 1 and 18) and one step to the left under the pull of the carriage draw-spring (not shown) so that the next lower place of the column totalizer now lies opposite to the main driving wheel 114 (Fig. 5).

Before, however, the carriage shift takes place the slide 79 (Fig. 5) has moved upwards again and has effected the various locking operation again.

As soon as the paper carriage 140 (Figs. 1, 10, 16 and 18) has moved so that the tens decimal place of the corresponding column totalizer and of the cross footer CT have arrived in the working position, the operations, since the key 1 (Fig. 7) is held depressed, are repeated, whereby the number roller of the cross footer CT, showing an "8" is moved to zero while in the tens decimal place of the column totalizer an "8" appears, whereby the number "8" has been typed, the paper carriage 140 again moves one step to the left.

Consequently, the units decimal place of the column totalizer and of the cross footer CT 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 140 is moved one step to the left by means of the space key 310, whereby the tenths decimal place of the column totalizer and of the cross footer CT, has arrived in the working position.

Now, the same operations are repeated in the tenths decimal place of the column totalizer and of the cross footer CT as the key 1 is still held depressed—whereby the tenths decimal place of the cross footer CT moves to zero, and in the tenths decimal place of the column totalizer a "3" is visible.

When in the manner already described, the column totalizer and the cross footer CT, are now moved so that their hundredths decimal place are in the working position and the Zero is typed on the paper, a further carriage step follows.

Accordingly the column totalizer now stands in such a position that the nose 158 (Fig. 6) of the lever 159 lies in the gap 160 formed by the bars 159 of the column totalizer which was in an operative position and the next column totalizer. The lever 161 could therefore, in consequence of the pull of the spring 162 on the rod 163, swing out in the clockwise direction and the rod 163 could move downwards. The pin 164 of the rod 163 thereby presses on the member 165, whereby the rod 166 is also moved downwards. The lever 167 is thereby swung in the anti-clockwise direction, whereby the lug 168 of the lever 167 is laid in front of the nose 169 of the lever 170 and accordingly a rocking movement of the lever 170 and of the shaft 141 in the clockwise direction is not possible. In consequence of this the arms 134 and 135 fixed on the shaft 141 (Fig. 5) cannot be swung. A downward movement of the figure key striking bar 120 cannot therefore take place. In this case, therefore, the lock 90, 171 would be superfluous. On the other hand, it must, however, be present in order to provide a lock in the comma place, in which case the parts controlled by the totalizer bar 159 (Fig. 6) take up the position according to Fig. 6 in which a locking of the lever 170 is not effected.

By swinging of the lever 167 (Fig. 6) in the anti-clockwise direction round the screw 172 the

nose 173 of the lever 167 moves into the working position in relation to the bend 174 of the flap 5.

If now in the rotation of the cam element 19, 20, 21 the lever 15 (Fig. 3) is swung in the opposite direction to that of the arrow 25 round the shaft 30 by the cam 19, whereby the parts 13, 11, 14, 12 swing in the clockwise direction so that at the end of this movement the nose 173 (Fig. 6) of the lever 167 is laid against the bend 175 of the flap 5 and holds this stationary together with the parts 12, 11, 14, 13 in this position. The nose 38 of the lever 15 (Fig. 3) thereby stands in the working position in relation to the stop 40 of the coupling pawl 17. When shortly before the termination of the revolution of the cam element 19, 20, 21 the cam 21 acts on the lever 20 and swings this against the action of the spring 31, the stop angle 26 of the locking flap is released, so that the latter under the action of the springs 28 which have been tensioned by the swinging of the parts 13, 11, 14, 12 is swung back in the clockwise direction on the shaft 14. In virtue of this the nose 3' (Fig. 7) of the lever 3 is released from the bend 176 of the flap 36 so that the T. C. key lever 3 can return into its rest position under the influence of the spring 45 (Fig. 7). Consequently, the flap 5 also returns into its initial position under the action of the spring 6 (Fig. 3) whereby the lug 7 of the flap 5 can be again laid against the lug 10 of the support 9, since the face 2 (Fig. 7) of the T. C. key lever 3, which in the meantime has been raised, does not prevent this any longer. At the end of the revolution of the cam element 19, 20, 21, the stop 40 (Fig. 3) of the coupling pawl 17 is held by the nose 38 of the lever 15 whereby the coupling 17, 18 (Fig. 3) is raised and consequently the rotation of the cam element 19, 20, 21 is interrupted.

Consequently a totalizer on the machine is therefore at times automatically cleared at one operation whereby the T. C. key 3 during the clearing is automatically held depressed and after the completion of the total taking is again automatically released.

By the release of the key 3 (Fig. 7) the slide 43 is returned under the action of its spring 45, in the direction of the arrow 44 into its rest position again, whereby the part 68 rigidly mounted on it acts on the pin 69 of the lever 70 and swings the same round the shaft 177 in the clockwise direction against the action of its spring 71. The driving lever 72 which is arranged on the key lever 70 and is one the depression of the key 1 has snapped over the nose 74 of the draw lever 75 takes the draw lever 75 along with it, and swings it in the clockwise direction against the action of its spring 178, whereby the pawl 179 engages with the continually rotating cam-shaft 149. The draw lever 75 is thereby carried along and thus swings the intermediate lever 180 in the clockwise direction round its pivot 181.

Consequently the type lever 182 is also swung round its pivot 183, whereby the clear sign "" is impressed on the paper behind the number "184.30." The mechanism belonging to the sign printing return thereafter into their normal position illustrated in Figure 7.

#### Tabulating device

For the sake of a better understanding of the present invention, it seems advisable to briefly set forth the operation of the tabulating device.

If one of the column totalizers T1 to T6 (Figs. 1, 10, 16 and 18) is to be brought with a certain denomination into the calculating position, the

tabulator key 185 (Figs. 10, 11, 12, 16 and 18) of the denomination tabulator corresponding to this denomination is depressed, whereby the carriage 140 is released in a manner to be later described, and is moved to the left until the totalizer concerned which is fixed to the carrying rail 186, is brought into the calculating position through striking of the pre-set rider 187, correspondingly arranged to this totalizer on the rider shaft 188, against the column selecting lever 189 (Figs. 1, 10, 11, 12, 14 and 18) corresponding to the depressed tabulator key 185.

On the depression of a tabulator key 185 (Figs. 1, 10, 16 and 18) of the denomination tabulator, the tabulator key lever 190 is moved in the arrow direction "191" round the shaft 192 (Figs. 10, 11 and 12) whereby the associated column selecting lever 189 is raised. The locking yoke 193 (Figs. 10, 11 and 12) thereby moves out of the upper stop 194 of the column selecting lever 199, which is possible within difficulty, in consequence of the spring 195, which engages with the arm 199, of the locking yoke 193. In consequence of this arrangement, however, the locking yoke 193 is capable of entering automatically into the lower stop 194 of the column selecting lever 199, whereby the same is held in its upper position so that the tabulator key 185 on raising of the finger from the key remains consequently in its depressed position, and by the entrance of its key lever 190 into the known roller lock 197 (Figs. 2, 10 and 11) locks all the calculating keys 198 (Figs. 1, 2, 3, 5, 10, 11, 16 and 18) and tabulator keys 185.

By the depression of the tabulator key 185, however, the shift bridge 199 (Figs. 10, 11 and 12) positioned under the tabulator key levers 196, has likewise been swung in the arrow direction 191 round the bearing points 200 and 201.

The arm 202 (Figs. 10, 11 and 12) which engages with its roller 203 under the arm 204 of the auxiliary lever 205 thereby transmits the movement to the auxiliary lever 205 which is swung in the arrow direction 191 around the bearing bar 206. The auxiliary lever 205 thereby enters with its nose 207 into the usual roller lock 209 (Figs. 10 and 11), whereby all the typing keys 209 (Figs. 1, 10, 16 and 18) are locked against depression so long as the tabulator key 185 concerned remains in its depressed position. By the swinging movement of the auxiliary lever 205 the lever 210 is swung round its pivot 211 in the clockwise direction by means of the pin 212 which projects into the slot 213 of the auxiliary lever 205. The arm 214 of the lever 210 is thereby drawn away from beneath the nose 215 of the pawl 216. The pawl 216 now swings under the action of the compression spring 217 in the clockwise direction round its bearing pin 218 fixed in the cam 220, whereby the nose 219 of the pawl 216 is laid into the space standing opposite to it of the rotating cam shaft 149 (Figs. 10, 11 and 12). The cam 220 is therefore rotated in the clockwise direction along with the continually rotating shaft 149, until the latter is connected from the cam shaft 149 as follows:

On the movement of the auxiliary lever 205 (Figs. 10, 11 and 12) in the arrow direction 191 the lever 221 is swung in the clockwise direction round its bearing point 222 against the periphery of the cam 220 by the pin-slot connection 223, 224, whereby the nose 224' of the lever 221 moves into the range of the nose 215 of the pawl 216. If according to the foregoing a rotation of the cam 220 results in the arrow direction 191 the rotation of the same is interrupted after one half-revolution by the striking

of the nose 215 of the pawl 216 against the nose 224' of the lever 221 lying in its path of movement, whereby the nose 219 is brought out of engagement with the cam shaft 149. In the rotation of the cam 220 which is mounted eccentrically to the cam shaft 149, this cam slides with its periphery over the roller 225 mounted on the arm 226 of the lever 227, and swings the lever 227 in the clockwise direction round its bearing pin 228. The levers 229 and 230 fixed to the shaft 231 are swung by way of the rod 232 also in the same direction. Consequently, the angle lever 233 is swung by way of the pin and slot connection 234, 235 in the anti-clockwise direction against the action of its spring 235 (Figs. 10 and 12), whereby its arm 237 (Fig. 13) acts on the nose 238 of the lever 239. This is now swung with its bearing member 240 and the shaft 241 in the arrow direction 242 (Figs. 10, 11, 12 and 13).

During this swinging movement of the lever 239 in the arrow direction 242 the pin 243 (Figs. 10, 11, 12 and 13) fixed thereto slides away from the nose 244 of the locking lever 245, whereon the lever 245 under the action of its spring 246 is laid with its edge 247 in front of the pin 243 of the lever 239. The lever 239, together with the shaft 241 and all the parts fixed to the latter are thereby held in their swung position.

Even without the lock 243, 245 the parts 239, 240 together with the shaft 241 are held in their swung position by the cam 220, which, as the tabulator key lever 185 remains in its depressed position, is held after one-half revolution so that rods 227, 229, 230, 233 and therewith the lever 239 are held positively in their swung position until the tabulator key lever 190 can again move upwards, which as will be evident later will occur when the rider 197 (Fig. 10) located on the carriage 140, runs against the raised column selecting lever 189.

The shift lever 248 (Figs. 10, 11 and 12) fixed on the shaft 241, has naturally been swung in the arrow direction 242 along with the lever 239, 240. The shift lever 248 presses in its turn on the nose 249 (Fig. 15) of the lever 250 fixed on the shaft 251 which latter lever on its part acts with the part 252 screwed to its lug 253, on the arm 254 of the angle lever 255 and swings the latter in the clockwise direction round the bearing screw 256. The arm 257 of the angle lever 255 thereby presses against the nose 258 of the shift tooth 259 (Fig. 15) loosely mounted on the shift rocker 260, and by swinging round the bearing screw 261 brings this out of engagement with the shift wheel 262, whereby the carriage movement to the left takes place.

The shift lever 253 (Fig. 14) fixed on the shaft 241 was likewise swung in the arrow direction 242, whereby the pin 264 of the arm 265 of the lever 263 takes along with it the locking bridge 266 (Figs. 10, 12 and 14) together with its locking bar 193 against the action of the spring 195 by striking on the arm 196. The second locking bridge 267 (Figs. 10, 11, 12 and 14) arranged loosely on the shaft 241 is carried along in the same direction by means of the spring 268 which is connected on the one hand to the pin 269 of the bridge 267 and on the other hand to the lug 270 of the lever 263. In the swinging of the shaft 241 in the arrow direction 242 the locking bar 193 acting only on the raising of the column selecting lever 189 is therefore moved out of the working position in relation to the same, whilst the other locking bridge 267 moves into the work-

ing position in relation to the column selecting lever 189 and takes over the holding of the same by entering into the lower stop 271 (Fig. 12).

According to the foregoing, however, the paper carriage 140 has been released for a movement towards the left, in which the carriage movement is braked by a tabulator brake, not illustrated, which on the swinging of the lever 272 (Fig. 12) in the arrow direction 242 is brought into the working position by the curved slot connection 273, 274, by way of the lever 275 actuated thereby.

In the said movement of the carriage 140 to the left the rider 187 arranged on the rider shaft 188 of the carriage 140 correspondingly to the totalizer moving into the working position strikes on the raised column selecting lever 189 (Figs. 1, 10, 11, 12, 14 and 18) corresponding to the depressed tabulator key 185. All the column selecting levers 189 mounted between the lever 263 (Fig. 12) and the adjusting collar 276 (Fig. 11) together with the shaft 241 and all the parts fastened thereon are thereby displaced in the arrow direction 277 (Figs. 11, 12 and 13) against the action of the spring 276.

In this displacement the lever 239 (Fig. 12) through being displaced along with the bearing piece 240 strikes with its nose 279'' on the pin 279 (Figs. 11, 12 and 13) fixed to the bearing rail and is swung first of all in the arrow direction 280 round the bearing screw 281 against the action of the spring 282.

The pin 243 (Fig. 13) which under the influence of the spring 283 has been laid against the edge 247 of the lever 245 (Figs. 10, 12 and 13) now moves in a lateral direction out of the range of the locking lever 245, so that the lever 239 and its bearing 240, together with the shaft 241 and all the parts attached to the latter, are now swung back by the spring 283 in the opposite direction to the arrow direction 242 (Figs. 10, 12 and 13) into their rest position, whereby the locking bridge 267 releases again the column selecting lever 189 which up to this point has been held fast.

Since, however, at this moment the locking bridge 193 (Fig. 12) swings likewise in the opposite direction of the arrow 242 under the action of its spring 195, it could happen that the same engages in the lower stop 194 of the column selecting lever 189 before this could move downwards. In order to prevent this undesired occurrence, the inclined nose 284 (Figs. 11 and 12) is provided on the part 285 on which runs up the arm 286 of the locking bridge 193, so that the locking bridge 193 is at first prevented from performing a swinging movement in the opposite direction of the arrow 242. Meanwhile, however, by the displacement of the shaft 241 in the arrow direction 277 the lever 248 (Fig. 12) fixed on the shaft 241 has slid away from the nose 249 (Fig. 15) of the part 250 so that the parts 250, 255 were released and consequently the loose shift tooth 259 could engage with the shift wheel 262, whereby this now takes over the holding of the carriage 140. This follows simultaneously with the swinging of the shaft 241 in the opposite direction of the arrow 242, i. e., at the instant when the pin 243 leaves the locking lever 245 in the arrow direction 277.

As soon as the column selecting lever 189 under the action of the tabulator key lever spring, not illustrated, has moved downwards the bridge 199 and the auxiliary lever 205 were brought back into their rest position by means of the spring 281 (Figs. 10 and 12) engaging with the aux-

iliary lever 205, whereby the nose 224'' of the angle lever 221 releases the coupling pawl 216, which up to this point was held fast, and swings the nose 214 of the lever 210 again in to the rotational path of the coupling pawl 216 so that the disc 220 performs its second half-revolution after which it comes to a stand still again as the nose 215 of the coupling pawl 216 runs up on the nose 214 of lever 210. During this half-revolution the rods 227, 232, 229, 230, have arrived again in their rest position by means of the spring 236 engaging with the lever 233.

The releasing conditions of the raised column selecting lever 189 are different with short carriage paths than with long carriage paths, i. e., with short carriage paths the releasing movement proceeds more slowly than with long carriage paths, in which the carriage in spite of the breaking action through the tabulator brake still possesses relatively great inertia. Consequently, the coupling commences its second half-revolution earlier with long carriage paths than with the short carriage paths.

The result of this is that the swinging of the shaft 241 in the opposite direction of the arrow 242 occurs too early and accordingly the loose shift tooth 259 engages too early with the shift wheel 262, so that when, for example, it is desired to tabulate in the units denomination without the provision of special means the carriage 140 would yet stop in the tens denomination.

This disadvantage is avoided by the lock 243, 245 (Fig. 13) which does not permit a swinging of the shaft 241 in the opposite direction of the arrow 242 before the pin 243 has left the lever 245 laterally.

After the pin 243 (Figs. 12 and 13) has moved out of engagement laterally with the lever 245 and the column selecting lever 189 has taken up its lower position again, the shaft 241 moves back in the opposite direction of the arrow 277 into its rest position under the action of the spring 278 (Fig. 12) and accordingly also the lever 239 (Fig. 13). Simultaneously with this movement the locking yoke 193 (Fig. 13) swings again into its locking position in relation to the column selecting lever 189 while the locking yoke 267 was swung earlier out of its locking position through the action of the lug 270 (Fig. 14) of the lever 263 on the nose 283 of the locking yoke 287.

The object of the locking yoke 267 is to hold the column selecting lever 189 in its raised position until the pin 243 (Fig. 13) is swung laterally out of the locking lever 245, while the locking yoke 193 (Fig. 14) is still held by the control curve 284 (Figs. 11 and 12) of the lever 285 out of the locking position in relation to the column selecting lever 189 during the return movement of the shaft 241 in the opposite direction of the arrow 277.

#### *Comma skipping device*

As soon as one of the column totalisers T1 to T0 is located with its units denomination in the working position the pawl 290 (Figs. 1 and 15) is somewhat less than one denomination distant from the set rider 291, i. e., it is located somewhat less than a denomination to the left of the rider 291. By the carriage step released in the units denomination the rider 291 moves within the working range of the pawl 290. Since this acts thereby on the nose 292 (Fig. 15) of the lever 293, the lever 293 is swung around the screw 294 in the clockwise direction, whereby the arm 295 of the lever 293 acts on the rocker

260 and swings the same around its centre points (not illustrated) in the anti-clockwise direction, i. e., the loose escapement tooth 259 which is lifted out of engagement with the escapement wheel 262, is lifted immediately a second time out of engagement with the escapement wheel 262. During this lifting-out movement the rider 291 has already released the pawl 290 again so that the escapement rocker 260 can return into its rest position under the action of the spring 296. The fixed escapement tooth 298 (Fig. 15) thereby released the escapement wheel 262 which is again moved a step further which is limited by the falling-in of the loose escapement tooth 259. On the swinging back of the rocker 260 into its rest position under the action of the spring 296 the rocker 260 acts on the arm 295 of the lever 293 and swings the same round the screw 294 back into its rest position which is determined by the limb 299 of the lever 293 striking on the pin 301 arranged on the part 360 (Figs. 1 and 15) of the frame. The comma position has therefore been automatically skipped and consequently the totaliser stands in the tenths denomination.

#### Carriage return

If the carriage return key indicated by "CR" (Figs. 41 and 42) is depressed, the key lever A which is connected with the slide B causes a downward movement of the same, whereby the lever C, D, is swung round its pivot E in the anticlockwise direction so that the nose F of the lever C, D, acts upwards against the projection G of the flap H, whereby the flap is swung up and releases the nose I (Fig. 41), of the lever K, so that the lever K moves in the opposite direction to the indicated arrow direction "A." The lever L is thereby swung round its pivot M (Fig. 42) in the anticlockwise direction, whereby the lever N brings the coupling half O into engagement with the coupling half P and, insofar as the coupling Q, R, is closed, rotates the toothed wheel Aa, which is continually in engagement with the rack Ab in the arrow direction x, by way of the toothed wheel S the spur wheel T the spur wheels U and V the bevel wheel Z which is rigidly mounted on the shaft Y. The rack Ab is thereby displaced to the right by the amount determined by the pin slot connections Ac, Ad.

After the movement of the rack Ab to the right, relatively to the carriage frame 305, is terminated by the left-hand end of the slots Ac striking against the screws Ad, the carriage 140 is taken along by the rack Ab by means of the screws Ad in the further rotation of the toothed wheel Aa, whereby the carriage is likewise forwarded to the right, i. e., is returned.

Towards the end of the carriage return movement the left-hand margin setter Af (Fig. 16) runs against the stop Ah arranged on the bar Ag (Fig. 41) and brings the bar Ag and the parts co-operating with it back into their illustrated rest position, whereby the coupling P, O, is again opened and the carriage return movement interrupted.

#### General mechanism

On the rails 303 and 304 fixed to the machine frame 302 (Figs. 1, 10 and 18) the paper carriage 140 already mentioned together with its platen 152 is arranged. On the front bridge of the carriage frame 305 of the paper carriage 140 is fixed a supporting rail carrying the column totalizers T1 to T6. On a table 307 attached to

the calculating mechanism housing 306 is displaceably arranged a prism bar 306, which carries a cross footer Cf. In front of the calculating mechanism 306 are located the figure typing keys 309 the letter typing keys 209 the space key 310 the decimal calculator keys 195 and the calculating keys 196. To the left of the calculating keys 199 (Fig. 16) is arranged the "TT" key and to the right of the calculating keys 196 the TC key I. Further on the left of the letter typing keys 209 the carriage return key "CR" (Fig. 41) is located and to the right of the letter typing keys 209 the case-shift or type-shift key "SK" and the key "PS" for continuous type-shift. These parts and their arrangements are sufficiently known, and are here only shortly described for the completion of the description.

#### Value punching mechanism

On the side parts 311 and 312 (Figs. 16, 18, 27, 28 and 29) of the case shift frame carrying the platen 152 of the paper carriage 140 are fixed two supporting plates 313 and 314 by means of screws 315 and 316 (Fig. 18). Into the supporting plates 314 and 315, two tubular shafts 317 and 318 (Figs. 16, 18, 20, 27, 28 and 29) are riveted, so that they form together with the supporting plate 313 and 314 a rigid frame. Two bearer members 319 and 320 are combined by means of screws 321 and 322 (Figs. 16 and 31) to a unit forming a perforator carriage in which guiding-in slot 323 formed on the part 319 serves for the introduction of a record card hereinafter described. On the projection 324 (Fig. 31) 325 and 326 of the part 320 are rotatably mounted coned rollers 330, 331 and 332 (Figs. 18, 20 and 30) by means of screws 327, 328 and 329, the end rollers 330 and 332 being above the tubular shaft 318 and the middle roller 321 below this shaft. Two rollers 333 and 334 are rotatably mounted by means of screws 335 and 336 in the supporting angles 337 and 338 (Fig. 30) which on their part are screwed by means of screws 339 and 340 to the part 319. The parts 319 and 320 are mounted on the tubular shafts 317 and 318 by means of the rollers 330, 332, 333 and 334, so as to be longitudinally moveable thereon, whereby lifting-off of the parts from the shaft 317 is prevented by the roller 331, while lifting off of the parts from the shaft 317 is not possible owing to a guide angle 342 fixed by means of the screws 341 (Figs. 16 and 30) to the part 319 and guided on the shaft 317. On the shaft 317 two collars 343 and 344 (Figs. 30 and 16) are fixed by means of pins 345 and 346 (Fig. 30), while two further collars 347 and 348 are arranged loosely on this shaft. Between the collars 343 and 347 and 344 and 346 compression springs 346 and 350 (Figs. 16 and 17 to 30) are arranged on the shaft 317. If the guide angle 342 is located with its recesses 351 over a pin 352 fixed in the tubular shaft 317 so the collars 347 and 348 are acted upon against the pin 352. The guide angle 342 is thereby held fast between the collars 347 and 348. The rest position of the perforator carriage 319 and 320 is thereby determined. A supporting member of 353 (Figs. 16, 17, 20 and 30) is screwed by means of screws 354 to a part 355 of the bearing member 319. In corresponding recesses in a part 356 of the supporting member 353 cores 357, 358, 359 and 360 (Fig. 30) of magnet coils 361, 362, 363 and 364 are pivotably mounted on a shaft 365 fixed in the part 256 and the armature parts 366, 367, 368 and 369 (Figs. 18, 20 and 30), these cores are capable of co-acting with the supporting member 353 on closure of an

electric circuit. The cores of the coils thereby act with their ends 370, 371, 372 and 373 on the punching pins 374, 375, 376 and 377 (Figs. 16, 18 and 20). The punching pins 375, 376 and 377 are guided in corresponding holes in the perforator carriage part 319 and are acted upon continually towards the magnet coil core parts 370 to 373 by means of compression springs 378, 379, 380 and 381 (Figs. 18, 20 and 30) which are arranged between shoulders 382, 384 and 385 on the punching pins 374 to 377 and corresponding recesses in the perforator carriage part 319 and which are arranged on the punching pins 374 to 377. The coils 361 and 364 are thereby swung out so far in the clockwise direction around the bearing shaft 365 (Figs. 18 and 20) until they strike on the correspondingly bevelled part 356 and hold thereby all the parts acted on by the springs 378 to 381 in the rest position. In a dove-tail groove formed on the part 355 of the supporting member 318 is inserted a correspondingly formed bar 385 (Figs. 16, 18, 20 and 30) which consists of an insulating material and is held against displacement by means of a screw 387 (Fig. 16). A bus bar 388 (Fig. 30) pressed into the rail 386 is capable of co-acting with contact pins 389, 390, 391 and 392 (Figs. 17 and 36). The contact pins 389 to 392 are longitudinally displaceable in small bushes 393, 394, 395 and 396 which are pressed into insulating sleeves 390, 400, 401 and 402 (Figs. 17, 20 and 31). The insulating sleeves 399 to 340 on their part are pressed into corresponding holes of the perforator carriage part 320. By means of contact springs 403, 404, 405, 406, (Figs. 17 and 20) which are fixed on the bearing member 320 between insulating plates 407, 408, 409, 410 and screws 411, 412, 413, 414, the contact pins 389 to 392 are pressed constantly against the bus bar 388. In recesses in the bearing member 320, dies 415, 416, 417 and 418 (Figs. 18, 17 and 20) are fixed, with which the hole punches 374 to 376 already described co-act for the purpose of punching a record card hereinafter described. Further a receptacle 419 (Figs. 16, 18 and 20) is fixed by means of the fixing angles 420 and 421 (Fig. 16) welded to it and by means of screws 422 and 423 to the supporting member 320, which receptacle serves for the reception of the card punchings, which fall into it through corresponding holes 424 (Fig. 20) provided both in the housing 419 as well as in the bearing member 320. To the left-hand side (seen in Fig. 30) a bearing part 425 (Figs. 16, 21 and 30) is fixed to the part 319 by means of a screw 426, and to the upper part 427 of the part 425 a further magnet coil 426 together with its core 429 is guided in a corresponding slot of the part 427 and is swingably mounted on a pivot screw 430 screwed into the latter. The coil core 429 is capable of co-acting by means of its end 431 with a punching pin 432 (Figs. 21 and 31) longitudinally displaceable in a hole of the bearing member 319. A spring 434 which is arranged between a shoulder 433 (Fig. 21) on the punching pin 432 and a corresponding recess in the bearing member 319, and which is arranged on the pin 432 presses the latter constantly against the end 431 of the coil core 429 and swings this together with the coil 426 in the anti-clockwise direction round the pivot screw 430. This swinging movement is limited by the core 428 striking on the bevelled part 427 of the bearing member 425, whereby the rest position of all parts acted on by the spring 434 is determined. This punching pin 432 co-acts with a die 435 fixed in a recess of the perforator carriage part 328, when a hole

is to be made in a record card described herein-after. A receptacle 440 (Figs. 16 and 21) screwed to the bearing member 320 by means of fixing angles 436 and 437 (Fig. 16) and screws 438 and 439 serves for the reception of the card punchings which fall thereinto through holes 441 in the bearing member 320 and in the housing 440 into the latter. On a shaft 444 (Fig. 16) rotatably mounted in projections 442 and 443 (Figs. 16 and 19) of the bearing member 320, is fixed a lever 445 (Figs. 16 and 19) by means of its boss 446 and a pin 447 at the left-hand side of the shaft. By means of a rivet 450 the lever 445 is articulately jointed to the flattened end of a sensing pin 440, which is displaceably mounted, in a corresponding hole of the bearing member 320, for which purpose the sensing pin 448 is provided at the jointing position with a corresponding elongated slot.

At the right-hand side of the shaft 444 a lever boss 452 and a pin 453 to this shaft which lever is jointed by means of a rivet 456 to the flattened end 454 of a sensing pin 455 displaceably mounted in a corresponding hole of the bearing member 320, for which purpose the sensing pin 455 is provided at its jointing position with a corresponding slot. A further lever 457 (Fig. 19) is fixed by means of its boss 451 and a pin 459 likewise at the right-hand side of the shaft 444. By the arrangement of the left-hand lever 445 at the left-hand outer side of the bearing 442 and of the right-hand lever 457 at the right-hand outer side of the bearing 443, the shaft 444 is mounted so as to be non-slidable in the said bearings. On the extreme right-hand end of the shaft 444 a lever 460 is mounted so as to be loosely swingable and is held by means of an adjusting collar 462 fixed by a screw 461 on the shaft 444. The levers 457 and 460 are interconnected with one another by a torsion spring 463 arranged between them on the shaft 444, whereby the spring projects with its one end into a corresponding hole of the lever 457 and with its other end into a similar hole of the lever 460. To an actuating lever 464 (Figs. 16, 18 and 19) for the paper feeding means is articulately jointed by means of a rivet 465 a connecting member 466 which is guided laterly by means of two guide angles 468, screwed to the already described case-shift frame side part 312 by means of two screws 467. A pin 470 riveted into the connecting member 466 projects through a corresponding hole in the lever 460 and thereby connects the lever 460 with the actuating lever 464 by way of the connecting member 466, so that the lever 460 is laterly displaceable in relation to the pin 470 without losing the driving connection of the parts 460 and 470.

A stop angle 471 (Figs. 27 to 31) is fixed at the left-hand side of the perforator carriage parts 319 and 320 by means of screws 472 (Fig. 31). To a bend 473 of the part 471 a locking pawl 474 is pivotally mounted (Figs. 30 and 31) on a screw 475. The locking pawl 474 is held in its position for the time being by friction and is capable of co-operating for a purpose hereinafter described, with a stop 476 arranged on the machine frame. A further stop 477 (Figs. 27, 28, 29, 31) on which the stop angle 471 acts in a manner hereinafter described, is likewise fixed to the machine frame, and acts in the same direction of movement as the stop 476.

Contacts C28, C29 and C30 (Figs. 27 to 28, 33 to 36 and 40) are fixed on a bar of insulating material on the carriage frame and co-acts with an insulated rail C31 fixed to the machine frame.

On each of two further shafts 478 and 479 (Fig. 20) mounted between the two case-shift frame side parts 311 and 312 (Fig. 18) are adjustably mounted two or several forwarding rollers 480 and 481 for the purpose of forwarding the cards. On the end of the shaft 478 projecting from the right hand side part 312 of the paper carriage 140 (Figs. 16 and 20) a roller 482 is rigidly mounted, and is in driving connection with a roller 484 arranged on a stub shaft 483 so as to be loosely rotatable thereon. The latter roller 484 again is in driving connection with a roller 486 rigidly mounted on the platen shaft 485. In this case on rotation of the platen 152 by means of the hand knob 487 the drive is effected to the shaft 478 and its rollers 489 by way of the friction drive 482, 484, 486 (Fig. 20), whereby the rollers 481 together with the shaft 479 are spring pressed on to the rollers 480 and thereby participate in the drive.

The shaft 125 (Figs. 18 and 26) is carried out of the left-hand side of the calculating mechanism housing 308 (Figs. 16 and 18). On the projecting end of the shaft 125 is fixed a lever 514 (Figs. 16, 18 and 26) by means of its hub 515 and a pin 516. To the lower segment-formed end 517 is fixed a metal plate 518 and a plate 519 of insulating material, whereby contact pins 520 fixed in the metal plate project through corresponding holes of the insulating plate 519. The contact pins 520 are capable of co-acting with the contact springs 521, 522, 523 and 524. The contact pins 521 to 524 are clamped between two plates 525 and 526 (Fig. 18) of insulating material. The plates 525 and 526 are screwed to the machine frame 302 by means of screws 527. These parts are covered up and protected on the outside by a casing (not illustrated).

The manner of working of the value perforating mechanism shall now be described in the following section "Value punching" by the aid of an example:

#### *Method of operation in value punching*

For the description of the method of operation let it be assumed that the entries are to be performed according to the record card 489 partially illustrated in Fig. 32.

It may be remarked to commence with that in the position 464 for the lower paper feed rollers 490 and 491, these rollers contact with the platen 152. In this position of the release lever 464 the pins 448 and 445 which sense the edge perforations of the account card are in their inoperative position illustrated in Fig. 19. The account card 489 (Fig. 32) can therefore be freely inserted in the slot 323 (Fig. 31) formed by the parts 319 and 320 of the perforator carriage, until its lower edge as is shown in Fig. 18 lies between the rollers 480 and 481. The account card 489, moreover, is introduced with its right-hand edge at a distance  $t$  (Fig. 32) from the right-hand edge of the slot 323, which distance can be indicated by a mark 492 (Fig. 33). By rotating the rotatable knob 489 (Fig. 16) of the platen 152 the rollers 480 and 481 are rotated in the manner described under the section "Value punching mechanism," whereby the account card 488 is carried downwards in the arrow direction 493 (Figs. 18 and 20). Its lower edge is then inserted either by hand or by a correspondingly arranged guide plate laid between the platen 152 and paper guide plate 494 (Figs. 18 and 20), where it is gripped by the front lower feed rollers 491. By rotating the

rotatable knob 487 (Fig. 16) of the platen 152 further, the account card 489 is now forwarded also through the co-operation of the platen 152 with the lower feed rollers 490 and 491, whereby the velocity generated by the platen 152 in the rollers 480, 481, and in the feed rollers 490 and 491, is naturally so determined that it is the same. The account card 489 is now moved in the arrow direction 493 until it is located with its line 495 indicated in Fig. 32, at the typing level.

Then the name "Herman Müller," place of residence "Hamburg," and account number "32," are typed, in which operation the paper carriage and the perforator carriage are moved together.

After this has been effected the account card 489 is moved upwards by a rotation of the rotatable knob 487 (Fig. 16) so far in the opposite direction to the arrow 493 (Figs. 18 and 20), until the line indicated by 498 in Fig. 32 lies at the typing height. After this has been effected the columns I to VI of the account card 489 are clearly visible, so that now, if this has not already been effected, the totalizers T1 to T8 (Fig. 16) can be sent on and the tabulator riders 187 (Fig. 18) adjusted.

When this has taken place the account No. "375," the date "12.3" and the text "Pay cash account in bare" is typed. Then the paper carriage is brought into the highest denomination of the column II in the manner described under the section "Tabulating device," by pressing on the corresponding tabulator keys, namely the keys "0,01" and "1000."

By striking the corresponding calculating keys 198, the value "30750,00" is typed in the column II, whereby as known, it is simultaneously registered in the totalizer T2, and in the cross footer CT. It may be remarked at this point that on depression of the calculating keys 198, substantially the same operations occur as are described under the section "Total-taking," and since this mechanism does not belong to the invention it shall not be further described, since the pre-setting plate 50 (Fig. 18) of the totalizer T2 for the control of the kind of calculation of the cross footer CT is set in this case for addition, the value "30750,00" is registered additively in the cross footer Q. Now, by further tabulating operations the paper carriage 140 is brought with the column VI of the card Y in the typing position.

In this column the value "30750,00" is to be cleared from the cross footer Q, and registered in the totalizer T6.

According to the invention, however, the value "30750,00" during the clearing operation from the cross footer CT, is to be perforated automatically at 497 to 503 (Fig. 32) which is effected as follows:

First, the pawl 474 arranged on the perforator carriage, which now stands opposite to the tooth 504 of the stop 476 (Figs. 27 to 28 and 39 to 36) is brought into engagement with the tooth. It is thereby attained that the perforator carriage 318, 320, which up to the present has travelled in common with the paper carriage 140 to the left, now remains stationary in relation to the paper carriage 140 which travels further to the left. Meanwhile in the previous common movement of the paper carriage and the perforator carriage to the left the contact C28 arranged in the paper carriage 140 is moved into the working position in relation to the contact C31, which is rigidly mounted on the machine frame 302,



This position is shown in Fig. 33. In Fig. 33 the stationary held or stationary parts, namely the stop 478, the perforator carriage 319, 320 (Fig. 27), the contact C31, and the main drive wheel 505 for driving the totalizers T1 to T8 are illustrated in thick lines, while the parts moving to the left and now independent of the perforator carriage 319, 320, namely the paper carriage 140, the account sheet 488, and the totalizers T1 to T8 are represented in thin lines. The account sheet 489 held on the platen 152 by the feed rollers 490, 491 (Fig. 18) and the rollers 480, 481, is now moved on the further travel of the paper carriage 140 to the left in the slot 323 of the perforator carriage 319, 320, and consequently changes its position in relation to the punching pins 374 to 377, at each carriage step, which it can do unimpeded since the pins 448 and 455 (Figs. 16 and 19) are located in the inoperative position.

Now after depression of the corresponding tabulator key, the paper carriage 148 has been brought into the position corresponding to the highest denomination of the value "30750,00" in the manner described under the section "Tabulating device," the total-taking key indicated by TC (Fig. 16) is depressed, whereon the total-taking is effected in the manner described under the section "Total-taking." The value "30750,00" registered in the cross footer CT is thereby automatically cleared denomination by denomination out of the cross footer, and registered in the totalizer T6, located in the working position, whereby it is likewise automatically and simultaneously typed in the column VI of the card 489 (Fig. 32) as a new balance.

In the present mechanism the typed value which in the total-taking is transmitted from one totalizer to the other and simultaneously typed on the card 489 is at the same time punched automatically denomination by denomination in a suitable position, for example, on the left-hand side of the card 489 (Figs. 32 and 37). The punching means, which lie at a determined distance over the position where the type is struck on the platen 152, are so arranged that the value punching takes place between the typing lines of the card (Fig. 32). Since in the present mechanism the numbers "0" to "9" in the value punching are effected not by ten but only by four hole punches, 374, 375, 376 and 377 (Figs. 1 to 17) it is necessary that these four hole punches come into operation in a determined sequence, singly, or by twos in the perforation of a value for the numbers "0" to "9." This actuation of the hole punches is effected according to the key illustrated as a table in Fig. 39. The distance of one punch in relation to the other must also be somewhat greater than the highest placed value to be typed. In the punching operation the following mechanisms are operated:

On the depression of the TC-key 1 (Fig. 16), the insulator member 508 (Fig. 8) arranged on the key lever 3, acts on the spring 507, whereby the part 508 contacts with the part 509 of the spring 510 and consequently the contact 508, 509 (Fig. 40) is closed. It may be remarked at this point that the two springs 508 and 510 are insulated from one another by means of an insulator member 511, and that the parts 507, 510 and 511 are screwed by means of screws 512 to an angle piece 513 of insulating material which again is mounted on the machine frame 1 by means of screws, not illustrated.

The clearing of the value effected in the total-

takings results, as described in detail in the section "Total-taking," by toothed segment 82 (Figs. 1 and 26), in which operation the later makes no movement for the number "0," while for the numbers "1 to 9," swings out with the shaft 125 progressively for 9 differently great paths. These swinging movements are transmitted to the segment lever 514.

If, therefore, the first number "3" of the value "30750,00" of the first entry is cleared from the cross footer CT, the toothed segment 82 (Figs. 18 and 26) and with it the segment lever 514 are swung out for an amount corresponding to the number "3", whereby the contact pin 520 corresponding to the number 3, co-acts with the contact spring 523, (Figs. 40 and 26). After the lever 514 has come to rest in this swung-out position after making the contact, the contact C32 (Fig. 40) is closed, by the insulator contact plate 528 arranged on the continually rotating shaft 22 (Figs. 18 and 40), and the contact springs 529 and 530. The circuit now closed takes therefore the path 531, C32, 518, 520, 523, punch magnet 363, C28, C31, 508, 509, 532. This circuit cannot be closed in the short contact connections 520, 521, and 520, 522, effected during the swinging movement of the part 514, since the final closure of the circuit is only effected after the closing of the contact C32, which, according to what has been said previously, is only caused when the segment lever 514 has completed the swinging movement arising in the punching of a number. The magnet coil 363 therefore obtains current, whereby the core 359 (Figs. 16 and 30) with the part 368 is attracted to the part 353 (Figs. 16, 18, 20 and 30). The coil core 359 thereby acts on the shoulder 384 of the punching pin 376 and displaces this against the action of the spring 380 and in the opposite direction to the arrow 533 (Fig. 18) whereby it is pushed through the card 489. A hole 497 (Fig. 37) for the number "3" has therefore been formed in the card 489. The punched-out portions arising from this operation pass through the hole 424, into the receptacle 419, and thus cannot fall into the machine so as to interfere with the mechanism.

The contact plate 528 arranged on the continually rotating shaft 22 has only closed for a short time the contact C32, in order to open it again immediately. The coil core 359 and the punching pin 376 following the strained spring 380 are thereby immediately returned into their initial position so that the punching pin 376 is moved again out of the card 489, when the carriage step follows after typing the number "3", in the column VI of the card 489, cleared from the cross footer CT. The paper carriage 140 with the card 489 is thereby moved for a step to the left, whereby the card 489 is moved in the slot 323 of the perforator carriage 319, 320 (Figs. 16 and 27) which according to what has been said above, is held fast in its position according to Fig. 33. Now the second number "0" of the value "30750,00" is cleared from the cross footer CT, and registered in the totalizer T8. In this operation the contact pins 520 corresponding to the number "0" co-act with the contact springs 521 and 520, and after the contact C32 is closed in the manner hereinbefore described, the following circuit is closed: 531, C32, 518, 520, 521, 522, punching magnets 361 and 362, C28, C31, 508, 509, and 532. The magnet coils 361 and 362 thereby obtain current, whereby the cores 357 and 358 (Fig. 30) are attracted against the action of the springs 378 and 379 in the manner hereinbefore de-

scribed, so that the card obtains a further punching 498 (Fig. 37), which consists of two perforations and corresponds to the number "0". After, as above described, the punching pins 374 and 375 are moved under the action of their springs out of the card 489 again, and the number "0" is typed in the column VI of the card 489, a further carriage step takes place, which brings the card 489 further to the left. The number "7" of the value "30750,00" in the cross footer CT is brought to zero. In the swinging out of the segment lever 514 which thereby takes place, the contact pins 520 corresponding to the number "7" make connection with the contact springs 521 and 524, so that after the contact C32 is closed the current takes the following path: 531, C32, 518, 520, 521, 524, magnet coils 361 and 364, C28, C31, 508, 509 and 522. The cores 537 and 360 (Figs. 17 and 30) of the magnet coils 361 and 364 obtaining the current are swung out, whereby the punching pins 374 and 377 are moved in the opposite direction to the arrow 535 against the action of the swings 378 and 381, and pushed through the card 489.

A further punching 499 (Fig. 37) consisting of two holes corresponding to the number "7" is thereby made in the card 489. This number "7" is now typed in the column VI on the card 489 after the contact C32 has previously been re-opened and the punching pins 374 and 377 returned into the initial position under the action of the springs 378 and 381, that is, they are moved out of the card 489. The carriage 140 with the card 489 thereby obtains a further movement to the left of one step. Now the number "5" of the value "30750,00" is cleared from the cross footer CT, whereby the segment lever 514 performs a swinging movement corresponding to this number, and thereby connects the contact pins 520, associated with the number "5", with the contact pins 521 and 623. As soon as the contact C32 is closed, the current takes the path 531, C32, 518, 521, 523, magnet coils 361 and 363, C28, C31, 508, 509, 523. The magnet coils 361 and 363 thereby obtain current, whereby their cores 357 and 359 are attracted and thereby act on the punching pins 374 and 376 so that these are pushed through the card 499 against the action of their springs 378 and 380. The card 489 thereby obtains a new punching 500 (Fig. 37) which consists again of two holes. On the typing of the punched number "5" the carriage with the card 409 is again shifted further through one step after the contact C32 has been previously re-opened, and the punching pins 374 and 376 following the strained springs 378 and 380 are returned into their initial position. Now the next number "0" of the value of "30750,00" is cleared out of the cross footer CT in which operation the same mechanisms are actuated as in the clearing of the foregoing "0" of the value "30750,00". The card 489 thereby obtains a further punching 501 (Fig. 37) which corresponds exactly to the perforation 498 only that it is punched on the card 489 in a position displaced by the corresponding number of carriage steps. The carriage 140, after the "0" is typed in the column VI of the card 489, is located with the comma position of the value "30750,00" of the column VI of the card 489 in the typing position. This position is skipped by the comma-skipping mechanism described in the section "comma-skipping device." No punching is effected in this case on the card 489; it is only shifted for a step further to the left, that is effected by the comma-skipping mechanism hereinbefore described. After this, the two "0's" after the comma are

cleared from the cross footer CT, whereby the same mechanisms are actuated as in the case of the zeros already cleared from the cross footer CT. The paper carriage 140 is thereby moved two steps further to the left, while the two zeros after the comma of the value "30750,00" are typed in the column VI of the card 489 and the card obtains two further punches 502 and 503. The punchings 502 and 507 corresponding exactly to the punchings 498 and 501, only that these are punched in the card 489 at corresponding step distance to one another. As soon as the last number of the value "30750,00" is cleared from the cross footer CT, the TC-key 1 is automatically released in the manner described under the title "Total-taking", whereby the switches 508 and 509 are automatically opened again. The opening of the switches 508, 509 after completion of the total taking is necessary, since in the rest position of the segment lever 514 the contact pins 520 corresponding to the number "0" are constantly in connection with the corresponding contact springs 521 and 522. In the event of the switches 508, 509 remaining closed after total-taking has been completed, the punching pins 374 and 375 would be continually operated, since the contact C32 is constantly opened and closed alternately by the continuously rotating shaft 22. It would be possible therefore a punching to be punched on the card 489 corresponding to the number "0" that does not correspond to the value "30750,00" cleared by total-taking from the cross footer CT, so that therefore in the testing described under the title "Sensing device" of the punched value, errors would arise. Since, as hereinbefore described, the perforator carriage 319 and 320 was locked on the arrival of the paper carriage 140 with the column VI of the card 489 in typing position or at the beginning of the total-taking, the spring 350 (Fig. 27) has been tensioned in the carriage movement to the left, during the total-taking, whereby the card 489 following the movement of the paper carriage 140 has moved freely to the left in the slot 323 of the perforator carriage 319, 320. The carriage 140 is now brought by hand into the extreme right-hand position. In this movement to the right the perforator carriage 319, 320 follows first the tensioned spring 350, and returns into its initial position which forms its rest position, whereby the card 489 inserted in the paper carriage 140 travels to the right in the slot 323 of the perforator, and takes up the position illustrated in Figs. 16 and 33. In the further movement to the right the stop pawl 474 moves away from the stop nose 504 and ratchets thereby over the stops F30, F22 and F31 (Fig. 11). Shortly before the termination of the carriage movement to the right the perforator carriage 319, 320 is prevented from moving further to the right by its stop angle 471 (Fig. 28) striking on the stop 477 fixed to the machine frame 302, whilst the paper carriage travels further for one or more carriage steps (a distance  $t$  (Figs. 28 and 31), up to its extreme right-hand position. The spring 349 is thereby tensioned, while the card 489 travels to the right freely for the amount  $t$  in the slot 323 of the perforator carriage 319, 320. The perforator carriage 319, 320 and the paper carriage 140 together with the card 489 thereby take up the position shown in Fig. 28, in which the contact C30 is in connection with the contact rail C31. In this position the card 489 is located with the extreme left-hand hole of the punchings 497 to 503 (Fig. 37) at the distance  $t$  (Figs. 32 and 37) to the right of the

punching pins 374. Now, if in this position the switches 588 and 534 (Fig. 40) are actuated, the switch 508 of course independently by the lever 3, the following circuit is closed: 532, 508, C31, C38, magnet coils 361 and 428 (Fig. 30). The magnet coils 361 and 428 thereby obtain current, whereby their cores 357 and 329 are attracted to the supporting members 353 and 425, and are swung round the bearing positions 365 and 430. They thereby act with their ends 370 (Fig. 20) and 431 (Fig. 21) on the punching pins 374 and 432 (Figs. 16, 20 and 21) and push these through the card 489 against the action of their springs 378 and 434, whereby a further punching 535 (Fig. 7) is thereby effected, which consists of one hole each on the two sides of the card at the edges thereof. This punching 535 (Figs. 32 and 37) which is provided at the same height as the value holes 407 to 503, correspond in regard to the distance of their two holes, to the distance of the sensing pins 448, 455 (Fig. 16) which as hereinafter described serve for the taking up of the card. By locking the perforator carriage before the paper carriage 140 arrives in its extreme right-hand position, according to the foregoing, the result is also obtained, that for the punching of the left-hand hole of the edge punching 535, the punching pin 374 with its associated parts already used for the value holes, can be applied.

After the circuit is re-opened by the actuation of the switches 508 and 534 (Fig. 40) and the perforating punches 374 (Fig. 20) and 432 (Fig. 21) with the parts associated with them are returned under the action of the strained springs 378 and 434 and withdrawn from the card 489, the card 489 is taken out of the machine. This is effected as in the introduction of the card 489, by corresponding rotation of the platen 152 and by way of the parts 482, 483, 486, 485, (Fig. 20) by the forwarding rollers 480 and 481. After the removal of the card 489 the same is laid aside for the purpose of effecting the next entry.

#### *Sensing mechanism*

The shaft 22 (Figs. 18 and 24), is extended to the left, and at the left-hand side is mounted in bearings in the supporting frame 536 of the machine frame 302. On the shaft 22 (Figs. 1, 18 and 24) is fixed a toothed wheel 537 by means of its boss 538, and a pin 529. The toothed wheel 537 is in engagement with a toothed wheel 540, which by means of its boss 541 and a pin 542, is fixed on a shaft 30. On the shaft 30 which constantly rotates, a cam 543 is loosely mounted by means of its boss 544, and is capable of acting on a lever 545. The lever 545 together with two further levers 546 and 547, held at the necessary distance in relation to each other by a distance ring 548 (Fig. 16) are pivotally mounted on a headed screw 550 screwed into a fixing angle 549 (Fig. 16). The fixing angle 549 is screwed by means of screws 551 to the inner side of the supporting frame 536. The lever 545 (Figs. 18 and 24) is capable of acting with its bent portion 552 on an arm 553 of a lever 554 which is pivotally mounted on a screw 556 screwed into a part 555. The part 555 is screwed by means of screws 557 (Fig. 24) to the left-hand space key lever 558, while its bent portion 559 is fixed to the space key 310, by means of a spring 562 which, on the one hand, is attached to the arm 553 of the lever 554, and on the other hand, to a spring connecting pin 561 fixed in the part 555, the lever 554 is constantly acted on in the clock-wise direction around its supporting screw 556, whereby its pin 564 riveted

to its lower arm contacts with an arm 565 of the lever 546 already described, and thereby limits the swinging movement of the lever 554. The lever 546 is articulately jointed at its end 566 to a connecting rod 568 by means of a rivet 567, the connecting rod being combined with a core 569 of a magnet coil 570 to form a single unit. By means of a pin 572 riveted into its eye 571 the lever 546 is capable of acting on the lever 547. At its lower end 573 the lever 547 is articulately jointed by means of a rivet 574 to a connecting rod 575, which is combined with a core 576 of a magnet coil 577 to form a single unit. By means of a spring 580 which is connected, on the one hand, to a pin 579, fixed to the connecting rod 575, and, on the other hand, to a pin 579, the lever 547 is brought with its locking nose 581, into the locking position in relation to the nose 582 (Figs. 18 and 24) of a locking pawl 583, whereby the pawl is held in its rest position. The pawl 583 (Figs. 24 and 25) is pivotally mounted on a headed rivet 585, riveted into a disc-cam 584. The disc-cam 584 is fixed to the boss 544 of the cam 543 already described and along with this is loosely rotatable on the shaft 30. A spring 587 connected, on the one hand, to the locking pawl 583 and, on the other hand, to a pin 586 (Fig. 24) riveted into the disc-cam 584, is capable of holding the locking pawl 583 with its nose 582 in the locking position in relation to the nose 561 of the lever 547, or to bring the nose 588 of the disc-cam 584 into driving connection with a cam 589 (Figs. 24 and 25) fixed on the shaft 30. The disc-cam 584, the boss 544 and the cam 543 form, as is evident from Fig. 25, a unit which is held against axial displacement by the cam 569 and the boss 541 of the toothed wheel 540. When the disc-cam 584 is driven its curved projecting surface 590 acts on an arm 591 of a lever 592. The lever 592 (Figs. 16, 18 and 24) is pivotally mounted on a headed screw 593, screwed into a fixing angle 594 (Fig. 16) which on its part is fixed by means of screws 595 to the inner side of its supporting frame 536. The lever 592 is capable of acting with its arm 596 (Fig. 24) on a contact spring 597, and at the contacting position of both these parts, an insulator member 598 is fixed on the contact spring 597. In conjunction with insulator members 608 and 601 (Figs. 18 and 24) contact springs 597 and 599 are fixed by means of a screw 602 (Fig. 16) to a connecting bridge 603 of the supporting frame 536, whereby a contact F24 (Fig. 24) is formed. The magnet coils 570 and 577 are fixed to a part 605 (Figs. 16 and 18) which is screwed to the connecting bridge 603 of the supporting frame 536 by means of screws 606.

To the front side of the supporting frame 536 is screwed an angle bar 607 (Figs. 16 and 18) by means of screws 608, on which angle bar ten magnet coils 609 to 618 (Fig. 40) are fixed. The cores 619 to 629 of the coils 609 to 618 are articulately jointed by means of pins 629 to 638 (Fig. 18) to the calculating key levers 639 to 648 of the calculating keys. 198.

In the supporting frame 536 (Fig. 18) of the machine frame two angle members 649 are rigidly mounted by means of screws 658, one on the left-hand and one on the right-hand inner side (in Fig. 18 only the right-hand member is visible). On these two angle members a bar 651 formed of insulating material is rigidly mounted by means of screws, not illustrated. The bar 652 formed of insulating material is likewise fastened by means of screws, not illustrated, to angle pieces rigidly mounted 654, one on the left-hand and

one on the right side of the supporting frame 536 by means of screws 653. A bar 655 is fixed, on the one hand, to the bent-off part 656 of the right-hand side wall of the supporting frame 536 of the machine and, on the other hand, to the bent-off part, not illustrated, of the left-hand side wall of the supporting frame 536 of the machine. To this bar 655, further, an angle piece 662 is fixed by means of screws 647 for each magnet coil 656, 659, 660, 661, on which angle piece the magnet coils 658, 659, 660, 661 are rigidly mounted.

A number of contacts, for example, C1 to C27 (Fig. 40) some of which are opened and some closed, and are switched over by means of the magnet coils 658, 659, 660, 661 for a purpose to be hereinafter described, are distributed in four groups for this purpose. The first group consists of the contacts C1 to C7, and is switched over by the coil 658. The second group is formed by the contact C8 to C13, which are switched over by the coil 659. The contact C14 to C20 form the third group and are switched over by the coil 660. The fourth group consists of the contacts C21 to C27, which are switched over by the coil 661. In Figs. 22 and 23 the magnet 658 is illustrated with its contact group.

The part 663 (Figs. 22 and 23) of the U-shaped magnet core 664 projects through the magnet coil 658. On the free end of the part 663 of the magnet core 664 an armature part 665 is arranged in a corresponding slot, so as to be pivotable by means of a pin 666 which is fixed in the part 663. On both sides of the armature part 665, fixing angles 667 and 668 are riveted by means of rivets 668, to the bends 670 and 671 of which angles a trapezium-shaped bar 672 of insulating material is fixed by means of rivets 673 and 674. On both sides of the bar 651 formed of insulating material, spring plates 675 to 682 are fixed by means of rivets 683 to 686, and with their rests 667 to 694 form the contacts C2, C3, C4 and C7 (Fig. 40). On a further insulator bar 652 spring plates 685 to 700 are fixed at both sides by means of rivets 701 to 703, and with their rests 704 to 709 form the contacts C1, C5 and C6 (Fig. 40). A spring 711 which, on the one hand, is connected to a spring connecting pin 710, and, on the other hand, to a corresponding hole of the fixing angle 668, swings the armature part 665 and therewith the fixing angles 667 and 668 and the bar 672 constantly in the clock-wise direction round the bearing pin 688, the swinging movement being limited by striking of the armature part on a stop pin 712, and the rest position of the moved parts is thereby attained. In this position the bar 672 is clamped between the contact parts 704 to 709, so that the contacts C1, C5 and C6 are opened, whilst the contacts C2, C3, C4 and C7 are not acted upon by the bar 672 and for this reason are closed.

The magnet coils 659, 660 and 661 (Fig. 40) and the contacts C8 to C27 are arranged in the same manner as the magnet coil 658 and the contacts C1 to C7 respectively for which reason these are not illustrated separately, and in the description will not be described in greater detail.

A further contact C22 is formed by means of a contact plate 528 (Figs. 16 and 40) which is arranged on a ring 713 of insulating material pressed on to the shaft 22 and which co-acts with two contact springs 529 and 530 clamped between two insulator plates 714 and 715 and screwed together with them by means of screws 718 to the bridge 603 of the bearing frame 536.

The individual electrical control elements hereinafter described are supplied from an electrical source of current 432 to 531 (Fig. 40) in the necessary manner and sequence for the working operations of the present mechanism over the network of wires represented diagrammatically in Fig. 40, after the circuits have been closed by way of switches 506 and 534.

#### Method of operation of the sensing mechanism

Before the card 489 is introduced anew for the registration of the next entry into the perforator carriage 319, 320, the perforator carriage must first be brought back into its initial position which forms the rest position. To this end the paper carriage, for example by operation of a corresponding tabulator key is first of all moved again to the left through at least a distance corresponding to the distance  $t$  (Figs. 28, 32 and 37) to the left. The striker angle 471 is thereby removed from the stop 477 (Fig. 28) so that the perforator carriage 319, 320 following the strained spring 439, takes up the initial position. This carriage movement to the left is more advantageously effected before the removal of the card after the completion of a booking operation, since this ensures that the perforator carriage 319, 320, on the introduction of the card 489 for a further booking operation, is located in the correct position. The card 489 is then introduced again for the next booking into the slot 323 of the perforator carriage 319, 320, whereby it falls with its lower edge between the forwarding rollers 460 and 481. Now the actuating lever 664 (Figs. 16 and 19) is swung out in the arrow direction 718, for the release of the paper feeding rollers 490 and 481, whereby the connecting member 466 is moved and with it the parts 463, 457, 444, 451, 445 and 448 by way of the pin 470. The sensing pins 455 and 448 are first displaced in the arrow direction 719 (Figs. 19 and 21) until they are pressed against the inserted card 89, whilst the lever 460 is swung out still further against the action of the spring 483, so that the latter is tensioned. By rotating the platen 152 by hand by the rotatable knob 487, the card 489 is gripped by the forwarding rollers 460 and 481 and drawn into the machine in the arrow direction 493 (Figs. 18 and 20), whereby its lower part is led by an additional paper guide plate, not illustrated, into the paper guide plate 494 proper (Figs. 18 and 20), and guided by this, is laid on the platen 152. The forwarding movement of the card 489 in the arrow direction 493 is limited as soon as the holes 535 (Figs. 32 and 37) of the card move into the range of the sensing pins 448 and 455, so that the latter are moved in the arrow direction 719 through the holes 535 of the card 489 into the extensions in the perforator carriage part 319 of the corresponding holes in the perforating carriage part 320, by way of the parts 445, 451, 444 and 457 following the tensioned spring 463. In this position the card 489 along with the forwarding rollers 480 and 481 are stopped, the friction drive provided preventing the card holes being torn out when the platen 152 is moved still further after the card 489 has already been stopped by the sensing pins 448 and 455. After the card 489 is stopped by the pins 448 and 455 in the typing position, the paper feeding means are again brought into operation by actuation of the lever 464 in the opposite direction of the arrow 718 (Fig. 19). The sensing pins 448 and 455 are moved back into their initial position (Fig. 19) by way of the parts 466, 470, 460, 483, 457,

444, 455 and 451, whereby they are disengaged again from the edge punching 535 of the card 489.

Since the sensing pins 448 and 455 lie at the same height as the testing pins 388 to 392 and the holes 535 co-acting with the sensing pins, lie at the height of the holes 497 to 503, so the holes 487 to 503 lie at the level of the testing pins 389 to 392. Since however, on the other hand, the sensing pins 448 and 455 and the testing pins 389 to 392 lie in a position higher by the distance of one line than the punching pins 374 to 377, so the card 489 is to be pushed less deeply in the arrow direction 493 (Fig. 18) by the distance 721 of a line (Fig. 32), so that now the line indicated with 72 (Fig. 32) lies at the typing height.

To commence with, the account number, date, and text of the entry is again typed by means of the typing keys 209. The paper carriage 140 is then brought with the column I of the card 489 into the typing position by operation of the corresponding tabulator key 185. The value 750,00 is first typed by means of the calculating keys 198 in the column I of the card 489 as a debit value, and simultaneously registered in the corresponding totalizer T1. This value is transmitted into the cross footer plate 80 of the totalizer T1, in this case, therefore, subtractively. Now, in the column IV the old balance "30750,00" is automatically registered by sensing the holes 497 to 503; this is effected as follows:

By further tabulating operations the paper carriage is moved into the highest denomination of the column IV. The paper carriage 140 now takes up the position according to Fig. 35, in which the contact C29 has come into contact with the fixed contact C31. In this position the pawl 474 of the perforator carriage 319 to 320 is brought into engagement with the projection 722 of the stop 478, whereby the perforator carriage 319, 320 is held stationary, so that the paper carriage 140 together with the totalizers T1 to T8 and the account sheet 489 alone is moved further to the left. The value "30750,00" as described in the following is now sensed denomination by denomination automatically, and therefore registered additively in the corresponding totalizer T4 and in the cross footer CT, and typed in the column IV as old balance. The sensing of the value "30750,00" is effected similarly to the punching by means of four testing pins 389 to 392, which come into operation for this purpose singly or by two's according to the key in Fig. 39. In order that the magnet coils 809 to 818 operating the calculating keys 198 for the numbers "0" to "9" can all be actuated and in the correct sequence by the four testing pins 389 to 392, the latter influence first four magnet coils associated with them likewise in the determined assembly singly or by twos, which on their part act again in like manner on the contacts C1 to C27, subdivided into four groups. By the switching over operation effected thereby which opens one part of the contacts, while it closes another part the result is attained that in the sensing of the numbers "0" to "9" at the time being, only a single coil of the magnet coils 609 to 610 corresponding to the value hole is actuated. After, therefore, the paper carriage 140 is located with the column IV of the card 489 in the typing position, the card 488 lies with the value punching 487 (Fig. 48) corresponding to the first number "3" of the value "30750,00" (Fig. 38) opposite to the testing pin 391. Accordingly the latter moves through the hole and consequently contacts with the conducting bar

388 (Fig. 20). Now if the switch 508 is closed the sensing operation sets in automatically. The current now passes from 532 by way of 508, C31, C29, 388, 391, 405, magnet coils 880 and 577 to 531 (Fig. 40). The magnet coils 860 and 577 thereby obtain current. The magnet coil 880 thereby acts in the manner hereinafter described for the magnet coil 858 the switching over of the contact group C14 to C20 (Fig. 40) associated with it. The contacts C14, C15, C17 and C18, which are closed in the rest position, are thereby opened, and the opened contacts C18, C19 and C20 are closed. The circuit now takes the following path: 532, 508, C29, 723, C21, C16, closed through the magnet coil 880, C10, C3, magnet coil 611, to the contact 724. By the excitation of the magnet coil 577 in the sensing operation, the rod 575 (Fig. 24) is acted upon in arrow direction 725 and against the action of the spring 580, whereby the lever 547 is swung out in an anti-clockwise direction around its supporting position, and its nose 581 is withdrawn from the nose 582 of the coupling pawl 583. The coupling pawl 583 following the tensioned spring 587 is acted upon in the anti-clockwise direction around its supporting rivet 585 (Figs. 24 and 25) fixed in the disc-cam 584, and is thereby brought into driving connection with the cam 589 of the constantly rotating shaft 30. The disc-cam 584 now participates in the rotational movement of the shaft 30 in the anti-clockwise direction and acts after a part, for example, a third of the revolution on the lever 592. The latter is thereby swung in the anti-clockwise direction around its support, whereby it acts on the spring 597 and thereby closes the contact 724. The running time which hereby occurs enables the starting magnet 880 to come completely to rest, so that no false contacts arise. The contact 724 now closes the circuit finally, so that the magnet coil 611 obtains current by way of 531. The core 821 of the coil 611 is thereby attracted and consequently the calculating key lever 641 corresponding to the calculating key 198 of the "3" is drawn down.

The number "3" of the value "30750,00", is thereby registered in the corresponding totalizer T4, and is transmitted additively into the cross footer CT corresponding to the setting of its pre-setting plate 50, while it is simultaneously typed in the column IV of the card 489.

In the carriage movement to the left for one step which thereby results and in which according to the foregoing the perforator carriage does not participate, the card 489 in the slot 323 of the perforator carriage 319, 320 is moved freely to the left. The connection of the contact pin 391 with the bus bar 380 is thereby interrupted by the interposition of the card 489, and the magnet coils 660 and 577 are again without current. Accordingly, the contacts C14 to C20 are brought again into their initial position, whereby the contact C16 is opened again, and the magnet coil 611 is thereby again without current. The calculating key lever 641 returns into its rest position following its spring, not illustrated, whereby the calculating and typewriting operations are completed. The magnet coil 577 (Figs. 24 and 40) is thereby also without current, whereby the rod 575 under the action of the spring 580 is moved back in the opposite direction to the arrow 725 (Fig. 24) into the initial position. The lever 547 thereby moves so that its nose 581 is again within the range of the nose 582 of the coupling pawl 583. At the end of the introduced rotation of the shaft 30, the coupling 583, 589 is thereby released, so that

the lever 592 is no longer operative. All the foregoing mechanisms which were actuated have therefore returned into the rest position again.

After the termination of the carriage step which is effected at this point, the card 489 is positioned with the value punching 489 (Fig. 38) corresponding to the next number "0", of the number "30750.00", opposite to the testing pins 389, 390, so that the latter move into contact with the bus bar 380 through the punching. The following circuit is thereby closed: 532 (Fig. 40) 508, C31, C29, 388, 390, 404 and 388, 389, 403, magnet coils 659 and 658 and 577, 531. The magnet coils 658, 659 and 577 effect in the manner hereinafter described the switching-over of the contact groups C1 to C7 and C8 to C13. By means of the current which flows through the coil 658 (Figs. 22 and 23) the part 664 becomes magnetic and attracts the armature part 665 so that the latter with the parts 667, 668 and 672 are swung against the action of the spring 711, round the supporting pin 666 in the anti-clockwise direction. The trapezium-shaped insulator bar 672 thereby frees the contact members 704 to 709, so that the contacts C, C5 and C6 are closed by the action of the springs 695 to 700. The bar 672 is thereby moved between the contact pieces 687 to 694 against the action of the springs 675 to 682 and thereby opens the contacts C2, C3, C4 and C7. In the manner just described, the contacts C8 to C13 are also switched-over by means of the magnet coil 659 (Fig. 40) whereby the contacts C8, C10, C11 and C13 are opened, and the contacts C9 and C12 closed. Also, the switching-over of the contacts C14 to C20 hereinbefore described, by means of the magnet coil 660, and the switching-over of the contacts 621 to 627 by means of the magnet coil 661 results exactly in the manner hereinbefore described for the coil 658 and the contacts C1 to C7, for which reason it has only been described for this group and illustrated. The circuit takes after the following path, switching-over the contacts C1 to C13 by the magnet coils 658 and 659: 532, (Fig. 40) 508, C31, C29, 723, C21, C14, C9, closed by the magnet coil C6, closed by the magnet coil 658, magnet coil 618 up to contact F24. Since, as above mentioned, the magnet coil 577 is excited again in this case, the contact 724 has again been closed in the manner already described. With this the circuit is again definitely closed, and the magnet coil 618 obtains current by way of 531. The core 628 of the magnet coil 618 is thereby attracted, and draws down the calculating key lever 648 corresponding to the calculating key 196 of the number "0". Since in the actuation of the calculating key for the number "0" no calculating operation results, the number "0" is only printed in the column IV of the card 489. The paper carriage 140 with the card 489 thereby obtains a further movement of one step to the left. Since the card 489 is thereby moved again between the testing pins 389 and 390, and the bus bar 380, these contacts are opened and the magnet coils 658 and 659 as well as 577 are without current. Accordingly, the armature part 665 of the magnet coil 658 (Figs. 22 and 23) and the parts 667, 668, and 672 are brought back, under the action of the spring 711, into their initial position which is determined by the parts 665, 667 and 668 striking on the stop pin 712. The contacts C1 to C7 have thereby taken up again their initial position (Figs. 22 and 23) while being influenced by the springs 675 (Fig. 23) to 682 and against the action of the springs

685 to 700. In the same manner the contacts C8 to C13 have also been returned to their rest position. Since the contacts C8 and C9 were thereby opened again, the magnet coil 618 has been de-energized, so that the calculating key lever 648 returns into its initial position under the action of its spring. Since the magnet coil 577 also is again without current, the contact 724 remains also open in the manner already described. All the operative mechanisms in the sensing operation have therefore again returned into the initial position.

Now, after the next effected carriage step has ended the card 489 stands with the punching 499 (Fig. 38) corresponding to the next number "7" of the value "30750.00" opposite to the testing pins 389 and 392, so that these are connected through the punching with the bus bar 380. The circuit 538 (Fig. 40) 508, C31, C29, 380, 392, 408 and 388, 389, 403, magnet coils 661, and 658 and 577, 531, is thereby formed, whereby the magnet coils 658, 661, as well as 577 are excited. The magnet coil 658 effects in the manner hereinbefore described the changing-over of the contact group C1 to C7, whereby the contacts C5 and C6 are closed and the contacts C2, C3, C4 and C7 are opened, while the magnet coil 661 changes-over the contact group C21 to C27, whereby the contacts C23, C24, C25 and C27 are closed, and the contacts, C21, C22 and C28 are opened. The circuit now takes the following path: 532 (Fig. 40), 508, C31, C29, 723, C1 (closed by the magnet coil 658) C8, C15, C25 (closed by the magnet coil 661) magnet coil 615, up to the contact 724. Now, since the contact 724 was also closed in the manner above described by the disc-cam 584 controlled by the magnet coil 577 the circuit is closed, so that the magnet coil 615 obtains current by way of 531. The core 625 (Fig. 40) of the magnet coil 615 is thereby attracted and with the latter the key lever 645 corresponding to the calculating key "7" is drawn down. In the calculating process which thereby follows, the number "7" of the value "30750.00" is registered in the totalizer T4, and, in consequence of the setting of the pre-setting plate 80 at addition, is also transmitted additively to the cross footer CT. After the simultaneous printing of the number "7" in the column IV of the card 489 is effected, a further carriage step to the left takes place. The connection of the parts 388, 389 and 388 and 392 are thereby released, whereby the mechanisms actuated in the sensing operation previously carried out come to the rest again in the manner already described.

On the completion of the carriage step which has been released, the paper carriage stands with the punching 500 (Fig. 38) of the card 489, corresponding to the next number "5" of the value "30750.00" opposite to the testing pins 389 and 391. The testing pins 389 and 391 thereby obtain connection through the punching 508, with the bus bar 388, and thereby close the following circuit: 532, (Fig. 40), 508, C31, C29, 388, 391, 405, and 388, 389, 403, magnet coils 660 and 658, and 577, 531, whereby the coils 658 and 660 as well as 577 obtain current. The magnet coil 658 thereby switches over the contact group C1 to C7 and closes the contacts C1, C5 and C6 and opens the contacts C2, C3, C4 and C7, whilst the magnet coil 660 switches over the contact group C14 to C20, whereby the contacts C16, C19 and C20 are closed. The circuit now takes the following path: 532, (Fig. 40) 508, C31, C29, 723, C21, C12 (closed by magnet coil 680) C10, C5,

(closed by magnet coil 658), magnet coil 613 up to contact 724. After the contact 724 is closed by the disc-cam 584 controlled by the magnet coil 577, the circuit is closed and the magnet coil 613 obtains current from 531. The core 823 of the magnet coil 613 is thereby attracted and therewith the calculating key lever 843 corresponding to the calculating key of the number "5" is drawn down. By the calculating operation thereby released the number "5" of the value "30750,00" is registered in known manner in the totalizer T4, and transmitted to the cross footer CT, whilst it is simultaneously typed in the column IV of the card 489. After the typing of the number "5" has taken place, the paper carriage 140 obtains a further movement of one step to the left, whilst the connection of the contact parts 388, 391 and 388, 389, is released, and the mechanism actuated in the previously effected sensing operation return into their initial positions in the manner already described.

After the carriage step has been completed, the carriage is located with the punching 501 (Fig. 38) of the card 489 corresponding to the next number "0" of the value "30750,00" opposite to the testing pins 389 and 390. The sensing operation hereby effected is exactly the same as was released with the first number "0" of the value "30750,00" for which reason it will not be further described here. On completion of the carriage step which was effected at this point, the paper carriage 140 with the card 489 stands with the comma place of the value "30750,00" in the calculating position. Since the card 489 does not show any value punching in this position and consequently no contact-giving connection of the testing pins 389 to 392 is produced, no sensing and calculating operations can result in this case. In order to bring the paper carriage 140 into the position for the next sensing operation in which the next lower denomination of the value "30750,00" is in the calculating position, the space key is actuated as follows:

Through the circuit 532 (Fig. 40) 508, C31, C20, 723, C21, C14, C13, C7, 570, 531 (Fig. 40) closed in this position of the paper carriage 140, the magnet coil 570 (Fig. 24) obtains current, so that its coil core 569 is attracted and the rod 588 (Fig. 24) is moved in the arrow direction 725. The articulately jointed lever 546 is thereby swung in an anti-clockwise direction round its support, whereby its arm 585 acts on the pin 564 and swings the lever 550 in the anti-clockwise direction round its supporting screw 556 and against the action of the spring 562. The lever 554 in this position lies under the bend 552 (Fig. 24) of the lever 545. Further, the pin 572 of the lever 546 acts in this swinging movement on the lever 547, and swings the latter likewise in the anti-clockwise direction round its support, whereby the articulately jointed rod 575 is moved along with it in the arrow direction 725, against the action of the spring 580, without, however, influencing thereby any further part. In the swinging of the lever 547, its nose 581 is withdrawn from the nose 582 of the coupling pawl 583, so that the latter following the tensioned spring 587, swings round its support and moves into driving connection with the cam 588 of the shaft 30. The disc-cam 584 participates in the succeeding revolution of the shaft 30 by way of the coupling 583, 589, whereby it swings out the lever 592 on a part, for example, a third of this revolution, and closes the contact 724. This influence, however, no further mechanisms as no

further circuit is thereby closed. On the rotation of the disc-cam 584 however, the disc-cam 543, which is rigidly connected with it, is rotated along with it. The cam 543 in the first half of its revolution acts on the lever 845 and swings it in a clockwise direction round its supporting screw 542. The lever 545 thereby presses by means of its bend 562 on the lever 564, which as above described, was brought into the working position in relation to the bend 552 of the lever 545. The space key 310 is thereby drawn down by way of the part 555 and the space key lever 558, so that the paper carriage 140 is released for a further movement of one step towards the left. During the drawing down of the space key 310, the pin 164 slides along on the arm 565 of the lever 548, and thereby holds the lever 554 in the operative position in relation to the lever 545. The skipping of the comma space can also take place in the manner described under the heading "comma skipping device."

After the termination of the carriage step which occurred in moving from the comma position into the next lower denomination, the carriage 140 stands with the punching 502 (Fig. 38) of the card 489 corresponding to the following number "0" of the value "30750" opposite to the testing pins 389 and 390, whereby the same sensing operation is released as in the previous number "0" of the value "30750,00" for which reason they shall not be gone into in detail at this point. Since the contact group C1 to C7 and C8 to C13 is switched over, that is the contact C13 and C17 are opened the circuit 532 (Fig. 40) 508, C31, C29, 723, C21, C14, C13, C7, 570, 531 is first interrupted, and the magnet coil 570 is de-energized, so that the parts 554, 546, 566, can return into the initial position under the action of the spring 562, in which position the lever 554 is located out of the working position in relation to the lever 545. On the contrary, the parts 457, 575 cannot follow this spring 580, i. e., they cannot therefore return into the initial position; on the contrary, they are held in the swung-out position, since through further sensing operation effected, as hereinbefore described, the magnet coil 577 was excited. The coupling of the disc-cams 584 and 543 and of driving shaft 30 therefore, is not released, whereby the disc-cams 584 and 543 are rotated further. The disc-cam 543 thereby influences the lever 545 further, which, however, can no longer operate the space key 310, as the lever 554, according to the foregoing, is out of the working position in relation to it. By the rotation of the disc-cam 584 the contact 724 is operated for the purpose already described in the foregoing sensing operations.

Now after the number "0" has been printed, and the carriage has moved to the left for one step further, it is located with the punching 503, corresponding to the next number "0" of the value "30750,00" opposite to the testing pins 389 and 388, whereby the same sensing operation is effected again as in the sensing of the previous sensed numbers "0" of the value of "30750,00." After the last number "0" of the value "30750,00" has been typed in the corresponding column IV of the card 489 and the corresponding carriage movement to the left has taken place, the whole sensing process is ended according to which the whole number "30750,00" is registered in the corresponding totalizer T4, transmitted into the cross footer CT and simultaneously typed in the column IV of the card 489.

After the carriage step which took place on the

last sensing operation, the switch 508, 509 is opened by hand, and the locking pawl 474 is brought by hand out of the working position in relation to the nose 722 of the stop 476, whereby the perforator carriage following the strained spring 350 returns into its initial position. By operating the corresponding tabulator key 195 the paper carriage 140 is now brought with the column IV into the typing position in the manner described under the title "Tabulating device."

Now by operation of the TC key, the value "30000,00" calculated in the cross footer is cleared out of this again automatically denomination by denomination in the manner described under the title "Total-taking," and transmitted to the corresponding totalizer T6, whereby it is printed simultaneously in the corresponding column VI of the card 489. The value "30000,00" is thereby likewise automatically punched denomination by denomination on the card 489 in the manner already described for the value "30750,00," so that the punching 728 (Fig. 32) issues at the distance of a line 721 under the value punching "30750,00." Then after the completion of the total-taking the carriage is brought into its extreme right-hand position, in which the edge punching 729 (Fig. 32) lying at the same height as the value punching 728, is effected on the card 489 in the manner previously described for the edge perforation 535. The card 489 is taken out of the mechanism in the manner already described and laid aside.

Any further entries on the card 489 are effected in the same manner as the two entries previously described.

Now, if a value, for example "200,00," whose highest denomination does not reach to the highest in the present case, i. e., to the ten thousands denomination forming the capacity, the paper carriage 140, which begins the sensing and typing of a value in the highest place of the value capacity, must first skip from this to the highest denomination corresponding to the value to be sensed. This is obtained as follows by operation of the space key 310, and this must be twice actuated in the present case until the card 489 with the value punching corresponding to the number "2" of the value "200,00" stands opposite to the testing pin 390, after which the value punching proper can commence.

On the arrival of the carriage with the column IV of the card 489 as above described, the switch 508, 509, (Fig. 40) is operated, whereby the following circuit is closed: 532 (Fig. 40) 508, 509, C31, C29, 723, C21, C14, C13, C7, 570, 531. Since the magnet coil 570 thereby obtains current, the space key 310 is operated in the manner hereinbefore described, and the operation is repeated until the paper carriage 140 through the carriage steps which thereby result stands with the punching, not illustrated, of the card 489 corresponding to

the number "2" of the value "200,00" to be sensed opposite to the testing pin 390, corresponding to the number "2." In the sensing operation which is thereby effected in the manner already described for other number values, the contact C13 is opened by switching-over of the contact group C8 to C13, so that the above-mentioned circuit is interrupted and the magnet coil 570 is de-energised. The lever 554 is thereby brought out of the working position again in relation to the lever 545 by means of the spring 362, in the manner already described, so that in the further operation of the lever 545 the space-key 310 is no longer acted upon.

In the punched and sensed values, as above-described, which are entered in the columns IV and VI (Fig. 32) of the card 489, the matters dealt with relate to credit items, that is, positive values. In the punching and sensing of debit items, that is, negative values, which are entered in the columns III and V, the locking pawl 474 for the purpose of locking the perforator carriage 319, 320 during the punching and sensing co-acts with the stop noses 730 and 731 (Figs. 34 and 36) of the stop 476. For the remainder, the punching and sensing operation is effected in the same manner as in punching and sensing of credit entries. By means of the present mechanism, therefore, a value typed denomination by denomination on a booking card by total-taking is simultaneously and likewise automatically punched on the card denomination by denomination in order that on the succeeding registration of an entry on the card 489, the value punchings which thereby issue are likewise automatically sensed denomination by denomination and thereby typed as an old balance at a corresponding place on the card 489. For this purpose the card 489 as mentioned, must be set on the first entry line 496. For locating the card 489 on the correct line for successive entries, edge punchings are made in the card 489 at the end of each value punching effected and are located at the same height as them.

Although the locating of the card 489 is effected by means of edge perforations 535, 729 (Fig. 32) on both sides of the card, the same can also be obtained with the edge punchings on one side by accurate guiding of the card.

Although the present arrangement is described in conjunction with a type writing-calculating machine or the like with automatic total taking mechanism, obviously it can also be applied in type writing-calculating, machines or the like in which the total taking is effected by hand by actuating the corresponding calculating keys.

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